

BÖLÜM 2

REJENERATİF ENDODONTİDE KANAL İÇİ MEDİKAMENT KULLANIMI

Ahter ŞANAL ÇIKMAN¹

Nihan ÇELİK²

GİRİŞ

İmmatür dişlerde travma, çürük veya anatomik varyasyonlar nedeniyle pulpa nekrozu gelişme riski oldukça yüksektir⁽¹⁾. Geleneksel olarak immatür dişleri tedavi etmek için uzun süreli kalsiyum hidroksit (Ca(OH)_2) apeksifikasyon ve mineral trioksit agregat (MTA) ile tek seans apeksifikasyon gibi farklı klinik yöntemler kullanılmaktadır. Her iki tedavi yöntemi ile apikal kapanma sağlanır da, kök gelişiminin durması ve dentin duvarlarının ince kalması, immatür daimi dişin prognozunu olumsuz yönde etkilemektedir^(2, 3). İlk defa 2001 yılında, Iwaya ve ark. nekrotik pulpalı immatür daimi dişlerin pulpa dokusunun revaskülarizasyonunu desteklemek için rejenerasyon tedavisinin alternatif bir tedavi seçenekini olabileceğini bildirmişlerdir⁽⁴⁾.

Rejeneratif endodontik prosedürler (REP) olarak da adlandırılan revaskülarizasyon tedavisi, hasarlı pulpa-dentin kompleksinin bütünlüğünü yeniden sağlayarak kök gelişimini devam ettirmeyi hedefleyen biyolojik temelli bir işlemidir^{(5), (2)}. REP'ler, hem ince kalan dentin duvarlarının kalınlaşmasını sağlayarak dişin kırılganlığını azaltır hem de pulpanın revaskülarizasyonu ile dişin vitalisini geri kazanmasına olanak sağlar⁽⁶⁾.

Amerikan Endodonti Derneği (American Association of Endodontists, AAE) tarafından hazırlanan klinik rehberde belirtilen tedavi protokolüne göre, ilk seanstaki kök kanalının % 1.5'lik sodyum hipoklorit ile irigasyonunun ardından, 1-4 hafta boyunca kanal içi medikament uygulanması önerilmektedir. İkinci seanstaki ise klinik belirti ve semptom yoksa kök kanalı, dentinden büyümeye faktörlerinin salınımını sağlayan % 17'lik EDTA ile irige edildikten sonra, apikal bölgedeki kök

¹ Dr. Öğr. Üyesi, Recep Tayyip Erdoğan Üniversitesi Diş Hekimliği Fakültesi Endodonti AD., ahterdeha@hotmail.com

² Arş. Gör., Recep Tayyip Erdoğan Üniversitesi Diş Hekimliği Fakültesi Endodonti AD., dt.nihancelik@gmail.com

dirilmiştir⁽⁶⁸⁾. Yapılan deneysel bir hayvan çalışmasında, Propolisin REP sırasında kanal içi medikament olarak etkinliği araştırılmış ve Propolis ve ÜAP arasında antimikrobiyal etkinlik açısından herhangi bir fark görülmediği gibi, REP' de başarı kriterleri arasında yer alan kök uzunluğunun artması, dentinin kalınlaşması ve apikal açıklığın azalması gibi parametrelerde de ÜAP'ye benzer sonuçlar elde edildiği bildirilmiştir⁽⁸¹⁾.

TY ve ark. nın yaptığı 18 aylık klinik bir çalışmada çeşitli antibiyotik patları ve Propolisin revaskülarizasyona etkisi değerlendirilmiştir. Propolis dahil test edilen tüm kanal içi medikamentlerin, immatür daimi anterior dişlerde kök gelişimini devam ettirdiği ve başarılı bir pulpal revaskülarizasyon sağladığı bildirilmiştir⁽¹⁷⁾.

Sonuç olarak, rejeneratif endodontide uygulanan prosedürler ve kullanılan materyaller, kök kanalını etkili bir şekilde dezenfekte etmeli, periapikal dokularla biyolojik olarak uyumlu olmalı, etkili dozda ve etkili sürede kullanılarak dentinin fiziksel ve kimyasal özelliklerini korumalıdır. Alternatif materyallerin kullanımıyla ilgili daha kesin sonuçların elde edilebilmesi için daha uzun klinik gözlem süresine sahip daha fazla klinik çalışmaya ihtiyaç vardır.

