International Poster Journal IPJ of Dentistry and Oral Medicine

Int Poster J Dent Oral Med 2010, Vol 12 No 3, Poster 498

Strengthening of fractured devitalized teeth by casted core

Language: English

Authors:
Assoc. Prof Dr Srdjan D. Postic,
University of Belgrade, Faculty of Stomatology, Clinic of Dental Prosthetic, Belgrade, Serbia

Date/Event/Venue:
October 1st-3rd, 2009
33rd Annual Congress of European Prosthodontic Association
Innsbruck, Austria

Introduction

Essential suggestion of fixed prosthodontic is positioning of casted posts and cores, or dowels, owing to strengthening of devitalized tooth's root (1, 2). Along these lines, fortified roots should be successfully loaded by crowns and bridges (1-4).

Objectives

Objective of this study was to present success of strengthening of infrabony fractured roots of devitalized teeth by particularly designed metal cores.

Material and Methods

3 patients (2 men and 1 women, aged 31 to 47 yrs.) having devitalized fractured teeth with infrabony lack of a part of root-dentin substance were selected for fabrication of fixed restoration (Fig 1-3). ¾ of root filling were removed in root canal preparations (Fig 4). Mock-up of cores was formed directly in the mouths using self-curing resin (Palavit G, Kultzer, Germany) (Fig 5-8). Bounding surface and borders were prepared in resin material as a shoulder surface of core in supragingival i.e. subgingival areas of dentin-root defects, using retraction cord (Ultrapack #1 and #2, U.S.A.) (Fig. 5), but as the form of chamfer respecting remained coronal surface of devitalized teeth. After casting, 4 cores made of precious alloys (Golden alloy type III, Zlatara Majdanpek; M-Palador cast, Galenika, Serbia) (Fig 9-13) were decidedly polished and cemented, using normal-set zinc-phosphate cement (Cegal-N, Galenika, Serbia) (Fig 14). Temporary crowns were not positioned onto cemented cores and these teeth (Fig 15). After finishing of bounding surface (Fine diamond burs NTI-Kahla rotary dental instruments, Germany) (Fig 15-18), dental arches were impressed (Oranwash L, Zhermack) (Fig 19). Metal-ceramic fixed restorations (Vita, Europe) were fabricated and positioned.

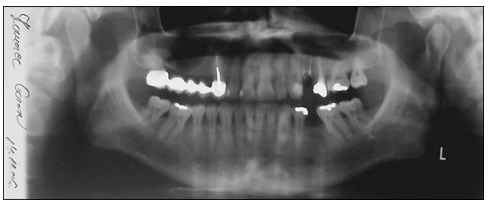

Fig 1: Panoramic radiograph of the patient at the beginning of prosthetic treatment

Fig 2: Lack of mesial tooth substance towards subgingival area

Fig 3: Defect after tooth fracturing

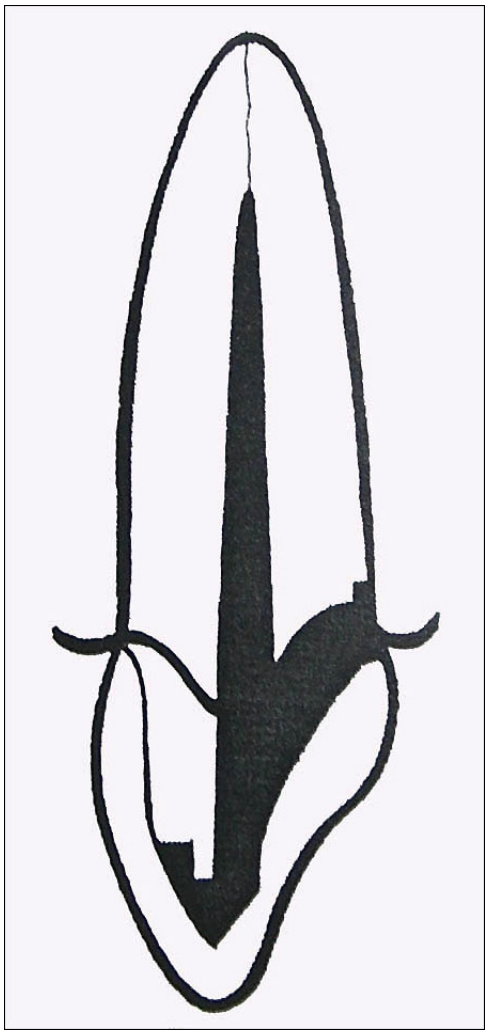

Fig 4: Schematic drawing of cast post and core in tooth with fractured surface of root and crown

