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YAZARLARA BİLGİ/YAZIM KURALLARI

Selçuk Tıp Dergisi (Selcuk Med J), Necmettin Erbakan Üniversitesi'nin bilimsel, bağımsız, hakemli, açık erişimli yayın organıdır. Tıp doktorları, araştırmacılar ve bilim adamlarından oluşan geniş bir kitleye hitap eden disiplinli bir dergidir. Temel amaç Tıp/Sağlık alanında, tanı ve tedavideki güncel gelişmelerin, cerrahi yenilikler ve bilim dünyasına katkıda bulunacak çalışmaların ulusal ve uluslararası literatürde paylaşımının sağlanmasıdır.

Selçuk Tıp Dergisi, tıp bilimine ve akademik çalışmalara katkısı olan, klinik ve deneysel çalışmaları, editöryal yazıları, klinik olgu bildirimlerini, teknik ve eğitici derlemeleri, orijinal görüntü raporlarını ve editöre mektupları yayınlar. Anket/mülakat çalışmaları; Editörün ilk değerlendirmesi sonucunda çok değerli bir katkı sunuyorsa değerlendirmeye alınabilir.

Dergi gönderim kurallarına ve dergi kapsamına uygun görülen, editöryal çalışmalar hariç tüm yazılar alanında uzman hakemlere bilimsel değerlendirme için gönderilir. En az iki hakem kararı aranır. Yayımlanan tüm makaleler çift taraflı kör akran değerlendirmesi sürecine tabidir. Uygunluğunu tartışılan çalışmalarda yardımcı editörler hakemlerin yorumlarını dikkate alarak kendi değerlendirmelerini eklerler. Gönderilen tüm yazılar için nihai karar Baş Editör'e aittir. Bütün makaleler için süreçlerin editör ve yayın kurulu tarafından en geç üç ay içerisinde sonuçlandırılması hedeflenir. Fakat elde olmayan gecikmelerden dolayı bu süre uzayabilir.

Yayın kurulu kararları ile belirlenen bazı konular hakkındaki yazılar, yayın kurulu üyelerinin tamamının incelemesine sunulur. İncelemeler sonucu oy çokluğuna ulaşan çalışmaların dergideki süreçleri devam edecektir. Yayın kurulu kararları dergi web sitesinde yayınlanmaktadır.

Yayına kabul edilen yazıların her türlü yayın hakkı yazarlara ve Selçuk Tıp Dergisine aittir. Selçuk Tıp Dergisi, ilave olarak websitesinde bulunan telif hakları bildirim belgesinin de yazarlar tarafından onaylanarak imzalanmasını ve ıslak imzalı formun sisteme eklenmesini talep etmektedir. Dergi her yıl mart, haziran, eylül ve aralık aylarında olmak üzere dört sayı olarak yayımlanmaktadır. Derginin yayın dili İngilizcedir.

Gönderilen yazıların daha önce herhangi bir yerde/dergide yayınlanmamış olması ve yayın için başka bir dergiye gönderilmemiş olması gerekmektedir [Bilimsel kongrelerde sunulan sözlü bildiri ve posterler (özet ya da tam metin olabilir) bildirilmek kaydı ile hariçtir]. Dergide yayımlanan yazıların her türlü sorumluluğu (etik, bilimsel, yasal vb.) yazarlara aittir. Dergide yayımlanan yazılarda ifade edilen ifadeler veya görüşler yazarların görüşleri olup, editörlerin, yayın kurulu ve yayıncının görüşlerini yansıtmaz; editörler, yayın kurulu ve yayıncı, bu tür materyaller için herhangi bir sorumluluk veya yükümlülük kabul etmemektedir. Yazım kurallarına uygun olarak hazırlanmamış olan yazıların incelenmeye alınıp alınmaması Editör ve Editöryal Kurulun insiyatifindedir.

Tüm çalışmalarda etik kurul onayı ve bu onamın belgelendirilmesi gerekmektedir. Tüm çalışmalarda yazarların çalışmaya katkı düzeyi ve onayı bildirilmelidir. Çalışmada veri toplanması, deney aşaması, yazım ve dil düzenlemesi dahil olmak üzere herhangi bir aşamasında finansal çıkar çatışması olmadığı bildirilmelidir. Çalışmada varsa ticari sponsorluk bildirilmelidir. Selçuk Tıp Dergisi'nde intihal programı (iThendicate) kullanılmaktadır. Akademik atıf sınırını aşan benzerlik taşıyan makaleler ve yayın kurallarına uygun olarak hazırlanmamış makaleler değerlendirmeye alınmayacaktır. Dergi intihal tarama raporunu yazardan talep edeceği gibi kendisi de tarama yapabilir.

Derginin yayın politikası ve süreçleri Uluslararası Medikal Dergisi Editörleri Komitesi (International Committee of Medical Journal Editors-I**CMJE),** Dünya Tıbbi Editörler Derneği (World Association of Medical Editors-**WAME),** Bilim Editörleri Konseyi (Council of Science Editors-**CSE),** Avrupa Birliği Derneği Bilim Editörleri (European Association of Science Editors-**EASE)** ve Yayın Etiği Komitesi (Committee on Publication Ethics-**COPE)** ve Ulusal Bilgi Standartları Örgütü (National Information Standards Organization-**NISO)** yönergelerini takip eder. Dergimiz 'Şeffaflık ve Akademik Yayıncılık En İyi Uygulamalar İlkelerine' (Principles of Transparency and Best Practice in Scholarly Publishing) **(doaj.org/bestpractice)** uygundur. Yayın Kurulu, dergimize gönderilen çalışmalar hakkındaki intihal, atıf manipülasyonu ve veri sahteciliği iddia ve şüpheleri karşısında **COPE** kurallarına uygun olarak hareket edecektir.

Derginin Yayın Kurulu, itiraz ve şikâyet vakalarını, COPE rehberleri kapsamında işleme almaktadır. Yazarlar, itiraz ve şikayetleri için doğrudan baş editör veya editör/yayın kurulu ile temasa geçebilirler. İhtiyaç duyulduğunda Yayın Kurulu'nun kendi içinde çözemediği konular için tarafsız bir temsilci atanacaktır. İtiraz ve şikayetler için karar verme süreçlerinde nihai kararı Baş Editör verecektir. Yayıncı ve editör gerektiğinde düzeltmeler, açıklamalar, geri çekilmeler ve özürler yayınlamaya her zaman hazırdır.

Selçuk Tıp Dergisi ile ilgili tüm yazışmalar, makale gönderme, makalenin takibi, danışman raporları, düzeltmelerin yapılıp yüklenmesi, kabul yazısı gönderimi ve diğer tüm makale ile ilgili formların yüklenmesi **https://www. selcukmedj.org s**ayfasından yapılacaktır. Bu site üzerinden yüklenecek makaleler için kurallar aşağıda belirtilmiştir.

Selçuk Tıp Dergisi, ücretsiz, açık erişim politikası benimsemektedir. Bu bağlamda dergide yayınlanan tüm yazılar https://www. selcukmedj.org adresinden erişime açık olup yazarlardan hiçbir ek ücret talep edilmeyecektir.

Yazarlık

Selçuk Tıp Dergisi'ne gönderilen çalışmalarda yazar olarak listelenen herkesin ICMJE (www.icmje.org) tarafından önerilen yazarlık koşullarını karşılaması gerekmektedir. ICMJE, yazarların aşağıdaki 4 koşulu karşılamasını önermektedir:

- Çalışmanın konseptine/tasarımına; ya da çalışma için verilerin toplanmasına, analiz edilmesine ve yorumlanmasına önemli katkı sağlamış olmak;
- Yazı taslağını hazırlamış ya da önemli fikirsel içeriğin eleştirel incelemelerini yapmış olmak;
- Yazının yayından önceki son halini gözden geçirmiş ve onaylamış olmak;
- Çalışmanın herhangi bir bölümünün geçerliliği ve doğruluğuna ilişkin soruların uygun şekilde soruşturulduğunun ve çözümlendiğinin garantisini vermek amacıyla çalışmanın her yönünden sorumlu olmayı kabul etmek.

Yazar olarak belirtilen her kişi yazarlığın dört koşulunu karşılamalıdır ve bu dört koşulu karşılayan her kişi yazar olarak tanımlanmalıdır. Yazar olarak atanan tüm kişiler yazarlık için hak kazanmalı ve hak kazanan herkes listelenmelidir. Dört kriterin hepsini karşılamayan kişilere makalenin başlık sayfasında teşekkür edilmelidir. Finansman alımı, veri toplanması ya da araştırma grubunun genel gözetimi, kendi başlarına, yazarlığı haklı çıkarmaz. Bir ya da daha fazla yazar, çalışma başlangıcından yayınlanmış makaleye kadar, bütün olarak çalışmanın bütünlüğünün sorumluluğunu üstlenmelidir.Çok merkezli çalışmalarda yazarlık bir gruba atfedilir. Yazar olarak adlandırılan grubun tüm üyeleri, yukarıdaki yazarlık kriterlerini tam olarak karşılamalıdır. Bu kriterleri karşılamayan grup üyeleri, onayları ile birlikte listelenmelidir. Mali ve maddi destek de kabul edilmelidir.

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Yazar Değişikliği Talepleri
Yazar listesindeki yazar isimlerinin eklenmesi, silinmesi veya yeniden düzenlenmesi ancak makale kabul edilmeden önce ve ancak dergi Editörü tarafından onaylandığı takdirde yapılabilir.
Böyle bir değişikliği talebi olursa Editör, sorumlu yazardan (a) yazar listesindeki değişikliğin nedeni ve (b) tüm yazarlardan eklemeyi kabul ettiklerine dair yazılı onay (e-posta), talep eder. Editör, yalnızca istisnai durumlarda, makale kabul edildikten sonra yazarların eklenmesini, silinmesini veya yeniden düzenlenmesini dikkate alacaktır.

Makale Yazımı
Orijinal araştırma makalesi kaleme alanlar, konuyu özgün bir şekilde ve nesnel bir tartışma ile ele almalıdır. Makale, başkalarının çalışmayı tekrarlamasına izin vermek için yeterli ayrıntı ve referansları içermelidir. Hileli veya bilerek yanlış beyanlar etik dışı davranış teşkil eder ve kabul edilemez.

Özgünlük
Yazar makalenin orijinal olduğu, daha önce başka bir yerde yayınlanmadığı ve başka bir yerde, başka bir dilde yayınlanmak üzere değerlendirmede olmadığı konusunda teminat sağlamalıdır. Makale yazımının yapay zekâ sistemleri kullanılarak yapıldığı çalışmalar kabul edilmemektedir. Yapay zekâ sistemleri, sadece yazıların dil düzenlemeleri için kullanılabilir.

Orijinal Kaynak Kullanımı ve Atıf Yapma
Yazarlar, tamamen özgün eserler yazdıklarından ve başkalarının eserlerini veya sözlerini kullanmışlarsa, bunun uygun şekilde alıntılandığından emin olmalıdır. Üçüncü taraflarla konuşma, yazışma veya tartışmalarda olduğu gibi özel olarak elde edilen bilgiler, kaynağın açık ve yazılı izni olmadan kullanılmamalıdır.

Veri Erişimi ve Muhafazası
Yazarlardan, editör incelemesi için makalelerini destekleyen araştırma verilerini sağlamaları ve/veya derginin açık veri gereksinimlerine uymaları istenebilir. Yazarlar, mümkünse, bu tür verilere kamu erişimi sağlamaya ve bu tür verileri yayınlandıktan sonra makul bir süre boyunca saklamaya hazır olmalıdır. Dergimiz, araştırma verilerinin TUBITAK'ın Aperta Portalı'na yüklenmesini tavsiye etmektedir.

Çoklu ve Eşzamanlı Yayın
Bir yazar aynı araştırmayı içeren makalesini birden fazla dergisinde yayımlamamalıdır. Aynı makalenin aynı anda birden fazla dergiye gönderilmesi etik dışı davranıştır. Bir yazar, özet şeklinde yayınlanmış olması dışında, daha önce yayınlanmış bir makaleyi başka bir dergide değerlendirilmek üzere sunmamalıdır.

Anket ve Mülakata Dayanan Çalışmaların Yayını ve Etik Kurul Onamları
Etik kurul izni gerektiren, tüm bilim dallarında yapılan araştırmalar için (etik kurul onayı alınmış olmalı, bu onay makalede belirtilmeli ve belgelendirilmelidir. Etik kurul izni gerektiren araştırmalarda, izinle ilgili bilgilere (kurul adı, tarih ve sayı no) yöntem bölümünde, ayrıca makalenin ilk/son sayfalarından birinde; olgu sunumlarında, bilgilendirilmiş gönüllü olur/onam formunun imzalatıldığına dair bilgiye makalede yer verilmelidir. Anket çalışmaları ve mülakata dayanan çalışmaların etik kurul onam belgeleri alınmış olmalı ve makale yüklenirken dergi sistemine eklenmelidir.

Çıkar Çatışması
Kişinin yaptığı işte çelişkiye düşmesine yol açacak, objektifliğini önemli oranda bozabilecek veya herhangi bir kişi ya da kuruluş lehine adil olmayan avantaj sağlayabilecek herhangi finansal ya da diğer tür çıkarlardır. Araştırmanın yürütülmesi ve makalenin hazırlanması sürecinde alınan tüm mali destek kaynakları ve sponsorların çalışmadaki rolü açıklanmalıdır. Finansman kaynağı yoksa bu da belirtilmelidir. Açıklanması gereken olası çıkar çatışması örnekleri arasında danışmanlıklar, maaş alımı, hibeler yer alır. Potansiyel çıkar çatışmaları mümkün olan en erken aşamada açıklanmalıdır.

Hata Bildirimi
Bir yazar yayınlanmış çalışmasında önemli bir hata veya yanlışlık fark ettiğinde, derhal dergiye bildirimde bulunmalıdır. Editör tarafından gerekli görüldüğü takdirde makaleyi geri çekmek veya düzeltmek için iş birliği yapmak da yazarın yükümlülüğüdür. Editör veya yayıncı, yayınlanan bir çalışmanın hata içerdiğini üçüncü bir şahıstan öğrenirse, yazarın konu hakkında editöre bilgi vermek de dahil olmak üzere editörle iş birliği yapması yazarın yükümlülüğüdür.

Görüntü Bütünlüğü
Bir görüntüde belirli bir özelliği geliştirmek, karartmak, taşımak, kaldırmak veya eklemek kabul edilemez. Yazarlar, dergi tarafından uygulanan grafik görseller için belirlenen politikaya uymalıdır.

Düzeltme ve Yayından Geri Çekme Talepleri
Selçuk Tıp Dergisi tarafından yayımlanan makaleler nihai versiyondur. Bu nedenle yayımlandıktan sonra düzeltme talepleri, Yayın Kurulu tarafından **COPE** yönergelerine göre değerlendirilir. Yayından geri çekme talepleri, makale kabulünden önce yapılmalıdır ve Editör Kurulu onayına tabidir. Makale kabulü sonrasında henüz yayınlanmadan önce bir geri çekme talebi olursa, gerekçesi ile birlikte baş editöre mail yolu ile ulaştırılmalıdır. Gerekçeler editör kurulu toplantısında değerlendirilerek nihai karar verilecek ve yazara mail yolu ile bildirilecektir. **Yayın aşamasına alınmış bir makalenin geri çekme talep başvuruları dikkate alınmayacaktır.** Yayımlanmadan önce çalışmasını geri çekme talebinde bulunmak isteyen yazar (lar), Geri çekme formunu doldurarak her bir yazarın ıslak imzası ile imzalanmış ve taratılmış halini editor@selcukmedj.org.tr adresi üzerinden e-posta aracılığıyla Baş Editör ve Editör kuruluna iletmekle yükümlüdür. Geri çekme formuna web sitemizin indirmeler sayfasından ulaşabilirsiniz(https://www.selcukmedj.org/tr-tr/indirmeler/). Editör Kurulu geri çekme bildirimini inceleyerek en geç 15 gün içerisinde dönüş sağlar.
Yazar isimleri, bağlantıları, makale başlıkları, özetler, anahtar kelimeler, herhangi bir bilgi yanlışı ve dijital nesne anımlayıcılardaki [digital object identifier (DOI)] yazım hataları, bir "erratum" ile düzeltilebilir.

Makale Değerlendirme Süreci
Dergiye gönderilen makalelerin hızlı bir şekilde değerlendirilmesi ve yayınlanması hedeflenmiştir. Tüm makaleler çift kör hakem değerlendirme sürecine tabidir. Makaleler, içerik, özgünlük, alandaki önem, istatistiksel analizin uygunluğu ve sonuçların çıkarılması için alanında uzman hakemler tarafından gözden geçirilecektir. En az iki hakem kararı aranacaktır. Hakemler arasında tutarsızlıklar olması durumunda, makale üçüncü ya da dördüncü bir hakeme gönderilebilecektir. Hakem kararları yardımcı editörler tarafından değerlendirilerek değerlendirme sonuçları baş editöre gönderilecektir. Gönderilen makalelerin kabulüne ilişkin nihai karar, baş editöre aittir.

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Hakemler tarafından bildirilen ve yazarlar için faydalı oldukları değerlendirilen yorum ve değerlendirmeler yazarlara gönderilir. Hakemler tarafından yapılan talimat, itiraz ve talepler kesinlikle yerine getirilmelidir. Hakem(ler)e cevap dosyası ayrıca bir Word belgesi halinde oluşturulmalıdır. Yazının gözden geçirilmiş şekliyle yazarlar, bu dosyada, hakemlerin taleplerine uygun olarak atılan her adımı açık ve net bir şekilde belirtmelidir. Yazar açıklama notları, hakemlerin değerlendirme sırasına göre numaralandırılmış olarak listelenmelidir. Ayrıca makale içerisinde de gerekli değişiklikleri yapmalı ve bunları makale içerisinde belirterek (boyayarak), revize edilmiş makale ve hakem önerilerine verilmiş yanıtları içeren formlar https://www. selcukmedj.org adresinden titizlikle yüklenmelidir.

Yazıların Gönderilmesi

Yazarlar Yayın Hakları Bildirim Formunu sisteme yüklemelidir. Tüm yazışmalar sorumlu yazara gönderilecektir. İlgili sorumlu yazarın, tüm diğer yazışmalar için bir e-posta adresi bildirilmelidir. Yazarlar makalelerininin alındığından kendisine verilen numara ile haberdar edilirler. Bildirilen makale numarası yapılan tüm yazışmalarda kullanılmalıdır. Yazarlara beyan edilir ki; editör ofisinin ilk değerlendirmesi sonucu okuyucunun menfaatine dönük olarak makalelerin içeriği dolayısıyla makalesi geri iade edilebilir. Bu hızlı reddetme süreci, yazarın başka bir yerde makalesini yayınlanmasına olanak sağlar.
Selçuk Tıp Dergisi'ne makale gönderilmesi, tüm yazarların, derginin yayın politikalarını ve yayın etiğini okuduğu ve kabul ettiği anlamına gelir. Makale gönderimi ve ilgili diğer tüm işlemler https://www. selcukmedj.org adresinden online olarak yapılacaktır.

Yazıların Hazırlanması

Yazarların, materyallerini göndermeden önce aşağıdaki kuralları okumaları ve makalelerini bu kurallara uygun halde sisteme yüklemeleri gerekmektedir:

Genel yazı biçimi: Tüm makaleler, her tarafta 2,5 cm genişliğinde kenar boşlukları bulunan standart A4 boyutunda bir word dosyası kullanılarak yazılmalı, kaynaklar, resim şekil ya da tablolar metinde geçiş sırasına göre numaralandırılmalıdır. Metin, sol hizalı ve heceli satır sonları olmayan 12 puntolu bir fontta çift boşluk kullanılarak ve Times New Roman karakterinde yazılmalıdır. Kelimeler arasında ve cümle noktası sonrasında tek boşluk bırakmaya özen gösterilmelidir. Paragraf için sol girintiyi sekme tuşu ile bir kez tıklayarak ayarlanmalıdır. Ölçüm birimleri için Uluslararası Birimler Sistemi (SI) kullanılmalıdır. Makalenin tüm sayfaları sayfa sonunda numaralandırılmalıdır. Tüm yazılar yazım kurallarına uymalı, noktalama işaretlerine uygun olmalıdır.

Tüm makalelerde; Kapak sayfası, Ön yazı (cover letter), makale dosyası, Etik kurul onay Belgesi (kurumdan alınan), intihal analiz raporu, Şekiller ve Resimler, Telif Hakları Devir Formu, ve gerekli ise hasta onam formu ayrı dosyalar olarak yüklenmelidir.
Kaynaklar makale dosyasında, makale biter bitmez değil ayrı bir sayfada başlamalıdır. Tablolar, tablo açıklamaları, resim/şekiller ve resim/şekil açıklamaları ayrıca makale ana dosyasına kaynakların ardından ayrı bir sayfada eklenmelidir. Tablo/Resim/şekil açıklamaları; Tablo/Resim/şekillerin hemen altlarında olmalıdır.

Makale bölümleri hakkında

1-Kapak Sayfası: Makalenin İngilizce tam başlığı ve 50'den fazla karakter içermeyen kısa bir başlık, tüm yazarların açık şekilde adları ve soyadları, ORCID numaraları, kurumları, sorumlu yazar ismi iş veya cep telefonu, e-posta ve yazışma adresi belirtilmelidir.Makale daha önce tebliğ olarak sunulmuş ise tebliğ yeri ve tarihi belirtilmelidir. Yazarlar ve kurumları hakkındaki bilgiler başlık sayfası haricinde ana metinde (materyal metot bölümü dahil), tablolarda, şekillerde ve video dokümanlarında yer almamalıdır. Herhangi bir hibe ya da diğer destek kaynaklarının detayları, makalenin hazırlanmasına katkıda bulunan ancak yazarlık kriterlerini karşılamayan bireylere teşekkür bölümü de kapak sayfasına eklenmelidir.

2-Ana makale dosyası; Ana makale dosyası, yazar isimleri ve kurumları gibi bilgiler içermemelidir. Ana makale dosyası:
1. Başlık, 2. Özet ve Anahtar Kelimeler, 3. Makale ana metni, 4. Kaynaklar, 5. Tablolar ve açıklamaları, 6. Resim ve Şekil açıklamaları ile birlikte resim ve şekiller, 7. Alt yazılar şeklinde dizilmelidir.
Başlık: Makale Word dosyasında en baş kısımda makalenin yazım dilinde tek uzun başlığı yer almalıdır.
Özet: Editöre Mektup haricinde tüm yazılar özet içermelidir. Orijinal araştırma makalelerinin özetleri Amaç, Gereçler ve Yöntem, Bulgular ve Sonuç alt başlıklarını içermelidir. Özetler; kaynak, şekil veya tablo numarası içermemelidir. Sözcük sayısı ve özellikler için Tablo 1'deki veriler dikkate alınmalıdır.
Anahtar sözcükler:Özelerin sonunda en az üç ile en fazla beş anahtar sözcük bildirilmelidir. Anahtar sözcükler kısaltmalar olmaksızın tam olarak listelenmeli birbirinden virgül ya da noktalı virgül kullanılarak ayrılmalıdır. Anahtar kelimeler, "Tıbbi Konu Başlıklarına **(MESH)"** uygun olmalıdır (Bakınız: www.nlm.nih.gov/mesh/MBrowser.html).
Kısaltmalar:Özetlerde ve başlıklarda kısaltmalar kullanılmamalıdır. Makalede kullanılacak kısaltmalar, mümkünse ulusal veya uluslararası kabul görmüş olmalı, ilk kullanıldığında metin içinde tanımlanmalı ve parantez içinde yazılmalıdır. Daha sonra metin boyunca o kısaltma kullanılmalıdır. Yaygın olarak kabul edilen kısaltmalar ve kullanım için lütfen "Bilimsel Stil ve Biçim"e bakınız. (https://www.scientificstyleandformat.org/Home.html). Ana metinde Bir ticari markalı ilaç, ürün, donanım veya yazılım programı ana metinde yer aldığında, ürün bilgisi, ürünün adını, ürünün imalatçısını ve şirket ile şirket merkezinin bulunduğu ülkeyi aşağıdaki biçimde parantez içinde verilmelidir: "Discovery St PET / CT tarayıcı (General Electric, Milwaukee, WI, ABD).
Makale ana metni:
Giriş: Konuyu ve çalışmanın amacını açıklayacak spesifik bilgilere yer verilir.
Gereçler ve Yöntem: Çalışmanın gerçekleştirildiği yer, zaman ve çalışmanın planlanması ile kullanılan elemanlar ve yöntemler bildirilmelidir. Verilerin derlenmesi, hasta ve bireylerin özellikleri, deneysel çalışmanın özellikleri ve istatistiksel metotlar detaylı olarak açıklanmalıdır. Çalışmaya alınanlar ve çalışmayı yürütmek için kullanılan tüm yöntemler ayrıntılı olarak açıklanmalıdır. Kullanılan yeni veya modifiye yöntemler ayrıntılı olarak açıklanmalı kaynak belirtilmelidir. İlaçların ve kimyasal ajanların dozları, konsantrasyonları, verilme yolları ve süresi belirtilmelidir. Elde edilen verileri özetlemek ve önerilen hipotezi test etmek için kullanılan tüm istatistiksel yöntemlerin kısa bir raporu, istatistiksel olarak anlamlı farklılık için belirlenen p değeri ölçütleri de dahil olmak üzere bir alt başlık altında sunulmalıdır. Yapılan istatistiksel değerlendirme ayrıntılı olarak açıklanmalıdır. Olabildiğince standart istatistiksel yöntemler kullanılmalıdır. Nadiren kullanılmış veya yeni istatistiksel yöntemler kullanılmışsa konuya ilişkin ilgili referanslar belirtilmelidir. Gerekirse, olağandışı, karmaşık veya yeni istatistiksel yöntemlerle ilgili daha ayrıntılı açıklamalar, çevrimiçi ek veri olarak okuyucular için ayrı dosyalarda verilmelidir.
Bulgular: Elde edilen veriler istatistiksel sonuçları ile beraber ayrıntılı olarak verilmelidir. Bulgular şekiller ve tablolar ile desteklenmelidir. Rakam ve tablolarda verilen bilgilerin gerekli olmadıkça metinde tekrarlanmamasına özen gösterilmelidir.
Tartışma: Çalışmanın sonuçları literatür verileri ile karşılaştırılarak değerlendirilmeli, yerel ve/veya uluslararası kaynaklarla desteklenmelidir. Yazıyla alakasız veya gereksiz genel bilgiler eklenmemeli, yazının amacına uygun yeterli uzunlukta olmalıdır.
Kaynaklar: Kaynaklar ayrı bir sayfaya yazılmalıdır. Kaynaklar APA 7 sistemine uygun olarak belirtilmelidir. Buna göre, kaynak numaraları cümle sonuna nokta konmadan () içinde verilmeli, nokta daha sonra konulmalıdır. Kaynak yazar isimleri cümle içinde kullanılıyorsa ismin geçtiği ilk yerden sonra () içinde kaynak verilmelidir. Birden fazla kaynak numarası veriliyorsa arasına ",", ikiden daha fazla ardışık kaynak numarası veriliyor ise rakamları arasına "-" konmalıdır [ör. (1,2), (1-4) gibi. Yazar sayısı 3 ve daha azsa tüm yazarların ismi olmalı, 3'dan daha fazla ise ilk3 yazar yazılıp diğerleri için et al. kullanılmalıdır. Kaynaklar metindeki kullanılış sırasına göre numaralandırılıp listelenmelidir. Atıf doğruluğu, yazarın sorumluluğundadır. Kaynaklar orijinal yazım, aksan, noktalama vb. ile tam olarak uyumlu olmalıdır. Metin içindeki tüm kaynaklar belirtilmelidir. Kaynak listesinde mükerrer yazım yapılmamalıdır. Farklı yayın türleri için kaynak stilleri aşağıdaki örneklerde sunulmuştur:

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Araştırma Makalesi:

- Mirza E, Oltulu R, Oltulu P, et al. Dry eye disease and ocular surface characteristics in patients with keratoconus. Saudi J Ophthalmol. 2022;36(1):117-21. doi: 10.4103/sjopt.sjopt_37_21.
- Vikse BE, Aasarød K, Bostad L, et al. Clinical prognostic factors in biopsy-proven benign nephrosclerosis. Nephrol Dial Transplant. 2003;18(3):517-23. doi: 10.1093/ndt/18.3.517.

Tek Yazarlı Kitaplar:

- Danovitch GM. Handbook of Kidney Transplantation. Boston: Little, Brown and Company (Inc.), 1996: 323-8.

Kitap Bölümü:

- Soysal Z, Albek E, Eke M. Fetüs hakları. Soysal Z, Çakalır C, ed. Adli Tıp, Cilt III,İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi Yayınları, İstanbul, 1999:1635-50.
- Davison AM, Cameron JS, Grünfeld JP, et al. Mesengiocapillary glomerulonephritis In: Williams G, ed. Oxford Textbook of Clinical Nephrology.New York:Oxford University Press, 1998: 591- 613.

