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Dentin Post: An Innovative Method for Restoring Endodontically Treated Teeth

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Abstract:- The aim of this case report is to describe a treatment option for the fractured anterior teeth by using autogenous dentin post. A 28 year old male reported to the department with the history of trauma for esthetic and functional rehabilitation. Root canal treatment followed by dentin post placement followed by prosthetic rehabilitation was planned.

I. INTRODUCTION

Restoration of endodontically treated teeth is important for restoration of function and esthetics. Posts are needed to keep the core in place in endodontically treated teeth with poor crown structure. (1)

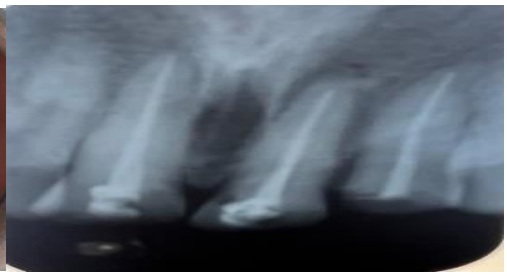
Post material is important for the biomechanical performance of the restored tooth and it should have physical properties similar to those of dentin. The post should also bond in a predictable manner to the root dentine. To provide intraradicular retention and stability of severely compromised anterior teeth, a variety of post systems, including custom-built or prefabricated posts composed of fiber glass, carbon fiber, metal, or ceramic, can be employed. Commercially available posts, however, are unable to fully satisfy the mechanical or biological criteria. (2) Dentin itself is the only substance that can possess all of the qualities. Few cases have shown successful outcome using dentin as a post material. (3, 4) This case report describes the restoration of a fractured maxillary central incisor using an autogenous dentin post.

II. CASE REPORT

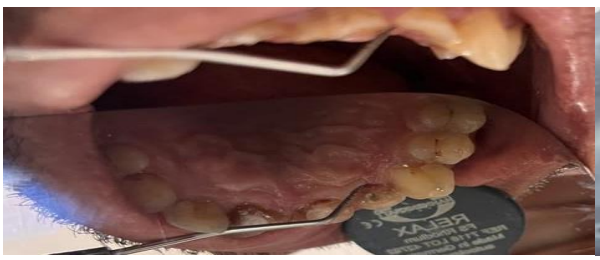
A male patient, age 28, reported to the Department of Conservative Dentistry and Endodontics with a cracked upper front tooth as his chief complaint and a history of a fall three months earlier. There were no notable findings from the extraoral examination. Upon clinical examination, it was discovered that teeth 11, 21, and 22 all had crown fractures, with 22 having a mobile palatal fragment that extended below the level of the gingiva. He had started his root canal treatment in private clinic a month back. 22 responded to percussion and palpation with a small amount of pain. The intraoral periapical radiograph showed inadequate obturation with 21 and a small widening of the periodontal ligament space with 21 and 22(figure b). Also pinpoint crown perforation was seen with 21 (figure a). Crown and root fracture with regard to 22 and crown fracture with respect to 11 and 21 were determined based on clinical and radiographic evidence. After extraction of the palatal fragment of the 22, the tooth would not be restored due to the extension of the fracture which involved the pulp space of radicular portion and decreased root length and it need to be extracted (figure c).

Additionally, the patient desired the treatment to end as soon as possible, therefore orthodontic extrusion was eliminated. He couldn't afford an implant, thus it was decided to perform an endodontic retreatment with 21 followed by post and core, post core with 11, and FPD. The biological post from the lateral incisor was used for 21, as extraction of tooth 22 was anticipated.

(a) Preoperative clinical picture



(b) Preoperative radiograph



(c) Extension after extraction of palatal fragment

(d) Radiograph after retreatment with 21

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(e) Clinical image after extraction with 22