Fig 5: Retraction cord in gingival sulcus and area of supragingival defect

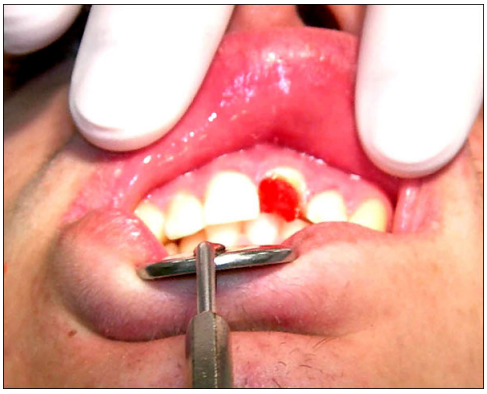

Fig 6: A form of custom made post and core using self-curing resin (Palavit-G, Kultzer, Germany)

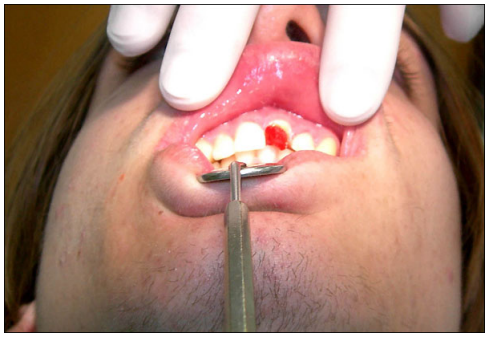

Fig 7: Acrylic form of core substituting previous lack of tooth substance

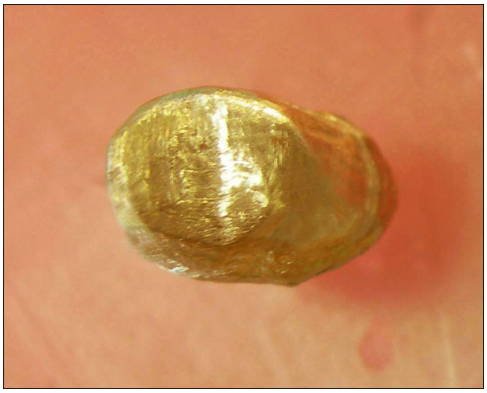

Fig 8: Acrylic core was modeling and formed directly in the mouth, respecting occlusal surfaces of teeth of the patient and providing adequate interocclusal distances with relation to antagonists

Fig 9: Custom made golden cast post and core with flat surface of shoulder towards subgingival (supragingival) defect

Fig 10: Cast post and core fabricated using silver-palladium alloy-proximal view of cast form with shoulder in metal surface.

Fig 11: Cast post and core (dowel) for anterior fractured tooth.

Fig 12: Cast post and core for reinforcement of fractured tooth - frontal view

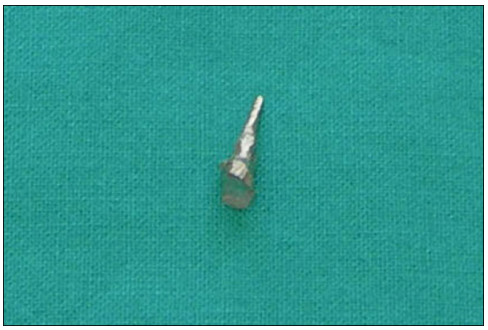

Fig 13: Cast post and core to reinforce fractured tooth - oral aspect

Fig 14: Position of cast core (cast post and core i.e. dowel) on fractured tooth in the mouth of a patient.

Fig 15: There were predisposition to fracturing of abraded teeth- frontal view of cores in the mouth of a patient.

Fig 16: Gold post and core cemented- occlusal view of core in the mouth

Fig 17: Cemented silver-palladium post and core - occlusal view of core in the mouth

Fig 18: Metal was cementing in the mouth of a patient, using zinc phosphate cement.