Baskıdan önce çevrim içi olarak yayımlanan dergi makalesi:

- Doğan GM, Sığırcı A, Akyay A, Uğuralp S, Güvenç MN. A Rare Malignancy in an Adolescent: Desmoplastic Small Round Cell Tumor. Turkiye Klinikleri J Case Rep. 10.5336/caserep.2020-77722. Published online: 31 December 2020.
- Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging.DiagnIntervRadiol. 2016 Feb 24.doi: 10.5152/dir.2016.15323. [Epub ahead of print].

Toplantı Raporları:

- Bengisson S. Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. pp.1561-5.

Bilimsel veya Teknik Rapor:

- Cusick M, Chew EY, Hoogwerf B, Agrón E, Wu L, Lindley A, et al. Early Treatment Diabetic Retinopathy Study Research Group. Risk factors for renal replacement therapy in the Early Treatment Diabetic Retinopathy Study (ETDRS), Early Treatment Diabetic Retinopathy Study Kidney Int: 2004. Report No: 26.

Tez:

- Kaplan SI. Post-hospital home health care: elderly access and utilization (dissertation). St Louis (MO): Washington Univ; 1995.

Web sayfası ve Sosyal Medya araçları: Yazar. Başlık. Erişim linki: URL. Erişim tarihi ve yılı

3-Tablolar ve açıklamaları: Tablolar, ana makale metnine dahil edilmelidir, kaynak listesinden sonra sunulmalı ve ayrı bir sayfada olmalıdır. Ana metinde yer alan sıraya göre numaralandırılmalıdır. Her bir tablonun üzerine açıklayıcı bir başlık konulmalıdır. Tabloda kullanılan kısaltmalar, tablonun altında dipnotlarla tanımlanmalıdır (ana metin içerisinde tanımlanmış olsa bile). Tablolar kolay okunması için açık bir şekilde düzenlenmelidir. Tablolarda sunulan veriler, ana metinde sunulan verilerin tekrarı olmamalı, ancak ana metni desteklemelidir.

4-**Şekil ve Resimler:** Şekil, grafik ve resimler makale gönderim sistemi aracılığıyla ayrı dosyalar (TIFF veya JPEG formatında) halinde yüklenmeli ilaveten ana makale dosyasında ayrı bir sayfada tablolardan sonra ana metin içinde de gösterilmelidir. Sisteme ayrı olarak yüklenmeyen sadece makale içerisinde geçen resimler kabul edilmeyecektir. Şekil ve resimler mutlaka isimlendirilmeli ve numaralandırılmalı, metin içinde sıralamaya dikkat edilerek belirtilmelidir. Ana metine eklenecek resim, şekil ve grafik altına açıklamaları da eklenmelidir. Resimler minimum 300 dots per inch (dpi) çözünürlüğünde ve net olmalıdır. Şekil ve resim altlarında kısaltmalar kullanılmış ise, kısaltmaların açılımı alfabetik sıraya göre alt yazının altında belirtilmelidir. Mikroskobik resimlerde büyütme oranı ve tekniği açıklanmalıdır. Yayın kurulu, yazının özünü değiştirmeden gerekli gördüğü değişiklikleri yapabilir. Şekil alt birimleri olduğunda, alt birimler tek bir görüntü oluşturmak için birleştirilebilir. Şekiller, alt birimleri göstermek için işaretlenmeli ve her birinin açıklamaları (a, b, c, vb.) yazılmalıdır. Şekilleri desteklemek için kalın ve ince oklar, ok uçları, yıldızlar, yıldız işaretleri ve benzer işaretler kullanılabilir. Makale içeriği gibi şekiller de kör olmalıdır. Bir birey ya da kurumu tanımlayabilecek resimlerdeki olası bilgiler anonimleştirilmelidir. Hasta fotoğrafı paylaşımlarında kimliğin birebir tanınmamasına özen göstermeli, hastalığı belirlemeye yetecek yeterlilikte görüntü paylaşılmalıdır. Hastanın kimliğini açık eden resim paylaşımları için, hastanın resminin paylaşımına izin verdiği onam formu şarttır.

Tablo 1. Makale türlerine göre sınırlamalar

Makale türü	Sözcük sınırı	Özet sınırı	Kaynak sınırı	Tablo sınırı	Şekil sınırı
Araştırma makalesi	3500	300	50	6	6
Derleme	5000	300	80	6	10
Olgu sunumu	1500	200	15	3	5
Editöre mektup	1000	Özet yok	8	Tablo içermez	Şekil içermez
Editöryal	1000	Özet yok	20	3	3
Orijinal görüntü raporu	200	Özet yok	5	1	3

Makale Türleri

Selçuk Tıp Dergisi'nde aşağıda kısaca açıklanan makale türleri yayınlamaktadır:

Araştırma Makaleleri: Orijinal araştırmalara dayanan yeni sonuçlar sağlayan en önemli makale türüdür. Orijinal makalelerin ana metni Giriş, Yöntemler, Bulgular, Tartışma, Sonuç ve Kaynaklar alt başlıklarıyla yapılandırılmalıdır. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız. İstatistiksel analiz genellikle sonuçları desteklemek için gereklidir. İstatistiksel analizler uluslararası istatistik raporlama standartlarına uygun olarak yapılmalıdır (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals. Br Med J 1983:7;1489–93). İstatistiksel analizler hakkında bilgi Materyaller ve Yöntemler bölümünde ayrı bir alt başlık ile sağlanmalı ve süreç boyunca kullanılan istatistiksel yazılım belirtilmelidir. Birimler Uluslararası Birimler Sistemine (SI) uygun olarak hazırlanmalıdır.
Makalenin kısıtlılıkları, sakıncalar ve eksik yönler, sonuç paragrafından önce Tartışma bölümünde belirtilmelidir.

Derleme Makaleleri: Yeterli sayıda bilimsel makaleyi tarayıp, konuyu bugünkü bilgi ve teknoloji düzeyinde özetleyen, değerlendirme yapan ve bulguları karşılaştırarak yorumlayan yazılar olmalıdır. Temel ve uygulamalı bilim alanlarında tüm gelişmeleri ile birlikte son bilimsel çalışmalardaki teknik ve uygulamalar değerlendirilir. Belirli bir alan hakkında kapsamlı bilgi sahibi olan ve bilimsel geçmişi yüksek atıf potansiyeli olan yazarlar tarafından hazırlanan derlemeler dergimiz tarafından kabul edilecektir. Bu yazarlardan makale kabul şekli davet yöntemiyle de olabilir. Ana metin Giriş, Klinik ve Araştırma Sonuçları ve Sonuç bölümlerini içermelidir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Olgu Sunumları: Tanı ve tedavide zorluk teşkil eden, yeni tedaviler sunan veya literatürde yer almayan bilgileri ortaya koyan nadir olgu veya durumlar hakkında eğitici olgu sunumları dergimizde yayınlanmak için kabul edilir. Olgu sunumu, Giriş, Olgu Sunumu ve Tartışma ve Sonuç alt başlıklarını içermelidir.

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İlginç ve sıra dışı resimler değerlendirme sürecinde bir avantajdır. Hasta tanımlayıcı resimlerde hasta kimliği açık ediliyorsa resmin paylaşımına izin veren hasta onamı mutlaka olmalıdır. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Editöre Mektuplar: Bu yazı türü, daha önce yayınlanmış bir makalenin önemli kısımlarını, gözden kaçan yönlerini veya eksik kısımlarını tartışır. Derginin dikkatini çekebilecek konular başta olmak üzere, okuyucuların dikkatini çekebilecek konular hakkında makaleler, özellikle eğitici konularda Editöre Mektup şeklinde sunulabilir. Okuyucular, yayınlanmış yazılar hakkındaki yorumlarını Editöre Mektup olarak da sunabilirler. Özet, Anahtar Sözcükler ve Tablolar, Şekiller, Görüntüler ve diğer medya eklenmemelidir. Metin alt başlıkları içermemelidir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Editöryal: Tıbbın herhangi bir alanında bir görüşün açıklandığı ya da başkalarının görüşlerinin yayınlandığı, kısa makalelerdir. Normal bir dergi makalesine göre daha yaratıcı yazabilme olanağı sağlar. Dergide yakın zamanda yayınlanmış bir makale tartışılabilir, Tarihi materyal, Halk sağlığına dair konular, Sağlık politikaları, Tıp Eğitimi ve Tıpta teknolojik gelişmeler hakkındaki yazılar bu bölümde değerlendirilebilir. Tam bir derleme olamayacak bir konuda kısa derleme bu başlık altında değerlendirilebilir. Dergi editörü; okuyuculara kişisel mesaj iletmek, aynı sayıdaki bir makale ile ilgili yorum yapmak, okuyucunun dikkatini yeni gelişmelere çekmek isterse bu bölüme yazabilir. Bilimsel makalelerin tipik yazım bölümlerini içermez. Temel mesaj bir cümlede özetlenebilmelidir. Bu cümleyi editoryali yazmaya başlamadan belirlemek yazımı kolaylaştırır. Bu mesaj konusunda okuyucuyu ikna etmek için mantıklı bir tartışma yürütmelidir. Şekiller, Görüntüler ve diğer medya eklenebilir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Orijinal Görüntü Raporu: Tıbbın her alanına ait ilgi çekici, tanımlayıcı veya eğitici görüntüler (ilustrasyon ya da Fotoğraf) birkaç satırlık açıklayıcı metin ve referanslarla birlikte bu bölümde değerlendirmeye sunulabilir. Makale uzunluğu 200 kelimeyi geçmemelidir. Özet, tartışma veya sonuca gerek yoktur ancak kısa bir başlık eklenmelidir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Hakem Raporu Sonrasında Değerlendirme

Yazarlar hakem raporunda belirtilen düzeltme istenen konuları maddelendirerek bir cevap olarak kendilerine ayrılan cevap bölümüne yazmalıdırlar ve hakem (ler)e cevap başlıklı ek bir dosya şeklinde https://www. selcukmedj.org adresinden yüklenmelidir. Ayrıca makale içerisinde de gerekli değişiklikleri yapmalı ve bunları makale içerisinde belirterek (boyayarak) online olarak tekrar gönderilmelidir.

Son Kontrol

1. Yayın hakkı devir ve yazarlarla ilgili bildirilmesi gereken konular formu gereğince doldurulup imzalanmış,
2. Ana makale metni ve özetlerde gerekli kelime sayıları aşılmamış
3. Yeterli sayıda anahtar kelime eklenmiş,
4. Başlık uzun ve kısa başlık şeklinde yazılmış,
5. Kaynaklar kurallara uygun olarak yazılmış,
6. Tablo, resim ve şekillerde bütün kısaltmalar açıklanmış olmalıdır.

Online Yükleme Basamakları, https://www. selcukmedj.org sayfasında;

1. Makale türü *
2. Uzun Başlık *
3. Kısa başlık *
4. Özet*
5. Anahtar kelimeler *
6. Yüklenmesi gerekli bölümler (Kapak sayfası, Ön yazı (cover letter), makale dosyası, Etik kurul onay Belgesi (kurumdan alınan), intihal analiz raporu, Şekiller ve Resimler, Telif Hakları Bildirim Formu ve gerekli ise hasta onam formu şeklinde tamamlanmalıdır.

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- Mirza E, Oltulu R, Oltulu P, et al. Dry eye disease and ocular surface characteristics in patients with keratoconus. Saudi J Ophthalmol. 2022;36(1):117-21. doi: 10.4103/sjopt.sjopt_37_21.
- Vikse BE, Aasarød K, Bostad L, et al. Clinical prognostic factors in biopsy-proven benign nephrosclerosis. Nephrol Dial Transplant. 2003;18(3):517-23. doi: 10.1093/ndt/18.3.517.

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Single Author Books:
- Danovitch GM. Handbook of Kidney Transplantation. Boston: Little, Brown and Company (Inc.), 1996: 323-8.

Book Chapter:
- Soysal Z, Albek E, Eke M. Fetüs hakları. Soysal Z, Çakalır C, ed. Adli Tıp, Cilt III,İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi Yayınları, İstanbul, 1999:1635-50.
- Davison AM, Cameron JS, Grünfeld JP, et al. Oxford Textbook of Clinical Nephrology. In: Williams G, ed. Mesengiocapillary glomerulonephritis. New York: Oxford University Press, 1998: 591- 613.

Journal article published online ahead of print:
- Doğan GM, Sığırcı A, Akyay A, Uğuralp S, Güvenç MN. A Rare Malignancy in an Adolescent: Desmoplastic Small Round Cell Tumor. Turkiye Klinikleri J Case Rep. 10.5336/caserep.2020-77722. Published online: 31 December 2020.
- Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging.DiagnIntervRadiol. 2016 Feb 24.doi: 10.5152/dir.2016.15323. [Epub ahead of print].

Meeting Reports:
- Bengisson S. Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. pp.1561-5.

Scientific or Technical Report:
- Cusick M, Chew EY, Hoogwerf B, Agrón E, Wu L, Lindley A, et al. Early Treatment Diabetic Retinopathy Study Research Group. Risk factors for renal replacement therapy in the Early Treatment Diabetic Retinopathy Study (ETDRS), Early Treatment Diabetic Retinopathy Study Kidney Int: 2004. Report No: 26.

Thesis:
- Kaplan SI. Post-hospital home health care: elderly access and utilization (dissertation). St Louis (MO): Washington Univ; 1995.

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When sharing patient photos, ensure that the identity is not recognized one-to-one, and images sufficient to identify the disease should be shared. For sharing images that reveal the patient's identity, a consent form in which the patient authorizes the sharing of the image is necessary.

Table 1. Limitations according to article types

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Research Article	3500	300	50	6	6
Review	5000	300	80	6	10
Case Presentations	1500	200	15	3	5
Letters to the Editor	1000	(-)	8	(-)	(-)
Editorial	1000	(-)	20	3	3
Original Image Report	200	(-)	5	1	3

Article Types

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Review Articles: Review articles should be articles that review a sufficient number of scientific articles, summarize the subject at the current level of knowledge and technology, evaluate and interpret the findings by comparing them. Techniques and applications in the latest scientific studies with all the developments in basic and applied sciences are evaluated. Reviews prepared by authors who have extensive knowledge of a particular field and have a scientific background with high citation potential will be accepted by our journal. Acceptance of manuscripts from these authors can also be by invitation. The main text should include Introduction, Clinical and Research Results and Conclusion. Please see Table 1 for word count and specifications.

Case Presentations: Educational case reports on rare cases or conditions that pose difficulties in diagnosis and treatment, offer new treatments or reveal information not included in the literature are accepted for publication in our journal. The case report should include the subheadings Introduction, Case Presentation and Discussion and Coclusion. Interesting and unusual pictures are an advantage in the evaluation process.

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If patient identity is disclosed in patient-identifying pictures, patient consent must be provided to share the picture. Please see Table 1 for word count and specifications.

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OPEN ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

The Influence of Social Media on Seborrheic Dermatitis Treatment: A Cross-Sectional Study

Sosyal Medyanın Seboreik Dermatit Tedavisi Üzerindeki Etkisi: Kesitsel Bir Araştırma

Metin Ozaslan[1], Gulgun Lale Katlandur[1], Tugba Akin[1], Aslihan Ozdemir[1]

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ÖZET

Amaç: Bu çalışmanın amacı seboreik dermatit hastalarının hastalıkları ile ilişkili olarak internet ve sosyal medya kullanım alışkanlıklarını, internet ve sosyal medya kullanımının altında yatan nedenleri ve kullandıkları tedavi önerilerini araştırmaktır.

Gereçler ve Yöntem: Seboreik dermatit hastalarından sekiz sorunun yer aldığı bir ankete cevap vermeleri ve bunun yanı sıra yaş, cinsiyet ve hastalık sürelerini belirtmeleri istendi. Hastalık şiddetini değerlendirmek için seboreik dermatit alan şiddet indeksi kullanıldı.

Bulgular: Bu çalışmaya göre, seboreik dermatit hastaları sıklıkla (%79,7) tıbbi olmayan tedavi önerilerine başvurmaktadır. Kadınların interneti ve sosyal medya'yı erkeklerden daha fazla kullandığı ve 18-32 yaş grubunun interneti ve sosyal medya'yı daha büyük yaş gruplarından daha fazla kullandığı görülmüştür (sırasıyla p<0.001, p=0.023). İnternet ve sosyal medya'dan edinilen en yaygın tedavi önerisi reçetesiz satılan bir üründür (%89,6). İnternette bilgi edinmek için en sık kullanılan çevrimiçi platform Google (%44,8), en çok tercih edilen sosyal medya platformu ise İnstagram (%36,2) olmuştur. İnternetten ve sosyal medya'dan tedavi ile ilgili tavsiye alanların ise temel nedeni hastalıkları ve hastalıklarının tedavisi hakkında bilgi almaktı. Hastaların çoğunluğu (%78,9) hastalıklarının başarılı bir şekilde tedavi edilebilmesi için doktorlarını en güvenilir kaynak olarak görmektedir.

Sonuç: Seboreik dermatite sahip hastaların bir klinisyene danışmadan önce tedavi tavsiyesi alma eğiliminde olduğu görülmektedir. İnternet ve sosyal medya araçları hastaların tedavi arayışında önemli bir rol oynamaktadır. Günlük klinik pratikte seboreik dermatite sahip hastaların özellikle reçetesiz satılan ürün kullanımı açısından sorgulanması gerekmektedir. Katılımcıların en çok dermatoloğa güvenmesi ve çevrimiçi platformlardan alınan tedavi tavsiyelerinden memnun olmamaları, klinisyenlerin çevrimiçi platformlarda seboreik dermatit ile ilgili daha çok güvenilir ve doğru bilgi vermeleri gerektiğini ortaya koymaktadır.

Anahtar Kelimeler: Reçetesiz ilaçlar, seboreik dermatit, sosyal medya

ABSTRACT

Objectives: This study aimed to investigate the internet and social media usage habits of seborrheic dermatitis patients in relation to their diseases, the underlying reasons for internet and SM usage, as well as the treatment advice they used.

Materials and Methods: Patients with seborrheic dermatitis were asked to answer a questionnaire consisting of eight questions and provide their age, gender, and disease duration. The seborrheic dermatitis area severity index was used to assess disease severity.

Results: According to this study, seborrheic dermatitis patients frequently (79.7%) turn to nonmedical treatment options. It was observed that females used the internet and SM more frequently than males and patients aged 18-32 years used the internet and SM more frequently than older age groups (p<0.001, p=0.023, respectively). The most common treatment recommendation from the internet and social media was an over-the-counter product (89.6 %). Google was the most frequently (44.8%) used online platform for garnering information on the internet, while Instagram was the most preferred (36.2%) social media platform. The main reason for those who received treatment advice from the internet and social media was to get information about their disease and its treatment. The majority (78.9 %) consider their doctors to be the most reliable source for the successful treatment of their disease.

Conclusion: Patients with seborrheic dermatitis tend to seek treatment advice before consulting a clinician. Internet and social media tools play an important role in treatment seeking. In daily clinical practice, patients with seborrheic dermatitis should be questioned especially in terms of over-the-counter product use. The fact that the participants trusted the dermatologist the most and were dissatisfied with the treatment advice received from online platforms leads to the need for clinicians to provide more reliable and accurate information about seborrheic dermatitis on online platforms.

Keywords: OTC drugs, seborrheic dermatitis, social media

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INTRODUCTION

The Internet and social media (SM) are now widely used by the masses for communication and information sharing. In daily clinical practice, it is observed that some of the patients use SM as platforms to search for symptoms and treatment of their disease before consulting a clinician, as well as to read comments about their disease and share their experiences with others. The information that patients obtain from SM about their disease may be medical information shared by health professionals (HPs) or complementary to this medical information, or conversely, it may be misleading (1,2). In the field of dermatology, it has been reported that patients frequently use the internet and SM to search for chronic skin diseases such as acne, psoriasis, atopic dermatitis, and skin cancers (3).

Seborrheic dermatitis (SD) is a chronic skin disease characterized by erythematous squamous lesions on the scalp, face and chest. SD is common in the community with a prevalence of approximately 1-8%. Although there are pharmacologic agents that provide remission in the treatment of SD, relapses are frequent in the course of the disease (4). Since medical treatment does not provide a cure and the symptoms of the disease can affect quality of life, SD patients may be in search of new treatments. However, there stands a gap in our understanding of how social media specifically impacts SD treatment. This study aimed to investigate the internet and SM usage habits of SD patients in relation to their diseases, the underlying reasons for internet and SM usage, as well as the treatment advices they used.

MATERIALS AND METHODS

Our study was approved by the Research Ethics Committee at Karatay University (date: June 23, 2023;-number: 2023/0008). All of the study procedures abided by the Declaration of Helsinki. Patients with seborrheic dermatitis who presented between June and September 2023 were included in the study. Patients were asked to answer a questionnaire consisting of 8 questions in addition to age, gender, and disease duration. Patients were asked whether they had received treatment advice before admission to our clinic, whether they had used over-the-counter (OTC) products, self-made products, diet modification, food supplements, or any other treatment advice, how useful the treatment advice was, and from which source they got the treatment advice, what is the treatment recommendation received from online platforms (internet and SM), what is the preferred online platform for treatment, why they prefer online platforms for treatment recommendation, what is the most trusted source for treatment of their disease, and what are the most challenging aspects of their disease. The seborrheic dermatitis area severity index (SDASI) was used to assess disease severity. Patients under 18 years of age and those who had previously used prescription treatment were excluded from the study.

For the continuous variables analyzed, descriptive statistics were documented as frequencies, mean values, standard deviation and minimum and maximum values. Student t test or Mann-Whitney U test was used for continuous variables based on their distribution characteristics. Statistical analysis of the data was done in IBM SPSS statistical version 22 program (IBM, USA). Pearson chi-square was used to compare categorical data between groups. $p<0.05$ was considered statistically significant.

RESULTS

Of the total 152 patients, 42.8% were male and 57.2% were female. The mean age of the patients was 29.93±10.65 years. The mean duration of disease was 3.59±3.36 years for men and 2.26±2.14 years for women. The disease was mild in 8.5%, moderate in 48.2%, severe in 32.8% and very severe in 10.5% of the patients. Mean Age, Gender, Severity of Illness and Comparison of Age Groups of Social Media Users and Non-Users of the Two Groups are shown in Table 1.

79.7% (n=121) of the patients had used a treatment recommendation before admission. Of the treatment recommendations, 85.9% were OTC products, 12.3% were self-made products, 11.5% were food supplements, and 5.7% were diet modification. 83 patients (68.5%) used only one treatment recommendation, 37 patients (30.5%) used two treatment recommendations together, and 1 patient (<1%) used more than two treatment recommendations together. Our study observed that patients most frequently (47.9%) searched for information about their condition and treatment via SM and the internet (n=58) (Table 2). Internet and SM tools used by the participants are shown in Figure 1.

Patients most frequently (44.8%) searched for information on Google. The most frequently used SM platform was instagram (36.2%), followed by youtube (29.3%), trendyol (8.6%), facebook (6.8%), and tiktok (5.1%). The majority of those who received treatment recommendations from the internet and SM were OTC products (89.6%). There was no significant difference between those who received treatment recommendations from the Internet and SM and those who did not in terms of disease severity and duration (p=0.511, p=0.837, respectively). It was observed that females used the

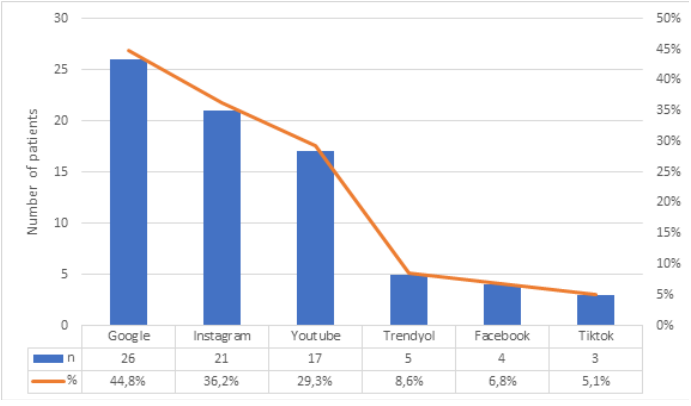

Figure 1. Internet and SM tools used by the participants

Table 1. Mean Age, Gender, Disease Severity of the Two Groups and Comparison of Age Groups of Social Media Users and Non-users

Characteristics	Total (n=152) n (%)	Consulted internet and SM (n=58) n (%)	Did not consult internet and SM (n=63) n (%)	P
Age (years)[b] Mean± SD	29.93±10,65	28.96±8,80	31.09±12,07	0.264
Age Group (years)[a]	18-32	46 (38)	38 (31.4)	0.023
	32-65	12 (9.9)	25 (20.6)	
Sex[a]				
Female	87 (57.2)	42 (72.5)	25 (39.6)	<0.001
Male	65 (42.8)	16 (27.5)	38 (60.4)	
Disease severity[a]				
Mild	13 (8.5)	6 (10.3)	3 (4.7)	0.511
Moderate	73 (48.2)	24 (41.3)	28 (44.4)	
Severe	50 (32.8)	22 (37.9)	26 (41.2)	
Very severe	16 (10.5)	4 (6.8)	6 (9.5)	

Note. a: Chi-squared test, b: t-test, SD: Standard deviation, SM: Social media

internet and SM more frequently than males and patients aged 18-32 years used the internet and SM more frequently than older age groups (p<0.001, p=0.023, respectively).

Most of the patients (54.5%) who received a treatment recommendation stated that they did not benefit from the treatment at all, 40% partially benefited, and 5% completely benefited. In response to the question "What was your reason for using online platforms for treatment?", 36.2% (n=21) of the patients answered to get information about the disease and its treatment, 27.5% (n=16) answered to search the comments of patients about the treatments they used, 13. 8% (n=8) to ask dermatologists questions about their disease, 13.8% (n=8) for medical care avoidance, and 8.6% (n=5) for other reasons (cosmetic product research and daily skin care research in SD) (Figure 2). To the question "Who is your most trusted source about the treatment of your disease", patients answered dermatologist, family physician, individuals with similar complaints, and pharmacist, respectively (78.9%; 10.5%; 7.8%; 2.6%, respectively). To the question "What are the most challenging aspects of your disease", 80.2% of the patients answered itching, 71.7% dandruff, 57.2% frequent recurrence, 46.7% negative impact on social life, 38.1% lack of therapeutic agents, and 19.7% expensive dermocosmetic products.

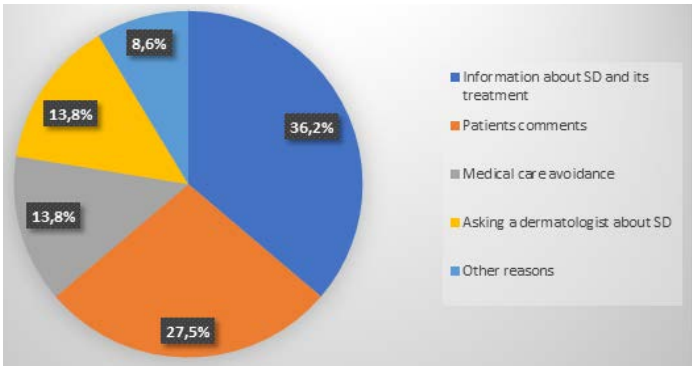

Figure 2. The answers to the question "What was your reason for using online platforms for treatment advice?

DISCUSSION

According to this study, SD patients frequently turn to non-medical treatment options. Internet and SM have a major role in determining treatment recommendations. It was observed that females used the internet and SM more than males and 18-32 age group used the internet and SM more than older age group. The most common treatment recommendation from the Internet and SM was OTC product (89.6 %). Google was the most frequently used online platform including internet and SM, while Instagram was the most preferred SM platform. The main reason for those who received treatment advice from the internet and SM was to get information about their disease and its treatment. The majority (78.9 %) consider their doctors as the most reliable source for the treatment of their diseases. Google is the most frequently used online search engine (5). Instagram is a SM platform that mainly provides photo and video sharing network services. While Instagram plays an important role in patient education, especially in visual medical branches, it has been reported that the information obtained by patients about their diseases may be misleading due to the conflict of interest (6).