Anahtar Kelimeler: Rejeneratif endodonti, antibiyotik patları, kalsiyum hidroksit

KAYNAKLAR

1. Diogenes A, Henry MA, Teixeira FB, et al. An update on clinical regenerative endodontics. *Endodontic topics*, 2013, 28: 2-23.
2. Huang GJ. Apexification: the beginning of its end. *International endodontic journal*, 2009, 42: 855-866.
3. Lin LM, Kahler B. A review of regenerative endodontics: current protocols and future directions. *Journal of Istanbul University Faculty of Dentistry*, 2017, 51: S41.
4. Iwaya Si, Ikawa M, Kubota M. Revascularization of an immature permanent tooth with apical periodontitis and sinus tract. *Dental Traumatology*, 2001, 17: 185-187.
5. Murray PE, Garcia-Godoy F, Hargreaves KM. Regenerative endodontics: a review of current status and a call for action. *Journal of endodontics*, 2007, 33: 377-390.
6. Chueh L-H, Huang GT-J. Immature teeth with periradicular periodontitis or abscess undergoing apexogenesis: a paradigm shift. *Journal of endodontics*, 2006, 32: 1205-1213.
7. American Association of Endodontists. AAE Clinical Considerations for a Regenerative Procedure Revised 6-8-16. 2016.
8. Galler KM, D'Souza RN, Federlin M, et al. Dentin conditioning codetermines cell fate in regenerative endodontics. *Journal of endodontics*, 2011, 37: 1536-1541.
9. Fouad AF, Verma P. Healing after regenerative procedures with and without pulpal infection. *Journal of endodontics*, 2014, 40: S58-S64.
10. Yassen GH, Chu T-MG, Eckert G, et al. Effect of medicaments used in endodontic regeneration technique on the chemical structure of human immature radicular dentin: an in vitro study. *Journal of endodontics*, 2013, 39: 269-273.
11. Banchs F, Trope M. Revascularization of immature permanent teeth with apical periodontitis: new treatment protocol? *Journal of endodontics*, 2004, 30: 196-200.

