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BÖLÜM 1

MİNİMAL İNVAZİV DİŞ HEKİMLİĞİNDE GÜNCEL RESTORATİF YAKLAŞIMLAR

Enise Betül GÖÇER[1]
Hacer BALKAYA[2]

GİRİŞ

Son yıllarda restoratif diş hekimliği alanında minimal invaziv operatif uygulamalar bu alandaki en önemli yeniliklerden biri olmuştur. Bu uygulamalar diş dokusunun korunmasını amaçlayarak bireysel çürük oluşum riski değerlendirmesi, çürüğün erken teşhisi ve minimal invaziv tedavi yöntemlerini içermektedir (1).

Minimal invaziv diş hekimliğinin temel prensibi, hastalık gelişmeden koruyucu önlemlerin uygulanması; hastalık oluştuğunda da etkilerini en aza indirmek amacıyla erken dönemde, çeşitli yöntemlerle tedavi edilmesidir (2). Erken evrede çürük lezyonlarının tedavi edilmesi hem pratik olması, hem tedavi süresini kısaltması, hem de maliyet açısından avantajlı olmasından dolayı klinik uygulamalarda sıklıkla tercih edilir (3). Minimal invaziv diş hekimliğinin (MİD) temel prensipleri şu şekilde sıralanabilir:

- Demineralizasyon ve kavitasyon oluşmadan karyojenik bakterilerin azaltılması
- Başlangıç çürük lezyonlarının remineralizasyonu,
- Kavitasyonlu lezyonların en az madde kaybıyla tedavisi
- Restorasyonların yenilenmesi yerine tamir edilmesi
- Hastalığın kontrolü

ÇÜRÜK LEZYONLARININ ERKEN TEŞHİSİ

Restoratif diş tedavisinde, geleneksel olarak kabul gören "minimal madde kaybı ile maksimum restorasyon" anlayışı yerini "minimal invaziv tedavi" yaklaşımına bırakmıştır. Koruyucu diş hekimliği; çürük teşhisi, profilaksisi ve başlangıç

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BÖLÜM 2

PEROKSİT İÇERMEYEN DİŞ BEYAZLATMA SİSTEMLERİ

Hafize Gamze DEMİRBAŞ[1]

GİRİŞ

Modern toplumda kişisel bakım bilincinin ve estetik beklentilerin artması, diş renginin iyileştirilmesine yönelik girişimleri estetik diş hekimliği uygulamalarının merkezine taşımıştır (1). Günümüzde diş rengi, yalnızca ağız sağlığının bir göstergesi olarak değil; bireyin sosyal algısı, özgüveni ve profesyonel imajı üzerinde belirleyici rol oynayan temel estetik parametrelerden biri olarak kabul edilmektedir (1). Epidemiyolojik araştırmalar, farklı toplumlar genelinde bireylerin değişken oranlarda mevcut diş renklerinden memnuniyetsizlik duyduğunu ve bu durumun küresel düzeyde yaygın bir estetik beklentiye işaret ettiğini göstermektedir (2). Özellikle ergenlik ve genç erişkinlik dönemlerinde diş renklenmeleri, bireylerin psikososyal gelişimini ve beden algısını olumsuz yönde etkileyebilmektedir (3). Güncel pazar analizleri ve klinik veriler, diş beyazlatma uygulamalarının estetik diş hekimliği endüstrisinde en sık talep edilen prosedürlerden biri haline geldiğini ve bu alandaki küresel pazarın, bireylerin artan estetik beklentilerine paralel olarak hızla büyümeye devam ettiğini göstermektedir (4).

Diş beyazlatma, diş renginin iyileştirilmesine yönelik etkili, konservatif ve nispeten düşük maliyetli bir tedavi seçeneği olarak öne çıkmaktadır (5). Kron veya porselen laminate veneerler gibi daha invaziv protetik yaklaşımlarla karşılaştırıldığında, doğal diş dokusunun korunmasına olanak tanıması ve geri dönüşümlü bir işlem olması nedeniyle klinik pratikte sıklıkla ilk basamak tedavi olarak tercih edilmektedir (5). Bununla birlikte, artan estetik talebe paralel olarak, beyazlatma uygulamalarında güvenlik, biyouyumluluk ve uzun dönem doku bütünlüğü gibi konular modern klinik araştırmaların temel odak noktaları haline gelmiştir (6).