A study by AlGhamdi KM et al. reported that 58.1% of the population used the internet for health-related information research. Internet use was found to be more frequent in the 30-39 age group and in women (7). In a study investigating the use of internet and SM in dermatology patients, it was found that patients most frequently preferred Google and YouTube to obtain medical information. It was reported that patients most

Table 2. Patient survey results

Survey question	Results	n (%)
Did you use any treatment advices before applying to our clinic? (n=152)	Yes	121 (79.7)
	No	31 (20.3)
What was the treatment advice you used? (n=121)	OTC product	104 (85.9)
	Self-made product	15 (12.3)
	Supplements	14 (11.5)
	Diet modification	7 (5.7)
	Others (spa water, leech therapy)	2 (1.6)
How useful was the treatment recommendation you used?	Never	66 (54.5)
	Partially	49 (40.5)
	Completely	6 (5)
What was your source of treatment advice?	Internet and SM	58 (47.9)
	Family or friend	53 (43.8)
	TV	15 (12.4)
	Own thought	7 (5.7)
	Pharmacist	4 (3.3)
	Others (hairdresser, herbalist, beauty sales consultant)	10 (8.2)
What was the treatment advice you received from online platform (SM or internet)? (n=58)	OTC product	52 (89.6)
	Self-made product	3 (5.1)
	Supplements	2 (3.4)
	Diet modification	1 (1.7)
What was your choice of online platform?	Google	26 (44.8)
	Instagram	21 (36.2)
	Youtube	17 (29.3)
	Trendyol	5 (8.6)
	Facebook	4 (6.8)
	Tiktok	3 (5.1)
What was your reason for using online platforms for treatment?	Information about SD and its treatment	(36.2)
	Patients'comments	(27.5)
	Asking a dermatologist about SD	(13.8)
	Medical care avoidance	(13.8)
	Other reasons	(8.6)
Who is your most trusted source about the treatment of your disease?	Dermatologist	120 (78.9)
	Family physician	16 (10.5)
	Pharmacist	4 (2.6)
	Individuals with similar complaints	12 (7.8)
What are the most challenging aspects of your disease?	Lack of effective therapeutic agents	58 (38.1)
	Frequent relapses	87 (57.2)
	Itching	122 (80.2)
	Dandruff	109 (71.7)
	Negative impact on social life	71 (46.7)
	Dermocosmetic products are expensive	30 (19.7)

Note. OTC: Over-the-counter product, SD: Seborrheic Dermatitis. SM: Social media, TV: Television.

frequently used SM to access medical information, followed by self-diagnosis/treatment, and alternative treatment methods, respectively (3). According to the results of a multicenter study conducted in Turkey examining the use of SM in acne vulgaris, 92.5% of the participants used SM, while the most preferred online platforms were Google and Instagram, respectively. It was reported that the most common reason for applying to SM was to be informed about their disease. In this study, most of the patients reported physicians as the most reliable source of information about their disease (8).

In a study by Kaminski M et al, itching, hair loss, and skin rash were the most frequently searched terms when Google trends data of skin diseases between 2004-2019 were compared. It was emphasized that patients used Google search more frequently for burdensome dermatological diseases (9). Dermatologic diseases searched on Instagram are similar to Google. A study by Braunberger T et al. reported that the most frequently searched dermatologic diseases on Instagram were acne, alopecia, eczema, and psoriasis (10). It has been reported that the majority of posts in the field of dermatology on Instagram are made by non-dermatologist influencers (11).

In a study examining posts about SD on youtube, instagram, and tiktok platforms, it was reported that the highest number of posts were available on youtube. It was found that the majority of the posts were made by non-HPs and often contained misleading information (12). In another study in which youtube content in SD was analyzed, it was reported that although the majority of the posts were made by non-HPs, the content of the posts were mostly misleading, whether HP or not. In this study, it was mentioned that the lack of understanding of the pathogenesis of SD and the lack of effective treatment agents may have led them to treatment recommendations of uncertain reliability as the reason for misleading posts by HPs (13).

In the literature, there is one study from Turkey on the use of internet and SM in patients with SD. In this study conducted in Istanbul, the majority of patients with SD (78.8%) used SM to seek treatment. It was found that females used SM more than males and 18-30 age group used SM more than older age groups (14). In this study, the most frequently used online platforms were instagram (63.6%), youtube, and Google, respectively, which is similar to our study. While the mean age of the patients in Güder H et al's (14) study was similar to our study (26.36 years; 29.60 years, respectively), the rate of SM use in our study (47.9%) was lower than in the previous study. The reason for the lower rate of SM use in our study compared to the previous study may be due to geographical regional differences. In a study conducted by Aslan Kayıran M et al. the rate of internet and SM use in the Marmara region was found to be higher than in other geographical regions of Turkey (15). The fact that women and the 18-32 age group used the internet and SM more frequently in our study is consistent with the study by Güder H et al (14). The fact that instagram was the most frequently used SM platform in our study may be an expected result since the age group that used SM most frequently in the previous study was similar to our study. Anderson M et al. reported that the most popular SM platforms at a young age were youtube and instagram, which also supports this result (16).

Other results of the previous study on SD include that patients most frequently received OTC product recommendation from SM (54.8%), 35.2% did not benefit at all from the treatment recommendation, the majority of patients were not against the use of SM for their disease, and the most challenging situation for them was the lack of satisfactory treatment for their disease (14). In our study, it was found that 89.6% of those who received treatment recommendations from SM were OTC products, which is higher than the previous study. In contrast to the study of Güder H et al (14), in our study, the most challenging aspects of SD were found to be itching (80.2%) and dandruff (71.7%), respectively. Nowadays, it is seen that most of the OTC products related to SD are generally emphasized to reduce itching and dandruff in their promotion and advertisements on the internet and SM. In our study, the fact that the conditions that challenged the participants in our study differed more in favor of itching and dandruff compared to the previous study may have led to a higher preference for OTC products compared to the previous study. In our study, it was observed that 43.1% of those who received treatment advice from the internet and SM did not benefit from the treatment advice at all, which is similar to the previous study. The finding that dermatologists were the most trusted source of patients in our study is also consistent with the previous study.

Our study has some differences from the study of Güder H et al (14). First of all, in our study, the reasons why the participants preferred the internet and SM about their diseases were questioned. It was observed that the two most common reasons for this were to get information about their disease and its treatment and to search for the comments of other patients about the treatments they used, respectively. The fact that the most common reason for the use of the Internet and SM by those who received advice from the Internet and SM was the need for information about the disease is consistent with the literature on the use of SM in health-related issues (1,8).

The other different aspects of our study from previous studies (14) on SD are that we investigated from which source patients with SD received treatment advice other than SM, the type of treatment advice, and how much benefit they received from treatment advice. It was observed that patients received treatment advice from family or friends with the second highest frequency after internet and SM. The most common treatment recommendation received from family or friends was OTC product (90.5%), similar to the treatment recommendation received from internet and SM.

The small number of patients and being a single-center study are the limitations of our study. Other limitations of our study include not knowing the educational level and socioeconomic status of the patients. The last 2 factors may have affected patients' preference for online platforms and their perception of over-the-counter products. However, our study is valuable in terms of showing the effects of the internet

and SM on SD, which is common in the society.

CONCLUSION

To the best of our knowledge, this is the second study investigating the effects of internet and SM on patients about SD treatment. Patients with SD tend to seek treatment advice before consulting a clinician. Internet and SM tools play an important role in treatment seeking. In daily clinical practice, patients with SD should be questioned especially in terms of OTC product use. In this study, the fact that the participants trusted the dermatologist the most and were dissatisfied with the treatment advice received from online platforms leads to the need for clinicians to provide more reliable and accurate information about SD on online platforms. It is important to emphasize that SD is a chronic and relapsing disease, that treatment recommendations from sources other than clinicians may have unpredictable results, that OTC products are often insufficient to reduce relapses and that they are not an alternative to prescribed treatment. The introduction of more effective therapeutic agents in the future compared to current SD treatment may reduce patients' resort to alternative treatment methods. Based on the results of this study, we believe that patients with SD should only rely on information from the clinician, regardless of the online platform.

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OPEN ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Candida Albicans Adhesion of New-generation Denture Base Materials

Candida Albicans'ın Yeni Nesil Protez Kaide Materyallerine Adezyonu

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ÖZET

Amaç: Yaklaşık %65 protez kullanıcısını etkileyen protez stomatiti, yaygın bir oral kandidiyazis belirtisidir. Dijital diş hekimliğinin gelişmesiyle beraber protez kaide materyali olarak daha güncel materyaller kullanılmaktadır. Candida albicans'ın adezyonunun yeni nesil protez kaidelerine etkisi incelenmemiştir. Bu araştırma, çeşitli üretim yöntemleriyle oluşturulan farklı dental polimerlere C.albicans'ın tutulumunu ve termal siklusun etkisini incelemeyi amaçlamaktadır.

Gereçler ve Yöntem: Mikrobiyolojik testler için toplam 60 disk örneği (10×2 mm) üretildi. Örnekler, her malzeme grubu için iki alt gruba ayrıldı (n = 10). Üç farklı protez kaide malzemesi farklı teknikler kullanılarak üretildi: 3 boyutlu (3D) baskıyla üretilen protez kaide resini, Formlabs (FL); geleneksel ısı ile polimerize edilmiş akrilik resin, Meliodent (MD); ve bilgisayar destekli tasarım/bilgisayar destekli üretim (CAD/CAM) teknolojisi kullanılarak üretilmiş pre-polimerize edilmiş polimetil metakrilat (PMMA) diski, Ivobase (IB). Termal döngü öncesi ve sonrası numuneler test edildi (5000 döngü, 5 °C/55 °C). Örneklerin C.albicans tutulumu mikroskopta incelendi. Tüm grupların yüzey görüntüleri taramalı elektron mikroskobu (SEM) kullanılarak değerlendirildi. Verileri incelemek için post-hoc Tukey testi ve iki yönlü varyans analizi kullanıldı.

Bulgular: CAD/CAM ile frezelenmiş grup ve 3D baskı grubu, ısı ile polimerize edilmiş akrilik resine kıyasla önemli ölçüde daha az C.albicans tutulumu gösterdi. Termal döngünün mikrobiyal tutuluma etkisi, test edilen tüm gruplar için önemsiz bulundu.

Sonuç: Kandida enfeksiyonları ve buna bağlı protez stomatiti, geleneksel ısı ile polimerize edilmiş akriliğe kıyasla yeni nesil protez kaide materyallerinde daha az görülmektedir. Mikrobiyal tutulumu azaltmak için, 3D baskıyla üretilen ve CAD/CAM ile frezelenmiş protez kaide materyalleri daha iyi bir tercih olabilir.

Anahtar Kelimeler: 3D baskı, Candida albicans, protez kaidesi, termal siklus

ABSTRACT

Aim: Denture stomatitis, affecting approximately 65% of denture wearers, is a common symptom of oral candidiasis. With the advancement of digital dentistry, more contemporary materials are being used as denture base materials. The effect of Candida albicans adhesion on new-generation denture bases has not been investigated. This study aims to examine the adhesion of C. albicans to various dental polymers produced by different manufacturing methods and the effect of thermal cycling.

Materials and Methods: A total of 60 disk samples (10×2 mm) were produced for microbiological tests. The samples were divided into two subgroups for each material group (n = 10). Three different denture base materials were produced using different techniques: 3 dimensional (3D) printed denture base resin, Formlabs (FL); conventional heat-polymerized acrylic, Meliodent (MD); and milled pre-polymerized polymethyl methacrylate (PMMA) resin disc manufactured using computer aided design/computer aided manufacturing (CAD/CAM) technology, Ivobase (IB). Before and after thermocycling, specimens were tested (5000 cycles, 5 °C/55 °C). The adhesion of C. albicans on the samples was examined under a microscope. Surface images of all groups were evaluated using scanning electron microscopy (SEM). Post-hoc Tukey test and two-way analysis of variance were used to analyze the data.

Results: The CAD/CAM milled group and the 3D printed group showed significantly less C.albicans adhesion compared to the heat-polymerized acrylic resin. The effect of thermal cycling on microbial adhesion was found to be insignificant for all groups tested.

Conclusion: Candida infections and associated denture stomatitis are less common in new-generation denture base materials compared to conventional heat-polymerized acrylic. To reduce microbial adhesion, denture base materials produced by 3D printing and milled by CAD/CAM could be a better choice.

Keywords: 3D printing; Candida albicans; denture base; thermal cycling

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INTRODUCTION

The porous structure of denture bases sometimes makes them vulnerable to the buildup of microbial biofilms. The adherence of bacteria to the denture surface is the initial step in the creation of biofilms. Opportunistic pathogens like Candida albicans, which are linked to precancerous lesions and oral infections (1), can be found in this microbial biofilm (2). Candida-infected leukoplakia is associated with a greater risk of cancer (3). Denture prosthesis users have a prevalence of denture stomatitis that ranges from 15% to over 70%. Denture stomatitis is caused by pathogenic Candida infection, poor denture cleanliness, and persistent denture use. C.albicans has the ability to stick to the denture's acrylic foundation, which can cause excruciating oral mucosal inflammation linked to contaminated dentures (4,5).

The most commonly used prosthetic base material is polymethyl methacrylate (PMMA) (6). PMMA, polymerized with heat, is preferred for its cost-effectiveness, easy availability, biocompatibility, aesthetic properties, lightness, ease of manipulation, and repairability. However, a number of variables, including the powder-to-liquid ratio, the polymerisation technique (fast or slow curing), the storage conditions of the material and the skill of the technician, affect how long acrylic resin-based prosthetic bases last (6-10). Nevertheless, the search for an ideal prosthetic base material continues due to weak physical properties such as poor compatibility with the tissue due to thermal shrinkage of heat-polymerized acrylic prosthetics, (11) allergic reactions (9) caused by residual monomers, wear resistance, insufficient surface hardness, and low durability (6,7).

With the development of digital techniques, complete prostheses can now be created from fully or partially polymerized acrylic disks by additive (using three-dimensional printers to manufacture acrylic resins) or subtractive (milling) techniques. In comparison with the traditional methods, CAD/CAM technology enables the manufacturing of dental prosthetics with less discomfort to the patient, in a shorter time, and with high precision-fit. It also allows for the direct replication of existing prosthetics (12,13).

In the production of next-generation prosthetic bases, milling techniques are more common than 3 dimensional (3D) printed (12). The accuracy of milled prosthetics depends on the milling tools (size and number of milling tips) and the materials used (14,15). Structural defects are reduced in materials obtained through milling (14,16). Prosthetics produced by subtractive methods require large amounts of raw material and generate significant waste (17).

Manufacturing through 3D printing involves building up material layer by layer. Compared to subtractive systems, it's often more cost-effective because there's less material waste and no wear on tools (18). In addition, 3D printing makes it possible to create multiple objects at the same time and to produce complex, large designs (19,20). While 3D-printed full prosthetics offer a promising option for treating complete tooth loss, their widespread clinical adoption has not yet occurred.

The oral environment is dynamic due to temperature changes, making it crucial to mimic these conditions when testing material properties. Therefore, thermal cycling is the most preferred test method to simulate the oral environment.

When we review the literature, there are very few studies that assess the microbiological properties of newly developed 3D-printed and milled denture base materials. However, there is no study investigating the effect of aging through thermal cycling on Candida adhesion in the next-generation bases. Therefore, the purpose of this study is to examine the adhesion of Candida, the most commonly encountered fungal infection in denture patients, to new-generation denture base materials and evaluate how the process of aging through thermal cycling affects Candida adhesion. Our first hypothesis is that there will be differences in Candida adhesion among denture base materials. Our second hypothesis is that Candida adhesion will increase in all samples after the thermal cycling process.

MATERIALS AND METHODS

A total of 60 disc specimens were fabricated for microbial testing, each measuring 2 mm in thickness and 10 mm in diameter (21). The specimens in each group, further divided into two subgroups: one subjected to thermal cycling and the other not (n = 10/group). The specimens were manufactured with 3 different production techniques. IvoBase CAD (IB) (Ivoclar Vivadent, Schaan, Liechtenstein) produced from prepolymerized PMMA disc by CAD/CAM milling technology; formlabs denturebase (FL) (Somerville, MA, USA) produced from denture base resin by 3D printing technology and Meliodent (MD) (Kulzer, Berkshire, Germany) heat-polymerized acrylic resin produced by conventional method are the materials used in the study (Figure 1).

For the CAD-CAM specimens, the Fusion 360 CAD software program (Autodesk, headquartered in Mill Valley, CA, USA) was utilized to design a 3D model of a disk measuring 10 mm × 2

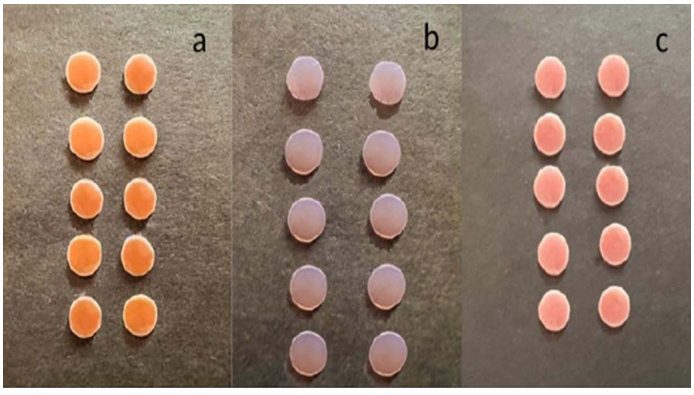

Figure 1. a) Milled specimens, b) 3D printed specimens, c) Heat-polymerized specimens

mm. To facilitate specimen production, this digital design was exported in Standard Tessellation Language (STL) file format. Subsequently, employing an IvoBase CAD system from Ivoclar in conjunction with a five-axis milling machine (HinriMill 5, located in Goslar, Germany), the CAD-CAM specimens were fabricated from a pre-polymerized PMMA resin disc.

The Form 3B+ printer (Formlabs, Somerville, Massachusetts, USA) was utilized to produce the specimens through the use of stereolithography (SLA) 3D printing technology. Commercial use of the Formlabs 3D-printed denture base material is now possible. Each sample had a layer thickness of 50 µm and a construction orientation of 90 degrees. Following printing, the specimens were cleaned for three minutes with 90% isopropyl alcohol using Form Wash, an ultrasonic cleaning device from Formlabs. Then, using FormCure (Formlabs Inc., also based in Somerville, MA, USA), they underwent a 60 minute post-polymerization procedure at 60°C (30 minutes at one temperature followed by another 30 minutes).

To produce specimens using the conventional method, disk-shaped wax samples were initially placed into the flask. Once the gypsum inside the flask had completely set, it was immersed in boiling water to facilitate the melting and removal of the wax. After the wax was eliminated, any negative voids were coated with lacquer, and a heat-polymerized acrylic resin material, Meliodent Heat Cure, was applied into the voids within the gypsum according to the manufacturer's instructions. The flask was then pressed at 100 bars of pressure to remove excess acrylic material and subsequently maintained under 200 bars of pressure for five minutes. The sealed flasks were then placed in cold water and brought to a boil. Once the temperature reached 100°C, the materials were boiled for 20 minutes. The samples were then extracted from the flask and leveled using a precision grinding machine and a hard mill. To simulate the texture of dentures, the specimens were sequentially wet-ground at a speed of 60 rpm using a grinding and polishing machine (Gripo 2V, METKON, Grinder-Polisher) with 400, 600, and 800 grit sandpaper. Measurements were taken systematically using an electronic caliper to ensure uniformity of sample dimensions during grinding and polishing. After sanding, the specimens were polished by the same technician using Ivoclar Vivadent Universal polishing paste and felt materials (22).

The process of thermal cycling

The samples were placed in a bath of distilled water at temperatures between 5°C and 55°C and subjected to 5000 cycles of thermal cycling. Every 60 second cycle had four distinct steps: 20 seconds at 5°C, 10 seconds of transitioning to a different bath, 20 seconds at 55°C, and then 10 seconds of returning to the 5°C bath. 5000 thermal cycles equivalent to approximately six months clinical use (23).

Microbiological evaluation

The samples were initially sterilized using an autoclave. Equal numbers of all samples were placed in sterile petri dishes. An equal amount of prepared yeast suspension was then added to each dish, enough to cover the sample surface. The dishes were then placed on a shaker and incubated for 24 hours at 37°C in a 5% CO2 incubator. For the preparation of the yeast suspension, a suspension was prepared from the standard strain C.albicans ATCC 14053, which was inoculated onto Sabouraud dextrose agar (SDA) agar (BD Difco) and incubated at 37 °C in a 5% CO2 incubator for 24 hours. Subsequently, microorganisms were taken from the growing cultures with sterile loops, and a suspension was prepared to have an absorbance of 0.5 McFarland turbidity standard by measuring absorbance at 530 nm wavelength with a spectrometer. The suspension was further diluted 10 times with Yeast Extract-Peptone-Dextrose (YPD) liquid. These prepared solutions were added to the Petri dishes containing the samples for incubation (24).

After incubation, the samples were gently washed with water and left to dry. Subsequently, they were treated with ethanol for 10 minutes to fixate. Then, they were stained with methylene blue and washed after staining. Once the materials were dry, each material was examined under a microscope (Olympus BX53) at 100X magnification (Figure 2). Ten fields were evaluated for each material, and the numbers of microorganisms in each field were recorded.

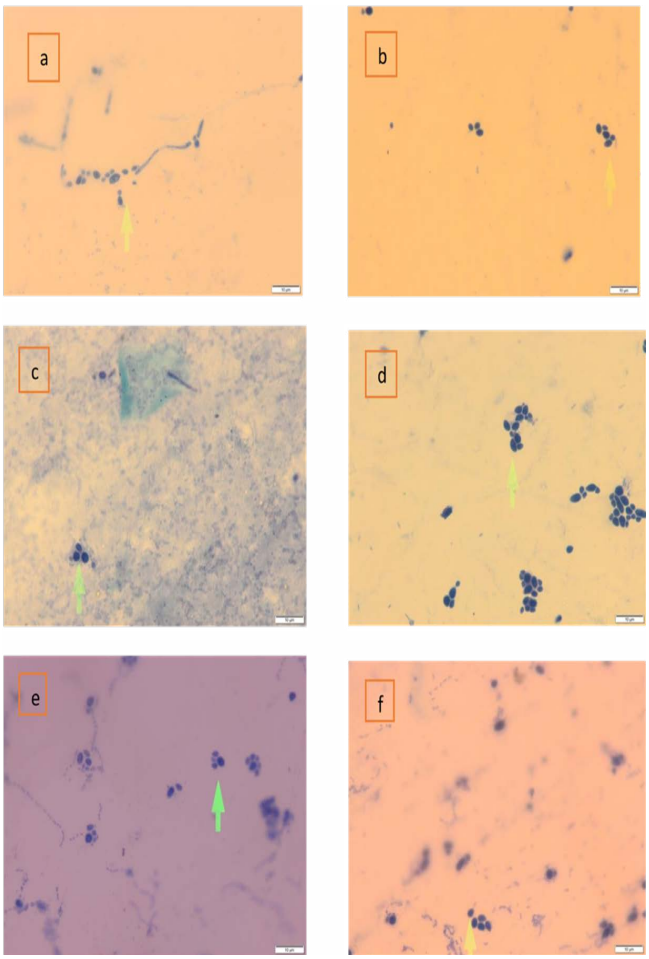

Figure 2. Microscope images; 100 X magnification; a: non aged FL, b: aged FL, c: non aged IB d: aged IB, e: non aged MD, f: aged MD

Table 1. Descriptive statistics (mean ± standard deviations) of C.albicans adhesion

Material	Non-aging	Aging
FL	13,47 ±5,48[b]	10,26 ±3,52[b]
IB	10,05 ±1,60[b]	11,82 ±5,10[b]
MD	38,97 ±11,51[a]	38,77 ±16,99[a]

* Different superscript letters in each column indicates statistically significant differences (p<0.05).

Scanning electron microscopy (SEM)

All specimens in the group were covered with Au and examined under scanning electron microscopy (SEM; SU5000; HITACHI, Japan) at a working distance of 13.8 mm and a voltage of 10 kV. SEM images were analyzed at a magnification of 3000 times.

Statistical analysis

Data were analysed using two-way analysis of variance (ANOVA) using IBM SPSS 20.0 software (SPSS Inc., Chicago, IL). Then, to determine whether there were differences between the groups, a Tukey honest post hoc test was used. Statistical significance was set at $p < 0.05$.

RESULTS

There was no statistically significant difference between the IB and FL groups, whereas Candida adhesion was mostly pronounced in the traditionally manufactured MD group. Candida adhesion was also lower in the next-generation denture base materials. In every tested group, the impact of aging was determined to be statistically insignificant (Table 1).

The type of material used was a significant factor in the results of the two-way ANOVA. However, this significance was reduced when both the type of material and the aging were considered together, and the influence of the aging was found to be negligible (Table 2).

The MD group had deeper scratches, grooves and a more porous surface than the other groups, as shown by the SEM images (Figure 3). For this reason, there was intense candida colonization in MD samples. In comparison, less dense Candida colonisation was observed on the surfaces of the FL and IB, which have a more uniform and smooth surface. The microbial colonies adhered relatively more to the MD.

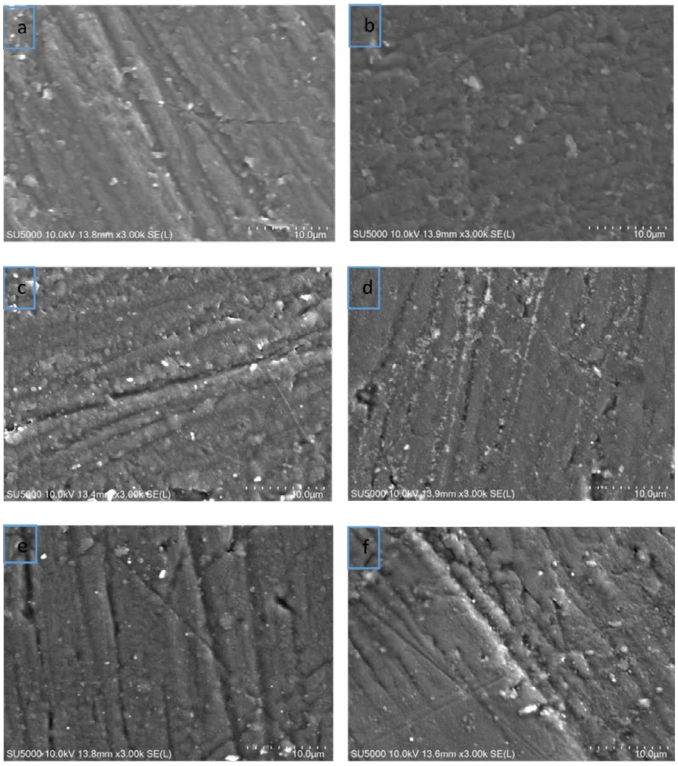

Figure 3. SEM images a: non aged FL, b: aged FL, c: non-aged IB, d: aged IB, e:non-aged MD, f: aged MD

DISCUSSION

This study compared C.albicans adhesion of denture base materials obtained through heat polymerization, CAD/CAM milling, and 3D-printed methods and investigated how the aging process with thermal cycling affected Candida adhesion. The first hypothesis was accepted, as differences were found in Candida adhesion among denture base materials manufactured by different methods. Samples produced with the conventional method showed significantly higher C.albicans adhesion compared to the CAD/CAM milling and 3D-printed methods. The second hypothesis, suggesting an increase in Candida adhesion after thermal cycling in all samples, was rejected, and the impact of thermal cycling was found to be insignificant.

Denture stomatitis is a disease that can affect more than half of the population using removable dentures. Plaque formation on dentures due to inadequate oral hygiene increases microbial colonization, leading to the development of the disease (25). Our study focused on this issue, as C.albicans is identified as

Table 2. Results of two-way ANOVA for C.albicans adhesion

Test method	Source of variation	Sum of squares	df	Mean square	F	p
	Material	10069.994	2	5034.997	160.089	0.06
	Aging	4.483	1	4.483	0.143	0.3742
	Material*Aging	62.902	2	31.451	0.384	0.683
	Error	4427.828	54	81.997		
	Total	25354.593	60			

p<0,05

the primary factor in denture stomatitis, particularly in patients using complete dentures in the upper jaw (26).

In studies comparing heat-polymerized base material with base materials obtained through CAD/CAM milling methods from different brands, it was observed that the amount of C.albicans adhering to specimens produced by CAD/CAM milling was lower than that of heat-polymerized acrylic resin (27-29). Our study also confirmed these results. The degree of polymer conversion in polymer materials affects the remaining monomer levels in the processed material, consequently influencing its physical, mechanical, and microbiological properties (30-32). Higher Candida adhesion in heat-polymerized acrylic resins may be attributed to factors such as monomer evaporation during polymerization, air entrapment during mixing, residual monomer presence, evaporation associated with exothermic reactions, inadequate monomer-polymer mixing, and porosity resulting from insufficient pressure applied to the mold (33). CAD/CAM milled disks are processed under high pressure and temperature, reducing the remaining monomer levels and strengthening the structure and properties of the processed material. These results explain the findings of our study.