12. Bose R, Nummikoski P, Hargreaves K. A retrospective evaluation of radiographic outcomes in immature teeth with necrotic root canal systems treated with regenerative endodontic procedures. *Journal of endodontics*, 2009, 35: 1343-1349.
13. Cehreli ZC, Isbitiren B, Sara S, et al. Regenerative endodontic treatment (revascularization) of immature necrotic molars medicated with calcium hydroxide: a case series. *Journal of endodontics*, 2011, 37: 1327-1330.
14. Galler K, Krastl G, Simon S, et al. European Society of Endodontontology position statement: revitalization procedures. *International endodontic journal*, 2016, 49: 717-723.
15. Graham L, Cooper PR, Cassidy N, Nor JE, Sloan AJ, Smith AJ. The effect of calcium hydroxide on solubilisation of bio-active dentine matrix components. *Biomaterials*, 2006, 27: 2865-2873.
16. Lana PEP, Scelza MFZ, Silva LE, et al. Antimicrobial activity of calcium hydroxide pastes on Enterococcus faecalis cultivated in root canal systems. *Braz Dent J*, 2009, 20: 32-36.
17. TY AMY, El-Ashry S, El-Batoty K, et al. Efficiency of Triple Antibiotic Mixture and Propolis as Intracanal Medication in Revascularization process in immature apex: A clinical study. *Glob J Medical Clin Case Rep*, 2019, 6: 019-025.
18. Behnen MJ, West LA, Liewehr FR, et al. Antimicrobial activity of several calcium hydroxide preparations in root canal dentin. *Journal of endodontics*, 2001, 27: 765-767.
19. Chueh L-H, Ho Y-C, Kuo T-C, et al. Regenerative endodontic treatment for necrotic immature permanent teeth. *Journal of endodontics*, 2009, 35: 160-164.
20. Windley III W, Teixeira F, Levin L, et al. Disinfection of immature teeth with a triple antibiotic paste. *Journal of endodontics*, 2005, 31: 439-443.
21. Smith AJ, Cassidy N, Perry H, et al.. Reactionary dentinogenesis. *International Journal of Developmental Biology*, 2003, 39: 273-280.
22. Smith AJ, Matthews JB, Hall RC. Transforming Growth Factor- β 1 (TGF- β 1) in dentine matrix: Ligand activation and receptor expression. *European Journal of Oral Sciences*, 1998, 106: 179-184.
23. Chang H-H, Chang M-C, Wu I-H, et al. Role of ALK5/Smad2/3 and MEK1/ERK signaling in transforming growth factor beta 1-modulated growth, collagen turnover, and differentiation of stem cells from apical papilla of human tooth. *Journal of endodontics*, 2015, 41: 1272-1280.
24. Gomes BPFdA, Ferraz CCR, Vianna ME, et al. In vitro antimicrobial activity of calcium hydroxide pastes and their vehicles against selected microorganisms. *Braz Dent J*, 2002, 13: 155-161.
25. Fava L, Saunders W. Calcium hydroxide pastes: classification and clinical indications. *International endodontic journal*, 1999, 32: 257-282.
26. Paikkatt JV, Sreedharan S, Philomina B, et al. Efficacy of various Intracanal medicaments in human primary teeth with necrotic pulp against Candida biofilms: An in vivo study. *International journal of clinical pediatric dentistry*, 2017, 10: 45.
27. Hui SHH, Ariffin Z, Alam MK. In vitro study of antibacterial properties of endodontic sealers and medications towards Streptococcus mutans and Enterococcus faecalis. *International Medical Journal*, 2013, 20: 493-495.
28. Siqueira Jr J, Lopes H. Mechanisms of antimicrobial activity of calcium hydroxide: a critical review. *International endodontic journal*, 1999, 32: 361-369.
29. Haapasalo H, Sirén E, Waltimo T, et al. Inactivation of local root canal medicaments by dentine: an in vitro study. *International endodontic journal*, 2000, 33: 126-131.
30. Alsubait SA, Hashem Q, AlHargan N, et al. Comparative evaluation of push-out bond strength of ProRoot MTA, bioaggregate and biociment. *The journal of contemporary dental practice*, 2014, 15: 336-340.
31. Endodontists AAo. AAE Clinical Considerations for a Regenerative Procedure Revised 4/1/2018. 2018.
32. Sahebi S, Moazami F, Abbott P. The effects of short-term calcium hydroxide application on the strength of dentine. *Dental Traumatology*, 2010, 26: 43-46.
33. White JD, Lacefield WR, Chavers L, et al. The effect of three commonly used endodontic materials on the strength and hardness of root dentin. *Journal of endodontics*, 2002, 28: 828-830.