Geleneksel diş beyazlatma sistemleri, temel olarak hidrojen peroksit veya karbamid peroksit gibi güçlü oksidan ajanlara dayanmaktadır (7). Bu ajanlar, renk-

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Sonuç olarak, diş beyazlatma tedavilerinde başarı yalnızca renk değişimi ile değil; biyolojik doku bütünlüğünün korunması, restoratif materyallerle uyum ve hasta konforu gibi çok boyutlu kriterlerle tanımlanmalıdır. Bu yaklaşım, estetik kazanımları minimal invaziv diş hekimliği ilkeleriyle uyumlu hâle getirerek daha sürdürülebilir ve hasta merkezli klinik protokollerin geliştirilmesine zemin hazırlamaktadır.

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BÖLÜM 3

BAŞLANGIÇ MINE LEZYONLARINA TEDAVİ YAKLAŞIMLARI

Cansu YIKICI ÇÖL[1]
Suat ÖZCAN[2]

1. AĞIZ HİJYENİNİN GELİŞTİRİLMESİ VE PLAK KONTROLÜ

Diş plağı, diş yüzeyinde bakteri ve tükürük kökenli polimer bir matriks içinde yer alan, gram-pozitif ve gram-negatif bakterilerden oluşan kompleks bir biyofilmdir. Dinamik bir süreç olan plak oluşumu, pelikıl formasyonuyla başlar ve biyofilmin olgunlaşmasıyla devam eder(1).

Etkili ve düzenli ağız hijyeni ile plak kontrolü, başlangıç mine lezyonlarının önlenmesi ve remineralizasyonu açısından temel öneme sahiptir. Diş fırçalama ve diş ipi kullanımı, plak kontrolünde altın standart mekanik yöntemlerdir(2). Araştırmalar, 2 dakika diş fırçalamanın 45 saniyeye kıyasla plak uzaklaştırmada %26 daha etkili olduğunu göstermektedir(3). Günde iki kez, uygun kuvvetle fırçalama önerilmekte; diş fırçasının üç ayda bir değiştirilmesi ve kontaminasyonun önlenmesi önem taşımaktadır(4).

Fırçalama tekniği de ağız hijyenini etkileyen önemli bir faktör olup, en sık Bass ve roll teknikleri önerilmektedir(4). Bununla birlikte, bireylerin hijyen ve diyet alışkanlıklarını sürdürmesindeki zorluklar nedeniyle mekanik yöntemlere ek olarak antiplak ve antimikrobiyal ajanlar içeren diş macunları ve gargaralar kullanılmaktadır. Bu ajanlar arasında klorheksidin, setilpiridinyum klorür, triklosan, metal tuzları, enzimler ve bitki özütleri yer alır. Ayrıca delmopinol, arjinin ve ksilitol gibi plak modifiye edici ajanlar, biyofilmin yapısını ve metabolik aktivitesini etkileyerek çürük oluşumunun önlenmesine katkı sağlar(1, 5).

2. DİYETİN DÜZENLENMESİ

Şeker terimi, monosakkaritler ve disakkaritleri kapsamakta olup, özellikle ekstrinsik olarak besinlere eklenen şekerler diş çürüğü açısından önem taşımaktadır.

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BÖLÜM 4

YÜKSEK DOLDURUCULU AKIŞKAN KOMPOZİTLERDE BİYOMİMETİK YAKLAŞIMLAR: GÜNCEL KLİNİK PERSPEKTİFLER

Mine BAŞAN TOSUN[1]

GİRİŞ

Minimal invaziv yaklaşımların ön plana çıktığı modern restoratif diş hekimliğinde, tedavi stratejileri yalnızca çürük dokunun uzaklaştırılmasını değil, aynı zamanda dişin biyomekanik bütünlüğünün korunmasını hedeflemektedir. Bu yaklaşımların temelinde yer alan biyomimetik felsefe, dentin ve minenin biyolojik, mekanik ve estetik özelliklerini taklit ederek restoratif tedavilerin doğal dokuya uyumunu artırmayı amaçlar (1). Biyomimetik restoratif yaklaşım, dişin doğal mimarisine benzer yapı ve işlevsellikte restorasyonlar oluşturmak üzere materyal seçimini ve klinik teknikleri yeniden tanımlar (2).

Günümüzde restoratif materyal seçimi yalnızca estetik beklentilerle sınırlı kalmayıp, aynı zamanda doğal dokulara benzer elastikiyet modülü, polimerizasyon büzülmesi, aşınma direnci ve stres dağılımı gibi biyofonksiyonel özellikleri de içerecek şekilde değerlendirilmektedir (3).

