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Temelden Kliniğe Ortodonti

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ÖNSÖZ

Diş Hekimliği tarihinde resmi olarak ilk uzmanlık branşı olan ortodonti, temel diş hekimliği bilgilerinin yanında, büyüme ve gelişim basamaklarını, fiziğin temel dinamik prensiplerini, etkili hasta iletişim tekniklerini, çeşitli büküm becerilerini ve yüksek estetik algıyı da barındıran önemli bir bilim alanıdır. Modern teknolojiyi, geçmiş deneyimler ile ortodonti biliminde harmanlamak suretiyle, etkili ve kalıcı tedavi çözümleri üretmek mümkündür.

Ortodontik tedavilerin hedefi yalnızca mekanik bir planlama ile doğru diş ve çene dizilimi elde etmek değil, aynı zamanda hasta ile doğru iletişimi kurmak, olası komplikasyonları öngörebilmek ve multidisipliner bir bakış açısı geliştirmektir. Diğer diş hekimliği branşlarının aksine uzun soluklu bir tedavi süreci olan ortodontide, teorik bilgi ve birikimin yanında pratik uygulamalar, hastayı sürece motive etmek ve olası olumsuzluklarda alternatif çözümler üretebilmek büyük önem taşır.

"Temelden Kliniğe Ortodonti" kitabımızla, sizlere ortodontinin teorik ve pratik yönlerini, klinik uygulamalarınıza katkı sağlayacak şekilde sunmayı amaçladık. Kitap; diş hekimliği öğrencilerinden araştırma görevlilerine, ortodonti öğrenen herkesin temel bilgilerden ileri klinik uygulamalara güvenle ilerleyebilmesi için titizlikle hazırlandı. İçeriğinde, ortodontik bükümleri gösteren video karekodları, her bölümün sonunda yer alan "bölüm sonu yıldızlı notlar" ve histolojiden ortognatik cerrahiye, büyüme ve gelişimden hasta iletişimine kadar pek çok güncel konu bulunmaktadır.

Editörlüğünü üstlendiğim bu ilk kitabın, yalnızca bir başvuru kaynağı olmanın ötesinde, sizleri düşünmeye, sorgulamaya ve her hastada en doğru ve etik çözümleri aramaya teşvik etmesini diliyorum. Bu eserin hazırlanmasında emeği geçen alanında uzman değerli yazarlarımıza, bilgi birikimimde payı olan kıymetli hocalarıma ve her daim yanımda olan değerli aileme teşekkür ederim.

Bilimsel bilgiyi pratiğe dönüştürmenin heyecanını ve sorumluluğunu sizlerle paylaşmak, benim için büyük bir mutluluktur. Sizleri, temelden kliniğe uzanan bu yolculukta keyifli ve verimli bir okuma deneyimine davet ediyorum.

Sevgi ve saygılarımla…

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BÖLÜM 1

Ortodontiye Giriş ve Temel Kavramlar

Pınar GEZER [1]

GİRİŞ

Bu bölümde, ortodontinin antik çağlardan günümüze kadar uzanan tarihsel gelişimi ele alınmaktadır. Antik çağlarda basit mekanik yöntemlerle başlayan ortodontik tedavilerin, 18. ve 19. yüzyıllarda modern ve bilimsel temelleri atılmıştır. 20. yüzyılda ise tel ve braket sistemlerinin gelişmesiyle sistematik bir bilim dalı haline gelmiştir. Bilimsel ilerlemelerle birlikte, sefalometrik röntgenler ve konik ışınlı bilgisayarlı tomografi teşhis ve tedaviyi daha hassas hale getirmiştir. Zamanla ortodonti yalnızca dişlerin hizalanmasıyla sınırlı kalmamış, fonksiyonel çene ortopedisi ile çene gelişiminin yönlendirilmesi ve fonksiyonel bozuklukların düzeltilmesi de hedeflenmiştir. Ortodontinin temel amaçları; fonksiyonun sağlanması, yapısal dengenin kurulması ve estetik görünümün iyileştirilmesidir. Günümüzde bu hedeflere, yalnızca ortodontik yöntemlerle değil, interdisipliner yaklaşımlarla da ulaşılmaktadır. Ayrıca, modern teknolojiler de ortodontinin gelişmesine büyük katkı sağlamaktadır. Üç boyutlu tarayıcı ve yazıcılar, kişiye özel apareylerin üretimini mümkün kılarken; lingual ortodonti ve şeffaf plaklar estetik çözümler sunmaktadır. Nanoteknoloji, dayanıklı ve biyouyumlu materyaller sağlamakta; robotik sistemler kişiye özel braket ve tellerin hassas şekilde hazırlanmasına olanak tanımakta; yapay zeka ise dijital ölçümler ve tedavi öngörüleriyle süreci hem kısaltmakta hem de bireyselleştirmektedir. Kısacası, bu bölümde ortodontinin geçmişten günümüze gelişiminden, hedeflediği temel amaçlar ve modern teknolojilerin alana kazandırdığı yeniliklerden bahsedilmektedir.

