

## BÖLÜM 5

# KÖK KANAL TEDAVİSİ UYGULANAN DIŞLERDE RESTORATİF STRATEJİLERE DAİR GÜNCEL YAKLAŞIMLAR

Furkan KONUŞ<sup>1</sup>  
Aybüke KARA<sup>2</sup>

### GİRİŞ

Literatürde dentin nem kaybının kırılma direncine etkisine dair yapılan çalışmalarda çelişkiler bulunmakta olup örneğin Rivera ve ark. yapmış oldukları çalışmada kök kanal tedavisi görmüş dişlerde nem kaybı sonucu kollajen çapraz bağlarında bazı değişimlerin meydana geldiği ve bu nedenle vital dişlere kıyasla kırılmaya daha yatkın olduklarını öne sürmüştür(1). Başka bir çalışmada Papa ve ark. vital dentinin nem oranını %12.35, endodontik tedavi görmüş dişlerden elde edilen dentinin ise %12.10 nem oranına sahip olduğunu bildirmiştir. Bu sonuçlar, endodontik tedavi görmüş dişler ile vital dişler arasında nem içeriği açısından anlamlı bir fark olmadığını göstermiştir(2). Bazı çalışmalarda ise dişin kök kanal tedavisi sonrası devital hale gelmesiyle nem içeriğinde belirli ölçüde azalma olduğu belirtilmektedir(3, 4).

Buna ek olarak kök kanal tedavisi sürecinde kullanılan irrigasyon solüsyonları, dentinin hem inorganik hem de organik yapısını etkileyerek dişin bükülme direncini, elastikiyetini ve mikro-sertliğini olumsuz yönde etkilemektedir(5, 6). Ari ve ark. endodontik tedavide yaygın olarak kullanılan irrigasyon solüsyonlarının (%5,25 ve %2,5 NaOCl, %3 H<sub>2</sub>O<sub>2</sub>, %17 EDTA, %0,2 klorheksidin glukonat) dentinin mekanik özellikleri üzerine etkisini değerlendirmiştir. Irrigasyon solüsyonu tercihinde birçok faktör olmasına rağmen, bu çalışmanın sonuçlarına göre

<sup>1</sup> Dr. Öğr. Üyesi, Yozgat Bozok Üniversitesi, Diş Hekimliği Fakültesi Endodonti AD.,  
furkan.konus@bozok.edu.tr, ORCID iD: 0009-0000-1107-4337

<sup>2</sup> Arş. Gör., Fırat Üniversitesi Diş Hekimliği Fakültesi Protetik Diş Tedavisi AD.,  
aybukekara537@gmail.com, ORCID iD: 0009-0003-6512-9198

DOI: 10.37609/akya.3813.c704

linik kanıt bulunmamaktadır. Postlar adeziv yöntemlerle simante edilecekse, firmalar tarafından belirtilen tüm protokol adımlarına eksiksiz uyulmalıdır. Restorasyonun başarısı açısından, kullanılan post materyalinden ziyade temiz ve yeterli şekilde hazırlanmış dentin yüzeyinin daha önemli olduğu unutulmamalıdır.

- Endokronlar, kök kanal tedavili molar dişlerde rezidüel diş dokusunun daha fazla korunmasına olanak tanıyan ve post tutuculu kron restorasyonlara uygun bir alternatif olarak değerlendirilebilir. Ancak bu restorasyonların başarısı, doğru adeziv simantasyon protokolünün eksiksiz uygulanmasına bağlıdır.