Son yıllarda geliştirilen yüksek doldurucu akışkan kompozit rezinler, biyomimetik restoratif anlayışı destekleyen yeni nesil materyaller arasında yer almaktadır. Bu materyaller, klasik akışkan kompozitlerin adaptasyon kolaylığı ile birlikte, yüksek doldurucu oranının sağladığı mekanik dayanımı bir araya getirerek hem estetik hem de fonksiyonel açıdan tatmin edici restorasyonlar sunmaktadır (4). Klinik uygulamalarda özellikle sınıf V kaviteler, minimal preparasyon gerektiren non-kaviteli lezyonlar, onlay-altı destek dolguları ve aşınmış diş yüzeylerinin restorasyonu gibi alanlarda yüksek başarı oranları bildirilmiştir (5-8).

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Bir diğer sınırlama, polimerizasyon büzülmesi ve buna bağlı stres gelişimi ile ilişkilidir. Yüksek doldurucu içeriği büzülmeyi azaltma eğiliminde olsa da, düşük viskoziteli yapı nedeniyle materyalin kavite duvarlarına hızlı adaptasyonu, bazı klinik durumlarda bağlanma arayüzünde stres birikimine yol açabilir. Bu nedenle, yüksek dolduruculu akışkan kompozitlerin çoğu klinik senaryoda tamamlayıcı veya ara tabaka (liner, stres kırıcı tabaka) olarak kullanılmasının biyomimetik açıdan daha rasyonel olduğu vurgulanmaktadır (45).

Estetik açıdan bakıldığında, güncel yüksek dolduruculu akışkan kompozitler renk stabilitesi ve yüzey parlaklığı açısından tatmin edici sonuçlar sunsa da, uzun dönem yüzey aşınması ve cilalanmış yüzeylerin kalıcılığı konusunda henüz sınırlı sayıda uzun süreli klinik çalışma sınırlıdır (46). Bu durum, özellikle anterior bölgede geniş yüzey alanına sahip restorasyonlarda materyal seçimini sınırlayan faktörlerden biri olarak değerlendirilmektedir.

Gelecek perspektifi açısından, yüksek dolduruculu akışkan kompozitlerin gelişimi biyomimetik prensipler doğrultusunda devam etmektedir. Yeni nesil formülasyonlarda, doldurucu-matriks bağlanmasının güçlendirilmesi, polimerizasyon stresinin daha da azaltılması ve mine–dentin elastikiyet gradyanına daha yakın mekanik davranış sergileyen materyallerin geliştirilmesi hedeflenmektedir. Ayrıca dijital planlama, enjeksiyon teknikleri ve minimal invaziv yaklaşımlarla entegrasyon, bu materyallerin klinik kullanım alanlarının önümüzdeki yıllarda daha da genişleyeceğini düşündürmektedir (3, 5-8, 12, 21, 23, 30).

SONUÇ

Yüksek dolduruculu akışkan kompozit rezinler, tek başına tüm restoratif gereksinimleri karşılayan "evrensel" materyaller olmaktan ziyade, doğru endikasyonda, doğru teknikle kullanıldığında biyomimetik restoratif diş hekimliğine anlamlı katkılar sunan ileri nesil materyaller olarak değerlendirilebilirler.

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BÖLÜM 5

DİŞ ÇÜRÜĞÜNÜN DOKU KORUYUCU YÖNETİMİ: MİNİMAL İNVAZİV DİŞ HEKİMLİĞİ PERSPEKTİFİ

Mehmet Alperen ŞAHİN[1]

GİRİŞ

Diş çürüğü, yaşamın her döneminde ortaya çıkabilen ve dişlerin mineralize sert dokularında progresif mineral kaybı ile doku harabiyetine yol açabilen, biyofilmle ilişkili enfeksiyöz bir hastalık olarak tanımlanmaktadır (1). Restoratif diş hekimliğinin geçmiş dönemlerinde, çürük lezyonlarının tedavisinde Black tarafından tanımlanan kavite sınıflaması ve preparasyon ilkeleri uzun süre temel yaklaşım olarak benimsenmiştir. Bu yaklaşımda, çürüğün ilerlemesini önleme hedefiyle lezyon çevresindeki sağlam diş dokularının da uzaklaştırılması öngörülmüş ve bu prensip "koruyucu genişletme" kavramı ile ifade edilmiştir (2). Söz konusu yaklaşımın uzun yıllar standart tedavi anlayışı olarak uygulanmasında; geçmişte çürüğün biyolojik davranışına ilişkin bilgilerin sınırlı olması ve restoratif diş hekimliğinde adeziv tekniklerin henüz klinik kullanıma girmemiş olması belirleyici rol oynamıştır. Bu sebeple, restorasyonların uzun dönem başarısının ancak geniş kavite preparasyonları ile sağlanabileceği düşüncesi geçmişte kabul görmüştür (3).