1.1. Ortodontinin Tarihsel Gelişimi ve Temel Kavramlar

1.1.1. Antik Çağda Ortodontik Uygulamalar

Ortodontik tedavinin kökeni, M.Ö. 300'lü yıllara kadar uzanmaktadır. Hipokrat ve Aristoteles, çene-yüz yapıları ve diş dizilimleri üzerine yaptıkları incelemelerle, bu dönemde or-

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BÖLÜM 2

Büyüme ve Gelişim

Kübra EMANET [1], Taner ÖZTÜRK [2]

GİRİŞ

Büyüme, bebekler ve çocuklar için nörolojik gelişimdeki ilerlemeyle eş zamanlı olarak gerçekleşen ve beklenen bir fiziksel süreçtir (1). Büyüme bir yapının farklı bölümleri arasındaki oranlarda bir değişim olmadan, boyutlarda oluşan hacimsel artış şeklinde tanımlanmaktadır (2).

Gelişim ise; büyüme sırasında yapının farklı bölümleri arasındaki birbirlerine göre oranlarının değişimi olarak tanımlanmaktadır (3).

Kraniyofasiyal büyümeyi açıklamak amacıyla Genetik, Fonksiyonel, Sentetik ve Servosistem teorileri geliştirilmiştir. Genetik teori, farklı yapıların rolünü vurgulayan üç alt başlıkta incelenir: *kemik merkezli genetik kontrol, sütur bölgelerindeki genetik etkileşimler ve kıkırdak yapıların genetik yönlendirmesi* (4). Buna karşın ilerleyen dönemde Moss (5, 6), dikkati 'fonksiyon'a yönelterek bunu, kemik-doku-boşluk etkileşiminden oluşan karmaşık bir sürecin nihai sonucu olarak açıklamıştır (Fonksiyonel teori). Sentetik teoriye göre kranium ve yüz gelişiminde belirleyici bir yapı olarak kabul edilen kondrokranyum, genetik kökenli olup özellikle orta yüz bölgesi ile kranial kubbenin morfogenezinde önemli bir rol oynamaktadır. Benzer biçimde, çevresel faktörler de bazı yapıların gelişiminde rol oynamaktadır (7). Bir diğer sentetik teori ise Servosistem Teorisi'dir. Petrovic (8), genetik ve endokrin mekanizmalarla kontrol edilen kranial taban sinkondrozisi ile septum kıkırdağının üst maksiller gelişim ve pozisyonunda önemli rol oynadığını belirtmiştir. Mandibula, oklüzal değişikliklere uyum sağlayarak periodontal ve temporomandibular eklem proprioseptörlerini aktive eder ve böylece Merkezi Sinir Sistemi'ne bilgi iletir. Bu süreç, mandibular kasların etkisiyle kondiler büyümeyi uyaran bir tepkiyi başlatır.

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- Pubertal büyüme atılımı kız çocuklarında erkeklere kıyasla ortalama iki yıl daha erken başlamaktadır.
- Kızlarda bu süreç genellikle 10-12 yaş aralığında başlarken, erkeklerde 12-14 yaşları arasında gözlenmektedir.

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BÖLÜM 3

Maloklüzyonun Sınıflandırılması ve Etiyolojisi

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GİRİŞ

Bu bölümde maloklüzyon; **dişsel** ve **iskeletsel** anomaliler başlıkları altında sınıflandırılmış ve oluşum nedenleri detaylandırılmıştır. Dişsel anomaliler; sayı, şekil ve hacim anomalilerini kapsarken, intramaksiller ve intermaksiller anomaliler de incelenmiştir. Angle sınıflaması, maloklüzyonun sagittal yöndeki tanısında kullanılırken, iskeletsel değerlendirme için sefalometrik analiz esas alınmıştır. Vertikal ve transversal yöndeki anomaliler, açık-kapanış ve çapraz kapanış örnekleriyle açıklanmıştır. Etiyolojik faktörler arasında kalıtım, konjenital bozukluklar, parafonksiyonel alışkanlıklar, travmalar ve erken diş kayıpları öne çıkmaktadır. Kalıtımsal mandibular prognatizm örneği olarak Habsburg Hanedanı ele alınmış; Pierre Robin, Treacher Collins, Down sendromu gibi sendromlarla ilişkili kraniofasiyal anomalilere de değinilmiştir. Parafonksiyonel alışkanlıklar (parmak emme, dil itimi, ağız solunumu), büyüme gelişimi olumsuz etkileyerek iskeletsel ve dişsel anomalilere yol açabilir. Ayrıca erken süt dişi kayıplarının dental arkta boşluk kapanmasına neden olarak çapraşıklık ve orta hat kaymalarına sebep olduğu vurgulanmıştır.

3.1. Dişsel Anomaliler

Bu başlıkta dişlerin sayı, hacim ve şekil anomalileri açıklanmıştır. Ayrıca dişlerin aynı çene içerinde birbiriyle (intramaksiller) ve karşıt çene ile (intermaksiller) olan ilişkisinden bahsedilecektir.

3.1.1. Dişlerin Sayı Anomalileri

Diş sayısındaki anomaliler, genellikle iki ana gruba ayrılmaktadır: diş eksiklikleri ve diş fazlalıkları. Etiyolojisinde genetik en belirgin faktördür.