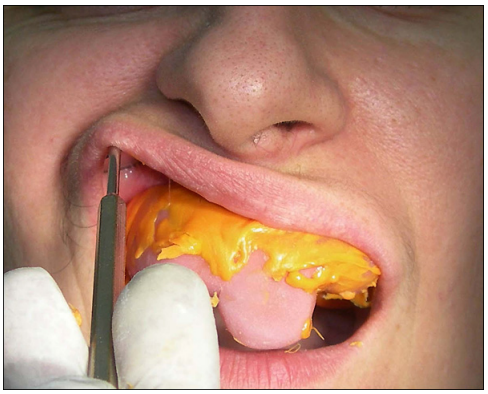

Fig 19: Impressing of dental arch and core using light body silicone in custom tray

Results

Restored teeth with surrounding tissues showed favorable appearance of gingival margins, and functional stability in static occlusion, dynamic occlusion and mastication. There were not bleeding during probing or dispositions of fixed restorations to horizontal functional loading (Fig 20-27). There was not pain at recalls in 1, 2 and 5 years (Fig 28 and 29).

Fig 20: Metal coping for fabrication of the metal-ceramic crown

Fig 21: The position of coping on core in the mouth of a patient

Fig 22: Probing

Fig 23: Probing circumferentially towards finishing line

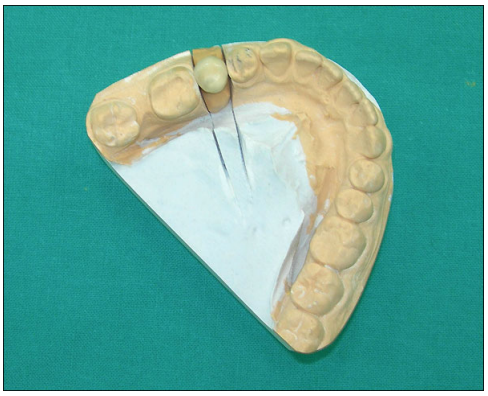

Fig 24: Metal-ceramic crown for single tooth\'s restoration after fracturing

Fig 25: Check of occlusion in static position of dental arches of jaws, after checking of the position of metal-ceramic crown

Fig 26: Tripod contacts established after checking of occlusion in the articulator and in the mouth of the patient-glazed metal ceramic crown on master cast prior to cementation in the mouth

Fig 27: Cementation of metal - ceramic crown on cast core in a mouth in the position of centric occlusion

Fig 28: Metal ceramic crown cemented on the cast core in the mouth-checking of occlusion at recall

Fig 29: Two fractured upper teeth restored with esthetic (one ceramic and a one metal-ceramic) crowns

Conclusions

Particular studies were illustrating methods of preservation of fractured teeth (1-3, 5-16).
A number of distinct individual clinical cases of restorating of clinical crowns after teeth fracturing, applying rationalized technique of positioning of prefabricated posts with composite restoration in a single visit (the one and same time visit), were reported in the literature (5, 13, 15-35).However, it could be categorically claimed that reliable treatment and restoration of more or less deeply fractured teeth (tooth roots) should have been fabricating and positioning of custom made cast core i.e. alloyed post and core unit. On the basis of experience in dental practice, as well on the basis of certain reports in dental literature, it has been shown, up to now, that the best option for restoration of fractured tooth should have been cast post and core unit or cast dowel fabricated using precious alloy (gold), or semi-precious alloy (silver -palladium), optionally (36, 37). Post and core unit should have been high polished. Precious dental alloy (gold) exposes sufficient hardness and resistance to stress and load on fractured tooth. Moreover, precious alloy absolutely would not cause any inflammation or other complications to adjacent periodontal tissue and soft tissues, as well as gingiva around fractured tooth.
Post component must be extended in a sufficient amount, removing adequate quantity of root's filling (1, 38, 39).
If cast post and core unit could be a part of definite treatment and work out of restoration of fractured tooth, preparation of a part of the cervical margin should have been supplied directly on (or within) the metal surface. Cervical margin of cast post and core (dowel) could be prepared as a flat (shoulder) cervical margin, groove or chamfer marginal surface (Fig 8, Fig 9, Fig 12, Fig 13, Fig 16-18). Because of that, it should be necessary that shapes of core build-ups should have been planned so if there would be enough space available, after casting, in purpose of providing extended and/or flat preparation of cervical margin, but preparation of axial surface of core too. It seems that shoulder's flat form should have provided the best marginal fit of a single crown, as well as retention, stability and optimal stress distribution through core towards apex of root. Continuum of cervical margin of cast post and core (dowel) and cervical margin of a rest of natural tooth substance should be also provided.
Additionally, slope, bevel and contra-bevel of bounding surface towards cervical margin of fractured and damaged teeth could be considered in custom made post and core element (2). For the both of gold-precious and silver-palladium-semiprecious casts, it looks as if bevel could be helpful in providing of fitting and retention of a single crown in restorating of fractured tooth.
Cast post and core piece absolutely must reinforce fractured tooth prior to positioning of metal-ceramic crown or any aesthetic crown (1, 3, 40, 41).
Conclusion
On the basis of the results of the present study it is concluded that ultimate providing of shoulder in subgingival area of metal core surface, decided core polishing and good quality of alveolar bone withstand fractured root and core completing the capability of functional loading and rehabilitation by fixed restoration.