Dental biyofilm içerisindeki mikroorganizmaların karbonhidrat metabolizması sonucu oluşturduğu organik asitler, plak–diş temas bölgesinde belirgin bir pH düşüşüne neden olmaktadır. Bu asidik ortam, diş sert dokularında bulunan fosfat ve kalsiyum iyonlarının çözünerek ortamdan uzaklaşması ile sonuçlanan demineralizasyon sürecini başlatmaktadır (4). Normal koşullarda tükürüğün bikarbonat sistemi asitleri tamponlayarak pH dengesini korumaya çalışsa da, bu mekanizmanın yetersiz kaldığı durumlarda plak pH'ı kritik eşik değerin (≈5,5) altına düşmekte ve diş dokusunda hidroksiapatitin çözünme süreci başlamaktadır. Diş yüzeyinden serbestleşen kalsiyum ve fosfat iyonları, plak içindeki asitleri kısmen tamponlayarak pH'ın yaklaşık 5,0 civarında stabil kalmasına katkı sağlamaktadır. Bu aşamada mine yüzeyi makroskobik olarak bütünlüğünü korurken,

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konusunda bilgilendirilmesi, koruyucu programlara aktif katılımının sağlanması ve minimal invaziv tedavilere yönelik motivasyonun artırılması, bu yaklaşımın klinik başarısını doğrudan etkileyen temel unsurlardır. Sağlam diş dokusunun maksimum düzeyde korunduğu restoratif uygulamalar ve düzenli klinik izlem, restorasyonların ağızda kalma süresini uzatabilirken, bireylerin daha invaziv ve maliyetli tedavilere olan gereksinimini azaltabilmektedir. Bu yönüyle minimal invaziv diş hekimliği, yalnızca bireysel ağız sağlığının geliştirilmesine değil, aynı zamanda toplum düzeyinde ağız sağlığının iyileştirilmesine ve sağlık kaynaklarının daha etkin kullanılmasına katkı sağlayan çağdaş bir klinik yaklaşım olarak değerlendirilebilir.

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BÖLÜM 6

BİYOAKTİVİTE KAVRAMI VE GÜNCEL RESTORATİF MATERYALLER

Hazal Deniz KÖSE[1]

GİRİŞ

2000'li yıllardan itibaren restoratif diş hekimliği, materyal bilimi açısından dikkat çekici bir dönüşüm sürecine girmiştir. Geleneksel restoratif materyallerin yerini, biyolojik dokularla daha uyumlu, klinik performansı artırılmış ve minimal invaziv tedavi yaklaşımlarını destekleyen yeni nesil materyaller almaya başlamıştır (1). Özellikle yeni sistemlerin gelişmesi, nanoteknolojinin materyal bilimine entegrasyonu ve biyomateryal araştırmalarındaki ilerlemeler, restoratif tedavilerin yalnızca mekanik dayanıklılık odaklı olmaktan çıkıp biyolojik etkileşimi de dikkate alan bir yaklaşıma yönelmesine neden olmuştur (2).

Bu süreçte "biyoaktivite" kavramı, restoratif materyallerin değerlendirilmesinde giderek daha fazla önem kazanan bir özellik olarak öne çıkmıştır (2). Günümüzde birçok materyal üreticisi, geliştirdikleri ürünleri "biyoaktif" olarak tanımlamakta; bu materyallerin iyon salınımı, remineralizasyonu destekleme, antibakteriyel etki gösterme ve diş dokuları ile biyolojik etkileşim kurma gibi özelliklere sahip olduğunu vurgulamaktadır. Ancak bu kavramın bilimsel anlamı ile pazarlama temelli kullanımı arasında önemli farklılıklar bulunabilmektedir (3).

Restoratif materyallerin temel amacı, kaybedilen diş dokusunun fonksiyonel ve estetik olarak yerine konulmasıdır (4). Bununla birlikte günümüzde ideal bir materyalden yalnızca mekanik dayanım ve estetik özellikler değil; aynı zamanda diş dokuları ile etkileşim kurabilmesi, sekonder çürük oluşumunu azaltabilmesi, remineralizasyonu destekleyebilmesi ve biyolojik açıdan güvenli olması da beklenmektedir (3). Bu beklentiler, biyoaktif materyal kavramını diş hekimliğinin merkezine yerleştirmiştir.

Restoratif diş hekimliğinde biyoaktivite, yalnızca bir terim değil; materyal ile diş dokusu arasındaki biyokimyasal sinerjinin temelidir (2). Bu bağlamda, 'gerçek

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Sonuç olarak, günümüzde kullanılan bazı materyaller belirli düzeylerde biyoaktif özellikler gösterebilse de, restoratif diş hekimliğinde tam anlamıyla ideal ve çok yönlü biyoaktif materyalin geliştirilmesine yönelik çalışmalar devam etmektedir. Bu alandaki ilerlemeler, restoratif tedavilerin yalnızca mekanik değil, aynı zamanda biyolojik olarak da daha başarılı hale gelmesine katkı sağlayacaktır.

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BÖLÜM 7

RESTORATİF DİŞ HEKİMLİĞİNE BİYOMİMETİK BAKIŞ

Aydan Büşra CEYLAN[1]
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1.GİRİŞ

1.1. Biyomimetik Kavramının Tanımı ve Tarihçesi

Biyomimetik kelimesi, Latincede 'bios' (yaşam) ve 'mimesis' (taklit etme veya kopyalama) sözcüklerinden türetilmiştir [1]. Biyomimetik, biyolojik mekanizmalar ve süreçler tarafından oluşturulan biyolojik ürünlerin yapı ve işlevlerini analiz ederek, doğal dokuları taklit eden yapay materyallerin geliştirilmesine odaklanan bir bilim dalıdır [2].

Biyomimetik Restoratif Diş Hekimliği (BRD), 20. yüzyılın son dönemlerinde ortaya çıkmış ve farklı akademisyenlerin, kaynak kitapların, laboratuvar verilerinin ve Alleman Biomimetic Dentistry Education Platformu isimli derneğin katkılarıyla gelişim göstermiştir.

Bu alanda öncü isim olarak kabul edilen Dr. David Alleman, restoratif işlemler sonrası sıkça karşılaşılan hassasiyet, ağrı, başarısız restorasyon, kron ve kanal tedavileri nedeniyle mesleğini bırakmayı bile düşündüğünü (kendi internet sitesinde aktardığına göre) dile getirmiştir. 1995 yılı civarında adeziv diş hekimliğiyle tanıştıktan sonra, çok sayıda laboratuvar çalışması ve vaka raporunu bir araya getirerek BRD'nin temelini oluşturan bir derleme hazırlamıştır[3].

1.2. Diş Hekimliğinde Biyomimetik Yaklaşımın Önemi

Günümüzde restoratif diş hekimliğinde, doğal diş dokusunun yapısal ve işlevsel özelliklerini taklit etmeyi amaçlayan yenilikçi yaklaşımlar doğrultusunda önemli gelişmeler olmaktadır. Bu anlamda, kaybedilen sert dokuların yerine konulmasına yönelik olarak; direkt, yarı-direkt ve indirekt restoratif yöntemler klinik pratiğe

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BÖLÜM 8

RESTORATİF DİŞ TEDAVİSİNDE, MİNE REMİNERALİZASYONUNA GÜNCEL YAKLAŞIM

Lena BAL[1]
Elif Damla AKTAŞ[2]

GİRİŞ

Diş çürüğü; diş-biyofilm ara yüzünde meydana gelen asit atakları sonucunda demineralizasyon-remineralizasyon dengesinin patolojik yönde bozulmasıyla gelişen, yaygın ve dinamik bir hastalıktır. Klinik açıdan, restorasyonların uzun dönem başarısını olumsuz etkileyen temel sorunlardan biri sekonder (rekürren) çürük olup, restorasyonların onarım veya yenilenmesinin en sık nedenleri arasında bildirilmektedir. Bu nedenle, güncel restoratif yaklaşımlarda materyallerden yalnızca kaviteyi doldurması değil; iyon salımı yoluyla çevre dokularda remineralizasyonu destekleyen biyolojik veya biyoaktif etki göstermesi, modern diş hekimliğinin önemli hedeflerinden biri haline gelmiştir (1,2).

Tükürük ve oral biyofilm örneklerinde, birincil (primer) ve ikincil (sekonder) çürükle ilişkili mikrobiyal profillerin büyük ölçüde örtüştüğü; özellikle S. mutans, Lactobacillus spp. ve A. naeslundii'nin sekonder çürük patogenezinde rol oynayabildiği bildirilmiştir. Oral biyofilmin çok türden oluşan karmaşık ekolojisi, sekonder çürüğe karşı etkili restoratif materyallerin geliştirilmesini güçleştirmektedir. Buna ek olarak, restorasyon çevresine tükürük sıvıları/proteinlerinin penetrasyonu ve tükürük ile bakteriyel esterazların reçine matriksindeki ester bağlarını hidrolize etmesi; monomer ve bozunma ürünü salınımını artırarak biyofilm birikimini kolaylaştırabilir ve materyalin uzun dönem klinik performansını olumsuz etkileyebilir (3,4).

Yüzey özellikleri, özellikle yüzey pürüzlülüğü bakteriyel adezyonun erken evrelerinde belirleyici rol oynar. Restorasyonun hizmet süresi boyunca diş restorasyon arayüzünde demineralizasyon remineralizasyon döngüleri tekrarlayabilir; bu dinamik mekanizmanın anlaşılması, primer ve sekonder çürüğün başlangıcını

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nun yapısal bütünlüğünü, estetik görünümünü ve asit direncini belirgin biçimde iyileştirmeyi hedeflemektedir. Günümüzde klinikte kullanılan birçok yaklaşım, florürün etkinliğini güçlendirirken florürle ilişkili olası riskleri en aza indirmeye odaklanmaktadır.

Uzun vadede temel hedef yönlendirilmiş mine rejenerasyonu olup, bazı biyomimetik teknolojiler "yapay mine" yaklaşımını daha uygulanabilir hâle getirmektedir. Bununla birlikte, birçok yöntem için mevcut kanıtlar hâlen sınırlıdır. Bu nedenle yeni remineralizasyon yaklaşımlarının, geleneksel florür temelli yöntemlere kıyasla ek klinik fayda sağlayıp sağlamadığını netleştirmek için iyi tasarlanmış, yeterli örneklemli randomize kontrollü çalışmalara ihtiyaç vardır.

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BÖLÜM 9

VİTAL PULPA TEDAVİSİNDE BAŞARI KRİTERLERİ VE PROGNOZU ETKİLEYEN FAKTÖRLER

Mehmet SALIK[1]

GİRİŞ

Dental pulpa, damar ve sinir ağından zengin, özelleşmiş bir bağ dokusu yapısına sahip olup, mine ve dentin gibi sert dokular tarafından çevrelenmiş bir anatomik yapıdır. Çürük, travma veya restoratif işlemler nedeniyle mine ve dentinde meydana gelen hasar, zamanla pulpa yapısını olumsuz etkileyebilir (1).

Pulpitis, pulpa dokusunun özellikle bakteriyel invazyon olmak üzere çeşitli zararlı uyaranlara maruz kalması sonucunda ortaya çıkan inflamatuvar bir durumdur. Klinik seyri çoğunlukla, etiyolojik faktörün ortadan kaldırılması halinde iyileşme potansiyeli bulunan geri dönüşümlü bir evreden, müdahale edilmediği takdirde yapısal ve fonksiyonel kaybın eşlik ettiği geri dönüşümsüz bir aşamaya doğru ilerleme eğilimindedir (2).

Vital pulpa tedavisi (VPT), vitalitesini sürdüren normal veya inflamatuvar değişiklikler gösteren pulpa dokusuna sahip dişlerin yönetiminde, geleneksel kök kanal tedavisine göre daha koruyucu bir yaklaşım sunan; minimal invaziv uygulamalar ve biyolojik temelli tedavi prensipleri üzerine yapılandırılmış klinik yöntemler bütününü ifade etmektedir (1,3,4). Ayrıca VPT; kök kanal tedavisine göre düşük maliyetli, daha güvenli, daha basit ve daha kısa sürede uygulanabilir olması gibi belirgin avantajlara sahiptir (5).

Vital pulpa tedavisi kapsamında yer alan başlıca yöntemler; dentinin tamamen uzaklaştırılmayarak pulpanın dolaylı olarak korunmasını amaçlayan indirekt pulpa kaplaması, pulpa ekspozisyonu üzerine biyouyumlu bir materyalin doğrudan uygulanmasını içeren direkt pulpa kaplaması, enfekte ya da inflamatuvar koronal pulpa dokusunun sınırlı bir kısmının uzaklaştırıldığı parsiyel pulpotomi ve koronal pulpanın tamamının çıkarıldığı ancak radiküler pulpanın korunduğu tam pulpotomi prosedürlerinden oluşmaktadır (Tablo 1) (4,6).

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teknolojisindeki ilerlemeler doğrultusunda yeni nesil materyaller de geliştirilmiştir. NeoMTA ve NeoPUTTY gibi biyoseramik esaslı materyaller ile Biodentine XP gibi geliştirilmiş kalsiyum silikat simanlarının daha gelişmiş biyouyumluluk, daha stabil fiziksel özellikler ve mineralize doku oluşumunu destekleyebilecek biyolojik özellikler gösterebildiği bildirilmektedir (30,31).

Bu biyomateryallerin kullanımı, vital pulpa tedavilerinin klinik başarı oranlarının artmasına katkıda bulunmuş ve günümüzde kalsiyum silikat esaslı materyaller VPT uygulamalarında tercih edilen başlıca pulpa kaplama ajanları haline gelmiştir.

SONUÇ VE KLİNİK ÖNERİLER

Vital pulpa tedavileri, uygun vaka seçimi ve doğru endikasyonlarla uygulandığında kök kanal tedavisine göre daha koruyucu ve daha düşük maliyetli bir alternatif sunmaktadır. Güncel kanıtlar, hem açık hem kapalı apeksli daimî dişlerde özellikle parsiyel ve total pulpotominin yüksek başarı oranlarıyla güvenle tercih edilebileceğini göstermektedir.

Başarının sürdürülebilmesi için doğru pulpal tanı, aseptik koşullarda rubber dam izolasyonu, uygun biyomateryal seçimi, kontrollü hemostaz, sızdırmaz bir daimî restorasyon ve düzenli klinik-radyografik takip temel unsurlar olarak öne çıkmaktadır. Bu prensiplere uyulduğunda dişin uzun dönem vitalitesinin korunması ve fonksiyonel olarak ağızda tutulması mümkün olmakta, böylece hastaya biyolojik ve ekonomik açıdan anlamlı avantajlar sağlanmaktadır.

Bununla birlikte, yeni nesil biyoseramik materyallerin uzun dönem klinik etkinliğini ortaya koyan yüksek kaliteli randomize kontrollü çalışmalara hâlen ihtiyaç duyulmaktadır.

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BÖLÜM 10

RESTORATİF DİŞ TEDAVİSİ EĞİTİMİNDE HAPTİK SİMÜLASYON

Hande FİLİZ[1]

GİRİŞ

Simülasyon, diş hekimliği eğitiminde uzun süredir kullanılan bir yöntem olup geçmişi 1990'lı yıllara kadar uzanmaktadır. Bununla birlikte robotik, haptik ve sanal gerçeklik (virtual reality, VR) alanlarındaki son gelişmeler bu alanı dönüştürmüş ve gelecek için umut verici fırsatlar sunmuştur (1).

Sanal gerçeklik (VR), diş hekimliği öğrencilerinin eğitimi için değerli bir araç olarak kabul görmeye başlamış ve dünya çapında diş hekimliği eğitiminde kullanımı artmaktadır (2). VR, yazılım kullanarak sürükleyici bir bilgisayar ortamı yaratan, üç boyutlu (3B) görüntü veya ortamın bilgisayar tarafından üretilen tıbbi simülasyonu olarak tanımlanmaktadır. Kullanıcılar, kendilerini bir deneyimin içine yerleştiren başa takılan bir ekran takarlar ve bu ekran sayesinde, gerçekmiş gibi hissettiren bir şekilde ortam ve sanal karakterlerle etkileşime girebilirler. VR, hastayla temassız bir eğitim ortamı sağlayarak diş hekimliği eğitiminde faydalı olabilir (3, 4).

Artırılmış gerçeklik (augmented reality, AR) bilgisayar tarafından üretilen grafiklerin gerçek hayattaki bir sahnenin üzerine yerleştirilmesidir. Doğal koşulları göstermeyen VR'dan farklıdır. AR, gerçek ve sanal unsurları birleştirilmiş bir deneyimde entegre eden ve öğrenenlerin karmaşık uzamsal ilişkileri, soyut kavramları görselleştirmelerine ve gerçek dünyada, özellikle cerrahi prosedürlerde imkânsız olabilecek fenomenleri deneyimlemelerine olanak tanıyan bir teknoloji biçimidir (5, 6).

Sürükleyici sanal gerçeklik (immersive virtual reality, IVR), kullanıcının 360 derece gerçek kayıtlarla yeniden oluşturulan dijital bir 3B ortamla etkileşime girdiği bir VR biçimidir.

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SONUÇ

Simülasyon temelli eğitim, diş hekimliği başta olmak üzere sağlık eğitiminde klinik beceri gelişimini destekleyen önemli bir öğrenme yaklaşımı olarak öne çıkmaktadır. Özellikle haptik ve sanal gerçeklik destekli sistemler, öğrencilere güvenli bir ortamda tekrar yapma olanağı sunarak psikomotor becerilerin gelişimine, klinik özgüvenin artmasına ve hasta güvenliğinin korunmasına katkı sağlamaktadır. Bununla birlikte yüksek maliyet, teknik altyapı gereksinimi ve gerçek klinik dokuların tam olarak taklit edilememesi gibi bazı sınırlılıklar da bulunmaktadır. Tüm bu yönleri değerlendirildiğinde, simülasyon teknolojilerinin geleneksel eğitim yöntemlerinin yerini tamamen almaktan ziyade onları tamamlayıcı bir araç olarak kullanılması en rasyonel yaklaşım olarak görülmektedir. Gelecekte yapay zekâ entegrasyonu, daha gelişmiş dokunsal geri bildirim sistemleri ve bireyselleştirilmiş eğitim modülleri ile simülasyon tabanlı dental eğitimin etkinliğinin daha da artması beklenmektedir.

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BÖLÜM 11

DİŞ ÇÜRÜĞÜ VE AĞIZ SAĞLIĞINDA ÇAYIN ETKİSİ

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GİRİŞ

Modern dünyanın en popüler içeceklerinden biri olan çay, içme suyundan sonra en çok tüketilen alkolsüz içecekler arasında yer almaktadır. Çayın yetişmesi için gereken iklim ve toprak tipleri, yeterli yağış alan tropikal ve subtropikal iklim ve yeterli drenaja sahip asitli topraklardır. Dünya genelinde çayın yetiştirilebileceği iklim ve toprak tiplerine sahip ülkelerin başında Çin, Hindistan ve Sri Lanka gelmektedir (1,2). Ülkemizde çay yetiştirebilecek iklim ve uygun toprak yapısına sahip coğrafya, Rize ili başta olmak üzere Doğu Karadeniz Bölgesidir. Türkiye, siyah çay tüketimi acısından dünyada birinci sırada gelmektedir (3,4).

Çay ilk kez M.Ö. 3000'li yıllarda Çin'de keşfedilmiştir ve o zamandan bugüne hem keyif verici bir içecek hem de ilaç olarak kullanılmıştır (5,6). Antik Çin'de efsaneleşmiş bir hikâyeye göre M.Ö. 2700'lü yıllarda Çin imparatoru Shen Nung, bir gün kendisine sıcak su hazırlamaktayken, su ısıttığı kabın içerisine birkaç yaprak düşer. Kaynayan suyun rengi değişmeye, açığa çıkan buhardan mistik ve rahatlatıcı bir aroma yükselmeye başlar. Shen Nung, merakına yenik düşerek bu sıcak içecekten bir bardak içer. Isıttığı su kabının içine düşen bu yapraklar bir çeşit yaban çay ağacına ait olduğu rivayet edilmektedir. Bu anlatılan efsaneye göre çay bitkisi keyfedilmiş olur (7).

Çay, *Camellia sinensis* bitkisinin yapraklarından elde edilir (8-10). Temel olarak *Camellia sinensis* bitkisinden siyah, yeşil, oolong ve beyaz çay olmak üzere 4 farklı çay elde edilir (9,11,12). Aynı bitkinin yaprakları kullanılmasına rağmen farklı türde çay tiplerinin elde edilmesinin sebebi, farklı tekniklerle bu yaprakların işlenmesinden kaynaklanır.

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Sürekli ve yüksek konsantrasyonlarda flor alımı, gelişim döneminde dental florozise, ileri vakalarda ise iskeletsel florozis gibi kronik flor toksisitesi tablolarının ortaya çıkmasına neden olabilmektedir (91). Florün kemik dokusunda birikmesi, kalsiyum emilimini azaltarak büyüme sürecini olumsuz yönde etkilemektedir. Bunun sonucunda, osteoskleroz, iskelet deformasyonları ve büyüme geriliği gibi patolojik durumlar ortaya çıkabilmektedir (92,93). Hayvanlar üzerinde yapılan çalışmalar, yüksek dozda flor alımı merkezi sinir sistemi disfonksiyonuna yol açabildiğini ve karaciğer, böbrek, beyin ve beyincik gibi yumuşak dokular üzerinde zararlı etkiler oluşturabileceğini ortaya koymaktadır (94).

SONUÇ

Çayın sağlık üzerindeki etkileri hem olumlu hem de olumsuz yönleriyle dikkat çekmektedir. Epigallocatechin-3-gallate (EGCG) gibi anti-inflamatuar etkiye sahip güçlü antioksidanlar sayesinde kanser hücrelerinin büyümesini ve yayılmasını inhibe edebilen yeşil çay, aynı zamanda yüksek dozlarda tüketildiğinde karaciğer, pankreas ve tiroid bezleri üzerinde toksik etkilere yol açabilmektedir. Ayrıca, çaydaki florür içeriği, gelişim döneminde nörotoksisite riski taşıyabilir. Bu nedenle, çayın faydalarından yararlanmak isteyen bireylerin, önerilen dozları aşmamaya dikkat etmeleri gerekmektedir.

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