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- Maloklüzyonun multifaktöriyel etiyolojisi, ortodontik tedavinin yalnızca dişleri değil, iskeletsel yapıları da dikkate almasını gerektirir.
- Erken tanı ve müdahale, ileride cerrahi gerektirebilecek ciddi maloklüzyonların önlenmesinde büyük avantaj sağlar.

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BÖLÜM 4

Tanı ve Tedavi Planlaması

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GİRİŞ

Yakın geçmişe kadar hastalığın ve sağlıkla ilgili yetersizliklerin kontrol altında tutulması gibi sınırlı bir tanımda ifade edilen sağlık hizmetleri, güncel yaklaşımda fiziksel iyi olma halinin yanı sıra zihinsel ve sosyal açıdan da tam bir *iyilik hali* olarak tanımlanmaktadır (1). Bu değişim, ortodonti pratiklerinde de uzun yıllardır sadece maloklüzyonun düzeltilmesine odaklanan geleneksel yaklaşımın aşılması için önemli bir dönüm noktası olmuştur. Böylece, ortodontik tedaviyle yalnızca statik bir dişsel kapanış ilişkisinin elde edilmesi değil; yüz estetiğinin iyileştirilmesi ve bunun sosyal ilişkiler üzerindeki olumlu yansımalarıyla bireyin yaşam kalitesinin korunması ve artırılması hedeflenmiştir (1).

Diğer tıp ve diş hekimliği alanlarında olduğu gibi, ortodontide de optimal bir tanı ve tedavi planlaması, mevcut olanaklardan tam olarak yararlanmayı gerektirir. Tüm ilgili faktörleri göz önünde bulundurmayan fazla iddialı yaklaşımlar veya yüzeysel bir planlamayla sonuca varma eğilimi her zaman bir risk faktörüdür. Bu nedenle, doğru ortodontik tanı için patolojik ve gelişimsel bozuklukların birbirinden ayrılmasının sağlanması ve tüm ortodontik problemlerin kapsamlı bir listesinin oluşturulması gerekir. Doğru ortodontik tedavi planlaması ise, tecrübeli ve bilgili bir ortodontistin hastaya en fazla faydayı, en az maliyetle sağlayacak bir stratejiyi tasarlamasına dayanır (2).

Yaşam kalitesinin artırılmasına yönelik bir bakış açısını benimseyen güncel ortodontik tanı ve tedavi planlaması, maloklüzyonun tedavisiyle birlikte; bireyin normal diş, çene ve yüz özelliklerinin geliştirilmesini ve bu yapıların bazal, alveol ve yüz kemikleri gibi sert dokularla; diş eti, dil, dudak ve yanak gibi yumuşak dokularla dengeli bir şekilde uyumlandırılmasını da içermelidir. Tanı ve tedavi planlamasının bu şekilde ayrıntılı yapılması, ortodontik hedeflere başarıyla ulaşabilmek için büyük önem taşımaktadır. Örneğin, hafif

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- Bolton analizi, diş boyut uyumsuzluğunu değerlendirir; 1.5 mm altındaki farklar önemsizdir, ancak daha büyük uyumsuzluklar ideal kapanışın sağlanmasını güçleştirir.
- Frankfurt Horizontal (FH) düzlemi ile Gerçek Yatay Çizgi (GYÇ) arasındaki fark bazı bireylerde 10°'ye kadar çıkabilir; bu nedenle FH, tek başına güvenilir bir referans değildir.
- Steiner analizi, üst kesicinin NA hattına, alt kesicinin NB hattına açısal ve doğrusal uzaklıklarını ölçerek dental protrüzyonu değerlendiren klasik yöntemdir.
- Tweed analizine göre, mandibular kesici dişlerin aksiyel eğimi ile bazal kemik ilişkisi, tedavi sonrası stabilitenin en önemli belirleyicisidir.
- Holdaway oranı, alt kesici–Pogonion ilişkisini esas alır ve iskeletsel-dentoalveolar dengenin göstergesi kabul edilir.
- Sassouni analizi, düzlemler önde hızla ayrışıyorsa açık kapanış, arkada kesişiyorsa derin kapanış eğilimini ortaya koyar.
- Wits analizi, A ve B noktalarının fonksiyonel oklüzal düzleme projeksiyonunu ölçerek sagittal uyumsuzlukları tanımlar ve ANB açısının sınırlılıklarını aşar.
- McNamara analizinde, Frankfurt düzlemine dik olarak çizilen Nasion Perpendicular referansına göre maksilla bu hattın üzerinde ya da hafif önünde, mandibula ise gerisinde konumlanmalıdır.
- Yüz fotoğrafları, tanısal olarak üç temel açıdan alınmalıdır: frontal, profil ve oblik.
- Ağız içi fotoğraf serisi; sağ ve sol yan kapanış, cephe kapanış, üst ve alt oklüzal olmak üzere beş adet standart görüntüden oluşur.
- Temporomandibular eklem değerlendirmesinde, en yüksek görüntü kalitesi küçük veya orta FOV'lu yüksek çözünürlüklü KIBT ile elde edilir.