34. Andreasen JO, Farik B, Munksgaard EC. Long-term calcium hydroxide as a root canal dressing may increase risk of root fracture. *Dental Traumatology*, 2002, 18: 134-137.
35. Yilmaz S, Dumani A, Yoldas O. The effect of antibiotic pastes on microhardness of dentin. *Dental Traumatology*, 2016, 32: 27-31.
36. Yassen GH, Eckert GJ, Platt JA. Effect of intracanal medicaments used in endodontic regeneration procedures on microhardness and chemical structure of dentin. *Restorative dentistry & endodontics*, 2015, 40: 104-112.
37. Yassen G, Vail M, Chu T, et al. The effect of medicaments used in endodontic regeneration on root fracture and microhardness of radicular dentine. *International endodontic journal*, 2013, 46: 688-695.
38. Yassen G, Platt J. The effect of nonsetting calcium hydroxide on root fracture and mechanical properties of radicular dentine: a systematic review. *International endodontic journal*, 2013, 46: 112-118.
39. Mackie I, Bentley E, Worthington H. The closure of open apices in non-vital immature incisor teeth. *British dental journal*, 1988, 165: 169-173.
40. Huang GT-J, Sonoyama W, Liu Y, et al. The hidden treasure in apical papilla: the potential role in pulp/dentin regeneration and bioroot engineering. *Journal of endodontics*, 2008, 34: 645-651.
41. Sonoyama W, Liu Y, Yamaza T, et al. Characterization of the apical papilla and its residing stem cells from human immature permanent teeth: a pilot study. *Journal of endodontics*, 2008, 34: 166-171.
42. Ruparel NB, Teixeira FB, Ferraz CC, Diogenes A. Direct effect of intracanal medicaments on survival of stem cells of the apical papilla. *Journal of endodontics*, 2012, 38: 1372-1375.
43. Althumairy RI, Teixeira FB, Diogenes A. Effect of dentin conditioning with intracanal medicaments on survival of stem cells of apical papilla. *Journal of endodontics*, 2014, 40: 521-525.
44. Nosrat A, Seifi A, Asgary S. Regenerative endodontic treatment (revascularization) for necrotic immature permanent molars: a review and report of two cases with a new biomaterial. *Journal of endodontics*, 2011, 37: 562-567.
45. Reynolds K, Johnson J, Cohenca N. Pulp revascularization of necrotic bilateral bicuspids using a modified novel technique to eliminate potential coronal discolouration: a case report. *International endodontic journal*, 2009, 42: 84-92.
46. Iwaya Si, Ikawa M, Kubota M. Revascularization of an immature permanent tooth with periradicular abscess after luxation. *Dental Traumatology*, 2011, 27: 55-58.
47. Grossman LI. Sterilization of infected root canals. *The Journal of the American Dental Association*, 1972, 85: 900-905.
48. Sato I, Ando-Kurihara N, Kota K, et al. Sterilization of infected root-canal dentine by topical application of a mixture of ciprofloxacin, metronidazole and minocycline in situ. *International endodontic journal*, 1996, 29: 118-124.
49. Abbott PV. Selective and intelligent use of antibiotics in endodontics. *Australian Endodontic Journal*, 2000, 26: 30-39.
50. Feigin K, Shope B. Regenerative Endodontics. *J Vet Dent*, 2017, 34: 161-178.
51. Thibodeau B, Trope M. Pulp revascularization of a necrotic infected immature permanent tooth: case report and review of the literature. *Pediatric dentistry*, 2007, 29: 47-50.
52. Häusermann P, Scherer K, Weber M, et al. Ciprofloxacin-induced acute generalized exanthematous pustulosis mimicking bullous drug eruption confirmed by a positive patch test. *Dermatology*, 2005, 211: 277-280.
53. Isik S, Karakaya G, Erkin G, et al. Multidrug-induced erythema multiforme. *Journal of Investigational Allergology and Clinical Immunology*, 2007, 17: 196.
54. Rodríguez-Benítez S, Stambolsky C, Gutiérrez-Pérez JL, et al. Pulp revascularization of immature dog teeth with apical periodontitis using triantibiotic paste and platelet-rich plasma: a radiographic study. *Journal of endodontics*, 2015, 41: 1299-1304.
55. Miller EK, Lee JY, Tawil PZ, et al. Emerging therapies for the management of traumatized immature permanent incisors. *Pediatric dentistry*, 2012, 34: 66-69.