## **KAYNAKLAR**

1. Rivera E, Yamauchi M. Site comparisons of dentine collagen cross-links from extracted human teeth. *Archives of oral biology*. 1993;38(7):541-6.
2. Papa J, Cain C, Messer H. Moisture content of vital vs endodontically treated teeth. *Dental Traumatology*. 1994;10(2):91-3.
3. Gutmann JL. The dentin-root complex: anatomic and biologic considerations in restoring endodontically treated teeth. *The Journal of prosthetic dentistry*. 1992;67(4):458-67.
4. Huang T-JG, Schilder H, Nathanson D. Effects of moisture content and endodontic treatment on some mechanical properties of human dentin. *Journal of endodontics*. 1992;18(5):209-15.
5. Grigoratos D, Knowles J, Ng YL, Gulabivala K. Effect of exposing dentine to sodium hypochlorite and calcium hydroxide on its flexural strength and elastic modulus. *International endodontic journal*. 2001;34(2):113-9.
6. Sim T, Knowles J, Ng YL, Shelton J, Gulabivala K. Effect of sodium hypochlorite on mechanical properties of dentine and tooth surface strain. *International endodontic journal*. 2001;34(2):120-32.
7. Ari H, Erdemir A, Belli S. Evaluation of the effect of endodontic irrigation solutions on the microhardness and the roughness of root canal dentin. *Journal of endodontics*. 2004;30(11):792-5.
8. Chang C-Y, Kuo J-S, Lin Y-S, Chang Y-H. Fracture resistance and failure modes of CEREC endo-crowns and conventional post and core-supported CEREC crowns. *Journal of Dental Sciences*. 2009;4(3):110-7.
9. Smith C, Setchell D, Hartly F. Factors influencing the success of conventional root canal therapy—a five-year retrospective study. *International endodontic journal*. 1993;26(6):321-33.
10. Bhuvu B, Giovarruscio M, Rahim N, Bitter K, Mannocci F. The restoration of root filled teeth: a review of the clinical literature. *International Endodontic Journal*. 2021;54(4):509-35.
11. Borén DL, Jonasson P, Kvist T. Long-term survival of endodontically treated teeth at a public dental specialist clinic. *Journal of endodontics*. 2015;41(2):176-81.
12. Salehrabi R, Rotstein I. Endodontic treatment outcomes in a large patient population in the USA: an epidemiological study. *Journal of endodontics*. 2004;30(12):846-50.
13. Mannocci F, Bhuvu B, Roig M, Zarow M, Bitter K. European Society of Endodontology position statement: The restoration of root filled teeth. *International endodontic journal*. 2021;54(11):1974-81.
14. Johnson JK, Schwartz NL, Blackwell RT. Evaluation and restoration of endodontically treated posterior teeth. *The Journal of the American Dental Association*. 1976;93(3):597-605.
15. Faria ACL, Rodrigues RCS, de Almeida Antunes RP, de Mattos MdGC, Ribeiro RF. Endodontically treated teeth: characteristics and considerations to restore them. *Journal of prosthodontic research*. 2011;55(2):69-74.
16. Yıkılğan İ, Bala O. Endodontik tedavi görmüş dişlerin konservatif restorasyonları. *Acta Odontologica Turcica*. 2013;30(1):44-8.