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BÖLÜM 5

Ortodontik Biyomekanik ve Diş Hareketi

Derya DURSUN [1] *Elif İpek KOMAR* [2]

GİRİŞ

Ortodontik diş hareketi, uygulanan mekanik kuvvetlerin periodontal ligament (PDL) aracılığıyla alveolar kemik üzerinde başlattığı biyolojik yeniden şekillenme (remodeling) sürecine dayanmaktadır. Uygulanan kuvvetin etkisiyle alveolde basınç ve gerilim alanları olmak üzere iki farklı bölge ortaya çıkar. Basınç bölgelerinde osteoklastik aktiviteye bağlı kemik rezorpsiyonu, gerilim bölgelerinde ise osteoblastik aktiviteye bağlı yeni kemik formasyonu gerçekleşir. Bu çift yönlü biyolojik yanıt, dişin destek dokularıyla birlikte alveol içerisinde kontrollü bir biçimde yer değiştirmesini sağlar. Ortodontik hareket, yalnızca mekanik bir yer değiştirme süreci değil; aynı zamanda hücresel ve moleküler düzeyde çok basamaklı adaptif tepkileri içeren kompleks bir biyolojik olgudur. Periodonsiyumun yapısal özellikleri, uygulanan kuvvetin büyüklüğü, yönü ve süresi ile bireysel biyolojik faktörler, bu yanıtın niteliğini belirleyen temel unsurlardır.

Bu bölümde öncelikle ortodontik biyomekanik çerçevesinde dişi destekleyen dokular, fizyolojik ve ortodontik diş hareketi, histolojik ve biyokimyasal mekanizmalar ele alınacaktır. Devamında, ortodontik diş hareketinin evreleri, optimal kuvvet kavramı ve kuvvetin biyolojik cevapla ilişkisi detaylandırılacak; ayrıca diş hareketini hızlandırmaya yönelik güncel cerrahi ve biyolojik yaklaşımlar özetlenecektir. Son olarak direnç merkezi ve moment–kuvvet ilişkisi çerçevesinde farklı diş hareket tipleri ile kuvvet sistemleri ele alınarak, klinik uygulamalar için gerekli temel bilimsel arka plan sunulacaktır.

5.1. Dişi Destekleyen Dokular

Dişi çevreleyen ve destekleyen dokular, periodonsiyum olarak tanımlanır. Bu yapılar, dişi alveolar kemiğe bağlayarak çiğneme gibi fonksiyonel kuvvetlere karşı destek sağlar ve

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BÖLÜM 6

Ortodontik Aygıtlar ve Temel Uygulamalar

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GİRİŞ

Ortodontik tedavi, maloklüzyonların düzeltilmesi ve dentofasiyal estetiğin sağlanması amacıyla yapılan bir tedavi türüdür ve çeşitli aygıt sistemleri bu tedavi kapsamına girmektedir. Bu aygıtlar, sabit ve hareketli olmak üzere temel iki ana gruba ayrılırken, her biri farklı klinik endikasyonlara ve biyomekanik prensiplere dayanır. Sabit aygıtlar, özellikle 3 boyutlu (3B) diş hareketlerinin kontrolünde yüksek doğruluk ve etkinlik sunarken; hareketli ve fonksiyonel aygıtlar ise büyüme modifikasyonu ve kas fonksiyonlarının düzenlenmesinde önemli rol oynar. Gelişen teknolojiyle birlikte braket tasarımlarında ve materyallerinde önemli yenilikler yaşanmış, ayrıca tedavi verimliliğini artırmak amacıyla kendinden kilitli sistemler ve ortodontik geçici ankraj cihazları gibi destekleyici yaklaşımlar yaygınlaşmıştır. Bu bölümde, ortodontik aygıt sistemlerinin tarihsel gelişimi, sınıflandırılması ve klinik uygulamaları detaylı biçimde ele alınarak, güncel literatür ışığında değerlendirme yapılacaktır.

6.1. Sabit Ortodontik Aygıt Sistemleri

6.1.1. Sabit Ortodontik Aygıtların Tanımı ve Tarihçesi

Ortodontik tedavide sabit aygıtlar, diş hareketlerinin daha kontrollü gerçekleştirilmesine olanak tanıması nedeniyle, özellikle güncel ortodontik tedavilerin temelini oluşturmaktadır. Sabit ortodontik sistemlerin gelişimi, 19. yüzyılın sonlarından itibaren hız kazanmış ve özellikle Edward H. Angle çalışmalarıyla bu alana büyük katkılar sunmuştur. İlk sabit ortodontik aygıtların öncüsü olarak kabul edilen Angle (1900), maloklüzyonların sınıflandırılmasını yapmış ve aynı zamanda ilk mekanik sistem olan Edgewise tekniğini tanıt-

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- Hareketli **apareylerin avantajı**, kolay temizlenebilir olmaları ve hasta tarafından takılıp çıkarılabilmeleridir.
- Hareketli **apareylerin dezavantajı**, hasta uyumuna bağlı olmaları ve kompleks diş hareketlerinde yetersiz kalabilmeleridir.
- Sabit **apareyler**, karmaşık maloklüzyonların düzeltilmesinde yüksek kontrol imkânı sağlar ancak oral hijyen açısından daha fazla dikkat gerektirir.
- Her cihazın seçimi, **vakanın özellikleri, büyüme gelişim durumu, hasta yaşı ve kooperasyonu** göz önünde bulundurularak yapılmalıdır.