Avi et al. (5) conducted a study comparing prosthetic base materials produced with different techniques (heat-polymerized acrylic, cold acrylic, 3D printing method and CAD/CAM milling method) in terms of C.albicans adhesion. They observed that specimens produced with the 3D printing method increased microbial adhesion compared to the conventional method. The discrepancy with our study's findings may stem from variations in the printing method, resin brand differences, and polishing techniques. Similarly, in the same study, the CAD/CAM milling method showed the lowest adhesion, consistent with our study. Likewise, Freitas et al.'s study (34) also showed the CAD/CAM milling method having the lowest Candida adhesion, resembling our findings. However, the 3D-printed group, while not statistically significant, exhibited higher bacterial adhesion than the conventional method. The variation in 3D-printed angle values influencing material properties in previous studies could be considered as a contributing factor. Choosing the printing parameters (printing method, wavelength, film thickness, temperature and final curing time) can affect the results. In a study where the printing method (90, 45, and 0 degrees) did not affect C.albicans adhesion in prosthetic base resins (35), Shim et al. (21) found the highest ratio of C.albicans were present on surfaces printed at 0 degrees, followed by 45 and 90 degrees. Therefore, it was concluded that the 90-degree printing method is more suitable for preventing C.albicans adhesion (36). Li et al (37) evaluated different build angles (90°, 45°, 0°) and print layer thicknesses (100, 50, 25 µm) on the surface properties of prosthetic base resin processed using the DLP additive technique. They found that the adhesion of C.albicans to DLP-printed prosthetic surfaces was influenced by the thickness of the print layer, but not by the build angle. As a consequence of the studies, it was concluded that the thickness of the layer should be less than 100 µm in order to prevent the adhesion of C.albicans (37). Earlier studies by Unkovskiy et al and Altarazi et al achieved the best results in the mechanical and physical features of 3D printed resin using a vertical printing technique (90°) (38-40). With regard to post-curing, Kim et al. (41) suggested a minimum of 60 minutes of UV curing in an oven to develop the physical features of 3D printed parts. The low level of microbial adhesion suggests that the 3D printed resin may be a better option than traditional prosthetic bases. The selection of a 90 degree printing method, a print film thickness of 50 µm and a post cure time of 60 minutes in our study was based on the previous studies.

Fiore et al. (42) confirmed greater adhesion of C.albicans to heat-polymerized PMMA resin within 90 minutes. However, after 16 hours of incubation, the 3D-printed SLA technique and milled prosthetic base resins showed similar microbial adhesion, with all resins showing high microbial adhesion. Arutyunov et al. (43) found differences in the Candida adhesion index among materials produced using the same manufacturing technology. Even the slightest difference in material composition can alter microbial properties (44,45).

Limitations of this study include the complexity and multifactorial nature of microbial adhesion in the oral cavity. It isn't easy to simulate this process in vitro. Further studies are needed on multi-species biofilms and in vivo or situ settings. Additionally, the oral cavity's acquired pellicle affects the surface characteristics and microbial adherence of materials. The main process by which the pellicle is formed is the selective adsorption of salivary proteins, peptides and other macromolecules. Further research is needed under saliva-coating conditions. Various parameters in additive manufacturing can affect the outcomes. For future studies, Candida adhesion results should be evaluated using different printers, various printing parameters, and more brands for each group.

CONCLUSION

Candida infections and associated denture stomatitis are less common in new-generation denture base materials compared to traditional heat-polymerized acrylic. Microbiological evaluation of base materials produced by digital method, which is more comfortable in terms of production technology, was found successful. 3D printed and milled denture base materials produced digitally can be used instead of heat-polymerized acrylics.

The thermal cycle did not affect the adherence of C.albicans in all groups.

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OPEN ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Comparison of the Effects of Preoperative or Postoperative Parasternal Block in the First 24 Hours in Patients Who Had Cardiac Surgery with Sternotomy

Sternotomi ile Kalp Cerrahisi Yapılan Hastalarda, Parasternal Bloğun Preoperatif veya Postoperatif Yapılmasının ilk 24 Saatteki Etkilerinin Karşılaştırılması

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ÖZET

Amaç: Bizim amacımız median sternotomi ile kardiyak cerrahi geçiren hastalarda, parasternal bloğun operasyon başlamadan önce ve operasyon bittikten sonra uygulanmasının, postoperatif sternum ağrısı, opioid ihtiyacı, komplikasyon, ekstübasyon zamanı ve bloğun uygulama kolaylığı açısından karşılaştırılmasını yapmaktır.
Gereçler ve Yöntem: Çalışma tek merkezli, gözlemsel ve retrospektiftir. Çalışmaya preoperatif parasternal blok yapılan (N=20) ve postoperatif parasternal blok yapılan (n=20) 40 hasta dahil edildi. Tüm hastalar, intravenöz midazolam (0.05-0,1 mg/kg), fentanil (2-5 µ/kg IV), propofol (1-2 mg/kg), roküronyum (1 mg/kg) ile trakeal entübe edildi. Anestezi idamesi, sevofluran (MAC 1), O2/hava (FIO2 0,40), fentanil (2–5 µ/kg/h) ve roküronyum (0.2-0,4 mg/kg) ile sağlandı. Preoperatif gruptaki hastalara, cerrahi öncesi blok yapılmıştır. Diğer gruba ise cerrahi bittikten sonra blok yapılmıştır.
Bulgular: Preoperatif ve postoperatif dönemde aynı bloğun yapıldığı 40 hasta çalışmaya dahil edildi. Preoperatif parasternal blok yapılan ve postoperatif parasternal blok yapılan iki grup arasında yaş, cinsiyet, ek hastalık, ASA skorlaması ve operasyon süresi açısından anlamlı fark bulunmamıştır. Gruplardaki hastaların dosyaları yoğun bakım sürecinde ağrı, opioid ihtiyacı, ekstübasyon zamanı ve komplikasyon gelişimi açısından değerlendirilmiştir.
Sonuç: Sonuç olarak parasternal bloğun cerrahi öncesi veya cerrahi bitiminde yapılmasının sternum ağrısının başlama zamanı, opioid ihtiyacı, komplikasyon oluşumu ve ekstübasyon zamanı üzerinde anlamlı bir etkisi yoktur. Fakat bloğun preoperatif veya postoperatif yapılması bloğun yapılma süresi üzerine etkilidir.

Anahtar Kelimeler: Parasternal blok, kardiyak cerrahi, sternum ağrısı

ABSTRACT

Aim: Our aim is to compare the application of parasternal block before and after the operation in terms of postoperative sternum pain, opioid need, complications, extubation time and ease of application of the block in patients undergoing cardiac surgery with median sternotomy.
Materials and Methods: The study is single-center, observational and retrospective. 40 patients who underwent preoperative parasternal block (N=20) and postoperative parasternal block (n=20) were included in the study. All patients were tracheally intubated with intravenous midazolam (0.05-0.1 mg/kg), fentanyl (2-5 µ/kg IV), propofol (1-2 mg/kg), rocuronium (1 mg/kg). Anesthesia maintenance was provided with sevoflurane (MAC 1), O2/air (FIO2 0.40), fentanyl (2–5 µ/kg/h) and rocuronium (0.2–0.4 mg/kg). Patients in the preoperative group received a block before surgery. The other group received a block after the surgery was completed.
Results: 40 patients who underwent the same block in the preoperative and postoperative periods were included in the study. There was no significant difference between the two groups in which preoperative parasternal block and postoperative parasternal block were performed in terms of age, gender, comorbidities, ASA scoring and operation time. The files of the patients in the groups were evaluated in terms of pain, opioid need, extubation time and development of complications during the intensive care unit process..
Conclusion: As a result, performing parasternal block before or at the end of surgery does not have a significant effect on the time of onset of sternum pain, opioid need, occurrence of complications and extubation time. However, whether the block is performed preoperatively or postoperatively has an effect on the duration of the block.

Keywords: Parasternal block, cardiac surgery, sternum pain

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INTRODUCTION

Developments in cardiac surgery have been closely followed in Turkey, and the first successful open-heart surgery was performed at Hacettepe University in 1960 (1). Pain that is not adequately controlled after heart surgery can lead to serious problems such as delayed healing and prolonged hospital stays (2). Inadequate pain control following sternotomy procedures can result in a high incidence of post-sternotomy persistent pain syndrome (3). Regional anesthesia techniques such as epidural anesthesia or paravertebral blocks are generally not suitable during cardiovascular surgery due to systemic reasons such as heparinization (2).

In cardiac surgery, the use of opioids is traditionally common for both intraoperative and postoperative pain control (4). Opioid-based analgesia has side effects such as nausea, vomiting, sedation, urinary retention, respiratory depression, constipation, and delayed extubation (3).

Recently, several chest wall blocks have been described and investigated for various thoracic surgeries, including heart surgeries (5). All these blocks contribute to better control of chest pain in cardiac surgery, faster recovery, and shorter discharge times(6). In patients who have undergone median sternotomy, parasternal blocks (PSBs), which can be considered relatively new, are effective alternatives for analgesia in postoperative pain management (7-9). PSBs can be administered as superficial parasternal intercostal plane (PIP) blocks and deep PIP blocks (10). Superficial PSBs are performed by injecting a local anesthetic between the pectoralis major and superficial intercostal muscles (11). This blocks the anterior cutaneous branches of the thoracic intercostal nerves (12). Since the nerve supply to the sternal area extends from thoracic 2 (T2) to T6, this block provides adequate analgesia for the sternotomy area(13).

This study aimed to compare the application of superficial PSBs before and after the operation in patients undergoing cardiac surgery with median sternotomy in terms of postoperative sternum pain, opioid requirement, complications, extubation time, and ease of block application.

MATERIALS AND METHODS

This single-center, observational, and retrospective study was approved by the Clinical Research Ethics Committee of Ordu University (Decision No: 2023/351). A total of 40 patients who underwent preoperative (n = 20) or postoperative (n = 20) PSB were included in the study. The preoperative PSB was performed while the patient was in the supine position after the induction of general anesthesia and before the start of the surgery, while the postoperative PSB was administered immediately before the patient was transferred to the intensive care unit after the surgery was completed.

Inclusion and exclusion criteria

All cardiac surgery patients who underwent median sternotomy, including heart valve replacement, coronary artery bypass graft surgeries, and aortic aneurysm surgery, in the cardiovascular surgery operating room of our hospital between September 1, 2023 and December 15, 2023 were included in the study.

Patients under 18 years of age, pregnant or breastfeeding women, those with known allergies to local anesthetics, emergency or revision cases, patients with mental retardation or those who could not communicate effectively, and surgical cases that did not involve sternotomy were excluded from the study.

Anesthesia management

In all patients, perioperative management was conducted in accordance with the standard care protocols for cardiac anesthesia at our center. Before the induction of general anesthesia, electrocardiogram, non-invasive arterial blood pressure, and arterial blood oxygen saturation were monitored through pulse oximetry. After monitoring, all patients were tracheally intubated with intravenous midazolam (0.05–0.1 mg/kg), fentanyl (2–5 µ/kg IV), propofol (1–2 mg/kg), and rocuronium (1 mg/kg). Anesthesia maintenance was provided with sevoflurane (minimal alveolar concentration 1), O2/air (FiO2 0.40), fentanyl (2–5 µ/kg/h), and rocuronium (0.2–0.4 mg/kg). In sedated patients, invasive arterial catheterization (radial or femoral) and central venous catheterization (jugular, subclavian, or femoral) were performed. At the end of the operation, patients were transferred to the intensive care unit while intubated without administering additional analgesic agents.

Preoperative PSB under ultrasound guidance

After the patients were tracheally intubated, the T3–T6 region and the ultrasound probe were prepared under aseptic conditions while the patients were in the supine position before the surgery commenced. The linear transducer was placed longitudinally on the sternum at the level of T4 and shifted approximately 2–3 cm laterally from the midline (Figure 1). A 21-gage 50 mm block needle was advanced cephalad from the caudal direction using the in-plane technique, and when it reached the space between the pectoralis major and

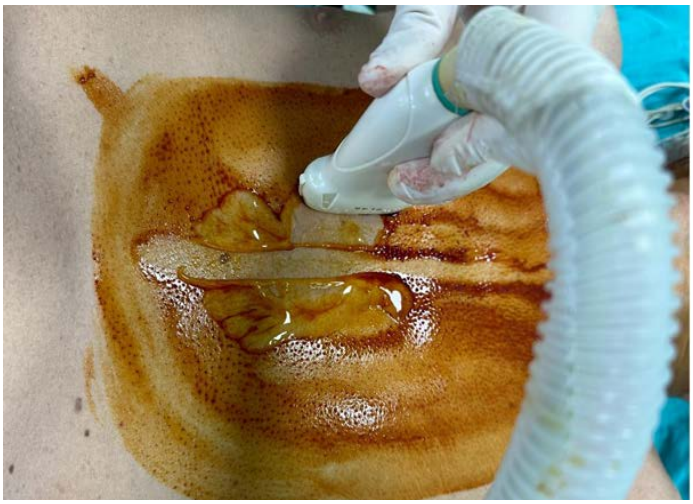

Figure 1. Parasternal block application

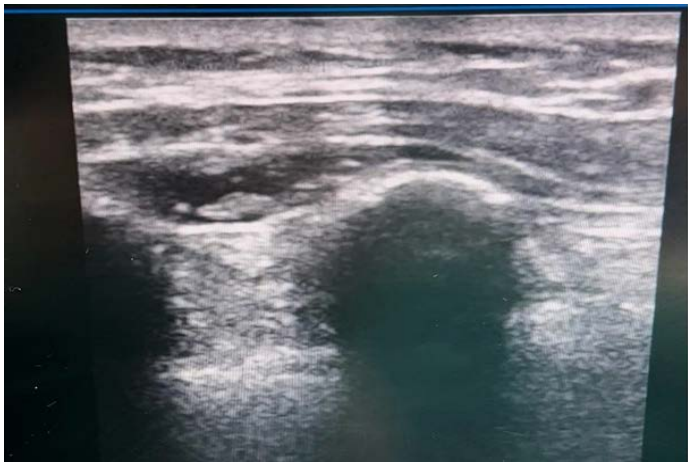

Figure 2. Spread of local anesthetics between the pectoralis major muscle and the superficial intercostal muscle

intercostal muscles, confirmation was made with physiological saline. After observing a zipper-like separation on ultrasound, aspiration was performed to confirm no blood was present. Subsequently, a total of 15 cc of local anesthetic was injected, consisting of 10 cc of bupivacaine (%5) and 5 cc of lidocaine (%2) (Figure 2). The same procedure was performed on the opposite side. The patient was then handed over to the surgical team.

Postoperative PSB under ultrasound guidance

After the operation was completed and the skin was sutured, the ultrasound probe was prepared under aseptic conditions without compromising the existing sterility, and the procedure was initiated. The linear transducer was placed longitudinally on the sternum at the level of T4 and shifted approximately 2–3 cm laterally from the midline. A 21-gage 50 mm block needle was advanced cephalad from the caudal direction using the in-plane technique, and when it reached the space between the pectoralis major and external intercostal muscles, confirmation was made with physiological saline. After observing a zipper-like separation on ultrasound, aspiration was performed to confirm no blood was present. Subsequently, a total of 15 cc of local anesthetic was injected, consisting of 10 cc of bupivacaine (%5) and 5 cc of lidocaine (%2). The same procedure was performed on the opposite side. The patient was then transferred to the intensive care unit while intubated and being monitored.

Intensive care process

At the end of the operation, patients were transferred to the intensive care unit while intubated and under monitoring for follow-up. Before beginning communication with the patients, analgesic agents were not administered unless there was an increase of more than 15%–20% in blood pressure and pulse values compared to the preoperative baseline values. After communication was established, the presence or absence of pain was assessed, and if pain was present, its localization was evaluated. Patients reporting pain in the sternum area were initially administered intravenous non-steroidal anti-inflammatory drugs (NSAIDs). Subsequently, intravenous opioids were administered to those patients who continued to experience pain after being re-evaluated. During the intensive care process in the first 24 hours postoperatively, records were also reviewed regarding the patients' extubation times, as well as any complications related to the local anesthetic and the block, in addition to pain and opioid requirements.

Statistical analysis

The data were analyzed using the IBM SPSS Statistics Standard Concurrent User V 26 (IBM Corp., Armonk, New York, USA) statistical software package. Descriptive statistics were presented as a number, percentage, mean, standard deviation, median, minimum, and maximum values. The normal distribution of numerical variables was evaluated using the Shapiro–Wilk normality test. Numerical variables were found to be normally distributed. Independent samples t-test was used to compare the numerical descriptive characteristics of the patients between groups, and chi-square tests (Pearson chi-square/Fisher exact test) were used to compare the categorical descriptive characteristics between groups. The chi-square goodness of fit test was used to compare the variables across the follow-up times within the groups. A p-value of <0.05 was considered statistically significant in all analyses.

RESULTS

Table 1 shows the distribution of the descriptive characteristics of the participants between the groups. A total of 40 people were included in the study: 20 in the preoperative group and 20 in the postoperative group. The median age of the participants was 65 years in the preoperative group and 67 years in the postoperative group. The median operation time was 172 minutes in the preoperative group and 174 minutes in the postoperative group. There were 14 (70%) male patients in the preoperative group and 15 (75%) in the postoperative group. There were 4 (20%) American Society of Anesthesiologists III patients in the preoperative group and 5 (25%) in the postoperative group. Seven (35%) patients in the preoperative group and eight (40%) patients in the postoperative group had an extubation time of 6 hours. The descriptive characteristics of the participants in the parasternal groups had a similar (homogeneous) distribution ($p > 0.05$). The duration of the block was between 3 and 5 minutes in the preoperative group and between 5 and 7 minutes in the postoperative group ($p < 0.05$).

Table 2 presents the comparison of sternum pain, opioid usage, complications, and extubation status across the follow-up times between the groups. At five different measurement times, the number of patients with sternum pain was statistically similar between the groups ($p > 0.05$). In the preoperative group, there were 0 participants (0%) with sternum pain at the 4th hour, 2 participants (10%) at the 6th hour, 1 participant (5%) at the 10th hour, 1 participant (5%) at the 15th hour, and

Table 1. Comparison of descriptive characteristics of the participants between the groups (n = 40).

	Parasternal		p-value
	Preoperative n = 20	**Postoperative n = 20**	
Age,(years)			
X ± SD	64,20 ± 7,09	68,35 ± 9,96	0,137 †
M(min–max)	65 (51-78)	67 (57-59)	
Operation time, (minutes)			
X ± SD	172,00 ± 22,38	176,25 ± 20,70	0,537 †
M(min–max)	170 (135-220)	174 (140-220)	
Sex			
Male	14 (%70)	15 (%75)	0,500 ϕ
Female	6 (%30)	5 (%25)	
Comorbidity			
No	3 (%15)	5 (%25)	0,347 ϕ
Yes	17 (%85)	15 (%75)	
ASA			
ASA III	4 (%20)	5 (%25)	0,500 ϕ
ASA IV	16 (%80)	15 (%75)	
Extubation time			
6th hour	7 (%35)	8 (%40)	0,500 ϕ
10th hour	13 (%65)	12 (%60)	
Block time			
3–5 minutes	20 (%100)	0 (%0)	0,000 ϕ
5–7 minutes	0 (%0)	20 (%100)	

Independent samples t-test(†); chi-square test (ϕ); American Society of Anesthesiologists (ASA). Descriptive statistics are presented as mean (X), standard deviation (SD), median (M), minimum (min), maximum (max), number (n), and percentage (%). Bold sections show statistically significant results ($p < 0.05$).

Table 2. Comparison of sternum pain, opioid use, complications, and extubation status between groups during follow-up (n = 40).

	Parasternal		p †
	Preoperative n = 20	**Postoperative n = 20**	
Sternum pain			
4th hour	0 (%0)	0 (%0)	0,999
6th hour	2 (%10)	2 (%10)	0,999
10th hour	1 (%5)	2 (%10)	0,564
15th hour	1 (%5)	2 (%10)	0,564
24th hour	1 (%5)	0 (%0)	0,999
p ϕ	0,896	0,999	
Opioid use			
4th hour	2 (%10)	1 (%5)	0,564
6th hour	1 (%5)	3 (%15)	0,317
10th hour	2 (%10)	3 (%15)	0,655
15th hour	1 (%5)	1 (%5)	0,999
24th hour	0 (%0)	0 (%0)	0,999
p ϕ	0,881	0,572	
Complication			
4th hour	0 (%0)	0 (%0)	0,999
6th hour	0 (%0)	0 (%0)	0,999
10th hour	0 (%0)	0 (%0)	0,999
15th hour	0 (%0)	0 (%0)	0,999
24th hour	0 (%0)	0 (%0)	0,999
p ϕ	0,999	0,999	
Extubation			
4th hour	0 (%0)	0 (%0)	0,999
6th hour	7 (%35)	8 (%40)	0,796
10th hour	20 (%100)	20 (%100)	0,999
15th hour	20 (%100)	20 (%100)	0,999
24th hour	20 (%100)	20 (%100)	0,999
p ϕ	0,036	0,046	

Chi-square test for goodness of fit ($\chi 2$); ϕ Intra-group comparison; † Inter-group comparison. Descriptive statistics are presented as number (n) and percentage (%). Bold sections show statistically significant results ($p < 0.05$).

1 participant (5%) at the 24th hour. The number of participants with sternum pain in the preoperative group did not show a statistically significant change over time ($p > 0.05$). In the postoperative group, there were 0 participants (0%) with sternum pain at the 4th hour, 2 participants (10%) at the 6th hour, 2 participants (10%) at the 10th hour, 2 participants (10%) at the 15th hour, and 0 participants (0%) at the 24th hour. The number of participants with sternum pain in the postoperative group did not show a statistically significant change over time ($p > 0.05$).

At five different measurement times, the number of participants with opioid use was statistically similar between the groups ($p > 0.05$). In the preoperative group, there were 2 participants (10%) using opioids at the 4th hour, 1 participant (5%) at the 6th hour, 2 participants (10%) at the 10th hour, 1 participant (5%) at the 15th hour, and 0 participants (0%) at the 24th hour. The number of participants with opioid use in the preoperative group did not show a statistically significant change over time ($p > 0.05$). In the postoperative group, there was 1 participant (5%) using opioids at the 4th hour, 3 participants (15%) at the 6th hour, 3 participants (15%) at the 10th hour, 1 participant (5%) at the 15th hour, and 0 participants (0%) at the 24th hour. The number of participants with opioid use in the postoperative group did not show a statistically significant change over time ($p > 0.05$). No complications were observed in participants from both groups at all follow-up times. No statistically significant differences were found within and between groups in terms of complications ($p > 0.05$).

At five different measurement times, the number of participants extubated was statistically similar between the groups ($p > 0.05$). In the preoperative group, there were 0 participants (0%) extubated at the 4th hour, 7 participants (35%) at the 6th hour, 20 participants (100%) at the 10th hour, 20 participants (100%) at the 15th hour, and 20 participants (100%) at the 24th hour. In the preoperative group, all patients were extubated by the 10th hour. In the postoperative group, there were 0 participants (0%) extubated at the 4th hour, 8 participants (40%) at the 6th hour, 20 participants (100%) at the 10th hour, 20 participants (100%) at the 15th hour, and 20 participants (100%) at the 24th hour. In the postoperative group, all patients were extubated by the 10th hour.

DISCUSSION

In this study, patients who underwent cardiac surgery with median sternotomy were compared regarding postoperative pain management, opioid requirements, complications, extubation times, and the durations of block application, with the same trunk block being administered preoperatively and postoperatively. A significant difference was observed between the two groups only in terms of the duration of block application.

With the increase in life expectancy, the average age of patients undergoing heart surgery has also risen. Therefore, as age increases and comorbidities rise, the patient profile becomes a higher-risk population. In this group of elderly patients with multiple comorbidities, anesthetic management is of even greater importance for maintaining stable vital signs (14).

The mean age of the patients in the present study was above 65, representing a high-risk patient group with multiple comorbidities. Various regional anesthetic techniques are recommended for better control of sternal pain after cardiac surgery. Starting from neuroaxial techniques, various approaches targeting the thoracic fascial plane, which contains intercostal nerves from T1 to T11, have been developed, including pectoral, serratus anterior, parasternal, and erector spinae plane blocks (15, 16). According to recent studies by Sepolvere et al., the PSB is noted as one of the more promising fascial blocks for the control of sternal pain compared to other trunk blocks (17, 18).

In the present study, a decrease in pain complaints and opioid requirements was observed within the first 24 hours in patients who received the PSB, while the timing of the block, whether preoperative or postoperative, did not affect the onset time of pain. In the preoperative parasternal group, the average duration of the block procedure was 3–5 minutes, whereas in the postoperative parasternal group, this duration was 5–7 minutes. In other words, performing the block during the preoperative period, without compromising tissue integrity, provides the practitioner with ease of visualization and shortens the duration of the block procedure. Moreover, the results of the chi-square test indicate a statistically significant difference between the groups regarding the duration of the block procedure ($p < 0.05$).

It was observed that patients who received the PSB were extubated and transferred from the intensive care unit to the ward earlier compared to patients who did not receive the block (14). In the present study, it was observed that although there was no significant difference in extubation times between the two groups that received the block, extubation occurred earlier in patients who did not receive an effective block and experienced pain.

In patients undergoing cardiac surgery with median sternotomy, ultrasound-guided PSB is an effective, safe, and technically easy method to apply (14). The PSB performed in our clinic by the same physician was completed quickly and without complications. However, in a patient who underwent preoperative PSB, hemorrhage was observed between the intercostal muscles after sternotomy. The timing of the PSB, whether preoperative or postoperative, resulted in a statistically significant difference in the duration of the block procedure. Performing the block in the preoperative period, without compromising the anatomical integrity of the tissue, allows for clearer and easier visualization of muscle structures on ultrasound. This makes the block easier to perform.

Many clinical studies have shown that PSB provides effective intraoperative analgesia in cardiac surgery and reduces opioid consumption (19, 20). In patients undergoing cardiac surgery with median sternotomy, ultrasound-guided PSB is easy to perform, safe, and effective. The PSB, which is effective in reducing intraoperative opioid consumption and achieving pain control, has a lower efficacy on postoperative

analgesia (14).

In the present study, the postoperative opioid requirement for patients who underwent the PSB due to sternum pain was very low (out of 40 patients, only 14 received opioids, with 10 of them requiring opioids for pain at the drainage site). NSAIDs were sufficient for patients experiencing sternum pain (out of 11 patients with sternum pain, only 4 required opioid treatment). There was no statistically significant difference between the groups.

This study investigated the effect of preoperative and postoperative PSB on analgesic requirements in patients undergoing cardiac surgery via median sternotomy. Important results have been obtained; however, the study has some limitations. These limitations include the study being single-centered and all blocks being performed by the same participant. Future studies could be planned as multicenter trials with blocks performed by different physicians.

CONCLUSION

In conclusion, performing the PSB either before surgery or at the end of the procedure does not have a significant effect on the onset of sternum pain, opioid requirement, complication occurrence, or extubation time. However, performing the block preoperatively enhances visualization for the practitioner due to preserved tissue integrity, facilitating the procedure. In clinical practice, if a block is planned for postoperative analgesia in patients undergoing sternotomy, performing the procedure before the surgery while tissue integrity is still preserved will facilitate an easier and faster execution of the application.

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OPEN ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Effect of Home Health Services on Emergency Department Admissions of Geriatric Patients: A District Example

Geriatrik Hastaların Acil Servis Başvurularında Evde Sağlık Hizmetlerinin Etkisi: Bir İlçe Örneği

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ÖZET

Amaç: Dünyada ve toplumumuzda ortalama yaşam süresinin uzaması, ölüm hızının azalması, tıp alanında yaşanan gelişmelere bağlı olarak yaşlı nüfus artmaktadır. Bu durum yaşlanan toplumla beraber, geriatrik hastaların kaliteli, uzun dönem bakım ihtiyacını ve yaşlı bakımında bütünsel etik yaklaşım gözetilerek, özerklik, adalet ve zarar vermeme gibi etik ilkelerin de etkin bir şekilde kullanılmasını beraberinde getirmektedir. Bu çalışmada Acil Servis'e başvuran geriatrik hastaların demografik ve genel özelliklerinin tespit edilmesi, Evde Sağlık Hizmetleri'nden faydalananlar ile bu hizmeti kullanmayanların Acil Servis başvurularının karşılaştırılması amaçlanmıştır.
Gereçler ve Yöntem: Çalışma, retrospektif dosya taraması olarak yürütülmüştür. Bu çalışma ilçede tek bir Acil Servis olması ve Evde Sağlık Hizmetleri hastalarının başka bir acil servise başvuramayacağı da dikkate alınarak bir ilçe devlet hastanesi acil servisinde yapılmıştır. Acil Servis'e 1 yıl içinde başvuran 65 yaş ve üzeri tüm hastaların verilerine ulaşılması amaçlanmıştır.
Bulgular: Acil Servis'te bir yıl içinde yapılan 116.263 muayenenin %11,4 (n=13.261)'ünün geriatrik yaş grubundaki bireylere ait olduğu bulundu. Acil Servis'e başvuran hastalardan Evde Sağlık Hizmetleri'ne kayıtlı olanların yaş ortancası 77 (65-101) iken kayıtlı olmayanlarınki 72 (65-107) idi. Acil Servis'e bir yıl içinde muayene için gelen geriatrik hastaların mükerrer başvuru sayıları ortancasının 3 (2-45) olduğu tespit edildi.
Sonuç: Sağlık sistemi ve Acil Servis açısından önemli bir gösterge olan mükerrer başvuru oranlarının Evde Sağlık Hizmetleri'ne kayıtlı geriatrik hastalarda daha yüksek olması başta olmak üzere bu çalışmada elde edilen birçok sonuç, Evde Sağlık Hizmetleri ile Acil Servis başvuruları arasında ilişki olduğunu göstermektedir. Bu durum Evde Sağlık Hizmetleri ve evde bakım uygulamalarının daha verimli hale getirilmesinin geriatrik hastaların Acil Servis başvurularında azalma etkisi oluşturabileceğini düşündürmektedir.