17. Sorensen JA, Martinoff JT. Intracoronal reinforcement and coronal coverage: a study of endodontically treated teeth. *The Journal of prosthetic dentistry*. 1984;51(6):780-4.
18. Öznurhan F, Özel A. Kuron harabiyeti olan kanal tedavili dişlerde endokuron uygulamaları: Derleme. *Journal of International Dental Sciences (Uluslararası Diş Hekimliği Bilimleri Dergisi)*. 2020;6(1):1-7.
19. Pilo R, Tamse A. Residual dentin thickness in mandibular premolars prepared with gates glidden and ParaPost drills. *The Journal of prosthetic dentistry*. 2000;83(6):617-23.
20. Peroz I, Blankenstein F, Lange K-P, Naumann M. Restoring endodontically treated teeth with posts and cores--a review. *Quintessence international*. 2005;36(9).
21. Ghasemzadeh M. Kompozit ve Amalgam Restoratif Materyallerle Yapılan Restorasyonların Ağız İçi Ömrü ve Buna Etki Eden Faktörler. *Türk Diş Hekimliği Araştırma Dergisi*. 2025;4(1):37-49.
22. Mannocci F, Bertelli E, Sherriff M, Watson TF, Ford TP. Three-year clinical comparison of survival of endodontically treated teeth restored with either full cast coverage or with direct composite restoration. *The Journal of prosthetic dentistry*. 2002;88(3):297-301.
23. Nagasiri R, Chitmongkolsuk S. Long-term survival of endodontically treated molars without crown coverage: a retrospective cohort study. *The Journal of prosthetic dentistry*. 2005;93(2):164-70.
24. Al-Asmar AA, Sabrah AH, Abd-Raheem IM, Ismail NH, Oweis YG. Clinical evaluation of reasons for replacement of amalgam vs composite posterior restorations. *The Saudi Dental Journal*. 2023;35(3):275.
25. Organization WH. Report of the informal global WHO consultation with policymakers in dental public health, 2021: monitoring country progress in phasing down the use of dental amalgam. Report of the informal global WHO consultation with policymakers in dental public health, 2021: monitoring country progress in phasing down the use of dental amalgam2021.
26. Cardoso JA, Almeida PJ, Negrão R, Oliveira JV, Venuti P, Taveira T, et al. Clinical guidelines for posterior restorations based on Coverage, Adhesion, Resistance, Esthetics, and Subgingival management: The CARES concept: Part I-partial adhesive restorations. *International Journal of Esthetic Dentistry*. 2023;18(3).
27. Bresser R, Gerdolle D, Van den Heijkant I, Sluiter-Pouwels L, Cune M, Gresnigt M. Up to 12 years clinical evaluation of 197 partial indirect restorations with deep margin elevation in the posterior region. *Journal of dentistry*. 2019;91:103227.
28. Manhart J, Chen H, Hamm G, Hickel R. Review of the clinical survival of direct and indirect restorations in posterior teeth of the permanent dentition. *OPERATIVE DENTISTRY-UNIVERSITY OF WASHINGTON-*. 2004;29:481-508.
29. Kuijs RH, Fennis WM, Kreulen CM, Roeters FJM, Creugers NH, Burgersdijk RC. A randomized clinical trial of cusp-replacing resin composite restorations: efficiency and short-term effectiveness. *International Journal of Prosthodontics*. 2006;19(4).
30. ATAĞ AY B, TÜRKER ŞB. Protetik Diş Hekimliğinde Üç Boyutlu Yazıcılar. *Journal of Ege University School of Dentistry/Ege Üniversitesi Dis Hekimligi Fakültesi Dergisi*. 2024;45(2).
31. Ferraris F. Posterior indirect adhesive restorations (PIAR): preparation designs and adhesthetics clinical protocol. *Int J Esthet Dent*. 2017;12(4):482-502.
32. Ahlholm P, Sipilä K, Vallittu P, Kotiranta U, Lappalainen R. Accuracy of inlay and onlay restorations based on 3D printing or milling technique-a pilot study. *The European journal of prosthodontics and restorative dentistry*. 2019;27(2):56-64.
33. Rocca GT, Krejci I. Crown and post-free adhesive restorations for endodontically treated posterior teeth: from direct composite to endocrowns. *Eur J Esthet Dent*. 2013;8(2):156-79.
34. Dioguardi M, Alovizi M, Comba A, Baldi A, Troiano G, Cadenaro M, et al. The influence of indirect bonded restorations on clinical prognosis of endodontically treated teeth: A systematic review and meta-analysis. *dental materials*. 2022;38(8):e203-e19.
35. Bindl A, Mormann WH. Clinical evaluation of adhesively placed Cerec endo-crowns after 2 years-preliminary results. *Journal of Adhesive Dentistry*. 1999;1:255-66.

36. Pissis P. Fabrication of a metal-free ceramic restoration utilizing the monobloc technique. *Practical periodontics and aesthetic dentistry: PPAD*. 1995;7(5):83-94.
37. Papalexopoulos D, Samartzi T-K, Sarafianou A. A thorough analysis of the endocrown restoration: a literature review. *J Contemp Dent Pract*. 2021;22(4):422-6.
38. Lise DP, Van Ende A, De Munck J, Suzuki TYU, Vieira LCC, Van Meerbeek B. Biomechanical behavior of endodontically treated premolars using different preparation designs and CAD/CAM materials. *Journal of dentistry*. 2017;59:54-61.
39. OĞUZ Eİ, SARIDAĞ M. Endokronlar ve Preparasyondaki Etkenler. *Türkiye Klinikleri Prosthodontics-Special Topics*. 2024;10(2):23-9.
40. Belleflamme MM, Geerts SO, Louwette MM, Grenade CF, Vanheusden AJ, Mainjot AK. No post-no core approach to restore severely damaged posterior teeth: An up to 10-year retrospective study of documented endocrown cases. *Journal of Dentistry*. 2017;63:1-7.
41. Biacchi G, Basting R. Comparison of fracture strength of endocrowns and glass fiber post-retained conventional crowns. *Operative dentistry*. 2012;37(2):130-6.
42. Ramirez-Sebastia A, Bortolotto T, Roig M, Krejci I. Composite vs ceramic computer-aided design/computer-assisted manufacturing crowns in endodontically treated teeth: analysis of marginal adaptation. *Operative dentistry*. 2013;38(6):663-73.
43. Zoidis P, Bakiri E, Polyzois G. Using modified polyetheretherketone (PEEK) as an alternative material for endocrown restorations: A short-term clinical report. *The Journal of prosthetic dentistry*. 2017;117(3):335-9.
44. Kahraman Z, Özden S. Permanent endocrown restorations: rapid clinical workflow with 3d printers. *International Dental Journal*. 2024;74:S199.
45. İRKEÇ Z. Post-Kor Restorasyonları ve Preparasyon İncelikleri. *Türkiye Klinikleri Prosthodontics-Special Topics*. 2024;10(2):30-8.
46. Sorensen J, Engelman M, Mito W. Effect of ferrule design on fracture resistance of pulpless teeth. *J Dent Res*. 1988;67:130.
47. Akkayan B. An in vitro study evaluating the effect of ferrule length on fracture resistance of endodontically treated teeth restored with fiber-reinforced and zirconia dowel systems. *The Journal of prosthetic dentistry*. 2004;92(2):155-62.
48. Assif D, Bitenski A, Pilo R, Oren E. Effect of post design on resistance to fracture of endodontically treated teeth with complete crowns. *The Journal of prosthetic dentistry*. 1993;69(1):36-40.
49. Sorensen JA, Engelman MJ. Ferrule design and fracture resistance of endodontically treated teeth. *The Journal of prosthetic dentistry*. 1990;63(5):529-36.
50. Bolhuis HP, De Gee AJ, Feilzer AJ, Davidson CL. Fracture strength of different core build-up designs. *American journal of dentistry*. 2001;14(5):286-90.
51. Morgano SM, Rodrigues AH, Sabrosa CE. Restoration of endodontically treated teeth. *Dental Clinics*. 2004;48(2):397-416.
52. Robbins JW. Restoration of the endodontically treated tooth. *Dental Clinics*. 2002;46(2):367-84.
53. Aydemir M, Bağlar S. Post-Kor Sistemlerinin Güncel Sınıflandırılması. *Türkiye Klinikleri Journal of Dental Sciences*. 2019;25(3).
54. Ahmetoğlu F, Şimşek N, Yıldırım G, Polat MT. Endodontik tedavili dişlerin restorasyonunda post materyalleri. *Atatürk Üniversitesi Diş Hekimliği Fakültesi Dergisi*. 2014;24(1):153-7.
55. Zarow M, Ramirez-Sebastia A, Paolone G, de Ribot Porta J, Mora J, Espona J, et al. A new classification system for the restoration of root filled teeth. *International endodontic journal*. 2018;51(3):318-34.
56. Guldener KA, Lanzrein CL, Siegrist Guldener BE, Lang NP, Ramseier CA, Salvi GE. Long-term Clinical Outcomes of Endodontically Treated Teeth Restored with or without Fiber Post-retained Single-unit Restorations. *Journal of endodontics*. 2017;43(2):188-93.
57. Ferrari M, Vichi A, Fadda GM, Cagidiaco MC, Tay FR, Breschi L, et al. A randomized controlled trial of endodontically treated and restored premolars. *Journal of dental research*. 2012;91(7 Suppl):72s-8s.