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BÖLÜM 7

Ortodontide Büyüme Modifikasyonları ve Erken Dönem Tedaviler

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GİRİŞ

Ortodontik tedavinin zamanlaması, başarılı sonuçlar elde etmek için kritik öneme sahiptir. Erken ortodontik müdahale, gelişmekte olan maloklüzyonların ilerlemesini önleyerek daha karmaşık problemlerin ortaya çıkmasını engellemek ve ileriki dönemde yapılacak tedavi sürecini kolaylaştırmak amacıyla uygulanır. Süt ve erken karışık dişlenme dönemlerinde başlayan tedavilerin, maloklüzyonların önemli bir kısmında olumlu etkiler sağladığı, bazı durumlarda ise tamamen düzelme sağladığı gösterilmiştir. Maloklüzyon türüne göre farklı erken tedavi yaklaşımları mevcuttur; posterior çapraz kapanışlar, sınıf II ve sınıf III maloklüzyonlar ile açık/derin kapanış vakalarında büyüme potansiyelinden yararlanarak uygun apareyler ve teknikler kullanılmaktadır.

Erken müdahale hem iskeletsel hem de dental gelişimi yönlendirebilir, psikososyal sorunların azaltılmasına katkı sağlar ve tedavi süresini kısaltabilir. Ancak, her hasta bireysel değerlendirilerek, uygun zaman ve yöntemle tedavi planlanmalıdır. Bu yaklaşım, tedavi başarısını artırırken hastanın yaşam kalitesini olumlu etkilemektedir.

Bu makalenin amacı, erken ortodontik tedaviye ilişkin güncel durumu özetlemek, konuya dair kanıta dayalı literatürü sunmak ve araştırmaların çelişkili olduğu durumlarda, yazarların kapsamlı klinik deneyimlerine dayanarak etkinliği kanıtlanmış basit ve kısa süreli tedavi yaklaşımlarını okuyucularla paylaşmaktır.

7.1 Ortodontide Zamanlama: Erken vs. Geç Müdahale

Ortodontik müdahalelerin ideal zamanlaması, uzun zamandır süregelen ve sürekli tartışılan bir konudur. Gelişmekte olan maloklüzyonları düzeltmek ya da ileride yapılacak

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Maloklüzyon Türlerine Göre Erken Müdahale

- Posterior çapraz kapanış: Maksiller genişletme (RME veya Hawley vidalı aparey) ile fonksiyonel kaymaların önlenmesi.
- Sınıf II: Erken dönemde genelde yalnızca travma riski veya psikososyal nedenlerle; fonksiyonel apareyler (Twin block, Monoblok, Joho plağı) pubertal büyüme döneminde daha etkili.
- Sınıf III: Maksiller darlık + ilerletme (RME + yüz maskesi), geç dönemde cerrahi ihtiyacını azaltabilir ya da tamamen ortadan kaldırabilir.
- Ark boyu uyumsuzluğu: Genişletme (Hyrax, Schwarz, lip bumper) veya gerekli durumlarda seri çekim.
- Vertikal uyumsuzluklar:
  - Açık kapanış: Alışkanlık kırıcı aparey + miyofonksiyonel tedavi.
  - Derin kapanış: Servikal headgear veya fonksiyonel aparey ile posterior sürme teşviki.
- Trainer sistemleri: Miyofonksiyonel alışkanlıkları düzeltmek, transversal/dikey gelişimi desteklemek, burundan solunumu teşvik etmek.

Klinik İpuçları

- Her vaka bireysel değerlendirilmelidir; tek protokol yoktur.
- Tedavi sıralaması, büyüme dönemine ve vakaya özel belirlenir.
- Erken müdahalede amaç, fonksiyonel, estetik ve psikososyal faydaları aynı anda sağlamaktır.
- Retansiyon süreci uzun tutulmalı, relaps riski gözetilmelidir.

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BÖLÜM 8

Erişkin Ortodontisi ve Estetik Yaklaşımlar

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GİRİŞ

Günümüzde internet ve sosyal medyaya erişimin oldukça kolaylaşmasının etkisiyle, yetişkin hastaların ortodontik tedaviye olan ilgisi üst seviyeye ulaşmıştır. Erişkin hastaların ortodontik tedavi esnasındaki estetik beklentileri, diğer hasta gruplarından oldukça fazladır ve bu nedenle ortodontistin tedavi metodu seçiminde oldukça belirleyici bir faktördür. Ortodontik tedavi sırasında geleneksel metal braketlere göre daha estetik bir görünüm sunan şeffaf plak tedavileri, lingual ortodonti ve estetik braket seçenekleri, erişkin hasta grubu için önemli tedavi alternatifleridir. Bunun yanında, erişkin popülasyondaki ortodontik tedavi, sadece dişlerin düzgün seviyelenmesi ve hizalanmasını değil; estetik, fonksiyonel, periodontal ve protetik gereksinimlerin bütünlük içinde ele alınmasını gerektiren kompleks bir süreçtir. Büyümenin sona ermiş olması, sınırlı biyolojik cevap, estetik kaygılar ve restoratif beklentiler gibi faktörler, erişkin ortodontisinin çocuk ve genç bireylerden önemli ölçüde farklılaşmasına neden olur. Erişkin hastalarda tedavinin başarısı için bireyselleştirilmiş planlama, multidisipliner yaklaşım ve hasta ile etkili iletişim vazgeçilmezdir. Bu bölümde erişkin hastaların ortodontik tedavisindeki farklılıklar ve dikkat edilmesi gereken noktalar ele alınacaktır.