Anahtar Kelimeler: Evde bakım hizmetleri, sağlık hizmetleri, geriatrik, acil tıp, tıbbi etik

ABSTRACT

Objective: The elderly population is increasing worldwide and in Turkish society due to increased life expectancy, decreased mortality rate, and developments in medicine. This situation, together with the aging society, brings with it the need for quality long-term care of geriatric patients and the effective use of ethical principles such as autonomy, justice, and non-maleficence by considering a holistic ethical approach in elderly care. In this study, we aimed to determine the demographic and general characteristics of geriatric patients admitted to the emergency department (ED) and to compare the ED admissions of those who benefit from Home Health Services (HHS) with those who do not use this service.
Materials and Methods: The study was conducted as a retrospective file review in the ED of a district state hospital, taking into account that there is only one ED in the district, and HHS patients cannot apply to another emergency department. It was aimed to access the data of all patients aged 65 years and over who applied to the ED within 1 year.
Results: It was found that 11.4% (n=13,261) of 116,263 examinations performed in the ED within one year belonged to individuals in the geriatric age group. The median age of the patients admitted to the ED who were registered to HHS was 77 (65-101), while the median age of those who were not registered was 72 (65-107).
Conclusion: Many results obtained in this study, especially the fact that the rate of repeated admissions, which is an important indicator for the health system and the ED, is higher in geriatric patients enrolled in HHS, indicate that there is a relationship between HHS and ED admissions. This suggests that making HHS and home care practices more efficient may reduce geriatric patients' ED visits.

Keywords: Home care services, health services, geriatric, emergency department visits, ethics, medical

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INTRODUCTION

Today, the elderly population in societies is increasing due to the improved mean life expectancy, decreased death rate, and developments in medicine. Aging society brings the need for quality long-term care for geriatric patients. A holistic ethical approach should be observed in elderly care and ethical principles such as autonomy, justice, and non-maleficence should be used effectively to increase the quality of care and support for the elderly. There is no single definition of old age accepted by all disciplines and there are many different definitions from physiological, biological, economic, or sociological perspectives, but the chronological definition put forward by the World Health Organization (WHO) is commonly used (1-4). It is not completely accurate to define elderly individuals only with a chronological approach, however when viewed from this perspective, it was reported that the number of individuals aged 60 and over exceeded the number of children under the age of 5 in 2020. It is estimated that by 2050, the population of people aged 60 and over will double its current level, and the number of elderly people aged 80 and over will increase threefold (2). Similar to the changes in the world, it is reported that the elderly population in Türkiye has increased between 2007 and 2023 and the median age has increased from 33.5 to 34 in the last year, while the proportion of the elderly population in the total population has increased from 9.9% to 10.2% (5-7).

Per this information and projections, many new applications are being implemented worldwide to closely monitor geriatric patients and improve their quality of life. Geriatric hospitals, day hospitals, subacute care units, three-generation homes, elderly residences, elderly villages, retirement homes, technological assistant services, and elderly care robots can be listed as some models and services for these applications (8, 9). In Türkiye, the services for the elderly carried out by the Ministry of Family and Social Policies and the health services provided by preventive, curative, rehabilitation, and care carried out by the Ministry of Health are among these regulations (10, 11). Within the framework of the "Turkish Healthy Aging Action Plan and Implementation Program" prepared by the Ministry of Health regarding healthy aging and health protection in the elderly, "Development of Home Health Services (HHS) for the Elderly" has been accepted among the priority intervention plans, and "Ensuring the Organization of Acute Care and Emergencies in Geriatrics" is among other goals and strategies of the program. As mentioned in this program, many studies are being conducted and developments are being made regarding geriatric emergencies (12-15).

Plans made for geriatric patients show that all preventive, treatment and rehabilitative health services are complementary and inseparable parts of elderly care services. Considering that HHS aim to meet the health and social needs of people in their homes and that some of the patients who apply to the emergency department (ED) are elderly and in need of care, it is conceivable that there may be a relationship between the use of HHS and emergency service visits. This study aimed to determine the demographic and general characteristics of geriatric patients who apply to ED and to compare the ED visits of those who use HHS and those who do not use this service.

MATERIALS AND METHODS

The study was conducted as a retrospective file review in a state hospital emergency services department, considering that there was only one ED in the district and that HHS patients could not apply to another ED. Ethics Committee (2023/4381) approval and administrative permission were obtained before the study. No sample calculation was made for the study, and the aim was to access the data of all patients aged 65 and over who applied to the ED between 01.01.2022 and 31.12.2022. Data were collected by scanning patient digital files through the Hospital Information Management System.

Patients registered to the HHS were primarily identified through the HHS system during data collection. HHS patients under the age of 65 in 2022 and patients who were not active in terms of service were excluded from the study, and patients aged 65 and over who applied to the ED for examination were screened. Among these patients, those who applied to the ED for dressing and injection were excluded from the study (Figure 1). Demographic characteristics of the patients included in the study, reasons for admission, how they came to the hospital, and recurrent hospital admissions were recorded.

The obtained data were transferred to the computer and analyzed. The statistical analysis of the findings was done by using Statistical Packages for the Social Sciences (SPSS) 18.0 Windows software package (SPSS Inc., Chicago, IL, US). Descriptive statistical methods (number, percentage, median (min-max), arithmetic mean ± standard deviation) were used in the evaluation of the data. The Kolmogorov-Smirnov test was used to analyze whether the data were normally distributed. Chi-square ($\chi 2$) test was used to compare categorical data, and Mann-Whitney U test was used to compare two groups with nominal data. The status of being registered with HHS and the decision to be hospitalized and treated in the ED were evaluated with Fisher Chi-Square. The level of statistical

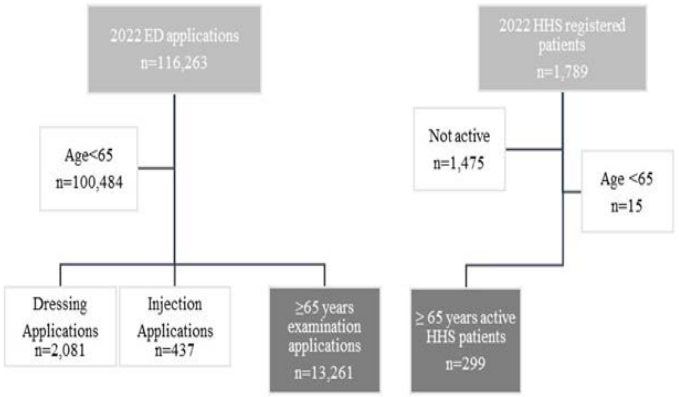

Figure 1. Inclusion and exclusion criteria of the study

significance was accepted as p<0.05.

RESULTS

Of the 116,263 examinations performed in the ED in a year, 11.4% (n=13,261) were done on individuals in the geriatric age group. Other data on the number and characteristics of geriatric visits are presented in table 1.

A total of 1,366 HHS visits were performed in one year. There were 299 patients over the age of 65 registered with HHS and 98.6% (n=1347) of the visits were made to these patients. The median age of patients that were visited was 76 (65-101). Other demographic and general characteristics of the patients are shown in table 2. The median benefit from HHS in a year for geriatric patients registered with HHS was 3 (2-43).

Diagnoses of 13,261 geriatric patients who visited the ED and 1,347 geriatric age group visits registered with HHS were listed according to the 3-digit diagnosis codes of the International Classification of Diseases (ICD). Accordingly, the first three most commonly used ICD 3-digit diagnosis codes are given in table 3.

The median number of repeated applications of geriatric patients who came to the ED for examination in a year was 3

Table 1. Evaluation of Geriatric Patient Applications to the Emergency Department (n=13,261)

Characteristics		n (%)
Gender	Male	5.875 (44.3)
	Female	7.386 (55.7)
Application type	By ambulance	809 (6.1)
	With own means	12.452 (93.9)
Application codes	Green	1.883 (14.2)
	Yellow	11.338 (85.5)
	Red	27 (0.2)
	Black	13 (0.1)
		Median (min- max)
Age		73 (65-107)

Table 2. Characteristics of patients enrolled in Home Health Services (n=299)

Characteristics		Patients Registered for Home Health Services n (%)
Gender		
	Male	126 (42.1)
	Female	173 (57.9)
Dependency Status		
	Semi-Dependent	210 (70.2)
	Fully Dependent	89 (29.8)
Time of Enrollment in Home Health Services		246 (82.3)
	Previously Registered Patient	53 (17.7)
		Median (min-max)
Age		76 (65-101)

Table 3. Most frequent ICD 3-digit diagnosis codes in geriatric patients in emergency department visits and Home Health Service visits

Emergency Department Most common ICD codes	n (%)	Home Health Services Most common ICD codes	n (%)
M79-Other soft tissue disorders, not elsewhere classified	2081 (15.7)	M79- Other soft tissue disorders, not elsewhere classified	136 (36.4)
Z00-General examination and examination of individuals with no complaints or known diagnoses	1215 (9.2)	R54-Old Age	105 (16.7)
J06-Acute upper respiratory tract infections	640 (4.8)	N30- Cystitis	99 (16.0)

Table 4. Characteristics of HHS-registered patients (n=201) and non-HHS registered patients (n=5277) presenting to the emergency department

Characteristics		Patients Presenting to the Emergency Department		
		Registered with HHS n (%)	Not registered with HHS n (%)	p
Gender	Male	80 (39.8)	2301 (43.6)	p=0.284
	Female	121 (60.1)	2976 (56.4)	χ2=1.147
Application Method	By ambulance	41 (20.4)	290 (5.5)	p<0.001
	With own means	160 (79.6)	4987 (94.5)	χ2= 157.696
Treatment Method	Receiving inpatient treatment	36 (17.7)	95 (1.8)	p<0.001
	Receiving outpatient treatment	165 (82.2)	5182 (98.2)	χ2=235.801
		Median (min-max)	**Median (min-max)**	
Age		77 (65-101)	72 (65-107)	p<0.001 U=304.261

(2-45). When evaluated on a patient basis 67.2% (201) of 299 patients registered with HHS applied to the ED, and the rate of repeated applications to ED among these was 73.1%. There were 5,277 patients over the age of 65 who applied to the ED and were not registered with HHS, and the rate of repeated applications among them was 52.6%. A statistically significant difference was found between the repeated application status of patients applying to the ED and being a home health patient ($p<0.001$, $\chi2=32.693$). Moreover, 90.5% of those who used HHS were examined with the yellow zone examination code, while the percentage of yellow-coded examinations in those not registered with HHS was 85.3%. No significant difference was found between whether the patients applying to the ED were examined with a green or yellow code and whether they were registered with the HHS ($p= 0.82$, $\chi2= 3.030$). Other data regarding whether the patients applying to the ED were registered with the HHS are given in table 4.

DISCUSSION

The age distribution of geriatric patients who applied to the ED and received HHS services in our study is consistent with the information in the literature that reports the mean age of 65-99 and the distribution of gender ratios of 51-60%, where the majority is female patients (16-19). Considering this situation, a high prevalence of female patients in ED applications and HHS registrations is expected (20-22). Therefore, it may be important to consider the age and gender factors in terms of the patient group to be served in ED and HHS during planning. In addition, the fact that the mean age of patients who applied to the ED and were registered in HHS was significantly higher suggests that with the arrangements to be made in terms of quality and efficiency in the presentation of HHS for those in the older age group, the ED applications of this patient group may be reduced.

According to the results obtained in the study, the vast majority of active HHS patients are geriatric patients. This is an expected result considering the physical and cognitive losses of geriatric patients and the hearing and vision problems they have. However, considering that life expectancy is shorter in geriatric patients, the fact that HHS patients in this study were more likely to be older patients and that the HHS patient profile consisted of geriatric patients compared to young patients suggests that the care and treatment processes were well managed and that the care of patients is not planned to be temporary and that the right patients are included in the HHS system. Although it is conceivable that a well-functioning HHS structure will have a significant impact on ED admissions, no comparison could be made due to the lack of sufficient studies in the literature (23, 24). Sharing data on ED admission rates of HHS patients in future HHS-focused studies will contribute to the literature.

The significant difference between HHS-registered and non-registered geriatric patients arriving at the ED by ambulance can be explained by the higher mean age and the limited mobility of HHS patients. Due to the limited availability of ambulance services, increased use of HHS transport vehicles can be considered to prevent problems that may occur during transportation of these patients to the healthcare facilities. In addition, considering that most of the geriatric patients not registered at the HHS also require assisted transportation, the fact that the rate of ambulance applications in ED is lower than the 10-11% rate reported in the literature may indicate that a conscious behavior has developed regarding the use of ambulances (25-27). More studies are needed to understand this situation.

When the ED triage codes obtained in our study were examined, the ED yellow zone coding rates of geriatric patients were higher than the 53-75% rate reported in the literature (28, 29). The fact that more tests are requested for geriatric patients and their follow-up periods are longer may be considered as the reason for this. Physician preference or the fact that fewer patients are seen in district conditions may have allowed these patients to be followed up with more yellow zone codes. In HHS patients, this rate is high and reaches 90% in the literature (12). Although there is no significant difference between HHS-registered and non-registered geriatric patients in this regard, the results obtained are consistent with the literature (12,24,25). This situation can be considered as an indicator of the need for other regulatory requirements to be made in the ED organization, such as the establishment of specialized teams in EDs for geriatric patients, especially those registered with HHS, and the importance of a multidisciplinary approach, to prevent the disruption of the treatment processes of other patients in the yellow zone and to demonstrate an ethical approach.

In our study, the rate of geriatric patients applying to the ED was found to be above the TÜİK district center population rate of 65 and over (9.6%). This shows that the rate of the elderly population receiving service from the ED is higher than their share of the population and seems to be consistent with the information presented in the literature (5, 16). The fact that the elderly population receives service from the ED at a high rate will provide important information in terms of the directions in which the services provided by the HHS should be expanded. This situation makes patient diagnoses valuable. Although there are different data in the literature (24, 30), this study shows that geriatric patients mostly come with complaints of soft tissue disorders and then apply for general examination. This situation suggests that HHS services may need to be planned differently for different regions and that more efficient service by primary care and HHS will reduce ED applications. The studies that focus on the use of technological equipment and development of remote examination conditions will be important (31, 32).

The fact that the hospitalization rates of patients admitted to the ED vary greatly in the literature, ranging from 2% to 85% (16, 17, 19, 33, 34) may be related to the medical equipment status, physical structure, and personnel availability in the centers where the studies were conducted. The fact that the rate of inpatient follow-up of geriatric patients was lower in our study suggests that the difficulty of patient follow-up in district conditions and the high probability of referral to other

hospitals caused the hospitalization rate to decrease even further. However, according to the results obtained in our study, the fact that geriatric patients registered with the HHS receive inpatient treatment at a higher rate than non-registered patients supports the study by Benli et al. that the development of home care and health services and the planning to be made in this direction will benefit many situations such as reducing the rates of ED admissions and hospitalizations of geriatric patients and protecting them from hospital infections and resistant microorganisms (35).

Kim et al. reported that elderly patients had higher rates of repeated ED applications (36). Repeated or early applications are one of the most important problems in ED. In addition to being a quality indicator of the provided health services, the repeated applications of elderly patients are a situation that causes concern for ED doctors in terms of reviewing the accuracy of diagnosis and adequacy of treatment (37, 38). The findings obtained in our study were also consistent with the literature in this respect. The fact that HHS-registered geriatric patients in this study had a significantly higher rate of repeated ED applications supports the view that developments in HHS and the widespread use of technology in the field of HHS will reduce ED applications (15, 20, 31).

In conclusion, the fact that the mean age, hospitalization rates, and yellow zone follow-up rates of geriatric patients registered with HHS were higher than those of geriatric patients not registered with HHS indicates that the fragility of the former group was higher. Many results of this study, especially high recurrent ED visit rates, which are an important indicator for the health system and ED, in HHS-registered geriatric patients, show a relationship between HHS and ED applications. This suggests that making HHS and home care practices more efficient may decrease ED applications of geriatric patients. In addition, the ED application rates of geriatric patients are proportionally higher when compared to the rate of the same group in the population. Considering the disadvantaged situation of these patients in accessing health services in the crowded and chaotic environment of EDs, arrangements should be made for faster, more effective, and more efficient provision of ED services for geriatric patients, and international practices should be closely followed.

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OPEN ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Application of Mechanical Negative Pressure Drainage (Cupping Method) for Venous Compromise in Flap Surgery

Flep Cerrahisinde Venöz Yetersizlikte Mekanik Negatif Basınçlı Drenaj Yönteminin (Kupa Yöntemi) Kullanımı

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ÖZET

Amaç: Flep cerrahilerinden sonra ortaya çıkan venöz yetmezlik öngörülemez bir komplikasyon olup flep kaybına kadar ilerleyebilmektedir. Flep ameliyatları sonrasında karşılaşılan venöz drenaj problemlerinin ortadan kaldırılmasına yönelik çeşitli yaklaşımlar tanımlanmış olsa da halen tam anlamıyla çözülmemiştir. Bu çalışmada fleplerde ortaya çıkan venöz yetersizliğin tedavisinde kupa ile mekanik negatif drenaj yönteminin uygulanmasını göstermeyi amaçladık. Sülük ve diğer tanımlanan tedavilere kıyasla daha steril ve kontrollü drenaj sağlayarak işlem süresini kısaltmayı, dolayısıyla flebin venöz yük altında olduğu süreyi minimuma indirmeyi hedefledik.

Hastalar ve Yöntem: Çalışmaya fleplerinde venöz yetmezlik nedeniyle mekanik negatif basınçlı drenaj uygulanan hastalar dahil edildi. Tromboz, hematom ve anastomoz problemlerinden kaynaklanan venöz yetersizlikli olguları çalışma dışı bırakmak için sadece pediküllü ada flebi cerrahisi uygulanan hastalar dahil edildi. Bunun dışında, serbest flepler, perforatör flepler ve cilt bağlantısı korunan flepler de örneklem dışı bırakıldı. Demografik veriler (yaş, cinsiyet), ortalama uygulama süresi ve sıklığı, komplikasyonlar kaydedildi.

Bulgular: Çalışmaya 8 hasta dahil edildi ve ortalama yaş 40,3 olarak bulundu. Dört hastaya paraskapular flep, üç hastaya transvers rektus abdominis kas flebi, bir hastaya ise medial gastroknemius muskulokutan flep uygulandı. Mekanik negatif drenajın ortalama süresi 2,8 gün ve ortalama uygulama sıklığı günde 4,6 idi. İşlemin ortalama süresi ise 2.25 dakika olarak belirlendi. İki hastaya ameliyat sonrası 5. günde marjinal nekroz nedeniyle lokal anestezi altında revizyon ameliyatı uygulandı. Diğer hastaların hiçbirisinde komplikasyonla karşılaşılmadı.

Sonuç: Kupa ile uygulanan mekanik negatif basınçlı drenaj yöntemi literatürde açıklanan diğer yaklaşımlarla karşılaştırıldığında venöz perfüzyon problemine daha pratik ve hızlı çözüm sağlayabilir. Araştırmaya dahil edilen hasta sayısının azlığı başlıca kısıtlayıcı faktör olsa da çalışmanın ana amacı yöntemin uygulanabilir olduğunu ortaya koymaktı. Kontrollü randomize metodoloji ile yapılan geniş popülasyonlu çalışmalar literatüre olumlu katkı sağlayacaktır.

Anahtar Kelimeler: Kupa yöntemi; venöz yetersizlik; flep cerrahisi; mekanik negatif basınçlı drenaj yöntemi

ABSTRACT

Background: Venous insufficiency after flap surgery is an unpredictable complication that can lead to flap loss. Several approaches have been described to eliminate the venous problems after flap surgery, but it still remains unsolved. In this study, we aimed to demonstrate the application of the cupping method to treat the venous compromise in the flaps.

Patients and Methods: Patients with flaps undergoing mechanical negative pressure drainage due to venous compromise were included in the study. Only procedures with pedicled island flaps were included to exclude cases of venous insufficiency due to thrombosis or anastomotic problems. Patients with free flaps, perforator flaps and skin-connected flaps were also excluded. Demographic data (age, sex), mean duration and frequency of application, complications were recorded.

Results: Eight patients were included in the study with a mean age of 40.3 years. A parascapular flap was performed in four patients, a transverse rectus abdominis flap in three patients and a medial gastrocnemius musculocutaneous flap in one patient. The mean duration of mechanical negative pressure drainage was 2.8 days and the mean frequency of application was 4.6 times per day. The mean duration of the procedure was 2.25 minutes. Two patients underwent revision surgery on postoperative day 5 under local anaesthesia due to marginal necrosis of the flap. There were no complications in the other patients.

Conclusion: Compared to other approaches described in the literature, the cupping method may provide a more practical and faster solution for venous congestion. Although the limited number of patients seems to be a limitation of the study, the main priority of the study was to demonstrate the applicability of the method. A large population study with a controlled randomised methodology will make a positive contribution to the literature.

Keywords: Cupping method, venous compromise, flap surgery, mechanical negative pressure drainage method

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INTRODUCTION

The flap concept, which forms the infrastructure of reconstructive surgery, is the most preferred of the repair techniques. Flaps are preferred not only for functional reconstruction of difficult and complicated defects, but also for achieving good cosmetic results in appropriate cases. The techniques of flap surgery have been developed over many years of experience. However, the predictability of surgical procedures is still inadequate. Patient-related factors such as wound healing problems, comorbidities, smoking; trauma-related parameters such as type of injury, wound depth and impact of trauma energy; and surgical-related factors such as pedicle injury during harvesting, flap planning wider than the angiosome, etc. should be addressed among the reasons for flap failure (1-3).

Venous insufficiency after flap surgery is an unpredictable complication that can lead to flap loss (4,5). Venous compromise is theoretically defined as a blockage of venous outflow, although arterial perfusion remains intact for some time. The propensity for thrombosis due to low blood flow velocity and collapse during pedicle rotation manoeuvres are some of the etiological factors of venous perfusion problems. If left untreated, increased venous pressure irreversibly affects arterial flow and tissue perfusion.

Several studies have investigated venous drainage insufficiency in the flaps, but no data are available on the timing of clinical onset of venous compromise. During clinical follow-up, mauve-purple colour changes, shortening of filling time and increasing oedema are the main signs of venous outflow obstruction in the flap (6). After early diagnosis, removal of tissue tension (removal of sutures, etc.), re-adaptation of the flap to the donor area or provision of venous blood drainage from the flap are the most commonly used approaches. Application of heparin solution to the punctured tissue or leech therapy are the methods used to achieve venous drainage (7,8). However, these treatments may not be able to resolve venous compromise and flap failure, especially in the flaps with high tissue volume.

To the best of our knowledge, the treatment method of negative pressure to achieve venous blood drainage from flaps, especially those with high tissue volume, has not been described in the literature. The aim of this study was to demonstrate the applicability of negative pressure drainage tools, used in cupping therapy, in the flaps with venous compromise to provide venous blood drainage. Our aim was to obtain a more sterile and controlled drainage compared to leeches, etc., and to reduce the number and duration of procedures by draining more venous blood at one time using these tools.

PATIENTS AND METHODS

The patients with flaps who underwent mechanical negative pressure drainage due to venous compromise were included in the study. Data were collected retrospectively from case series operated between November 2020 and May 2023. Only procedures with pedicled island flaps were included to exclude cases of venous insufficiency due to thrombosis or anastomotic problems. Patients with free flaps, perforator flaps and skin-connected flaps were also excluded. Approval was obtained from the local ethics committee (2023-0132). Written and verbal consent was obtained from the patients. First, to ensure that the problem was not caused by the haematoma, pedicle tension or pressure in the tunnel, a few stitches were removed and the underlying wound was checked. Mechanical negative pressure drainage was then applied and followed postoperatively by the same surgeon.

Mechanical negative pressure drainage

The device, which is often used for cupping therapy in traditional and complementary medicine, consists of a part that creates negative pressure with its piston and a chamber that collects the venous blood (Figure 1a). First, the area with the venous perfusion problem is prepared for the procedure by cleaning with povidone iodine. After making a tiny incision with an 11 blade scalpel, the chamber is placed centrally (Figure 1b). Vacuum is then applied to connect the parts of the tool. The plunger is pulled out maximally so that drainage can be achieved with the same pressure in all patients. As the amount of blood increases and the tissue swelling decreases, the connection between the chamber and the tissue separates. After removal of the device, bleeding is stopped by applying light pressure to the incisions. Clinical signs of venous insufficiency were the main parameter determining the number of procedures per day. Demographic data (age, sex), mean duration and frequency of use, and complications were recorded.

RESULTS

This retrospective study included 8 patients who underwent mechanical negative pressure drainage due to venous perfusion problems (Table 1). Four of the patients underwent parascapular flap surgery for their axillary defects after removal of hidradenitis suppurativa, while three patients underwent pedicled transverse rectus abdominis muscle (pTRAM) flap after mastectomy. Venous drainage insufficiency occurred in one patient after medial gastrocnemius musculocutaneous flap for knee reconstruction.

The F:M ratio was 4:4 and the mean age was 40.3 years

Figure 1. a-A device used in a cupping treatment; b- An application of the tool in the flap with venous compromise.

Table 1. Characteristic features of the patients included in the study (TRAM: transverse rectus abdominis myocutaneous).

Patients (n)	Age	Gender	Flap	Frequency of mechanical negative pressure drainage (per day)	Duration of mechanical negative pressure drainage (day)	Duration of each session (min)	Complication
1	48	F	TRAM flap	6	3 days	3 min	None
2	52	F	TRAM flap	6	4 days	4 min	None
3	32	M	Parascapular flap	4	2 days	2 min	Marginal necrosis
4	26	M	Parascapular flap	5	2 days	2 min	None
5	27	M	Parascapular flap	4	3 days	1 min	None
6	38	F	TRAM flap	5	3 days	3 min	None
7	33	M	Parascapular flap	3	3 days	2 min	Marginal necrosis
8	66	F	Medial gastrocinemius musculocutaneous flap	4	2 days	1 min	None

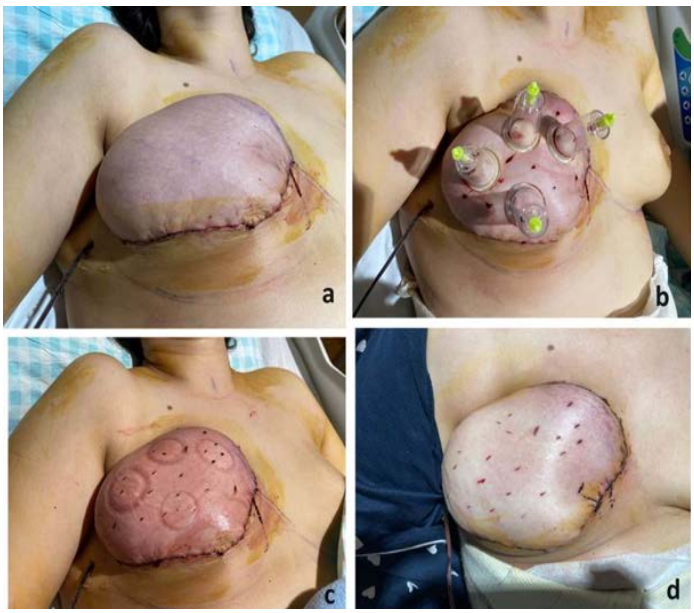

Figure 2. a- venous insufficiency was occurred immediate after the surgery of pedicled transverse rectus abdominis muscle flap for breast reconstruction; b, c- cupping treatment was applied to the several parts of flap in order to obtain adequate venous drainage from the flap; d- venous insufficiency was totally recovered in the postoperative second day.

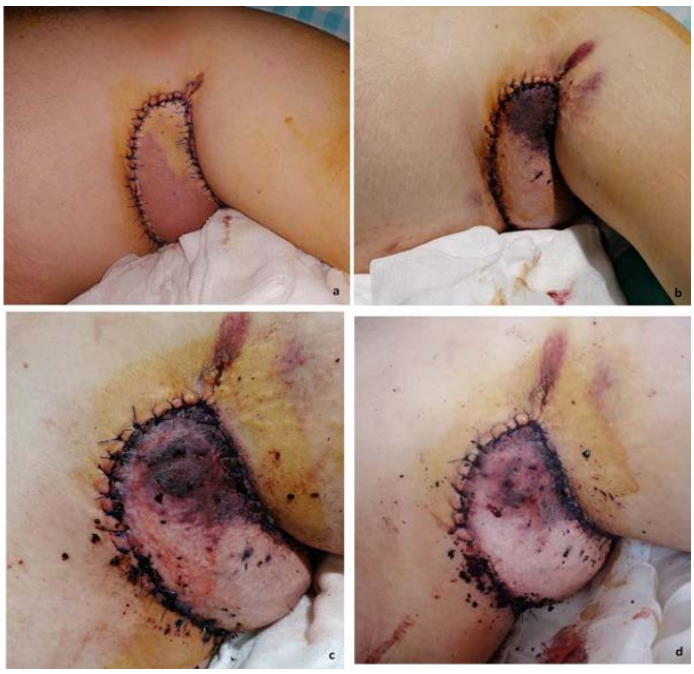

Figure 3. a- color changes were occurred immediate after the flap surgery of parascapular island flap; b- a distal part of the flap had venous insufficiency in the postoperative first day; c- a cupping therapy was applied and recovery was obvious in the postoperative second day; d- there was no need for venous drainage in the postoperative third day and only lateral margin of the flap was revised and restitched.