Literature

1. Shillingburg HT, Hobo S, Whitsett LD, Jacobi R, Brackett SE. Fundamentals of fixed prosthodontics, Chapter 6, Chapter 9, Chapter 13, ed.3., Quintessence Publishing Co., Chicago, 1997, ISBN: 0-86715-201-X.
2. Baraban DJ. The restoration of endodontically treated teeth: An update. J Prosthet Dent, 1988, 59(5):553-558.
3. Von Amr Hussein MA. Survival rate and fracture strength of endodontically treated crowned maxillary incisors with severe defects, restored with different post and core systems after exposure to the artificial mouth. Doctoral dissertation. Aus der Universitätsklinik für Zahn-, Mund- und Kieferheilkunde der Albert-Ludwigs-Universität Freiburg im Breisgau, Abteilung Poliklinik für Zahnärztliche Prothetik, 2001, pp.7-59.
4. Morgano SM. Restoration of pulpless teeth:application of traditional principles in present and future contexts. J Prosthet Dent, 1996, 75(4):375-380.
5. Hoffmann M. ER post system for build-up of non-vital teeth-III. Quintessenz,1985, 36(3):451-456.
6. Fehling W, Wolfert RE. Multiple cast post and cores for anterior teeth: Rationale and technique. J Prosthet Dent, 1988, 59(5):558-562.
7. Abadie FR. Cast 'headed' post-cores to resist fracture of endodontically treated anterior teeth. J Prosthet Dent, 1988, 60(6):660-661.
8. Assif D, Aviv I, Himmel R. A rapid dowel core construction technique. J Prosthet Dent, 1989, 61(1):16-17.
9. Rahmat A. Barkhordar RA, Radke R, Abbasi J. Effect of metal collars on resistance of endodontically treated teeth to root fracture. J Prosthet Dent, 1989, 61(6):676-678.
10. Goyal S, Shyamala PV, Miglani R, Narayanan LL. Metal collars - are they serving any purpose? J Conserv Dent, 2007,10:14-18.
11. Greenfeld RS, Roydhouse RH, Marshall JF, Schoner B. A comparison of two post systems under applied compressive-shear loads. J Prosthet Dent, 1989, 61(1):17-24.
12. Orkin DA, Louw NP. Comparative study of the retentive strengths of dowels of three different diameters in combination with one or two different-sized threaded pins. J Prosthet Dent, 1990,63(2):144-150.
13. Kocadereli I, Tasman F., Guner SB. Combined endodontic-orthodontic and prosthodontic treatment of fractured teeth. Case report. Aust Dent J, 1998, 43(1):28-31.