8.1 Erişkinlerde Ortodontik Tedavinin Özellikleri

Günümüzde sosyal medyanın efektif kullanımı ve etkisinin yükselmesi ile erişkin hastaların ortodontik tedaviye olan ilgisi ve isteğinde artış yaşanmaktadır. Erişkin popülasyondaki estetik beklenti, ortodontik tedavi tercihinde oldukça belirleyici bir unsur haline gelmiştir. Metal braketlerin estetik yetersizliği, erişkin hastaların ortodontik tedaviye

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- Erişkin hastaların yüksek estetik beklentilerini karşılamak üzere estetik braket sistemleri, lingual ortodontik tedavi ve şeffaf plaklarla ortodontik tedavi gibi birçok alternatif bulunmaktadır.
- Plastik ve seramik braketlerin çeşitli geliştirmelerle dayanıklılık, sürtünme ve mukavemet gibi özellikleri güçlendirilmiş olsa da geleneksel paslanmaz çelik braketlere yakın bir klinik performans sunan estetik braketler üretilmesi için daha fazla çalışmaya ihtiyaç duyulmaktadır.
- Lingual sistemlerin görünmez olmalarından dolayı estetik avantajları olsa da hasta konforu, ağız hijyeninin sağlanmasının zorluğu, ortodontist için uygulama zorluğu ve artmış hasta başı süresi gibi bazı temel dezavantajları ön plana çıkmaktadır.
- Şeffaf plak tedavileri, estetik görüntüsü, konforu, rahatlığı gibi faktörlerden dolayı günümüzde erişkin hastalar tarafından büyük ilgi görmektedir.
- Erişkin hastalarda şeffaf plaklarla başarılı bir tedavi için doğru tedavi planlaması, iyi hasta kooperasyonu, biyomekanik unsurlar, hekim deneyimi ve maloklüzyonun şiddeti gibi temel faktörler ele alınmalı ve şeffaf plak sistemlerinin limitasyonları iyi anlaşılmalıdır.
- Tedavi bitiminden sonraki retansiyon aşaması, erişkinlerde daha önemli hale gelir. Yaşla birlikte dokuların yeniden yapılanma kapasitesinin azalması, relaps riskini artırabilir.
- Erişkin hastalarda ortodontik tedavi, genç hastalardan daha farklı ve bütüncül bir yaklaşımla ele alınmalıdır. Başarılı bir ortodontik sonuç için tedavi planlaması sırasında, tedavi süresince ve tedaviden sonra, erişkin hastalardaki azalmış hücresel aktivite, büyüme ve gelişimin tamamlanmış olması, olası periodontal yıkım, restoratif gereklilikler ve estetik beklentiler gibi faktörlerin itinayla değerlendirilmesi gerekmektedir.

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BÖLÜM 9

Ortognatik Cerrahiye Hazırlık

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GİRİŞ

Ortognatik cerrahi, iskeletsel maloklüzyonların, dentofasiyal deformitelerin ve ilişkili fonksiyonel bozuklukların düzeltilmesinde sıklıkla tercih edilen tedavi yöntemidir. Cerrahi öncesi ortodontik hazırlık, postoperatif stabiliteyi artırmak, relaps riskini azaltmak ve cerrahi sonrası iskeletsel uyumu desteklemek için kritik öneme sahiptir. Bu aşamada oklüzal ilişkilerin doğru konumlandırılması, dental kompansasyonların düzeltilmesi ve cerrahi sonrası iskeletsel uyumun desteklenmesi temel hedeflerdir. Dentoalveolar dekompansasyon, kompansatuvar diş hareketlerini düzelterek iskeletsel ilişkilerin doğru şekilde ortaya çıkarılmasını ve cerrahi düzeltimin kolaylaştırılmasını sağlar. Hazırlık aşamasında kesici dişlerin sagital pozisyonu ve inklinasyonu, arkların seviyelenmesi, transversal uyumun sağlanması ve oklüzal interferenslerin ortadan kaldırılması cerrahi planlamanın doğruluğunu etkilemektedir. Açık kapanış olgularında seviyeleme çoğunlukla bölümlü arklarla yapılmalı, segmentlerin cerrahi sırasında düzeltilebilmesine olanak tanınmalıdır. Alt arkta spee eğrisinin artmış olduğu vakalarda, seviyelemenin kesici diş intrüzyonu veya premolar ekstrüzyonu ile yapılması kararı istenen son yüz yüksekliği göz önünde bulundurularak verilmelidir. Cerrahi hazırlık süreci; ayrıntılı klinik ve radyografik muayene, sefalometrik analizler, üç boyutlu görüntüleme yöntemleri, model cerrahisi, dijital simülasyon tekniklerinin entegrasyonu ile şekillenmektedir. Sonuç olarak cerrahi öncesi hazırlığın titizlikle yürütülmesi komplikasyon risklerini azaltmakta, cerrahi sonrası stabiliteyi ve hasta memnuniyetini arttırmaktadır. Ayrıca periodontal sağlık, temporomandibular eklem fonksiyonlarının değerlendirilmesi ve oral hijyenin optimize edilmesi, komplikasyonların önlenmesine katkıda bulunmaktadır. Multidisipliner bir yaklaşım, ortognatik cerrahinin uzun dönem başarısının en önemli belirleyicilerinden biridir.