58. Jawed A, Alghmlas AS, Khurshid Z. Fiber post: Physics, chemistry, adhesive properties, and its implications on root canal retreatment. *Biomaterials in Endodontics*: Elsevier; 2022. p. 357-78.
59. Franco ÉB, do Valle AL, de Almeida ALPF, Rubo JH, Pereira JR. Fracture resistance of endodontically treated teeth restored with glass fiber posts of different lengths. *The Journal of prosthetic dentistry*. 2014;111(1):30-4.
60. Papadogiannis D, Palaghias G, Papadogiannis Y. Creep and dynamic viscoelastic behavior of endodontic fiber-reinforced composite posts. *Journal of prosthodontic research*. 2009;53(4):185-92.
61. Fokkinga WA, Kreulen CM, Bronkhorst EM, Creugers NH. Up to 17-year controlled clinical study on post-and-cores and covering crowns. *Journal of dentistry*. 2007;35(10):778-86.
62. Mahmoudi M, Saidi A, Nassab SAG, Hashemipour MA. A three-dimensional finite element analysis of the effects of restorative materials and post geometry on stress distribution in mandibular molar tooth restored with post-core crown. *Dental materials journal*. 2012;31(2):171-9.
63. Pierrisnard L, Bohin F, Renault P, Barquins M. Corono-radicular reconstruction of pulpless teeth: a mechanical study using finite element analysis. *The Journal of prosthetic dentistry*. 2002;88(4):442-8.
64. Scotti N, Scansetti M, Rota R, Pera F, Pasqualini D, Berutti E. The effect of the post length and cusp coverage on the cycling and static load of endodontically treated maxillary premolars. *Clinical oral investigations*. 2011;15:923-9.
65. Nothdurft F, Seidel E, Gebhart F, Naumann M, Motter P, Pospiech P. The fracture behavior of premolar teeth with class II cavities restored by both direct composite restorations and endodontic post systems. *Journal of dentistry*. 2008;36(6):444-9.
66. Ibrahim RO, AL-ZAHAWI AR, Sabri LA. Mechanical and thermal stress evaluation of PEEK prefabricated post with different head design in endodontically treated tooth: 3D-finite element analysis. *Dental Materials Journal*. 2021;40(2):508-18.
67. Sorrentino R, Monticelli F, Goracci C, Zarone F, Tay F, Garcia-Godoy F, et al. ALKALMAZÁSI JAVALLATOK. *American journal of dentistry*. 2007;20:269-74.
68. Gök T, Durdu E, Atik MR, Konuş F, Gök A. Evaluation of Fracture Resistance and Failure Modes of Maxillary Premolars Restored with Different Coronal Designed Fiber Posts: In Vitro Study. *European Endodontic Journal*. 2025;10(1):58-65.
69. Ellakany P, Tantawi ME, Mahrous AA, A- Harbi F. Evaluation of the accuracy of digital impressions obtained from intraoral and extraoral dental scanners with different CAD/CAM scanning technologies: an in vitro study. *Journal of Prosthodontics*. 2022;31(4):314-9.
70. Hamid NFA, Zulkefle NJ, Ariff T, Ghani Z, Ahmad R. Computer Aided Design/Computer Aided Manufacturing [CAD/CAM] Post and Core--A Review. *Journal of Evolution of Medical and Dental Sciences*. 2021;10(36):3143-52.
71. Öge SÇ, Küden C, Ekren O. Evaluation of the Mechanical properties of 3D-Printed Post and Core systems. *Int J Prosthodont*. 2024;37(7):127-31.
72. Benli M, Eker Gümüş B, Kahraman Y, Huck O, Özcan M. Surface characterization and bonding properties of milled polyetheretherketone dental posts. *Odontology*. 2020;108:596-606.