56. Akcay M, Arslan H, Yasa B, et al. Spectrophotometric analysis of crown discoloration induced by various antibiotic pastes used in revascularization. *Journal of endodontics*, 2014, 40: 845-848.
57. Berkhoff JA, Chen PB, Teixeira FB, Diogenes A. Evaluation of triple antibiotic paste removal by different irrigation procedures. *Journal of endodontics*, 2014, 40: 1172-1177.
58. Arslan H, Capar I, Saygili G, et al. Efficacy of various irrigation protocols on the removal of triple antibiotic paste. *International endodontic journal*, 2014, 47: 594-599.
59. Shokouhinejad N, Nekoofar MH, Iravani A, et al. Effect of acidic environment on the push-out bond strength of mineral trioxide aggregate. *Journal of endodontics*, 2010, 36: 871-874.
60. Alsubait S, Alsaad N, Alahmari S, et al. The effect of intracanal medicaments used in Endodontics on the dislocation resistance of two calcium silicate-based filling materials. *BMC Oral Health*, 2020, 20: 1-7.
61. Nagas E, Cehreli Z, Uyanik M, et al. Effect of several intracanal medicaments on the push-out bond strength of ProRoot MTA and Biodentine. *International endodontic journal*, 2016, 49: 184-188.
62. Topçuoğlu HS, Arslan H, Akçay M, et al. The effect of medicaments used in endodontic regeneration technique on the dislocation resistance of mineral trioxide aggregate to root canal dentin. *Journal of endodontics*, 2014, 40: 2041-2044.
63. Turk T, Ozisik B, Aydin B. Time-dependent effectiveness of the intracanal medicaments used for pulp revascularization on the dislocation resistance of MTA. *BMC Oral Health*, 2015, 15: 130.
64. Turk T, Fidler A. Effect of medicaments used in endodontic regeneration technique on push-out bond strength of MTA and Biodentine. *Biotechnology & Biotechnological Equipment*, 2016, 30: 140-144.
65. Baumgartner JC, Xia T. Antibiotic susceptibility of bacteria associated with endodontic abscesses. *Journal of endodontics*, 2003, 29: 44-47.
66. Kim S, Malek M, Sigurdsson A, et al. Regenerative endodontics: a comprehensive review. *International endodontic journal*, 2018, 51: 1367-1388.
67. Nosrat A, Li KL, Vir K, et al. Is pulp regeneration necessary for root maturation? *Journal of endodontics*, 2013, 39: 1291-1295.
68. Ahangari Z, Naseri M, Jalili M, Mansouri Y, Mashhadiabbas F, Torkaman A. Effect of propolis on dentin regeneration and the potential role of dental pulp stem cell in Guinea pigs. *Cell Journal (Yakhteh)*, 2012, 13: 223.
69. Ahangari Z, Naseri M, Vatandoost F. Propolis: chemical composition and its applications in endodontics. *Iranian endodontic journal*, 2018, 13: 285.
70. Shrivastava R, Rai VK, Kumar A, et al. An in vitro Comparison of Endodontic Medicaments Propolis and Calcium Hydroxide alone and in Combination with Ciprofloxacin and Moxifloxacin against Enterococcus Faecalis. *The journal of contemporary dental practice*, 2015, 16: 394-399.
71. Saleh RS, Nagi SM, Khallaf ME, et al. In-vivo assessment of dentin bridge formation after using MTA and experimental PropolisPaste as direct pulp capping material. *RESEARCH JOURNAL OF PHARMACEUTICAL BIOLOGICAL AND CHEMICAL SCIENCES*, 2016, 7: 1244-1250.
72. Ikeno K, Ikeno T, Miyazawa C. Effects of propolis on dental caries in rats. *Caries Research*, 1991, 25: 347-351.
73. Sforcin JM, Bankova V. Propolis: is there a potential for the development of new drugs? *Journal of ethnopharmacology*, 2011, 133: 253-260.
74. Rezende GPdSR, Costa LRdRS, Pimenta FC, et al. In vitro antimicrobial activity of endodontic pastes with propolis extracts and calcium hydroxide: a preliminary study. *Braz Dent J*, 2008, 19: 301-305.
75. Awawdeh L, AL-Beitawi M, Hammad M. Effectiveness of propolis and calcium hydroxide as a short-term intracanal medicament against Enterococcus faecalis: A laboratory study. *Australian Endodontic Journal*, 2009, 35: 52-58.
76. Kousedghi H, Ahangari Z, Eslami G, et al. Antibacterial activity of propolis and Ca (OH) 2 against Lactobacillus, Entrococcus faecalis, Peptostreptococcus and Candida albicans. *African Journal of Microbiology Research*, 2012, 14: 3510-3515.

Güncel Endodonti ve Restoratif Çalışmaları

77. Madhubala MM, Srinivasan N, Ahamed S. Comparative evaluation of propolis and triantibiotic mixture as an intracanal medicament against Enterococcus faecalis. *Journal of endodontics*, 2011, 37: 1287-1289.
78. Al-Shaher A, Wallace J, Agarwal S, et al. Effect of propolis on human fibroblasts from the pulp and periodontal ligament. *Journal of endodontics*, 2004, 30: 359-361.
79. Rouhani A, Erfanzadeh M, Jafarzadeh H, et al. Comparison of Residual Triple Antibiotic Paste, Propolis and Calcium Hydroxide on Root Canal Walls in Natural Open Apex Teeth: An In Vitro Study. *Iranian endodontic journal*, 2018, 13: 25.
80. Ansorge S, Reinhold D, Lendeckel U. Propolis and some of its constituents down-regulate DNA synthesis and inflammatory cytokine production but induce TGF- β 1 production of human immune cells. *Zeitschrift für Naturforschung C*, 2003, 58: 580-589.
81. El-Tayeb MM, Abu-Seida AM, El Ashry SH, et al. Evaluation of antibacterial activity of propolis on regenerative potential of necrotic immature permanent teeth in dogs. *BMC Oral Health*, 2019, 19: 174.