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- Sefalometrik cerrahi planlama için manuel asetat çizimi teknikleri, foto sefalometrik yöntem, bilgisayarlı sefalometrik tahmin, video sefalometri ve üç boyutlu sefalometrik tahmin kullanılabilmektedir.
- Maksiller genişletme en az stabil olan ortognatik cerrahi prosedürdür.

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BÖLÜM 10

Retansiyon ve Relaps

Esra EKİZER [1]

GİRİŞ

Ortodontik tedavinin temel amacı, yalnızca dişlerin düzgün dizilimini sağlamak değil, aynı zamanda hastaya fonksiyonel, estetik ve stabil bir oklüzyon kazandırmaktır (1). Ancak bu hedeflere ulaşıldıktan sonra, elde edilen sonuçların uzun vadeli olarak korunması her zaman kolay değildir. *Retansiyon;* dişlerin estetik, fonksiyonel ve ideal bir pozisyonda tutulduğu ortodontik tedavinin son ve en önemli aşamasıdır. Retansiyon aşaması, ortodontik tedavinin başarıya ulaşmasında kritik bir rol oynar (2).

Retansiyon ihtiyacı, çoğu zaman teşhis ve tedavi planlaması aşamasında öngörülür. Doğru bir teşhis, mantıklı bir tedavi planı ve uygun zamanlamayla yapılan uygulamalar, hem estetik hem de fonksiyonel açıdan kalıcı sonuçların elde edilmesini destekler. Öte yandan; dental arkların aşırı genişletilmesi, ark formunda belirgin değişiklikler yapılması, anteroposterior ilişkilerin yeterince düzeltilmemesi ya da diş rotasyonlarının tamamen düzeltilmemesi gibi durumlar, tedavi sonrası ek retansiyon önlemlerini zorunlu kılabilir (3).

Relaps, İngiliz Standartları Enstitüsü tarafından, ortodontik düzelmeyi takiben orjinal maloklüzyon özelliklerinin yeniden ortaya çıkması olarak tanımlanmıştır. Ancak klinik açıdan hastalar için asıl önemli olan, tedavi sonrasında meydana gelen her türlü diş pozisyonu değişikliğidir. Bu durum, tedavi sonunda elde edilen son diş pozisyonlarından sapma şeklinde tanımlanabilir (4). Tedavi sonrası görülen bu değişiklikler, başlangıçtaki maloklüzyona doğru bir geri dönüş olabileceği gibi, ortodontik tedaviyle doğrudan ilişkili olmayan ve yaşa bağlı fizyolojik süreçler nedeniyle de ortaya çıkabilir (1, 4).

Ortodontik relaps çok faktörlü bir olgudur ve tedavi sonrası relapsı etkileyen birçok unsur vardır. Bunlar arasında kullanılan retansiyon tekniği, hastanın aparey kullanımına uyumu, yaş, iskeletsel büyüme paternleri, oklüzal kuvvetler, parafonksiyonel alışkanlık-

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- Alışkanlığa bağlı açık kapanış vakalarında, uzun dönem stabilite için alışkanlıkların (dil itimi, parmak emme vb.) ortadan kaldırılması şarttır.
- Derin kapanış vakalarında anterior bite-plate içeren retainer ile uzun süreli koruma sağlanabilir.
- Retansiyon süresi bireysel vaka özelliklerine göre belirlenmelidir.
- Sabit, hareketli veya aktif retainer seçimi; vaka tipi, estetik gereksinimler ve hasta uyumuna göre yapılmalıdır.
- Gerekli durumlarda fiberotomi, frenektomi ve gingivoplasti gibi yardımcı prosedürler stabiliteyi artırabilir.
- Ortodontik tedavi öncesinde retansiyon süreci ve olası relaps riskleri hasta ile ayrıntılı görüşülmeli ve bilgilendirilmiş onam alınmalıdır.
- Hareketli retainer kullanımında hasta uyumu, relaps riskini doğrudan etkiler.
- Sabit retainerların düzenli kontrolü, tel aktivasyonu veya kırıklarının erken fark edilmesi için şarttır.
- İkili retansiyon (sabit + hareketli) yöntemi, sabit retainerın kopması durumunda ek güvenlik sağlar.

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BÖLÜM 11

Dijital Ortodonti ve Yapay Zekâ Uygulamaları

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GİRİŞ

Dijital teknolojilerin ve yapay zekanın ortodontiye entegrasyonu, geleneksel uygulamalarda devrim yaparak tanı, tedavi planlaması ve ortodontik aparey üretiminde gelişmiş hassasiyet ve öngörülebilirlik sağlamıştır (1). Ortodontinin dijital dönüşümü, büyük veri analitiği ve gelişmiş iletişim teknolojileriyle desteklenen bilgisayar kaynaklı veri işleme ve gelişmiş üretim teknikleriyle ağız ve diş sağlığı hizmetlerinin sunumunu kolaylaştırmaktadır (2). Bu teknolojik gelişmeler yalnızca klinik iş akışlarını optimize etmekle kalmaz, eş süreli olarak hasta konforunu ve sonuçlarını da iyileştirmeyi sağlamaktadır (3). Dijital ortodonti, ağız içi tarayıcılar, konik ışınlı bilgisayarlı tomografi, CAD/CAM sistemleri ve üç boyutlu baskı dahil olmak üzere bir dizi tekniği kapsayarak ve ortodontistlerin hastanın dental yapısının sanal modellerini oluşturmasına, ayrıntılı analizler yapmasına ve daha yüksek doğrulukla özelleştirilmiş apareyler üretmesine imkân tanımaktadır (4). Yapay zekâ, büyük veri kümelerinin analiz edilmesinde, örüntülerin belirlenmesinde ve klinik karar alma, tedavi planlaması ve otomatik değerlendirme süreçlerine yardımcı olmada önemli rol oynamaktadır (5). Yapay zekâ algoritmaları, malkoklüzyonları tespit etmek için radyografileri, görüntüleri ve hasta verilerini analiz edebilmektedir (6).

Bu bölüm, dijital ortodonti ve yapay zekânın entegrasyonunu kapsamlı bir şekilde inceleyerek, klinik prosedürler, teşhis olanakları, tedavi stratejileri ve hasta bakımının iyileştirilmesi üzerindeki etkilerini ayrıntılı olarak açıklamayı sağlamaktadır.

11.1. Dijital Model Analizi ve CAD/CAM Sistemleri

Dijital model analizi, ortodontistlerin dental modellerin daha yüksek hassasiyet ve verimlilikle değerlendirmelerini sağlayarak ortodontik tanıyı dönüştürmeyi hedeflemekte-

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BÖLÜM 12

Klinik Protokoller, Hasta-Hekim İletişimi ve Medikolegal Yaklaşımlar

Kevser KURT DEMİRSOY [1]

GİRİŞ

Ortodontik tedavi, yalnızca dişlerin düzgün hizalanmasıyla sınırlı olmayan; estetik, fonksiyonel ve psikososyal boyutları olan çok yönlü bir süreçtir. Diğer diş hekimliği branşlarının aksine ortodonti branşı en uzun süre hasta-hekim ilişkisinin kurulduğu alandır. Bu süreçte hekimin rolü, teknik uygulamaların ötesine geçerek hastayla güvene dayalı bir ilişki kurmak, etik kararlar almak ve medikolegal sorumluluklarını titizlikle yerine getirmektir.

Bu bölümde, ortodontik tedaviye ilişkin temel klinik protokoller adım adım ele alınırken; her aşamada etkili iletişimin nasıl kurulacağına da özel bir vurgu yapılacaktır. Çünkü doğru iletişim, doğru tedavinin birinci adımıdır. Hekimin hastayla kurduğu sağlıklı diyalog; tedaviye uyumu artırır, memnuniyeti yükseltir ve olası yanlış anlamaların önüne geçer. Bilgilendirme süreci, empatik yaklaşım, yaşa uygun anlatım dili ve kültürel farkındalık gibi temel iletişim stratejileri bu bağlamda değerlendirilecektir.

Ayrıca, ortodontik tedavinin medikolegal boyutu — yani hekimin yasal yükümlülükleri, hukuki riskler ve kayıt sistemlerinin önemi — vaka örnekleriyle birlikte işlenecektir. Estetik beklentilerin yönetimi, hasta konforunun artırılması ve bireysel farklılıkların gözetilerek tedaviye uyumun sağlanması da bu bölümün temel bileşenlerindendir.

Ortodontik tedaviye karar verme sürecinde bireyin yaşı, sosyal çevresi ve psikolojik durumu göz önünde bulundurulmalı; özellikle çocuk ve ergen hastalarda hekimin taşıdığı sorumluluk daha bütüncül bir yaklaşımla değerlendirilmelidir.

Kısacası, bu bölüm; yalnızca "nasıl tedavi edilir" sorusuna değil, aynı zamanda "nasıl daha insancıl, etik ve güvenli bir ortodontik yaklaşım geliştirilir" sorusuna da yanıt sunmayı amaçlamaktadır.

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- Tedavi ücretleri, ödeme planları ve olası ek maliyetler hastaya önceden net ve yazılı olarak bildirilmelidir; bu, hasta beklentilerini yönetir ve anlaşmazlıkları önler.
- Ortodontik tedavi sürecinde hekimlerin hukuki hakları ve yükümlülükleri hakkında bilgi sahibi olması, olası riskleri önceden fark edip önleyici tedbirler almasını sağlar.
- Malpraktis sigortası yaptırmak, olası yasal süreçlerde hem maddi hem manevi zararların azaltılması için kritik bir güvencedir.
- Etkili bir ortodontik uygulama; teknik yetkinlik, hasta-hekim güveni, etik sorumluluk ve titiz dokümantasyonun bir arada yürütülmesiyle mümkün olur.
- Ortodontik tedavilerde etkili hasta-hekim iletişimi ve güvenli bağlanma, sürecin en önemli unsurudur.

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