(min. 26, max. 66). Clinical signs of venous drainage problems were observed in all patients on postoperative day 1. The mean duration of mechanical negative pressure drainage was 2.8 days and the mean frequency of application was 4.6 times per day. Due to the large volume of the pTRAM flap, more than one area was used for safe drainage in each application (Figure 2 a-d). The mean duration of the procedure was 2.25 minutes.

Mean follow-up was 18.6 months. Marginal necrosis occurred in two patients in whom the parascapular flap was revised after debridement under local anaesthesia on postoperative day 5 (Figure 3 a-d). There were no complications in the other patients. After a healing period of one month, no skin deformities caused by the multiple incisions on the flaps were observed.

DISCUSSION

Researches have been carried out to identify venous compromise in the early postoperative period of flap surgery. It has been suggested that differences between systemic and flap blood glucose levels may predict intraoperative venous compromise. It has also been reported that blood glucose >62 mg/dL measured from the flap may predict the possibility of venous compromise for the next 48 hours after surgery with 90% sensitivity (9). It has also been shown that flap perfusion problems can be analysed from photographs using various digital surface scanning software (10). However, once venous compromise has occurred, almost all approaches aim to drain the venous outflow from the flap. One of the most commonly used methods is to bleed a flap with a needle or scalpel and wash with heparinised solution to maintain bleeding for a while (11). In addition, leech therapy is also preferred by the majority of surgeons to achieve continuous bleeding from the tissue (12). This study has shown that controlled bleeding can also be achieved by the mechanical negative pressure drainage method, which appears to be more practical than the above approaches.

In their experimental study, Koh et al. found that flaps could be made more resistant to postoperative complications after preconditioning with the cupping method (13). It was reported that the occurrence of necrosis was minimised after cupping application for 30 min with continuous negative pressure of -25 mmHg for 5 days, which enriched the flaps with vascularisation. In the other study, the cyclic mode of pressure-controlled cupping (0 to -25 mmHg pressure for 30 minutes with the cyclic mode once a day for 5 days) was found to be more effective in increasing flap viability than continuous application (14). In another clinical trial, it was also found to be safe to apply the negative pressure treatments immediately after critical major replantations (15). We studied the drainage of venous blood from the area accumulated in the flap by the cupping method. Although not directly related to flap viability, we aimed to prevent arterial perfusion from being blocked by increasing venous pressure.

The salvage protocols used in venous congestion of the flaps were evaluated in the systematic review (7). According to the results, leech therapy seems to be a safer method compared to the other protocols, as many studies present detailed and comprehensive data on leech treatments. There are several disadvantages of the leech therapy, although it is often preferred by surgeons. Patient compliance is the most important issue, as patients should be taught to adapt to leeches during treatment. Disadvantages include leech care, housing conditions, migration from the target area, infection and uncontrolled bleeding. The heparin effect in the saliva of leeches helps constant bleeding, which is sometimes necessary in certain cases. The amount of venous blood collected in the chamber per session is more than the leeches can provide, thus eliminating the need for additional bleeding after removal of the device, which makes this method safer. The method presented in our study aimed to provide a practical and quick solution for venous congestion in flaps, avoiding the above problems.

Parascapular flaps may present venous insufficiency, especially when applied to axillary defects, due to pressure in the intertriginous area (16). Inadequate venous drainage can be managed with minimal changes in surgical planning. Maintaining skin continuity in certain parts of the flap may obviously reduce the risk of venous insufficiency due to the contribution of the dermal venous plexus. Therefore, we did not include the patients who underwent reconstruction with skin-intact flaps. Patients with perforator and free flaps were also excluded in order to standardise the data, as there are more than one ethiological factors causing venous insufficiency in these cases. In addition, a delay procedure may also be used in pedicled flaps to prevent venous insufficiency (17). Several medical treatments have been proposed to increase the survival rate of flaps, but most of them have been proposed for use in arterial rather than venous problems (18,19).

There are several limitations of the approach we used to address the problem of venous perfusion in this study. Firstly, the cupping method can be described as a practitioner-related treatment, although it is practical to use. In addition, unlike the other vacuum-assisted devices, a number of negative pressure is not clear and the pressure decreases in direct proportion to the amount of blood collected in the chamber. There is no evidence on the amount of venous blood that needs to be drained in case of venous compromise. Similarly, in our study, the recovery of the clinical signs of the flap (return from purple to pink colour, normal capillary refill time, decrease in flap swelling) was the parameter that determined the need for venous blood drainage. With this type of drainage, regular control of the blood count becomes very important, especially in the cases with a high tissue volume such as TRAM or DIEP flaps.

COCLUSION

Venous compromise is one of the most common problems after flap surgery and should be well managed to avoid flap failure. Compared to other approaches described in the literature, the cupping method may provide a more practical and faster solution to venous compromise. Although the limited number of patients seems to be a limitation of the

investigation, the main priority of the study was to demonstrate the applicability of the method. This is a preliminary study in the clinical category and a large population study with a controlled randomised methodology will make a positive contribution to the literature.

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OPEN ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Is The Presence of Subscapularis Tear with Supraspinatus Tear Related to Scapular Morphology?

Supraspinatus Yırtığı İle Birlikte Subscapularis Yırtığının Varlığı Skapular Morfoloji İle İlişkili midir?

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ÖZET

Amaç: Yapılan çalışmalarda skapular morfolojinin supraspinatus yırtıkları ile ilişkili olduğu gösterilmiştir. Ancak subskapularis yırtıkları ile skapular morfoloji arasındaki ilişki tartışmalıdır. Bu çalışmanın amacı supraspinatus yırtığına eşlik eden subskapularis yırtığının skapular morfoloji ile ilişkili olup olmadığını araştırmaktır.

Gereçler ve Yöntem: 2016-2020 yılları arasında ortopedi ve travmatoloji kliniğimizde rotator manşet yırtığı nedeniyle yapılan 679 omuz artroskopisi ameliyatının kayıtları ve görüntülemeleri retrospektif olarak analiz edildi. İzole tam kat supraspinatus yırtığı olan 162 hasta ve supraspinatus yırtığına eşlik eden subskapularis yırtığı olan 83 hasta çalışmaya dahil edildi. Hastaların kritik omuz açısı (CSA), glenoid versiyonu (GV), glenoid inklinasyonu (GI) ve kritik korakoid proses açısı (CCPA) ölçüldü.

Bulgular: İzole supraspinatus yırtığı olan hasta grubunda ve supraspinatus yırtığına eşlik eden subskapularis yırtığı olan grupta; ortalama yaş sırasıyla 53.8±8.9 ve 61.1±8.4 idi ve anlamlı bir fark vardı (P<0.001); ortalama CSA değerleri 36.9º±4. 25º ve 35.6º±5.1º, (P=0.32); GI ortalama değerleri sırasıyla 7.72º±5.4º ve 8.4º±5.3º, (P=0.51); GV ortalama değerleri sırasıyla 2.1º±4,5º ve 2.5º±4.7º, (P=0.85); CCPA ortalama değerleri sırasıyla 21.4º±4.5º ve 22.3º±4.9º, (P=0.73). Cinsiyet açısından gruplar arasında anlamlı bir fark yoktu (P=0.59). Ölçülen açılar, yaş ve cinsiyet kriterleri kullanılarak yapılan lojistik regresyon analizinde, ileri yaşın diğer parametrelerden bağımsız olarak supraspinatus yırtığına eşlik eden subskapularis yırtığı üzerinde etkili olduğu görüldü (P < 0.001 OR:1.09).

Sonuç: İzole supraspinatus yırtığı ile supraspinatus yırtığına eşlik eden subskapularis yırtığı arasında skapular morfolojiye ilişkin radyolojik parametreler açısından anlamlı bir fark olmadığı görülmektedir. Supraspinatus yırtığına eşlik eden subskapularis yırtığında yaş en önemli faktör olarak görünmektedir. Supraspinatus yırtığı olan hastalarda yaşın bir birim (yıl olarak) artması, subskapular yırtık olasılığını 1,09 kat artırmaktadır.

Anahtar Kelimeler: Subskapularis, supraspinatus, skapular morfoloji

ABSTRACT

Aim: In previous studies it has been shown that scapular morphology is associated with supraspinatus tears. However, the relationship between subscapularis tears and scapular morphology is controversial. The aim of this study is to investigate whether or not subscapularis tear accompying supraspinatus tear is related to scapular morphology.

Materials and Method: Records and imaging of 679 shoulder arthroscopy surgeries performed for rotator cuff tear in our orthopedics and traumatology clinic between 2016 and 2020 were retrospectively analyzed. 162 patients with isolated full-thickness supraspinatus tear and 83 patients with subscapularis tear accompanying supraspinatus tear were included in the study. The critical shoulder angle (CSA), glenoid version (GV), glenoid inclination (GI) and critical coracoid process angle (CCPA) of the patients were measured.

Results: In the patient group with isolated supraspinatus tear and in the group with subscapularis tear accompanying supraspinatus tear; The mean age was 53.8±8.9 and 61.1±8.4 respectively, and there was a significant difference (P<0.001); the mean CSA values were 36.9º±4.25º and 35.6º±5.1ºrespectively, (P=0.32); GI mean values were 7.72º±5.4º and 8.4º±5.3ºrespectively, (P=0.51); GV mean values were 2.1º±4,5º and 2.5º±4.7º respectively,(P = 0.85); mean CCPA values were 21.4º±4.5º and 22.3º±4.9ºrespectively, (P=0.73). There was no significant difference between the groups in terms of gender (P=0.59). In the logistic regression analysis performed by using criteria of the measured angles, age and gender, it was observed that advanced age had an effect on the subscapularis tear accompanying the supraspinatus tear, independent of the other parameters (P < 0.001 OR:1.09).

Conclusion: There appears not to be a significant difference between isolated supraspinatus tears and subscapularis tear accompanying supraspinatus tear, in terms of radiological parameters regarding scapular morphology. Age seems to be the most important factor in subscapularis tear accompanying supraspinatus tears. In patients with supraspinatus tear, an increase in age by one unit (in years) increases the odds of subscapularistear by1.09 times.

Keywords: Supraspinatus, subscapularis, scapular morphology

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INTRODUCTION

Subscapularis tear is rare in patients with rotator cuff tear, and incidence is reported to be between 4 and 8% (1, 2). Subscapularis (Ssc) tear generally occurs traumatically owing to forced external rotation and abduction (3) (Figure-1). Ssc tear may occur in isolation, likewise it could co-exist with a supraspinatus (Ssp) tear, or may superimpose on a pre-existing Ssp tear (4) (Figure-2). The majority of rotator cuff tears are related to degeneration, and prevalence data have shown that degenerative cuff tears are associated with age (5, 6). On the other hand, it is a known fact that risk factors caused by different scapular morphologies can accelerate age-related degeneration (7). Previously, it has been shown that the critical shoulder angle (CSA) is a strong determinant in rotator cuff tears (8). According to reports, CSA is linked to common shoulder problems, including osteoarthritis and rotator cuff issues (8, 9). Glenoid inclination (GI), as defined by Mauer et al. (10), has been linked to prevalent shoulder issues like rotator cuff pathology and shoulder osteoarthritis. Tollemar et al.(11) demonstrated that there was no relationship between the coracohumeral distance and Ssc tears . Brunkhorst et al. (12) also indicated in their studies that the coracohumeral distance may vary depending on position of the arm. Wynel-Mayow et al.(13) defined the critical coracoid angle in relation to the glenoid and coracoid, and showed that there is an association between low critical coracoid angle and type-B osteoarthritis.

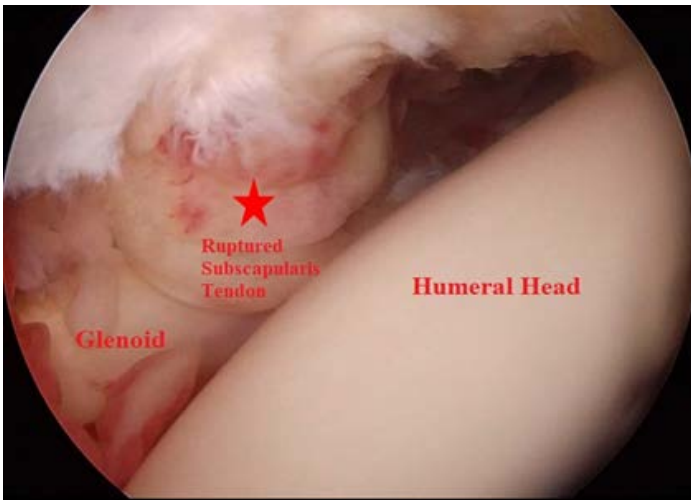

Figure 1. Arthroscopic view of subscapularis tear

Figure 2. Arthroscopic view of supraspinatus tear

Previous studies have shown a relationship between increased critical shoulder angle and Ssp tear. Whereas Watson et al. (14) reported a relationship between coracoid morphology and Ssc tear, Tollemar et al. (11) reported there was no relationship between the two . Although it is widely accepted that isolated Ssp tears and scapular morphology are related, the connection between Ssc tears and scapular morphology remains a subject of debate. This study aims to examine whether the presence of Ssc tears accompanying Ssp tears is associated with scapular morphology.

MATERIALS AND METHOD

Ethical clearance was granted by the "Necmettin Erbakan University Ethical Committee" (IRB number: 2024/4861). Patients who underwent shoulder arthroscopy in the Orthopedics and Traumatology Department of Necmettin Erbakan University Faculty of Medicine between 2016 and 2020 were retrospectively analyzed. Among 679 patients operated on in our clinic due to rotator cuff tear, 83 patients with Ssc tear accompanying Ssp tear (La Fosse type 1 and Type 2) were identified. For the control group, 162 patients who were operated on due to isolated full-thickness Ssp tear were included in the study. Exclusion criteria for the study were history of instability, glenohumeral arthrosis, traumatic rotator cuff tears, history of previous upper extremity fracture, massive irreparable tears, history of previous upper extremity surgery, neurological disease and upper extremity deformity.

The true anteroposterior (AP) radiographs and magnetic resonance imaging (MRI) of both patient groups were assessed. In the true AP radiographs, the CSA was measured by two independent observers in two sessions. The glenoid inclination (GI), glenoid version (GV), and critical coracoid process angle (CCPA) values were also measured in the MRI. The CSA was defined as the angle formed between the line connecting the superior aspect of the glenoid to the inferior aspect of the acromion and the line connecting the inferior aspect of the glenoid to the inferolateral aspect of the acromion (8) (Figure-3).

As Tetreault et al.(15) described, the term GV refers to the angle in the axial plane that is formed by the tangents of two lines. The first line is drawn between the anterior and posterior glenoids, and the second line is drawn from the most medial part of the scapula to the midpoint of the first line (15). The definition of retroversion is a positive angle, while anteversion is a negative angle (15) (Figure-4).

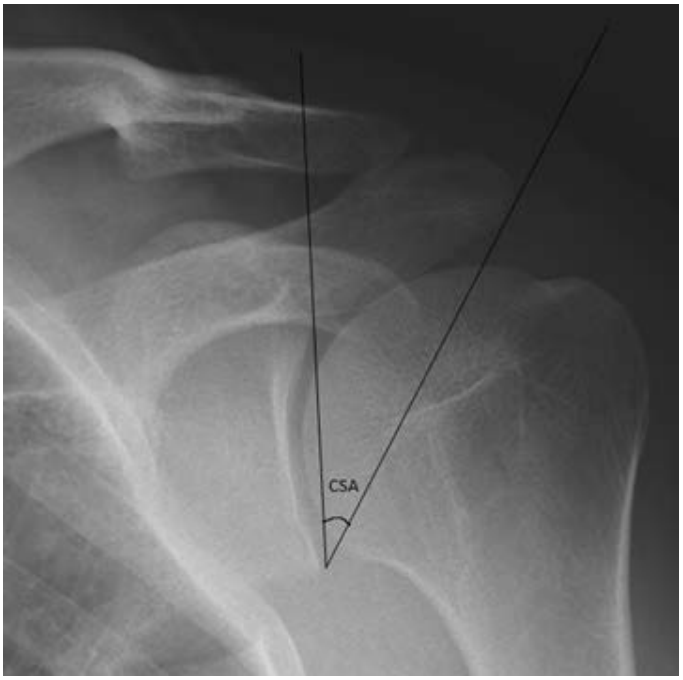

Figure 3. Demonstration of critical shoulder angle (CSA) measurement in a true AP radiograph

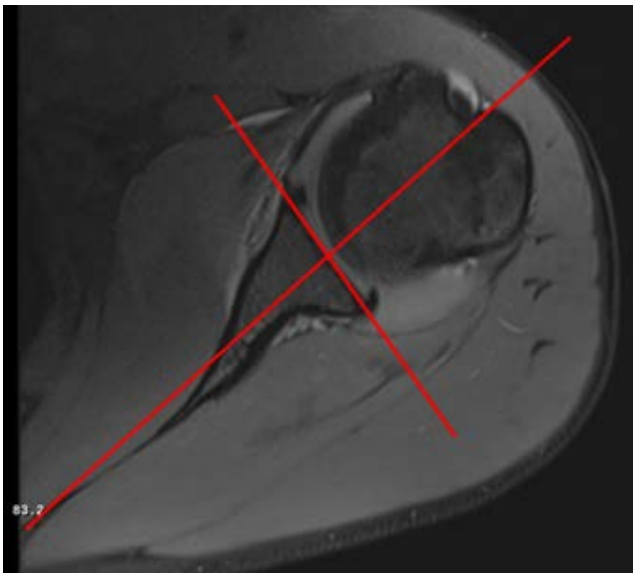

Figure 4. Demonstration of glenoid version measurement by intersecting the scapula body axis lines with a line from the anterior and posterior edges of the glenoid

In a coronal oblique view, the β angle is determined using the scapular body line, which signifies the deepest point on the supraspinatus fossa, and the line that connects the upper and lower glenoid borders, as described by Maurer at al. (10). The Glenoid angle (GI) was determined by subtracting 90° from the angle that is formed by the glenoid surface and the scapular body (β) (10). The upper and lower glenoid angles are referred to as positive and negative angles, respectively (10) (Figure-5).

On computerized tomography, CCPA is defined as the

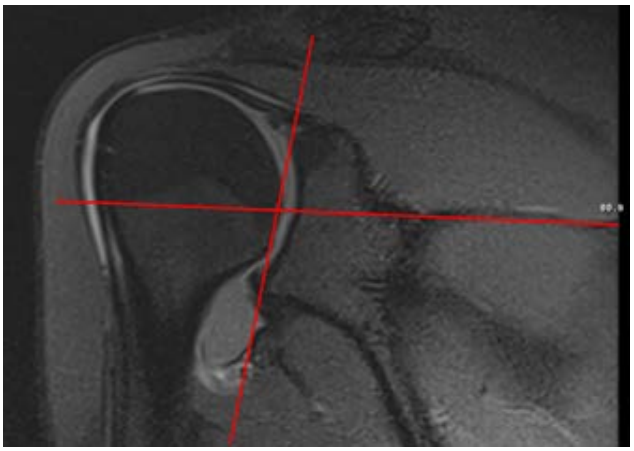

Figure 5. Demonstration of glenoid inclination measurement in a patient with Slap-5 lesion by intersecting the line passing through the superior and anterior borders of the glenoid and the lines passing through the base of the supraspinatus fossa

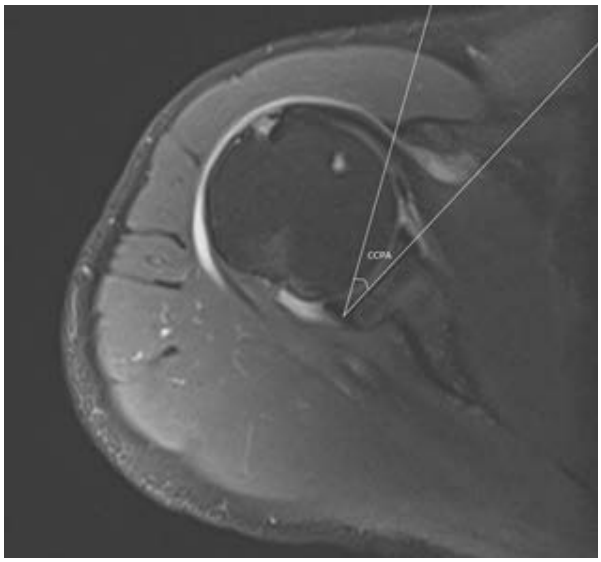

Figure 6. Demonstration of the critical coracoid process angle. The critical coracoid process angle is the angle between the line through the glenoid articular face and the line from the posterior corner of the glenoid to the apex of the coracoid process in the axial section where the coracoid process is most prominent.

angle between the line passing through the glenoid joint surface and the line extending from the posterior corner of the glenoid joint surface to the coracoid apex, in the section where the coracoid process apex is visible in the axial plane (13) (Figure-6). In this study, CCPA measurements were done as described by Wynell-Mayow et al.(13), but only on magnetic resonance imaging.

Data analysis was performed using SPSS software (IBM-SPSS 22.0, Armonk, NY, USA). Descriptive statistics and frequency analysis were used to evaluate the data. In addition, Cronbach's alpha test was used to assess the intra- and inter-class correlations between measurements made by the same observer in two separate sessions two weeks apart, and between measurements carried out by two different observers. The Shapiro-Wilk test was used to check the skewness of the data. T-test and Mann-Whitney U test were used to compare independent sample groups. Statistical significance was established at P<0.05. Logistic regression analysis was performed to investigate which of the radiologic parameters known to be associated with rotator cuff pathologies and age, which are known to be associated with rotator cuff tendon degeneration, had an independent effect on subscapularis tear accompanying supraspinatus tear.

RESULTS

Cronbach's alpha values were between 0.83 and 0.95 for all measurements.Whereas the mean age of the patient group with isolated Ssp tear was 53.8±8.9 (40-79), the mean age of patients with Ssc tear accompanying Ssp tear was 61.1 ±8.4 (48-79), and there was significant difference between the two groups in terms of age (P<0.001) (Table-1). While 97 of the 162 patients with isolated Ssp tear were females and 65 were males, the group of patients with Ssc tear accompanying Ssp tear consisted of 54 females and 29 males, and there was no significant difference between the two groups in terms of gender (P = 0.59 chi-square) (Table-1). While the mean CSA in patients with isolated Ssp tear was 36.9º±4.25º (28.8º/48.2º), it was 35.6º±5.1º (26.4º/45.9º) in the patient group with Ssc tear accompanying Ssp tear, and there was no significant difference between them (P=0.32) (Table-1). While the mean GI values were 7.72º±5.4º (-4.2º / 18.4º) in the patient group with isolated Ssp tear, it was 8.4º±5.3º (-6.7º / 17.9º) in the patient group with Ssc tear accompanying Ssp tear, and there was no significant difference between them (P = 0.51) (Table-1). While the mean GV values were 2.1º±4.5º (-9.5º / 13.1º) in the patient group with isolated Ssp tear, it was 2.5º±4.7º (-9.6º / 13.1º) in the patient group with Ssc tear accompanying Ssp tear, and there was no significant difference between them (P=0.85) (Table-1). While the mean CCPA values were 21.4º±4.5º (11.4º / 32.6º) in the patient group with isolated Ssp tear, it was 22.3º±4.9º (11.2º/39.16º) in the patient group with Ssc tear accompanying Ssp tear, and there was no significant difference between them (P=0.73) (Table-1). In the group of patients with isolated Ssp tears, there was no significant difference between male and female sexes in terms of CSA, GI, GV and CCPA (P=0.27, P=0.79, P=0.60, P=0.18 respectively). In the group of patients with Ssc tear accompanying Ssp tear, there was no significant difference between male and female sexes in terms of CSA, GI, GV and CCPA (P=0.17, P=0.62, P=0.77, P=0.91 respectively). In the logistic regression analysis performed by including the measured angles, age and gender criteria, it was seen thatonly age had an effect on Ssc tear accompanying Ssp tear, independent of other parameters (P<0.001 OR:1.09). In other words, an increase in age by one unit (in years) increases the odds of Ssc tear by 1.09 times.

DISCUSSION

The most important finding of this study is that age has a significant effect on Ssc tear accompanying Ssp tear, and that in patients with isolated Ssp tear and in those with Ssc

Table 1. Patients' Demographic Data

	Isolated Ssp tears (Number of Patients=162)	Ssp tears with Ssc tears (Number of Patients=83)	P-value
Age(years)±SD (min/max)	53.8±8.9 (40/79)	61.1 ±8.4 (48/79)	<0.001
Gender (M/F)	65/97	29/54	0.59
Side (R/L)	89/73	44/36	0.63

Table 2. Mean values and comparisons of radiological measurement parameters

	Isolated Ssp tears (Number of Patients=162)	Ssp tears with Ssc tears (Number of Patients=83)	P-value
CSA ±SD (min/max)	36.9º±4.25º (28.8º / 48.2º)	35.6º±5.1º (26.4º / 45.9º)	0.32
GI±SD (min/max)	7.72º±5.4º(-4.2º / 18.4º)	8.4º±5.3º (-6.7º / 17.9º)	0.51
GV±SD (min/max)	2.1º±4.5º (-9.5º / 13.1º)	2.5º ± 4.7º (-9.6º / 13.1º)	0.85
CCPA±SD (min/max)	21.4º ±4.5º (11.4º /32.6º)	22.3º±4.9º(11.2º / 39.16º)	0.73

(CSA: critical shoulder angle, GI: glenoid inclination, GV: glenoid version CCPA: critical coracoid process angle)

accompanying Ssp tear, the radiological parameters related to scapular morphology are similar.

The rotator cuff muscles serve to centralize the humeral head in the glenoid by pressing it against the glenoid, they as well attempt to neutralize the force exerted by the deltoid muscle, to prevent migration of the humeral head superiorly. Theoretically, as CSA increases, the point of attachment of the deltoid muscle on the acromion shifts more laterally, and as a result the superior vector of the force applied by the deltoid on the humeral head tend to increase, while the medial vector tend to decrease. Owing to an increased CSA, there is an increased superior vector of the deltoid's muscle strength, therefore in order to centralize the humeral head in the glenoid, the force exerted by the rotator cuff muscles must increase accordingly. Rotator cuff tears easily occur due to the increased workload on them, owing to increasing tendon degeneration caused by advanced age and an increased CSA (9). Moor et al. in their study demonstrated that Ssp tear increased significantly in patients with CSA>35º (9). On the other hand, Chalmers et al.(16), in their study investigating the correlation between rotator cuff tear progression and CSA, reported that although they found a significant correlation between CSA and tear sizes, they found a negative correlation between CSA and tear length. They also stated that they could not yet provide a biological explanation for these results . In our study, CSA values in patients with isolated Ssp tear and in patients with Ssc tear accompanying Ssp tear was above 35º, thus being consistent with the study by Moor et al, and there was no significant difference between them (9). In our study, while there was no difference between the two patient groups in terms of the radiological parameters measured, the difference in age may explain Ssc tear accompanying Ssp tear in two ways. The first of these explanations is that the degeneration patterns of Ssp and Ssc tendons may be different; Ssc may degenerate later than Ssp. However, there is no data on this in our study. Secondly, the increase in CSA may biomechanically affect the Ssp more than it does the Ssc, and after Ssp tears, the load on the Ssc to centralize the humeral head in the glenoid may increase further and the degeneration rate of the Ssc may increase indirectly. Repairing supraspinatus tears without neglect can prevent a possible subscapularis tear as it will restore shoulder biomechanics.

In their study, Tetreault et al.(15) indicated that increased glenoid retroversion was associated with Ssp tears. Doğan et al.(17) in their study on patients with Ssp and Ssc tears could not find a significant relationship between rotator cuff tears and GV. Although common theories regarding the etiology of degenerative rotator cuff tears primarily suggest an age-related decrease in tendon tissue quality, the potential importance of bony anatomy remains controversial. While the effects of GV on shoulder biomechanics were investigated in relation to rotator cuff tears, their relationship with glenohumeral instability was also investigated. Whereas Hohman et al.(18) and Aygün et al.(19) found a significant relationship between increased glenoid anteversion and anterior shoulder instability, Moroder et al.(20) and Peltz et al.(21) could not find a significant relationship between GV and anterior shoulder instability. In our study, no significant difference was found in terms of GV between isolated Ssp tear and Ssc tear accompanying Ssc tear. In light of the results obtained in our study on GV and by data in the literature, it appears the relationship between GV and shoulder biomechanics may continue to be controversial.

In their study where they defined the critical coracoid angle, Wynell-Mayow et al. found a significant relationship between low CCPA and shoulder osteoarthritis (13). They detailed the possible biomechanical explanation of this relationship in the following manner; the more medially the coracoid is located, the more medially the conjoint tendon inserting on the coracoid becomes, thus the anterior vector of the force of the pectoralis major, which courses anteriorly to the conjoint tendon decreases. Thus, they interpreted that the anterior-posterior translation balance of the humeral head becomes disrupted and the humeral head tends to be translated posteriorly. In our study, we evaluated the relationship between CCPA, which has been shown to affect the anterior-posterior translation of the humerus, and Ssc tears accompanying Ssp tears, but we could not find a significant relationship. Possible reasons for this may be that the control group did not have patients with normal MRI images without pathology, rotator cuff biomechanics may have been impaired in both patient groups, or that one of the patient groups did not have patients with isolated Ssc tears.

This study had some limitations. Unknown patient professions, activity levels and body mass indexes were a limitation. Unknown patient shoulder complaint duration was a limitation too.

CONCLUSION

There appears not to be a significant difference between isolated supraspinatus tears and subscapularis tear accompanying supraspinatus tear, in terms of radiological parameters regarding scapular morphology. Age seems to be the most important factor in subscapularis tear accompanying supraspinatus tears. In patients with supraspinatus tear, an increase in age by one unit (in years) increases the odds of subscapularis tear by 1.09 times.

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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Evaluation of Methods For Late-Term Abortion, Results of A Tertiary Center

Geç Gebelik Terminasyonu İçin Kullanılan Metodlarının Değerlendirilmesi, Tersiyer Merkez Sonuçları

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ÖZET

Amaç: Fetosid, gebeliğin geç 2. ve 3. trimesterinde fetal kardiyak asistoliye neden olmak için potasyum ve digoksin gibi maddelerin kalp içi, intraamniyotik sıvı veya kordona enjekte edilmesi işlemidir. Bu çalışmada, Türkiye'de Etlik Şehir Hastanesi'nde yapılan fetosid sonrası gebelik terminasyonlarının yöntemlere bağlı komplikasyonları ve sonuçları değerlendirildi.

Gereçler ve Yöntemler: 2022 Ekim ve 2024 Şubat ayları arasında, 22 hafta üzeri fetal anomali tanısı almış gebelik terminasyonları retrospektif olarak incelendi. Fetosid için intrakardiyak potasyum klorür (KCl) kullanıldı. Terminasyon yöntemleri arasında misoprostol, foley katater ve sezaryen değerlendirildi. Hastalar, yönteme göre üç gruba ayrıldı ve demografik verileri, hastanede kalış süreleri, komplikasyonlar ve hemoglobin (Hb) ile hematokrit (Hct) değerleri kaydedildi.

Bulgular: Çalışmaya 92 hasta dahil edildi. Misoprostol uygulanan grupta hastanede kalış süresi diğer gruplardan anlamlı olarak daha kısaydı. Hb ve Hct değerlerindeki değişim açısından gruplar arasında anlamlı fark bulunmadı. Misoprostol uygulanan grup en genç yaş ortalamasına sahipti ve bu grupta parite ve yaşayan çocuk sayısı da diğer gruplardan düşüktü. Terminasyon nedenleri arasında istatistiksel olarak anlamlı fark izlenmedi. Komplikasyon oranları ve Hb düşüşü açısından gruplar arasında anlamlı fark bulunmadı.

Tartışma: Çalışmamızda, misoprostol kullanılan grupta hastanede kalış süresi diğer gruplara göre daha kısa bulundu. Hb ve Hct değerlerindeki değişim istatistiksel olarak anlamlı değildi. Misoprostolün güvenli ve maliyet etkin bir yöntem olduğu, ancak sezaryan ve foley katater yöntemlerinin de güvenli olduğu gözlendi. Literatürle uyumlu olarak, uterus skarı olan hastalarda misoprostol kullanımının güvenli olduğu desteklenmektedir.

Sonuç: Misoprostol, geç gebelik terminasyonunda güvenli ve etkili bir yöntemdir. Ancak sezaryan ve foley katater yöntemlerinin de güvenli olduğu ve komplikasyon riskinin düşük olduğu gösterilmiştir. Klinisyenler, hasta durumuna göre bu yöntemleri güvenle kullanabilirler.

Anahtar Kelimeler: Fetosid, misoprostol, geç dönem gebelik terminasyonu, terminasyon yöntemleri

ABSTRACT

Objective: To evaluate the complications and outcomes associated with different methods of late-term abortion following fetocide in a tertiary care setting.

Materials and Methods: This retrospective study reviewed the data of 92 patients who underwent fetocide and subsequent abortion induction due to fetal anomalies at Etlik City Hospital between October 2022 and February 2024. Patients were categorized into three groups based on the method of termination: misoprostol, Foley catheter, or cesarean section. Key variables such as maternal age, parity, duration of hospitalization, hemoglobin and hematocrit levels, and complications were analyzed using appropriate statistical methods.

Results: The mean age of patients was significantly younger in the misoprostol group compared to the Foley catheter and cesarean section groups (27±4.8 vs. 31±6.7 and 33±4.9, respectively; p=0.026). The misoprostol group also had significantly lower parity and number of living children (p=0.044 and p=0.047, respectively). The duration of hospitalization was shortest in the misoprostol group (p=0.05). No statistically significant differences were found in hemoglobin and hematocrit levels, duration of abortion, or type of fetal anomaly across the groups.

Conclusion: Misoprostol is a safe and effective method for inducing abortion after fetocide, offering the advantage of a shorter hospital stay. Although concerns remain regarding its use in patients with previous uterine surgeries, our findings support its safety. Methods such as Foley catheter and cesarean section also do not significantly increase complications or affect hemoglobin and hematocrit levels. These findings provide reassurance to clinicians regarding the choice of termination method based on patient and clinical circumstances.

Keywords: Fetocide, misoprostol, late-term abortion, termination methods

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INTRODUCTION

Fetocide refers to the deliberate administration of chemicals, such as potassium and digoxin, directly into the heart, amniotic fluid, or umbilical cord. This procedure is performed during the late stages of the second and third trimester of pregnancy to induce fetal cardiac asystole (1). In our country, similar to many other nations, there are no legal restrictions on abortion during any week if there are physical and mental problems in the infant that would result in significant handicap (2). However, the number of live births increases beyond this point, making fetocide a prominent option for termination (2). There are several reasons to perform fetocide before abortion. The utmost priority is to avert the occurrence of a newborn, which has the potential to cause excruciating and distressing experiences (2). Furthermore, there is evidence indicating that the duration of the abortion or delivery procedure is reduced following a successful feticide (3,4). The Royal College of Obstetricians and Gynecologists (RCOG) advises the utilization of fetocide for abortions that exceed 21 weeks and 6 days.

Various techniques are employed worldwide for the purpose of fetocide. The most frequently employed approach is the intracardiac delivery of potassium chloride (KCL), as recommended by the RCOG, which guarantees fetal asystole (5).

Women who have serious congenital defects should be given the opportunity to choose abortion when the condition is diagnosed, and their family should be notified. Abortions performed on fetuses with congenital deformities can result in bleeding, infection, uterine and cervical damage. The risk of these consequences tends to rise as the pregnancy progresses (6). Misoprostol is the preferred method for inducing abortion in Turkey. Misoprostol is a pharmaceutical compound that has been employed for the purpose of inducing abortions throughout the second and third trimesters of pregnancy since 1997. It is an analog of prostaglandin E1 (7). Misoprostol has several benefits, including its ease of use, cost-effectiveness, and availability in several forms. Nevertheless, the utilization of this treatment may be restricted due to the low adherence of patients and the occurrence of adverse effects, which can reach a rate of up to 30% (8). In addition to this, antiprogestins such as mifepristone, cervical osmolytic dilators, Foley catheters, and oxytocin are alternative techniques for inducing medical abortion during pregnancy or labor (9). Another favored approach is the utilization of an intracervical Foley catheter in conjunction with misoprostol. While certain research indicate that this combination results in a shorter abortion length, other studies have shown no discernible difference (10–12).

In this study, as a tertiary center, we evaluated the complications of the procedure and the results depending on the method in patients who underwent abortion after feticide.

MATERIALS & METHODS

In this study, the data of patients who were diagnosed with fetal anomaly based on ultrasound findings, genetic examinations or both, who underwent feticide for the purpose of termination of pregnancy over 22 weeks and who subsequently underwent induction of labor were retrospectively examined in the Perinatology Clinic of Etlik City Hospital between October 2022 and February 2024. Approval of the Ethics Committee AEŞH-EK1-2023-680.

In all of our patients, intracardiac KCl was delivered as a way to induce fetal death. During this treatment, a volume of 2-3 ml of potassium chloride was introduced using ultrasound guidance. The fetal heartbeat was observed for around 5 minutes until it stopped and the loss of the fetal heartbeat was confirmed by Doppler flow. Following the termination of the fetus, the patients were provided with comprehensive information regarding the available alternatives, including misoprostol, Foley catheter, and cesarean delivery. Patients were granted the autonomy to select among the available alternatives. Subsequently, for the patients who agreed to take misoprostol, the suitable protocol was implemented in accordance with the misoprostol guidelines established by the International Federation of Gynecology and Obstetrics (FIGO), taking into consideration the patient's gestational age (13). Labor induction was performed in those who chose a Foley catheter by placing the catheter into the cervix and inflating it to a volume of 40-60 cc. Patients with medical indications for cesarean delivery under suitable conditions underwent cesarean delivery. The patients were categorized into three groups based on their chosen method: group 1 consisted of those who utilized misoprostol, group 2 included those who underwent a Foley catheter, and group 3 comprised those who underwent a cesarean section. Following the initiation of the abortion procedure, we noted the duration of labor, length of hospital stay, any difficulties that arose, the mode of delivery, as well as the hemoglobin (HB) and hematocrit (HTC) levels before and after birth. In addition, the demographic data of the patients, the weeks of pregnancy and the genetic results, if available, were evaluated.

Statistical Analysis

All statistical analyzes were performed using the RStudio to analyze the data. The variables were investigated using visual (histogram, probability plots) and analytic methods (Kolmogrov-Simirnov/Shapiro-Wilk's test) to determine whether or not they are normally distributed. Levene test was used to assess the homogeneity of the variance. Descriptive analyses were presented using means and standard deviation for normally distributed variables. One-way ANOVA was used to compare this parameter among the groups. For the non-normally distributed numerical data, descriptive analyses were presented using medians and quartiles (Q1-Q3). Kruskal-Wallis tests were conducted to compare these parameters among the antenatal corticosteroid treatment groups. The Dunn test was performed to test the significance of pairwise differences using Bonferroni correction to adjust for multiple comparisons. For the categorical variables, descriptive analyses were presented using frequency and percentage. Relationships between categorical variables were analyzed with the Chi-square test or Fisher's exact test (when chi-square test assumptions do not hold due to low expected cell counts). An overall 5% type-I error level was used to infer statistical significance. A p-value of

less than 0.05 was considered to show a statistically significant result.

RESULTS

The study comprised 92 patients who had abortion with feticide. The mean age of the mothers was 27±4.8 in the misoprostol group, 31±6.7 in the Foley catheter group, and 33±4.9 in the cesarean section group. It was found that the misoprostol-treated group was significantly younger than the other groups in terms of age (p = 0.026, Table 1). Parity and the number of living children were also significantly lower in the misoprostol group (p=0.044 and p=0.047, Table 1).

We assessed many factors in the patients, including their history of previous abortions, gestational age, body mass index (BMI), abortion duration, hemoglobin and hematocrit levels at admission, as well as the percentage change in hemoglobin and hematocrit levels following the abortion. There was no statistically significant disparity observed between the groups, as indicated in Table 1.

When comparing the duration of hospitalization (in hours) across the groups who received misoprostol, Foley catheter, and cesarean surgery, the group that received misoprostol had a substantially shorter hospital stay (p = 0.05, Table 1). No statistically significant difference was observed between the Foley catheter and cesarean section groups (p = 0.911, Table 1). The majority of abortions were performed due to fetal abnormalities. Out of them, there were 22 syndromes, 22 central nervous system anomalies, and 16 cardiac anomalies. No statistically significant difference was found between the indications (p = 0.206, Table 2). The genetic diagnosis of these patients was determined using amniocentesis (AS) in 52 cases, chorionic villus sampling (CVS) in 2 cases, and umbilical cord blood sample in 4 cases. Genetic diagnosis was not established in 28 cases, as indicated in Table 2. The ultrasound results in these cases indicated significant structural abnormalities in the fetus.

The majority of our indications for prenatal genetic tests were determined by ultrasound findings, accounting for 58.6% of cases. Only 8 patients (8.6%) underwent invasive procedures for genetic testing, as the prevalence of prenatal screening was high. No genetic diagnosis was made in 28 patients. When we analyzed these groups according to the termination method, no statistically significant difference was found between them (Table 2).

Uterine rupture occurred as a complication in the misoprostol group among the patients included in our study and this case had emergency surgery for this reason.

DISCUSSION

In our study, we investigated the termination methods after fetocide in the 2nd trimester, the duration of hospitalization and the changes in the patient's HB and HTC levels. The length

Table 1. Maternal Characteristics of the Pregnant Womans Included in the Study

	Group I (Misoprostol) (n=48)	Group II (Foley Catheter) (n=30)	Group III (Caesarean Section) (n=14)	p
Maternal age(year)	27.2±4.83	31.3±6.75	32.7±4.92	0.026[a]
Gravida	2 (1-3)	2 (2-3)	3 (2-4)	0.148
Parity	1 (0-1)	1 (1-2)	2 (1-2)	0.044[b]
Number of living children	1 (0-1)	1 (0-2)	2 (1-2)	0.047[c]
Abortion	0 (0-1)	0 (0-1)	0 (0-1)	0.939
BMI (kg/m^2)	26 (23-27)	26 (25-27)	26 (22-31)	0.372
Gestational age at abortion (week)	23 (22-25)	23 (22-29)	26(25-28)	0.059
Duration of hospitalization (hour)	36 (24-48)	48 (48-72)	48(48-48)	0.005[d]
Duration of abortion(hour)	15 (11-22)	24 (9-33)	0.162ϕ	
Pre-abortion hemoglobin (g/l)	12.2±0.99	11.5±1.07	11.6±1.33	0.162
Pre-abortion hematocrit (%)	37 (35-40)	35 (33-38)	37 (32-39)	0.237
Post-abortion hemoglobin (g/l)	11.7±1.13	10.8±1.32	10.5±1.14	0.024[c]
Post-abortion hematocrit (%)	36±3.6	32±3.4	32±2.8	0.019[b]
Difference between hemoglobins (%)	2 (1-6)	6 (0-12)	9 (8-10)	0.057
Difference between hemoglobins (g/l)	0.25 (0.13-0.68)	0.8 (0-1.4)	1 (0.9-1.2)	0.066

BMI: Body mass index. Data are expressed as mean±SD, median and quartiles (Q1-Q3), or number (percentage) where appropriate. A p value of <0.05 indicates a significant difference. Statistically significant p-values are in bold.

ϕ Caesarean Section group was not included in the statistical analysis.

[a]Statistical significance is between groups I-II and I-III. There is no statistical significance between groups II-III. Post-hoc analysis: LSD

[b]No statistically significant difference was found in the post-hoc analysis when comparing the groups with each other. Post-hoc analysis: Dunn adjusted with Bonferroni correction.

[c]Statistical significance is between groups I-III. There is no statistical significance between groups II-III and I-II. Post-hoc analysis: Dunn adjusted with Bonferroni correction.

[d]Statistical significance is between groups I-II. There is no statistical significance between groups II-III and I-III. Post-hoc analysis: Dunn adjusted with Bonferroni correction.

Table 2. Perinatal and Genetic Outcome of the Pregnant Womans Included in the Study.

	Group I (Misoprostol) (n=48)	**Group II (Foley Catheter) (n=30)**	**Group III (Caesarean Section) (n=14)**	**p**
Birth weight (gr)	670 (495-880)	955 (850-1004)	760 (595-933)	0.052
Indications for termination				
Multiple anomalies	12 (25)	10 (33.3)	6 (42.9)	0.206
CNS anomaly	10 (20.8)	12 (40)	8 (57.1)	
Cardiac anomaly	14 (29.2)	2 (6.7)	0 (0)	
Others	12 (25.0)	6 (20)	0 (0)	
Genetic diagnosis				
Amniocentesis	28 (58.3)	16 (53.3)	8 (57.1)	0.164
Chorİonous vİllus sampllng	0 (0)	2 (6.7)	0 (0)	
Cordocentesis	0 (0)	2 (6.7)	2 (14.3)	
Fetal skin biopsy	2 (4.3)	2 (6.7)	0 (0)	
Patients without genetic diagnosis	18 (37.5)	8 (26.7)	4 (28.6)	
Prenatal genetic diagnosis indications				
Prenatal high risk screening test	2 (4.2)	6 (20)	0 (0)	0.546
Patients with ultrasound findings	28 (58.3)	16 (53.8)	10 (71.4)	
Fatal congenital anomaly (genetic evidence without effect on prognosis)	18 (37.5)	8 (26.7)	4 (28.6)	

CNS: Central nervous system. . Data are expressed as median and quartiles (Q1-Q3), or number (percentage) where appropriate. A p value of <0.05 indicates a significant difference. Statistically significant p-values are in bold.

of hospital stay was considerably reduced in the misoprostol group compared to the other groups (p = 0.013). The percentage difference in the variations of HB and HTC values in these patients did not show statistical significance.

When we compared the termination methods in our study based on the demographic characteristics of the patients, we found that the group receiving misoprostol was the youngest group of patients. The difference between the groups was statistically significant, especially between misoprostol and the other 2 groups (p = 0.026). In the group that received misoprostol, there was a significantly lower number of living children and pregnancies compared to the other groups (p = 0.044 and p = 0.047, Table 1). We assume that this situation is due to doctors and patients avoiding the use of misoprostol, considering that the number of cesarean sections increases with the age of the patients and the number of gravidities. Out of the patients who asked for a cesarean section, 8 of them (57.1%) also sought a bilateral tubal ligation. Patients with uterine scars during abortions have become a significant category as a result of the rising rates of cesarean section during the past two decades (14). The existing literature lacks sufficient data regarding the safety of misoprostol usage, particularly in individuals who have undergone three or more cesarean sections (14,15). In a meta-analysis published by Andrikopoulou et al., they found that the rate of uterine rupture in patients with a cesarean section was similar to that in patients without a uterine scar, but that the risk of uterine rupture increased 17-fold in patients with 2 or more previous cesarean sections with the use of misoprostol. This meta-analysis revealed a greater incidence of placental retention and the requirement for blood transfusions in patients with uterine scars (16). Ho et al. discovered that the use of misoprostol in abortions should be decreased starting from the 22nd week (17). This situation, which is consistent with our study, explains the increasing use of gravida and methods such as Foley catheters and cesarean section with increasing age.

There are studies on the safety of misoprostol. The use of misoprostol, especially in patients with previous uterine surgery, is still a medical problem for doctors in our country. In a study conducted by Dickinson et al. it was discovered that administering 400 mcg of misoprostol every 6 hours to patients with a prior uterine scar did not impact the length of abortion and did not lead to additional difficulties when compared to pregnant women without a uterine scar (18). In a study conducted by Berghella et al., it found that patients with a lower segment uterine incision had a uterine rupture rate of 0.4%, a hysterectomy rate of 0%, and a transfusion requirement of 0.2% (19). Fawzy and AbdelHady administered a low dosage of misoprostol on the first day to women with uterine scarring. For those who did not respond, the dosage was increased twofold on the second day. This application had a success rate of 90% without any issues (14). Nevertheless, there are

still research papers that advocate for the use of misoprostol in low doses and advise avoiding increasing the dosage in patients who have a prior cesarean scar on the uterus due to safety concerns (20). In our study, however, we had one patient with a complication in the misoprostol group. She underwent surgery for a uterine rupture. We did not have a patient who had to undergo a hysterectomy. Our results indicate that the use of misoprostol is safe.

Severe fetal deformities are the primary reason for using intracardiac potassium chloride (KCL) to terminate most pregnancies, as stated in the literatüre (9,21). The rates of medical termination in the 2nd and 3rd trimesters have shown a substantial increase in recent years. The cause of this predicament is the escalating efficacy of 2nd Trimester fetal anatomical screening ultrasounds (22). The diagnosis of 70% of terminated pregnancies occurs during the second or third trimester (23). All termination indications in our study were exclusively related to fetal or chromosomal abnormalities. We categorized individuals based on syndromes, central nervous system anomalies, cardiac anomalies, and other factors. No statistically significant difference was seen between the kind of fetal abnormality and the technique of termination, as indicated in Table 2. Cayrac et al. did a study where they reported that the average gestational age of patients who underwent fetocide was 23 weeks and 2 days (22). In our study, the average gestational age at termination was 23 (22-25) in the misoprostol group, 23 (22-29) in the Foley catheter group and 26 (25-28) in the cesarean section group. Although the average gestational week in the cesarean group was 26, there was no statistically significant difference seen between the termination method and the gestational week.

Multiple studies have demonstrated that Misoprostol effectively speeds up the process of expelling a fetus during the middle trimester by 40-50% and decreases the necessity for dilation and curettage. Additionally, it has been proven to be a safe method (9,24,25). Our investigation revealed no discernible distinction in the duration of abortion between the group administered misoprostol and the group administered a Foley catheter. Nevertheless, our findings indicate that the duration of hospitalization was shorter among the participants who utilized misoprotol compared to those who employed alternative treatments.

There exist scholarly investigations in the body of literature about maternal hemorrhage problems during abortion. In their investigation, Chapman et al. showed a link between prior uterine surgery and the need for blood transfusions (26). In their study, Ruano et al. found that using fetocide during terminations can effectively decrease hemorrhage in individuals with complete placenta previa (27). However, to our knowledge, there is no study in the current literature examining the effect of the termination procedure on the change of hb and htc levels. Our current study on this subject shows that there is no statistically significant change in the percentage and value of hb and htc values ($p = 0.162$ and $p = 0.237$). Indeed, the patient asserts that the likelihood of experiencing a reduction in hemoglobin levels that would lead to an increase in morbidity is minimal, even if the patient undergoes a cesarean section. Nevertheless, further research is required on this topic.

The main limitations of our study are that it is a retrospective study and the number of patients is relatively small. Our research findings confirm that the administration of misoprostol is safe for patients with uterine scarring, consistent with existing literature. In addition, hb and htc values were evaluated within 3 termination methods, and the change was not statistically significant. Even when the caesarean section method is used for termination, it does not appear to be an important factor in increasing morbidity.

Our recommendation to clinicians: The duration of hospitalization was significantly shorter in the group receiving misoprostol, misoprostol was cost-effective; simultaneously, both groups can utilize this shared approach without any disparity in terms of problems or a reduction in HB levels. However, we maintain the belief that utilizing procedures such as cesarean section or Foley catheter on the patient, regardless of the reason, does not result in any rise in problems, reduction in HB-HTC levels, or heightened requirement for blood transfusion. This can provide doctors with a sense of security.

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DERLEME / REVIEW

Artificial Intelligence Studies and Data Analysis in Chronic Lymphocytic Leukemia: A Current Review

Kronik Lenfositik Lösemide Yapay Zeka Çalışmaları ve Veri Analizleri: Güncel Derleme

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ÖZET

Yapay zeka, bilgiyi bir nesne olarak kabul eden, ondan bilgi çıkaran, bu bilginin ifade edilme yollarını araştırıp analiz eden ve daha sonra bu yöntemleri insanın entelektüel faaliyetini simüle etmek için uygulayan bir bilgi projesi olarak tanımlanabilir. Yapay zekanın, makine öğrenimi ve derin öğrenme dahil olmak üzere tıbbi uzmanlıklara çok benzeyen çeşitli alt alanları vardır. Derin öğrenme algoritmalarının veya çeşitli işlem katmanlarına sahip yapay sinir ağlarının, karmaşık doğrusal olmayan giriş-çıkış etkileşimlerini simüle etme ve düşük seviyeli veri temsillerinden desen tanımlama ve özellik çıkarımı gerçekleştirme kapasitesi, bu alandaki ilerlemeden büyük ölçüde sorumludur. Hematolojide yapay zeka son yıllarda dramatik ilerleme kaydetti. Ancak bu ilerlemenin büyük bir kısmı görünüşte dağınıktır ve bir hematoloğun takip etmesi zor olan tutarlı bir yapıdan yoksundur. Kronik lenfositik lösemi (KLL) ileri yaşlarda ortaya çıkan özel bir hematolojik kanser türüdür. Hastalığın patogenezinde monoklonal B hücrelerinin kanda, kemik iliğinde, dalakta ve lenf düğümlerinde kontrolsüz ve aşamalı olarak çoğalması sorumludur. KLL'li hastalar son derece değişken klinik seyirlere sahiptir ve genel sağkalım süreleri birkaç aydan on yıllara kadar değişebilir. Hastaların %30'unun hiçbir zaman tıbbi tedavi ihtiyacı olmamaktadır. KLL'nin aşırı heterojenliği göz önüne alındığında, yeni prognostik modellerin geliştirilmesi kaçınılmazdır. Şu anda, giderek artan sayıda araştırma, yapay zeka tabanlı modellerin KLL'yi ne kadar iyi teşhis edebildiğini ve prognozu tahmin edebildiğini göstermektedir. Bu makalede, kronik lenfoid lösemi tanısında yapay zekanın radyoloji, patoloji, genetik, tanısal ve terapötik uygulamalarına özel olarak odaklanarak hematolojide yapay zekanın güncel bir incelemesini sunacağız. Yapay zekanın kronik lenfositik lösemide mevcut en son teknoloji kullanımını ve gelecekteki potansiyel kullanımlarını gösteren seçilmiş makalelerden bir derlemeyi tartışacağız.

Anahtar Kelimeler: Kronik lenfositik lösemi, makine öğrenme, teşhis, yapay zeka

ABSTRACT

Artificial intelligence (AI) is characterized as a knowledge project that views knowledge as an object, draws conclusions from it, investigates and evaluates the forms that knowledge takes, and then uses these techniques to mimic human thought processes. Certain subfields of AI, such as machine learning and deep learning, bear a strong resemblance to medical specializations. The main driver of progress in this field is the ability of deep learning algorithms, or artificial neural networks with multiple processing layers, to simulate intricate nonlinear input-output interactions and to identify patterns and extract features from low-level data representations. AI in hematology has made dramatic progress in recent years. However, much of this progress is seemingly scattered and lacks a coherent structure that is difficult for a hematologist to follow. Chronic lymphocytic leukemia (CLL) is a special type of hematological cancer that occurs in older ages. Uncontrolled and gradual proliferation of monoclonal B cells in the blood, bone marrow, spleen and lymph nodes is responsible for the pathogenesis of the disease. Patients with CLL have extremely variable clinical courses, and overall survival times can range from several months to decades. Thirty percent of patients never need medical treatment. Given the extreme heterogeneity of CLL, the development of new prognostic models is inevitable. Presently, there is a growing body of research demonstrating the effectiveness of AI-based models in diagnosing and determining the prognosis of CLL. In this article, we will present an up-to-date review of AI in hematology, with a special focus on the radiology, pathology, genetics, diagnostic, therapeutic applications of AI from an AI perspective in the diagnosis of CLL, a specialized cancer of hematology that appears in advanced age. We will discuss a selection of selected papers demonstrating the current state-of-the-art use of AI in CLL and its potential future uses.

Keywords: Chronic lymphocytic leukemia, machine learning, diagnosis, artificial intelligence

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INTRODUCTION

Artificial intelligence (AI) can be defined as a knowledge project that accepts information as an object, extracts knowledge from it, investigates and analyzes the ways in which it is expressed, and then applies these methods to simulate human intellectual activity (1). AI is the general term for the science of artificial intelligence. In addition to teaching computers to mimic human intelligence, it also employs computers to model human cognitive processes including learning, judgment, and decision-making. AI was initially just a collection of "if-then" rules. Over several decades, it has advanced to solve extremely complex and sophisticated algorithms. AI has several subfields, much like medical specializations, including machine learning (ML) and deep learning (DL).

AI can be applied to situational analysis. After then, the machine can "learn" this data and use the prediction tool in future instances that are similar. It can provide a dynamic shift to clinical decision-making to tailor patient care rather than adhering to a set methodology (2, 3). It has revolutionized labor productivity, reduced labor expenses, optimized the structure of human resources, and created new job demands. It plays an indispensable role in social development (4).

The capacity of deep learning algorithms, or artificial neural networks with several processing layers, to simulate intricate nonlinear input-output interactions and carry out pattern identification and feature extraction from low-level data representations, is largely responsible for this advancement. It has been demonstrated that certain deep learning models can perform on par with or better than current machine learning and quantitative structure-activity relationship (QSAR) approaches for drug development (5-7).

Monoclonal B cells proliferate uncontrollably and progressively in the blood, bone marrow, spleen, and lymph nodes in chronic lymphocytic leukemia (CLL), a mature B-cell neoplasm (8). It is recommended to use flow cytometry to verify the clonality of B cells in peripheral blood. Collectively, CD5, CD19, CD20, and CD23 are surface antigens on B cells expressed by CLL cells. Generally speaking, normal B cells express more of CD19, CD20, and CD79b than surface immunoglobulins (9).

Patients with CLL have extremely varied clinical courses, and their overall survival times might range from several months to decades. Thirty percent of patients never need medical attention. The disease burden and treatment indications are determined using two distinct staging systems: Modified Rai and Binnet. The typical survival in early stage disease (Rai 0 or Binet A) is more than 10 years, while the average survival in advanced stage disease (Rai III-IV or Binet C) is about 2-3 years (10,11). The Chronic Lymphocytic Leukemia-International Prognostic Index (CLL-IPI) has been utilized in risk classification in recent years. It includes genetic data (age, clinical stage, beta-2 microglobulin, IGVH (immunoglobulin heavy chain variable) mutation, 17p deletion, and/or p53 mutation) as well (12).

Given the highly heterogeneous nature of CLL, the development of new prognostic models is inevitable. Presently, there is a growing body of research demonstrating the effectiveness of artificial intelligence-based models in diagnosing and determining the prognosis of CLL. In this article, we will present an up-to-date review of AI in hematology, with a special focus on the radiology, pathology, genetics, diagnostic, therapeutic applications of AI from an AI perspective in the diagnosis of chronic lymphoid leukemia, a specialized cancer of hematology that appears in advanced age.

Literature search strategy

In October 2023, the EMBASE and PubMed/MEDLINE databases were used to conduct a literature search of all papers using CLL machine learning applications. The search technique included terms associated with CLL (such as "chronic lymphatic leukemia," "chronic lymphocytic leukemia," and "CLL") as well as terms related to machine learning (such as "Artificial Intelligence," "machine learning," and "neural network").

Artificial Intelligence Applications in Chronic Lymphocytic Leukemia

Baseline peripheral blood samples were taken from 247 CLL patients who were not receiving treatment at The University of Texas MD Anderson Cancer Center and processed in accordance with the protocol in a prior study. Following established techniques, the somatic mutation status of IGHV genes and ZAP70 (zeta-associated protein 70) expression, as determined by flow cytometry or immunohistochemistry, were evaluated on blood or bone marrow samples. In the study, two experiments ("A" and "B") were subjected to k-medoid clustering using ten distance measurements in accordance with the Döhler hierarchy, with the assumption that this approach may identify prognostic groupings in CLL. Survival analysis employing the Cox analysis model, the log-rank test, and Kaplan-Meier curves was used to evaluate the prognostic efficacy. The results of the analysis showed statistically significant relationships between clusters and significant survival outcomes, which were represented as a "spectrum" of subgroups using multidimensional scaling. This approach identified known binary markers of prognosis and outcome with a high degree of accuracy (13).

A study including 737 treatment-naive CLL patients diagnosed at the Mayo Clinic used inverse probability of censoring weighting (IPCW) as a method for time-to-event data analysis. Along with the traditional logistic regression (LR) model, we used well-known machine learning approaches in our classification study, such as Support Vector Machines (SVM), Random Forests (RF), and Gradient Boosting Machines (GBM). While ML techniques did not yield appreciably better time to first treatment predictions, automated risk stratification via clustering outperformed models created with traditional survival analysis techniques in identifying patients at risk for treatment within a year. Finally, this study suggests a technique that clusters the finite probabilities of predictive ML models to automatically produce distinct risk strata. It has been demonstrated that conventional ML techniques can yield longitudinal prognostic information by adding a clustering

step (14).

For feature selection in genome-scale data sets, Morabito et al. present DeepSHAP Autocoder Filter for Gene Selection (DSAF-GS), a revolutionary deep learning and explainable AI-based method. Using a gene expression profiles database with over 20,000 genes, DSAF-GS was utilized to identify genes that were predictive of the prognosis of 217 cases of chronic lymphocytic leukemia. For additional examination, the top ten genes were chosen. The ten genes that were chosen had a predictive power on time to first treatment (TTFT) in CLL, according to univariate studies in a basic prognostic model that included IGHV mutation status, del(11q) and del(17p), NOTCH1 mutations, beta-2-microglobulin, Rai stage, and B-lymphocytosis. Only the genes IGF1R (hazard ratio [HR] 1.41, 95% CI 1.08-1.84, P=0.013), COL28A1 (HR 0.32, 95% CI 0.10-0.97, p=0.045), and QTRT1 (HR 7.73, 95% CI 2.48-24.04, p<0.001) showed a significant association with TTFT in multivariate analyses when combined with the prognostic factors of the basic model. Additionally, the model's goodness of fit increased, suggesting that it performed better than the baseline prognostic model (c^2 = 20.1, p = 0.002). DSAF-GS concluded by identifying the gene group critical to the prognosis of CLL and offering recommendations for future paths in biomolecular research (15).

Vergnolle et al. used data recording to classify 654 patients (446 peripheral blood samples, 193 bone marrow samples, and 15 pleural fluid samples) and generated clinical diagnoses. B-cell neoplasms with various diagnoses (CLL, lymphoplasmacytic lymphoma (LPL), marginal zone lymphoma (MZL), and mantle cell lymphoma (MCL)) were designated based on this patient classification. Combining biological knowledge with mathematical techniques like regression tree (CART) models and classification algorithms produced a decision tree that correctly detects mature B-cell neoplasms. The CD5, CD200, FMC7, and CD43 were evaluated in this intricate decision tree. The Random Forest method was used to examine the outcomes. The primary finding regarding CLL is that users can diagnose and classify adult B-cell neoplasms with ease using the decision tree, which is also suggested for this purpose. Just three markers CD5, CD43, and CD200 integrated into AI research are sufficient to identify the majority of CLL cases. There's a chance that this research will boost productivity (16). Hoffman et al. examined the prediction power of explainable artificial intelligence (XAI) techniques to anticipate results by examining multiparameter flow cytometry (MPFC) data from peripheral blood samples belonging to 157 individuals with chronic CLL. Furthermore, results based on unique cell populations in MPFC dot plots were expected to be shown by XAI. Cell populations that were predicted to have poor outcomes (death, failure of first-line treatment) were identified using the ALPODS XAI algorithm. Through the use of receiver operating characteristic (ROC) curves, the diagnostic capacity of each XAI population was evaluated. ROC (AUC; 0.95 vs. 0.78) showed that 17 populations in the trial were better able to classify clinical outcomes than CLL-IPI. A population of CD4+ T cells with XAI (AUC; 0.78; 95% CI 0.70-0.86; p <0.0001) was the most effective single classifier. It was found that patients' prognosis was bad when their CD4+ T lymphocytes were low. The inclusion of CD4+ T cells increased the CLL-IPI's predictive power (AUC 0.83; 95% CI 0.77-0.90; p < 0.0001). Finally, the ALPODS XAI algorithm found highly predictive cell populations in CLL, indicating that it could aid in enhancing conventional prognostic scores like IPI (17).

Using digital microscopy to assess lymphocyte morphology, Marionneaux et al. conducted a retrospective analysis to examine the incidence of prognostic indicators in patients with atypical CLL (aCLL) and T-cell CLL (tCLL). The presence of trisomy 12, non-mutant IgVH, and CD38 expression-all linked to a poor prognosis-was found to be statistically significant as a prognostic marker in the aCLL group, but 13q14 deletions were less common than in the tCLL group (18).

Masic et al. used a decision tree approach to assess immunophenotype-based prognostic variables in 34 individuals with CLL. In this study, the C4.5 decision tree was simultaneously presented with 33 parameters (serum concentration of sCD23 and 32 distinct phenotypic characteristics). The most informative parameters were then identified, and a method was employed to categorize CLL patients based on the modified Rai staging system. As a result, it was demonstrated that the prognosis of CLL was influenced by the following two significant processes: 1. functionally compromised and imbalanced CD4 T-cell subpopulations in peripheral blood; 2. dysregulated function of the CD23 gene in B-cells and the appearance of sCD23 broken product in serum (19).

An AI model was developed using raw multiparameter flow cytometry data from 20,622 routine diagnostic samples, both diseased and healthy. It was able to distinguish between seven subtypes of mature B-cell neoplasms and distinguish between diseased and healthy samples. Seventy percent of instances could be classified by the AI model at a 95% CI or higher. It was suggested that more samples would be used to train AI to produce better outcomes, particularly for uncommon subtypes (20).

Salama et al. assessed whether an AI model might enhance diagnostic process in a clinical laboratory setting and how well it performed in identifying minimal residual disease (MRD) in 202 post-treatment CLL patients. Using ten color MRD panels of CLL patients who had received treatment, deep neural networks (DNNs) were trained. The MRD's "true" classification was confirmed by expert study. The results showed that DNN and expert analysis had a strong association (r > 0.999; Passing-Bablok slope = 0.997 (95% CI: 0.988-0.999) and intercept = 0.001 (95% CI: 0.000-0.001)). MRD was dramatically lowered with DNN, going from 15 minutes per case in manual processing to 12 seconds per case (21).

AI models were created utilizing 682 whole blood count data (88 verified CLL patients and 594 control groups) in a prior study by Padmanabhan et al. It has been proven that whole blood count-oriented AI models can improve patient outcomes and provide timely medical care while using less resources and at a lower cost (22).

4149 CLL patients' records from the Danish National CLL registry between 2004 and 2017 were examined by Agius et al. One of the main issues for CLL patients is infections. Nevertheless, there aren't many infection prediction models. The CLL therapy-Infection Model (CLL-TIM), which was validated in both internal and external cohorts, was created in that study. It identifies individuals at risk of infection or CLL therapy within two years of diagnosis. Using information from 4,149 CLL patients, 28 ML algorithms make up CLL-TIM. With 72% precision and 75% recall, the model can handle various types of data, including the high percentage of missing data that is typical in real-world scenarios. In order eliminate worries over the application of complicated ML algorithms in clinical settings, CLL-TIM offers explainable predictions for every CLL patient using uncertainty estimates and customized risk variables (23).

El Hussein et al. performed nuclear segmentation using stain-normalization from digitized whole slide images of lymph node biopsies (125 patients; 44 CLL, 34 accelerated CLL, 47 richter transformation of diffuse large B-cell lymphoma (RT-DLBCL)) from 2009 to 2021 to differentiate CLL, accelerated CLL, RT. They then used nuclear filtering to exclude overlapping nuclei with software. Cell nuclear size histogram by measuring nuclear size was the next application. Next, examined samples based on nuclear density and nuclear color components were further investigated by cellular density analysis and distance proximity analysis of cells to obtain their final markers. Finally, the synergistic effects of sequentially adding these biomarkers were evaluated to enhance diagnostic accuracy. El Hussein et al. suggest that the model of cell identification by nuclear size, nuclear density, cellular density and nearest neighbor distance can be used as artificial intelligence parameters to help in the differentiation and diagnostic evaluation of CLL, accelerated CLL, RT (24).

The difference between richter transformation and accelerated CLL transformation in the natural course of the disease is not easily understood by physicians. Physicians need to perform lymph node biopsy to ensure this awareness, which can be challenging in terms of diagnosis. Current guidelines are limited for differentiating CLL from its progressive forms, these differentiations are subject to the experience of the morphologist, and often the evaluation of limited biopsy specimens is not entirely useful.

In the study of El Hussein et al., artificial intelligence examined pale nodules consisting mostly of small lymphocytes and paraimmunoblasts known as proliferation centers. These nodules were evaluated with heat value histograms in 3 different disease areas with richter transformation, accelerated CLL and typical CLL. After this assessment, according to the heat value histogram score, the values above 0.288 indicate richter transformation, values below 0.228 indicate CLL, and values between 0.228 and 0.288 indicate accelerated CLL. These definitions have been studied in excisional biopsy specimens. This study illustrates that by combining the automation of PC mapping with the study of cell nuclear size and mean nuclear density, it is possible to develop an architecture-based method for objectively determining the extent of proliferation centers in CLL cases with suspected clinical disease progression (25). The lymphocyte identification in the study had an F1 score of 0.97 and a recall value of 0.96. Three distinct morphological categories of lymphocytes that somewhat correspond to distinct stages of the development of the disease were found by cluster analysis. From the same patient, they retrieved cellular morphological data at various time intervals in order to examine the lymphocyte's long-term evolution. The findings indicated some of the same patterns seen in the previously reported cluster analysis. Correlation analysis provided additional evidence for the prognostic value of factors based on cell morphology. In conclusion, this work offered insightful information about the dynamics of lymphocytes in CLL as well as future directions for further investigation. It was found that morphologic changes can be used as a useful tool to assist determine when to intervene most effectively in CLL patients (26).

Zhu et al. examined the genetic traits of CLL patients. Six datasets, including control samples and CLL, were obtained from the Gene Expression Omnibus database for their investigation. R software was utilized to find possible diagnostic biomarkers by least absolute shrinkage and selection operator (LASSO) regression, weighted gene coexpression network analysis (WGCNA), and differential gene expression analysis. Using differential gene expression analysis and WGCNA, a total of 47 differentially expressed genes (DEGs) and 25 potential hub genes were identified. Six hub genes were found to be possible CLL indicators by using LASSO regression analysis based on 14 genes that overlapped between DEGs and putative hub genes: ABCA6, CCDC88A, PMEPA1, EBF1, FILIP1L, and TEAD2. Patients with CLL have aberrant immunological statuses, according to functional analysis (27).

However, the majority of ML prognostic models for CLL overlook a number of factors and non-linear interactions between them. This reduces the accuracy of the models and makes it difficult to predict how the disease will progress (28). DL models, while their great capacity, are typically not readily interpretable, making it challenging to determine the exact cause and effect relationship between the inputs and outcomes. This is an even more serious issue in the field of bioinformatics, where it is essential to comprehend how a gene's expression can impact a patient's course with cancer, for instance, in the context of genomics (29). Recent studies on AI in CLL have some limitations. Some of these include sample size, generalizability, and lack of prospective analysis. In addition, most studies evaluated the predicted data of ML models retrospectively, Future studies should focus on prospectively evaluating the impact of ML models on CLL diagnosis, prognosis, and patient outcomes.

We asked chat GPT about Challenges in Artificial Intelligence Applications in Chronic Lymphocytic Leukemia Treatment*:

Data Access and Quality: AI models require large amounts of high-quality data. However, it can be difficult to find large and reliable data sources due to the rarity of chronic lymphocytic leukemia.

Heterogeneity: CLL demonstrates considerable heterogeneity among patients. Having patients with different genetic profiles, personalities and treatment responses may enable the applicability of a general AI model.

Complex Genetic Factors: The genetic basis of CLL is extremely complex. AI models may be limited in their ability to improve and unravel these genetic interactions.

Treatment Management and Monitoring: CLL treatment often requires personalized therapy. AI may be limited in monitoring, evaluating and recommending treatment responses and side effects.

Ethical Issues: The use of AI may raise ethical issues due to the sensitive production and involvement of genetic information. Personal privacy, information security and genetic counseling should be considered with caution.

Clinical Decision Making Uncertainties: CLL treatment processes are often complemented by performances. AI's ability to cope with performance may be limited in perspective, and full integration into clinical decision-making can be challenging.

Regulation and Standards: Standardization regarding the use of AI in medical practice is not yet fully in place. This may mean a lack of standards or uncertainty of AI calculations in the treatment of CLL.Despite these challenges, AI could be a potential tool to work on CLL and other types of cancer. However, the ethical, legal and scientific data on this technology need to be increased.

CONCLUSION

This review analyzes the use of AI as a prognostic factor in CLL survival, to predict time to first treatment initiation, to identify gene profiles and biomarkers affecting prognostic models, to confirm disease diagnosis and improve treatment efficiency, to assist in the development of the IPI score, to distinguish between atypical CLL and typical CLL on digital microscopic examination. It summarizes the diagnosis, classification, prognosis, infection management and treatment of patients with CLL, emphasizing new prognostic and predictive factors and new treatment strategies in flowcytometric molecule determination, minimal residual disease determination, increasing clinical efficiency. All these reasons show the potential of artificial intelligence applications in all aspects of chronic lymphocytic leukemia, from diagnosis to treatment. We suggest that artificial intelligence should be studied much more in CLL, which is a heterogeneous disease, and it will shed light on new developments.

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OLGU SUNUMU / CASE REPORT

Distal Phalanx Reconstruction with Bone Graft and Free SCIP Flap

Kemik Grefti ve Serbest SCIP Flep ile Distal Falanks Onarımı

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ÖZET

Distal falanks, elin tutma ve kavrama fonksiyonlarının yerine getirilmesinde parmağın önemli bir parçasıdır. Yaralanma türü ne olursa olsun, distal falanks onarımları her zaman zorlayıcıdır. Distal falanks onarımında dikkat edilmesi gereken 4 unsur: Kemiğin oluşturulması, yaranın kapatılması, yara kapatılırken estetik kaygılara dikkat edilmesi ve parmağa hareket kazandırılması olarak özetlenebilir. Tarafımızdan onarılan distal falanks amputasyon defekti sunulmuştur. Sol el 2.parmağın elektrikli testere ile kesilmesi sonucu orta falankstan başlayıp distale oblik uzanımlı olarak uzanan bir amputasyon defekti mevcuttu. Orta falanksta yumuşak doku defekti varken, distalde ise sadece tırnak yer alıyordu. Kemik onarımı, orta falankstan alınan parsiyel 1,5cm uzunluğunda kemik greftinin mikroplak ve vida ile sabitlenmesi ile onarıldı. Fleksör tendon ise distaldeki vidanın ucuna dikildi. Parmak kenarları debridmanı sonrasında 3x4,5 cm boyutlarında bir defekt meydana geldi. Sol inguinal bölgeden kaldırılan 3,5x6,5 cm boyutlarındaki ince SCIP flep ile, radiyal dijital artere uç-yan, konkomitan vene de uç-uca anastomoz yapılarak defektin kapatılması sağlandı. Bir haftalık takip sonrasında hasta taburcu edildi. Takiplerinde herhangi bir sorun görülmeyen hastanın flebinde incelme ve hareket kabiliyeti kazandığı görüldü. Hem hareket kabiliyetinin kazandırılması hem de kemik onarımının yapılması için falankstan kısmi kemik grefti alınması, tendon onarımının yapılması ve serbest flep yapılarak diğer bölgesel flep seçeneklerinin aksine elin dorsal anatomisinin bozulmaması bir avantajdır. Ameliyat süresinin ve hastanede yatış sürelerinin uzunluğu ve yüksek maliyet, bu yöntemin dezavantajıdır.

Anahtar Kelimeler: SCIP flep,Distal falanks,Parmak,Rekonstrüksiyon,Kemik grefti

ABSTRACT

The distal phalanx plays a crucial role in gripping and grasping functions of the finger. Injuries, particularly those requiring distal phalanx repair, can be challenging. Four main factors to consider in this repair are: bone reconstruction, wound closure, aesthetic concerns during wound closure, and restoring finger movement. This report presents a case involving an amputation defect in the 2nd finger of the left hand due to a power saw injury. The injury resulted in an oblique amputation defect extending from the middle phalanx to the distal phalanx. While there was a soft tissue defect in the middle phalanx, the distal phalanx only included the nail. In the repair process, a 1.5 cm long partial bone graft taken from the middle phalanx was fixed with microplates and screws. The flexor tendon was sutured to the end of the distal screw. After debridement of the finger edges, a 3x4.5 cm defect was created. This defect was covered with a 3.5x6.5 cm thin SCIP flap taken from the left inguinal region. The flap was anastomosed end-to-side to the radial digital artery and end-to-end to the concomitant vein. The patient was discharged after a one-week follow-up. Subsequent follow-ups showed thinning of the flap and restoration of finger mobility. Using a partial bone graft from the phalanx, performing tendon repair, and applying a free flap helped preserve the dorsal anatomy of the hand, unlike other regional flap options. However, the length of the surgery, extended hospital stay, and high cost are disadvantages of this method.

Keywords: SCIP flap,distal phalanx,finger,Reconstruction,Bone graft

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INTRODUCTION

The hand's ability to grasp and pinch relies significantly on the distal phalanx. Most hand traumas occur at this level (1). Maintaining the length of the finger and preserving the range of motion in the joints are critical for functional recovery, particularly in the index and middle fingers. Replantation remains the optimal method for preserving both the aesthetic and functional aspects of a finger. However, replantation is not always feasible (2,3). In cases where replantation is not possible, a comprehensive approach is required. Four key considerations must be addressed: 1) bone reconstruction, 2) restoration of finger mobility, 3) wound closure, and 4) aesthetic outcomes. Even when replantation is not an option, focusing on these four aspects can facilitate the restoration of a pleasing extremity.

This report presents a case of distal phalanx reconstruction of the second finger, emphasizing these critical considerations.

CASE REPORT

A 69-year-old male patient was referred to our clinic with an amputated distal phalanx of the left index finger following a crush and avulsion injury; unfortunately, the amputated part could not be recovered. The distal phalanx was absent, though the nail was preserved (Fig. 1). The middle phalanx exhibited partial abrasion, with tendon insertions compromised. The four considerations were addressed as follows:

1. ***Bone Reconstruction:*** The distal phalanx was reconstructed using a bone graft harvested from the middle phalanx. A 7x15 mm bone graft was excised with an oscillating saw and fixed to the middle phalanx using an L-shaped, four-holed microplate. Following appropriate debridement, a 5x3 cm skin and soft tissue defect with bony exposure was noted (Fig. 2).
2. ***Restoration of Finger Mobility:*** The mobility of the finger was restored by utilizing the flexor digitorum profundus (FDP) tendon, which was sutured to the bone graft using 4-0 Prolene sutures.

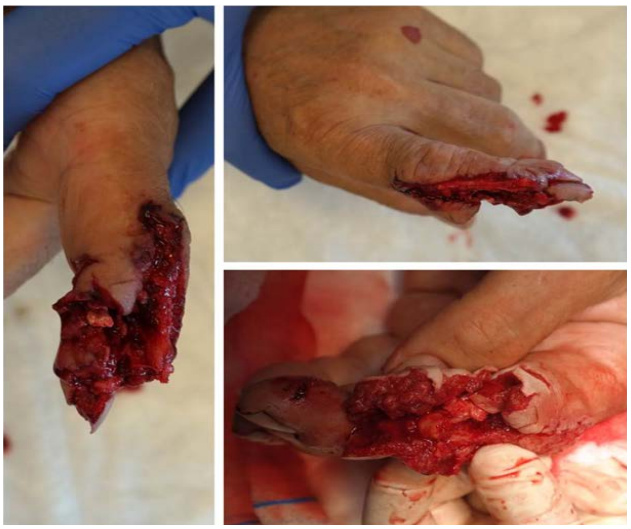

Figure 1. Three images of the amputated finger defect.

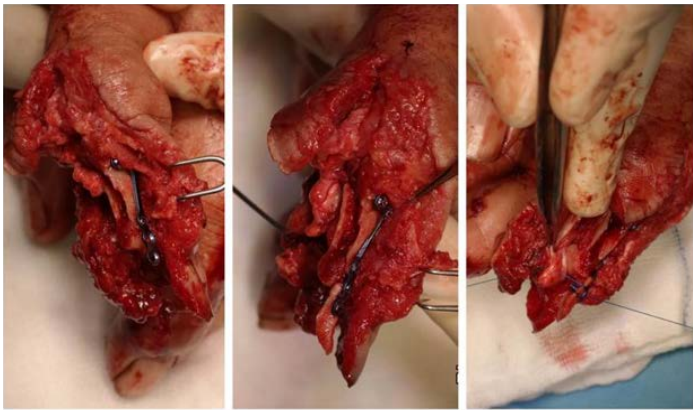

Figure 2. Bone and tendon reconstruction. Left: An L shaped microplate screwed to the middle phalanx where the bone graft is harvested. Middle: Bone graft fixated with 2 micro-screws to the middle phalanx. Right: FDP tendon sutured to the most distal screw to maintain mobility.

3. ***Wound Closure and 4. Aesthetic considerations:*** A thin superficial circumflex iliac artery perforator (SCIP) flap was used for wound closure and aesthetic considerations. A SCIP flap measuring 35x65 mm was harvested from the left groin area. Preoperative planning was conducted with a 20 MHz Clarius® ultrasound. Upon piercing the fascia, the artery was located just 2 mm beneath the skin, allowing for elevation of the flap to a maximum thickness of 5 mm with a 5 cm pedicle length. The pedicle contained one artery and two accompanying veins. The digital artery was dissected 3 cm proximally from the injury zone, and an end-to-side anastomosis was performed

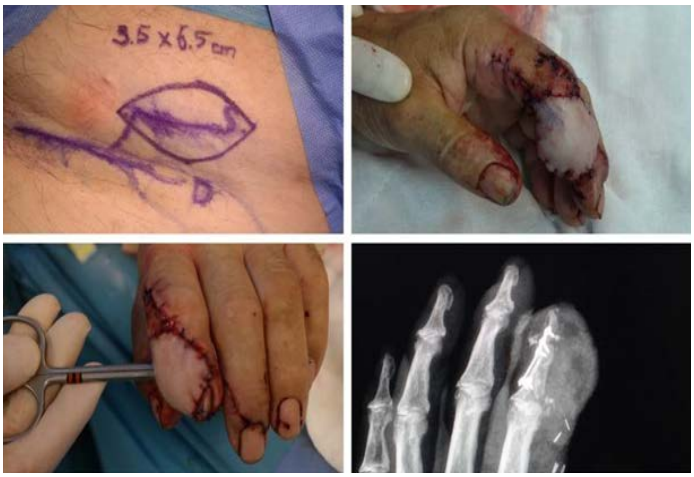

Figure 3. Wound closure with thin SCIP flap. Upper left: Planning of the SCIP flap based on the superficial branch of superficial circumflex iliac artery. Upper right: The lateral view of the closed wound. Below left: Post-op 1 week the dorsal view of the closed wound. Note the thickness of the flap resembles the proximal part of the finger. Below right: X-ray image of the bony reconstruction.

with the digital artery. The two veins were also connected to regional veins in an end-to-end fashion using 9-0 polipropilen sutures. The defect was closed in a proximal-to-distal manner. The pulp of the finger, which presented a 4 cm^2 skin defect, was closed using a skin graft obtained from the distal excess portion of the flap (Fig. 3).

DISCUSSION

The functional integrity of the hand largely depends on the length and mobility of the fingers. Distal-level amputations of the upper extremity are common, and replantation remains the most effective method for achieving a functional and aesthetically pleasing result. However, in cases of crush injuries or lost amputates, replantation may not be possible (2,3). This case illustrates an avulsion-type amputation with no recoverable parts, resulting in an index finger with an exposed middle phalanx and a preserved nail but absent distal phalanx. The typical approach would involve debridement of bony fragments and coverage with remaining skin flaps. An alternative method to preserve the middle phalanx includes the use of an interpolation flap, wherein the finger is buried in the groin or the thenar area for three weeks. This approach may be enhanced with an iliac bone graft to replace the distal phalanx. However, the thick groin flap would not be aesthetically pleasing or comfortable for the patient (4). Transferring the fourth finger to the thumb or index finger is another option (5), but it poses significant psychological barriers for patients reluctant to lose another digit. Toe-to-finger transplantation is another complex option, but it comes with challenges such as potential disturbance to gait function and the need for dense skin coverage. Although some modifications have been presented, anatomical differences such as curvature discrepancies between toes and fingers are some of the limitations of toe-to-finger transplants (6). Local flaps such as first dorsal metacarpal artery flap could also be a choice for distal phalanx defect coverage. Donor site morbidities and venous congestion are the major concerns in local flaps (7). Especially in tense skinned patients, it is hard to avoid donor site complications.

In cases of traumatic injuries, it is essential to keep in mind the principles of bone reconstruction, restoration of finger mobility, wound closure, and aesthetic considerations. Achieving a restoration that resembles the original anatomy is a fundamental principle in reconstructive surgery. In this case, the distal phalanx was successfully replaced with a graft from the middle phalanx, and mobility was restored via tendon connection to the distal graft. Aesthetic closure of the wound was prioritized, as it significantly impacts the patient's acceptance of the procedure.

The choice of a SCIP flap, characterized by its thin and pliable nature, facilitated optimal wound coverage while allowing for finger mobility. The flap may need to be thinned if another flap is selected for reconstruction. It has been reported that flap thinning operation increases the number of operations, cost, and recovery period (8).

With an average pedicle length of 5.4 cm, the SCIP flap typically extends beyond the injury zone, leaving a discreet scar on the groin. Patients generally accept this option more readily than alternatives such as toe-to-finger transplantation. In conclusion, while defect coverage is a primary concern in traumatic injuries, a thorough evaluation is essential to achieve both functional and aesthetic outcomes. The 4 aspects of distal phalanx reconstruction (bone replacement, restoration of finger mobility, wound closure with aesthetic considerations) should be kept in mind in planning.

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