14. Bergman B, Lundquist P, Sjögren U, Sundquist G. Restorative and endodontic results after treatment with cast posts and cores. J Prosthet Dent, 1989, 61(1):10-15.
15. Hornbrook DS, Hastings JH. Use of bondable reinforcement fiber for post and core build-up in an endodontically treated tooth:maximizing strength and aesthetics. Pract Period Aesthet Dent, 1995, 7:32-42.
16. Volwiel RA, Nicholls JI, Harrington GW. A comparison of three core build-up materials used in conjunction with two post systems in endodontically treated anterior teeth. J Endod, 1989,15(8):355-361.
17. Al-Wazzan KA, Al-Harbi AA, Hammad IA. The effect of eugenol-containing temporary cement on the bond strength of two resin composite core materials to dentin. J Prosthodont, 1997,6(1):37-42.
18. Amakawa Y, Fukushima S, Tsubota Y. An 11-year clinical evaluation of posts and cores. J Dent Res, 1999,78(IADR abstract no. 933):222.
19. Hudis SI, Goldstein GR. Restoration of endodontically treated teeth: a review of the literature. J Prosthet Dent, 1986, 55(1):33-38.
20. Kutesa-Mutebi A, Osman YI. Effect of the ferrule on fracture resistance of teeth restored with prefabricted posts and composite cores. Afr Health Sci, 2004, 4(2): 131-135.
21. Assif D, Bitenski A, Pilo R, Oren E. Effect of post design on resistance to fracture of endodontically treated teeth with complete crowns. J Prosthet Dent, 1993, 69(1):36-40.
22. Kovarik RE, Breeding LC, Cauhman WF. Fatigue life of three core materials under simulated chewing conditions. J Prosthet Dent, 1992, 68(4):584-590.
23. Hunt PR, Gogarnoiu D. Evolution of post and core systems. J Esthet Dent, 1996, 8(2):74-83.
24. Martinez-Insua A, da Silva L, Rilo B, Santana U. Comparison of the fracture resistances of pulpless teeth with a cast post and core or carbon-fiber post with a composite core. J Prosthet Dent, 1998,80(5):527-532.
25. Hunter AJ, Feiglin B, Williams JF. Effects of post placement on endodontically treated teeth. J Prosthet Dent, 1989, 62(2):166-172.
26. Karna JC. A fiber composite laminate endodontic post and core. Am J Dent, 1996, 9(5):230-232.
27. Mendoza DB, Eakle WS, Kahl EA, Ho R. Root reinforcement with a resin-bonded preformed post. J Prosthet Dent, 1997, 78(1):10-14.
28. Mentink AG, Meeuwissen R, Hoppenbrouwers PP, Kayser AF, Mulder J. Porosity in resin composite core restorations:the effect of manipulative techniques. Quintessence Int, 1995, 26(11):811-815.
29. Oliva RA, Lowe JA. Dimensional stability of composite used as a core material. J Prosthet Dent, 1986,56(5):554-561.
30. Yaman P, Thorsteinsson TS. Effect of core materials on stress distribution of posts. J Prosthet Dent, 1992, 68(3):416-420.
31. Godder B, Zhukovsky L, Bivona PL, Epelboym D. Rehabilitation of thin-walled roots with light-activated composite resin: a case report. Compend Contin Educ Dent, 1994,15:52-57.
32. Saupe WA, Gluskin AH, Radke RA. A comparative study of fracture resistance between morphologic dowel and cores and a resin reinforced dowel system in the intra-radicular restoration of structurally compromised roots. Quintessence International, 1996, 27(7):483-491.
33. Belvedere PC, Lambert DL. Use of an esthetic carbon-fiber post in a single-visit composite crown. Compedndium, 1999, Suppl. Restorat. Q.vol 1:3-7.
34. Duret B, Duret F, Reynaud M. Long-life physical property preservation and postendodontic rehabilitation with the composipost. Compend. Contin Educ Dent Suppl., 1996, 20:50-56.
35. Krasteva K. Rehabilitation of an endodontically compromised tooth with a carbon post. Nordin, 2004.
36. Shillingburg HT, Hobo S, Whitsett LD, Jacobi R, Brackett SE. Fundamentals of fixed prosthodontics, Chapter 21, ed.3., Quintessence Publishing Co., Chicago, 1997, pp.565-384; ISBN: 0-86715-201-X.
37. Goodacre CJ.Palladium-silver alloys: A review of the literature. J Prosthet Dent, 1989, 62(1):34-37.
38. Sorensen JA, Martinoff JT. Clinically significant factors in dowel design.J Prosthet Dent, 1984;52(1):28-35.
39. Goodacre CJ, Spolnik KJ. The prosthodontic management of endodontically treated teeth: a literature review. Part II. Maintaining the apical seal. J Prosthodont, 1995,4(1):51-53.
40. Morgano SM, Milot P. Clinical success of cast metal posts and cores. J Prosthet Dent, 1993;70(1):11-16.
41. Sorensen JA, Engelman MJ . Effect of post adaptation on fracture resistance of endodontically treated teeth. J Prosthet Dent, 1990, 64(4):419-424.

This Poster was submitted by Assoc. Prof Srdjan D. Postic, PhD, MSc.

Correspondence address:
Assist. Prof. Dr. Srdjan Postic
University of Belgrade
Faculty of Stomatology, Clinic of Dental Prosthetic
Ranekova 4
11000 Belgrade, Serbia

Poster Faksimile: