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Akademisyen Yayınevi A.Ş.

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Bölüm 1

CAD/CAM ENDODONTİK POST SİSTEMLERİ ve POST/CORE RESTORASYONLARDA DİJİTALLEŞME

Erman DİREKCİ[1]

GİRİŞ

Endodontik tedavi uygulanmış dişlerin restorasyonu hem fonksiyonel bütünlüğün yeniden sağlanması hem de biyomekanik stabilitenin korunması açısından birtakım zorluklar içermektedir. Kanal preparasyonu sırasında meydana gelen dentin kaybı ve dokusal zayıflama, bu dişlerin daha kırılgan hâle gelmesine neden olmaktadır. Bu nedenle post-core sistemleri, intraradiküler tutuculuğu artırarak üst yapı restorasyonunun stabilitesini desteklemek amacıyla yaygın şekilde kullanılmaktadır. (1). Geleneksel prefabrike post ya da döküm teknikleriyle üretilen restorasyonlar uzun süredir standart yaklaşım olmuş olmakla birlikte, bu yöntemlerin bazı sınırlamaları mevcuttur. Özellikle uyum sorunu, stres birikimi ve zaman alan klinik süreç bu yaklaşımların dezavantajlarını oluşturmaktadır.

Son yıllarda, CAD/CAM (Bilgisayar Destekli Tasarım / Bilgisayar Destekli Üretim) teknolojileri; endodontik post-core restorasyonlarını daha doğru, tekrarlanabilir ve hastaya özgü hale getirme potansiyeline sahiptir. Bu dijital yaklaşımlar, post boşluğu preparasyonundan itibaren dijital ölçü alımı, sanal tasarım ve üretim adımlarını sürece entegre ederek restoratif hataları azaltma ve klinik verimliliği artırma imkânı sunmaktadır (2,3).

CAD/CAM tabanlı post sistemleri; fiber, zirkonya veya metal gibi farklı materyallerde üretilebilen özel post-core tasarımlarına olanak sağlamaktadır. Bu sayede, bireyin kök kanalı anatomisine birebir uyum sağlayan restorasyonlar elde edilmekte ve mekanik stabilite önemli ölçüde arttırılmaktadır (3).

Dijital ölçü teknikleri de CAD/CAM post restorasyonlarının başarısında kritik bir rol oynamaktadır. Özellikle intraoral tarayıcı kullanımı, post boşluğunun anatomik formunun doğrudan dijital ortama aktarılmasına olanak tanımakta

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teknolojileri, modern dental restorasyonlarda yüksek doğruluk, kişiselleştirilmiş tedavi ve uzun dönem başarı hedeflerinin karşılanmasında giderek daha stratejik bir rol oynamaktadır.

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Bölüm 2

ELEKTRİK DEŞARJI İLE ÜRETİLEN Nİ-Tİ EĞELERİN TERMO-MEKANİK ÖZELLİKLERİ VE ENDODONTİK RETREATMENT PERFORMANSI

Özge BAŞAR[1]
Merve ÇOBAN ÖKSÜZER[2]

GİRİŞ

Endodontik tedavilerde kullanılan enstrümantasyon sistemlerinin güvenliği ve mekanik dayanıklılığı, klinik başarının temel belirleyicilerinden biridir. Nikel-titanyum (Ni-Ti) alaşımları, endodontik enstrümantasyonda devrim niteliğinde bir dönüşüm yaratarak eğe sistemlerinin esneklik, dayanıklılık ve güvenlik profilini önemli ölçüde yükseltmiştir (1). Süperelastisite, şekil hafızası davranışı ve yüksek kırılma direnci gibi malzeme özellikleri sayesinde Ni-Ti eğeler, özellikle eğri ve kompleks kök kanal anatomilerinde manuel paslanmaz çelik eğelere kıyasla çok daha etkin ve güvenli bir preparasyon imkânı sunmaktadır (2). Bununla birlikte, tüm avantajlarına rağmen geleneksel frezeleme yöntemleriyle üretilen Ni-Ti eğelerde yüzey mikro çatlakları, düzensiz kesit formu, üretim hatalarına bağlı zayıf bölgeler ve döngüsel yorgunluk direncindeki sınırlamalar, hâlen klinik performansı etkileyen önemli dezavantajlar olarak karşımıza çıkmaktadır (3). Bu sorunları aşmak amacıyla son yıllarda Ni-Ti eğelerin üretiminde yeni teknolojiler ve yüzey modifikasyonu yöntemleri geliştirilmiştir. Bunlardan biri olan elektrik deşarjı ile şekillendirme (Electrical Discharge Machining; EDM) yöntemi, mekanik temas içermeyen üretim prensibi sayesinde geleneksel frezeleme tekniklerine göre daha bütüncül, daha dayanıklı bir yüzey yapısı oluşturur (4). EDM işleminde eğe yüzeyi kontrollü elektrik arklarıyla mikrometre düzeyinde eritilip yeniden katılaştırıldığından, ortaya çıkan yüzey hem daha sert hem de daha pürüzsüz bir mikrotekstüre sahip olur. Bunun torsiyonel stres altındaki

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SONUÇ

Elektrik deşarjı ile şekillendirilen Ni-Ti eğeler, yüzey karakteristiği, mekanik dayanım profili, döngüsel yorgunluk direnci ve sıcaklık stabilitesi açısından geleneksel frezeleme yöntemleriyle üretilen sistemlere göre belirgin üstünlükler sunar. Retreatment işlemleri sırasında eğeler yüksek mekanik yük altında çalıştığı için, EDM teknolojisinin sağladığı dayanıklılık ve esneklik klinik açıdan büyük önem taşır. Bu eğeler hem kırılma riskinin azalması hem de stresin kanal içerisinde daha dengeli dağılması sayesinde daha öngörülebilir bir işlem süreci sağlar. Sonuç olarak EDM teknolojisiyle üretilmiş Ni-Ti eğeler, endodontik retreatment uygulamalarında güvenilir, dayanıklı ve etkin bir alternatif oluşturarak tedavi başarısını artırma potansiyeline sahiptir.

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Bölüm 3

MİNİMAL İNVAZİV ENDODONTİ: BİYOMEKANİK TEMELLERDEN DİJİTAL GELECEĞE

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1.GİRİŞ

Minimal invaziv diş hekimliği, diş sert ve yumuşak dokularında mümkün olan en az kayıpla, biyolojik dokuları koruma prensibine bağlı kalarak hastalığı erken teşhis etmeyi, başlamışsa durdurmayı ve gerektiğinde koruyucu-restoratif yöntemlerle tedaviyi amaçlayan modern bir yaklaşımdır.

Bu tedavi yaklaşımında, mine ve dentin dokularının gereksiz yere uzaklaştırılmasından kaçınılarak ve bu dokularda halihazırda oluşmuş demineralizasyonların remineralizasyonunu teşvik ederek mevcut diş yapılarını korumak amaçlanmaktadır. Bu yaklaşım ışığında, minimal invaziv diş hekimliği beş temel ilkeye dayanmaktadır. İlk olarak, başlangıç lezyonlarının remineralizasyonu hedeflenir. İkinci olarak, karyojenik mikroorganizmaların elimine edilmesi ve böylece demineralizasyon sürecinin durdurulması amaçlanır. Üçüncü olarak, kavitasyonlu dişlerde lezyonun tedavisi minimal madde kaybı ile gerçekleştirilir. Dördüncü olarak, problemli restorasyonların onarımı veya gerektiğinde değiştirilmesi ön plandadır. Son olarak ise, yeni problemlerin oluşumunun önlenmesi minimal invaziv yaklaşımın önemli bir parçasını oluşturur (1).

Bu ilkeler ışığında, minimal invaziv konseptin felsefesi "önce koruma, sonra minimal girişim" anlayışına dayanmaktadır. Bu yaklaşımda sağlam diş dokusunun çürük, erozyon, aşınma veya travma gibi durumlarda maksimum düzeyde korunması esastır. Hastalığın erken aşamalarında invaziv tedavilere gerek

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9. SONUÇ

Minimal invaziv endodonti, diş sert dokularını maksimum düzeyde koruma felsefesiyle, endodontik tedavide yapısal bütünlüğü önceliklendiren bir paradigma değişimi sunmaktadır. Geleneksel yaklaşımların aksine, minimal invaziv endodonti yaklaşımı; konservatif giriş kaviteleri (TrussAC, UltraAC) ve minimal taperlı kanal şekillendirme sistemleri (TruNatomy, Rotate gibi modern NiTi sistemleri) aracılığıyla periservikal dentini korumayı ve böylece dişin uzun vadeli kırılma direncini artırmayı hedeflemektedir.

Bu yaklaşımın klinik başarısı, biyomekanik fayda ile dezenfeksiyon etkinliği arasındaki hassas dengeye bağlıdır. Konservatif kavitelerin kırılma direncini artırdığına dair güçlü in vitro kanıtlar mevcutken, dar erişim, kanal bulma zorluğunu ve apikal bölgede yetersiz irrigasyon riskini beraberinde getirmiştir. Bu kısıtlamaların üstesinden gelmek için aktif yıkama teknolojileri (PIPS, SWEEPS, GentleWave) ve Tek Kon + Biyoseramik Sealer gibi adaptif dolum teknikleri kritik öneme sahiptir.

Minimal invaziv endodonti, teknolojik entegrasyonla (Dijital Endodonti) ayrılmaz bir şekilde ilerlemektedir. Rehberli sistemler (S-RGKP, D-RGKP) ve robotik sistemler özellikle kalsifiye ve karmaşık kanallarda hassas ve doku koruyucu bir kavite formu sağlayarak klinisyen hatalarını ve iatrojenik hasar riskini azaltmıştır. Yapay Zekâ (YZ), bu sistemlerle birleşerek sadece tanı ve tedavi planlaması yapmakla kalmayıp, aynı zamanda gerçek zamanlı adaptasyon için yol gösterici hale gelmektedir.

Sonuç olarak, minimal invaziv felsefenin uzun dönem başarısı, sadece dentin korumasına değil; aynı zamanda dijital rehberlik, YZ adaptasyonu ve gelişmiş nanoteknoloji ile desteklenen entegre bir tedavi protokolüne bağlı olacaktır.

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Bölüm 4

ENDODONTİK TEDAVİDE KULLANILAN İRRİGASYON-AKTİVASYON YÖNTEMLERİ

Nazife Maide DAYICAN[1]

1.GİRİŞ

Endodontik tedavinin temel amacı enfekte pulpa dokusunu ve mikroorganizmaları elimine ederek kök kanal sisteminin üç boyutlu olarak temizlenmesi, şekillendirilmesi ve dezenfekte edilmesidir. Ancak kök kanal sisteminin kompleks anatomisi, özellikle lateral kanallar, isthmuslar, apikal delta ve internal rezorpsiyon boşlukları gibi alanlar irrigasyon solüsyonlarının bu bölgelere etkili bir şekilde ulaşmasını güçleştirmektedir. Bu nedenle irrigasyonun etkinliğinin arttırılması amacıyla çeşitli aktivasyon yöntemleri geliştirilmiştir.

Endodontik tedavi sırasında kullanılan irrigasyon solüsyonunun mekanik, kimyasal ve biyolojik amaçları bulunmaktadır. Kök kanalının lubrikasyonu, organik ve inorganik dokuları çözmek, kök kanal preperasyonu sırasında oluşan smear tabakasını uzaklaştırmak mekanik ve kimyasal amaçlarıdır. Biyolojik amacı ise kök kanallarında antimikrobiyal etki sağlamak ve periodontal dokulara zarar vermemektir (1).

İrrigasyon solüsyonlarının pasif olarak uygulanması karmaşık anatomiye sahip kök kanal sistemi içerisinde etkili bir dezenfeksiyon sağlayamamaktadır. Bu sebeple irrigasyon solüsyonlarının etkinliğini arttırmak ve kök kanal duvarlarına daha derin penetrasyon sağlamak için aktivasyon tekniklerine başvurulmaktadır. Aktivasyon ile irrigasyon solüsyonunun hareketi arttırılmakta, dentin tübüllerine penetrasyonu sağlanmakta, biyofilm ve debrislerin uzaklaştırılması arttırılmaktadır (2).

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SONUÇ

Endodontik tedavinin başarılı olmasında kök kanal sisteminin etkili dezenfeksiyonu büyük önem taşımaktadır. Kök kanal sisteminin mekanik preperasyonundaki kısıtlamalar göz önüne alındığında etkili bir irrigasyon-aktivasyon sistemi büyük rol oynamaktadır. Bu yüzden kullanılan irrigasyon solüsyonlarının etkinliğini arttıran aktivasyon yöntemleri başarıyı arttıran kilit bir roldedir.

Geleneksel irrigasyon yöntemlerinden modern aktivasyon yöntemlerine kadar çeşitli aktivasyon yöntemlerinin amacı irrigasyon solüsyonunun etkinliğini arttırmak ve biyofilmi etkili şekilde uzaklaştırmak hedeflenmiştir.Literatürde yapılan araştırmalar her bir yöntemin farklı avantaj ve dezavantajlara sahip olduğunu göstermektedir.Modern aktivasyon yöntemleri geleneksel aktivasyon yöntemlerine göre kök kanal sisteminin dezenfeksiyonu sağlamak konusunda daha başarılı olarak tespit edilse de kullanılacak irrigasyon-aktivasyon yöntemi klinikte hasta bazlı olarak seçilmelidir. Sonuç olarak bu alanda yapılan teknolojik ve bilimsel gelişmelerin takip edilmesi gerekmektedir. Aynı zamanda bu gelişmeler klinik prosedürlere entegre edilmelidir. Etkili bir irrigasyon ve aktivasyonun endodontik tedavinin önemli parçalarından biri olduğu unutulmamalıdır.

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Bölüm 5

KÖK KANAL TEDAVİLİ DİŞLERDE VERTİKAL KÖK KIRIKLARI

Arda Kıvanç ÖZKÖK[1]
Neslihan Büşra KESKİN[2]

1. ENDODONTİK TEDAVİNİN AMACI

Kök kanal tedavisinin temel amacı, enfekte pulpa dokusunun ve kök kanallarında yer alan mikroorganizmaların ortadan kaldırılmasıdır. Bu amaç doğrultusunda uygulanan kemo-mekanik preparasyon, hem nekrotik ve enfekte dokuların uzaklaştırılmasını hem de kök kanal sisteminin şekillendirilmesini sağlar. Tedavi sürecinin devamında ise hazırlanan kök kanal boşluğu, uygun bir dolgu materyali ile hermetik biçimde kapatılarak yeniden mikrobiyal invazyonun önlenmesi ve periapikal dokuların iyileşmesine olanak tanınması hedeflenir (1). Endodontik tedavi görmüş dişlerin, canlı dişlere göre kron veya kök kırığına daha yatkın olduğu gösterilmiştir (1–3).

2. KRONİK ÇATLAK VE KIRIKLAR

Dişlerde çatlak veya kırıkların varlığının teşhisi ve klinik olarak yönetilmesi güç olabilmektedir. Bu durum bazen hiçbir belirti vermeyebilir, bazen de belirsiz ya da spesifik semptomlarla ortaya çıkabilir. Semptomlar çoğu zaman tek başına kesin tanı koymak için yetersizdir ve radyografik bulgular da çoğu kez net değildir. Çatlak veya kırığın klinik yönetimi büyük ölçüde lezyonun boyutuna bağlı olmakla birlikte, bu boyut çoğunlukla klinik olarak tam olarak belirlenememektedir (4).

Amerikan Endodontistler Birliği'nin (AAE) 2020 tarihli Endodontik Terimler Sözlüğü'ne göre, çatlak; "mine ve dentinde, bazen de sementumda meydana gelen, derinliği veya yayılımı bilinmeyen ince yüzey bozukluğu" olarak

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4. SONUÇ

Vertikal kök kırıkları (VKK), özellikle kanal tedavisi uygulanmış molar dişlerde yoğunlaşan bir klinik problem olarak karşımıza çıkmaktadır. Etiyolojisinde rol oynadığı düşünülen çok sayıda predispozan faktör tanımlanmış olmasına rağmen, hangi faktörlerin kırık oluşumunda birincil derecede etkili olduğu hususu belirsizliğini korumaktadır. Tanı sürecindeki en önemli zorluklardan biri, VKK'nin özellikle başlangıç aşamalarındaki semptom ve bulgularının özgül olmamasından kaynaklanmaktadır. Bu tanısal belirsizlik karşısında Konik Işınlı Bilgisayarlı Tomografi (KIBT), VKK'ye özgü periradiküler kemik kaybı modellerini görselleştirmedeki üstünlüğü sayesinde değerli bir araç haline gelmiştir. Bununla birlikte, mevcut literatür incelendiğinde, VKK'nin epidemiyolojisi, tanısı ve tedavi stratejileri üzerine kanıta dayalı verilerin yetersizliği dikkat çekmektedir. Bu nedenle, çeşitli tedavi protokollerinin sonuçlarını ve prognoza etkilerini sistematik olarak inceleyecek, kapsamlı ve iyi planlanmış klinik araştırmaların yürütülmesi büyük bir gerekliliktir.

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Bölüm 6

KÖK KANAL TEDAVİSİNDE GEÇMİŞTEN GÜNÜMÜZE KULLANILAN KANAL İÇİ MEDİKAMENTLER

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Selen İNCE YUSUFOĞLU[2]

1.GİRİŞ

Kanal şekillendirmesinin birincil amacı, enfekte pulpa dokusunun, debrisin ve mikroorganizmaların kanal sisteminden mekanik olarak uzaklaştırılması ve irrigasyon solüsyonlarının ve kanal içi medikamentlerin etkili bir şekilde ulaştırılmasına ve etki göstermesine olanak tanıyan bir kanal boşluğunun oluşturulmasıdır (1). Pulpa odası ve kök kanal sistemi, mikroorganizmaların yerleşebileceği çok sayıda girinti içeren karmaşık bir anatomiye sahiptir (2). Bu nedenle, tek başına mekanik enstrümantasyon, mikroorganizmalardan arınmış bir kanal sistemi elde etmek için yetersizdir. Kök kanal tedavisinde irrigasyon solüsyonlarının rutin kullanımı esastır (3, 4).

Mekanik şekillendirme ile irrigasyonun kombine edilmesi, enfekte kök kanallarındaki mikrobiyal yükü önemli ölçüde azaltmasına rağmen, tam eliminasyon için yetersiz kalabilir. Bu nedenle, dezenfeksiyonun etkinliğini artırmak için, bu prosedürlere ek olarak antimikrobiyal kanal içi medikamentlerin kullanımı gereklidir. Bakteriler, irrigantların ve medikamentlerin antibakteriyel etkilerinden korunarak sağ kalabildikleri lateral kanallara ve dentin tübüllerine invazyon yapabilir. Mekanik hazırlığı takiben, kök kanal sistemi içinde rezidüel mikroorganizmalar kalıcı olabilir; ancak kanalların hermetik obturasyonu, geride kalan bakterilerin sağ kalması için gerekli çevresel koşulları ortadan kaldırır.

Daimi restorasyon yerleştirilmesinden önce, birkaç randevu üzerinden gerçekleştirilen çoklu seans tedavileri, klinisyene kanal içi medikament kullanımı

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azalma olduğunu göstermiştir. Bununla birlikte, temizlik ve şekillendirme sonrası azalma, medikament uygulamasının etkisine kıyasla önemli ölçüde daha belirgin olduğu bulunmuştur. Nano-gümüş (nano-Ag) ve nano-kalsiyum hidroksit (nano-CH) preparatlarının antibakteriyel etkinliği, geleneksel kalsiyum hidroksit (CH) ile eşdeğer düzeyde bulunmuştur; ancak bu ajanlar, postoperatif ağrı kontrolü açısından daha üstün klinik sonuçlar sunmuştur (68).

SONUÇ

Geçmişten günümüze endodontide çok sayıda kanal içi medikament kullanılmıştır. Kullanılan medikamentlerden bazıları artık kullanımdan kalkmıştır. Kalsiyum hidroksit, uzun bir süre endodontide en yaygın kullanılan medikament olmuştur. Kalsiyum hidroksit en sık kullanılan medikament olmasına rağmen, ideal bir medikamentin tüm özelliklerini taşımaması, yeni alternatiflere olan ihtiyacı doğurmuştur. Kalsiyum silikat bazlı ve nanopartiküler patlar, gelecek için umut verici medikamentlerdir. Bu çağdaş materyallerin potansiyel üstünlüğünü kesin olarak belirlemek için titiz klinik ve laboratuvar çalışmaları zorunludur.

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Bölüm 7

KÖK REZORPSİYONLARI VE TEDAVİ YAKLAŞIMLARI

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1.GİRİŞ

Kök rezorpsiyonları, fizyolojik ya da patolojik bir süreç sonunda meydana gelen odontoklastik hücrelerin aktivasyonuyla diş sert dokularında meydana gelen kayıp olarak tanımlanmaktadır. Etiyolojisi ve patogenezi tam olarak anlaşılamamakla beraber travma, pulpal enfeksiyon, ortodontik tedavi sırasındaki basınç ve beyazlatma tedavileri en sık görülen etiyolojik faktörlerdir. Kök rezorpsiyonları sıklıkla asemptomatik seyretmeleri ve rutin radyografik incelemelerde tesadüfen saptanmaları nedeniyle erken tanıda zorluklar içermektedir. Bu durum, tanının gecikmesine ve tedavi seçeneklerinin kısıtlanmasına yol açabilmektedir.

Klinik ve radyografik özelliklerine göre kök rezorpsiyonları genel olarak internal ve eksternal olmak üzere sınıflandırılmaktadır. Bu sınıflandırma, rezorpsiyonun patogenezi, ilerleme hızı ve tedavi stratejisinin belirlenmesi açısından kritik öneme sahiptir. Günümüzde konvansiyonel radyografilerin yanı sıra konik ışınlı bilgisayarlı tomografi (CBCT), rezorpsiyonların lokalizasyonu, yayılımı ve çevre dokularla ilişkisini değerlendirmede önemli bir tanısal avantaj sunmaktadır.

Kök rezorpsiyonlarının tedavisinde temel amaç; rezorptif sürecin durdurulması, enfeksiyonun elimine edilmesi ve dişin fonksiyonel olarak ağızda tutulmasının sağlanmasıdır. Tedavi yaklaşımı, rezorpsiyonun tipi, yaygınlığı, pulpal ve periodontal durum ile hastaya ait bireysel faktörlere göre değişkenlik göstermektedir.

Bu kitap bölümünde, kök rezorpsiyonlarının etiyolojisi, sınıflandırılması, tanı yöntemleri ve güncel tedavi yaklaşımları literatür ışığında ele alınarak, klinisyenlere tanı ve tedavi sürecinde yol gösterici bir kaynak sunulması amaçlanmıştır.

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bilimsel verilerin birlikte değerlendirilmesi, dişin fonksiyonel ve estetik olarak korunmasına önemli katkı sağlamaktadır. Bu bağlamda, kök rezorpsiyonlarına yönelik tanı ve tedavi yaklaşımlarının sürekli güncellenmesi ve klinisyenlerin bu konuda farkındalığının artırılması büyük önem taşımaktadır.

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