(f) Post space preparation with 11 and 21


(g) Inlay wax impression of post space with 21

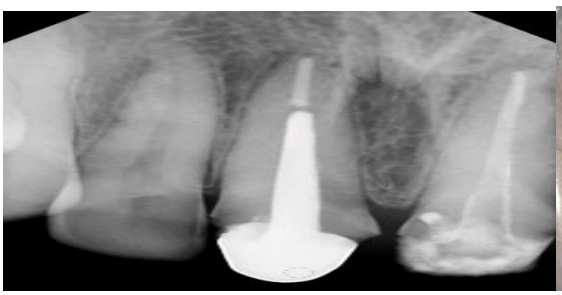

(h) Impression of maxillary arch with pinjet impression of 21


(i) Trail fit on prepared cast


(j) Dentin post prepared from 22


(k) Intermittent trial fit of dentin post


(l) Core buildup with 21


(m) Post operative radiograph


(n) Post operative clinical picture

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Regarding 21, endodontic retreatment was started and was isolated with the rubber dam. With the aid of an H-file, gutta percha was eliminated. The working length was estimated using an apex locator (Airpex, Orikam Healthcare), and the canal was prepared up to size 80 using k-hand files (MANI, INC Japan). During biomechanical preparation, Glyde (Dentsply) was utilized as a chelating agent. Intermittent recapitulation and irrigation with 3% sodium hypochlorite and normal saline was done. Utilizing cold lateral condensation, obturation was finished after a master cone was verified (figure d). The perforation with 21 was sealed with MTA.

In the subsequent visit, 22 was extracted, properly cleaned, and autoclaved at 121°C for 15 minutes to sterilize it. A size 2 peeso reamer (MANI, INC. Japan) was used to prepare the root canal of 21 (MANI, INC Japan) (figure f). The extracted tooth was then cut vertically in half, with one half being shaped into a dentin post. In order to shape the lateral incisor as a post, an inlay wax pattern with respect to 21 was created using pinjet (figure g). The entire maxillary arch was recorded using alginate impression material with the pinjet in place of the prepared post space after getting an inlay wax impression of the prepared post space with 21 (figure h). The cast was prepared, the impression was poured into die stone, the pinjet was taken out, and the cast served as a template for shaping the dentin post (figure i). After making small changes, the post's fit was periodically verified (figure k). After radiographic evaluation of the fit, dentin post was again subjected to autoclaving (121°C, 15 min) to minimize contamination.

To remove the smear layer, the canal was etched for 15 seconds with 37% phosphoric acid, rinsed with distilled water, and dried with paper point. Cementation was done using dual cure self-adhesive resin cement (Calibra Universal Dentsply) which was injected into the post space and applied over the dentin post prior to its placement into the prepared post space. To account for curing shrinkage, the post was gently kept in place during the initial curing. Light curing was done for 30-40 seconds. Core buildup was done with composite with 21(figure l). Post space preparation was done with 11 and restored with a cast post restoration (figure f, m). Fixed prosthesis was given for rehabilitation of these teeth (figure n). The occlusion of the patient was evaluated, and changes were made as necessary. The patient was given dietary guidelines as well as specific advice on hygiene and dental care to prevent undue strain on the teeth, which could increase the risk of tooth breakage.

III. DISCUSSION

With better endodontic therapy predictability and efficacy together with a greater focus on maintaining and preserving natural dentition, post endodontic restoration is a challenge in itself.[5] The skill of the operator is particularly necessary for the new advancements in restorative materials and adhesive protocols, which are technique-sensitive. It is possible to classify the use of natural tooth fragments as a biological method of restoration when treating anterior teeth that have fractured. Autogenous bonding involves bonding a patient's own tooth fragment for the best possible fit and appearance. [6] By conserving the root canal dentin and resulting in superior force distribution along the root surface in a compromised tooth, autogenous dentin post demonstrates remarkable outcomes in terms of its functional usefulness. One of its advantages is that the dentin post is inexpensive [6]. Dentin post resembles in its physical properties, such as modulus of elasticity, viscoelastic behaviour [7], compressive strength [8] and thermal expansion [9]. Compared to the majority of the current restorative materials, dentin has reportedly been shown to have higher fracture toughness [10]. A dentin post forms a micromechanical homogenous unit with the root dentin that results in uniform stress distribution.[11] The post functions as a shock absorber, sending only a tiny part of pressures applied to the tooth to the dentinal walls because the elasticity of the root dentin and the similarity of the dentin post's elasticity allow post flexion to mimic tooth flexion..[12] According to research by Ambica et al. and Kathuria et al., dentin posts gave teeth more fracture resistance than carbon fiber posts and glass fiber posts did.[13,14] In a finite element analysis investigation to examine the stress distribution in teeth restored with fiber post and dentin post, Henrique et al. came to the conclusion that both posts had comparable biomechanical performance[15]. The availability of tooth banks, patient acceptance, retrieval challenges, the availability of teeth with similar structural similarities, and tooth color are some of the drawbacks to using extracted teeth for restoration. To get around these limitations, one may use the dentin post created from the same patient.

IV. CONCLUSION

In this case report, a severely damaged tooth was restored utilizing an autogenous dentin post, which was chosen as a suitable replacement due to the tooth's resilience, great adhesion, dentin preservation, and lack of promotion of dentin stresses.

REFERENCES

[1.] Sorensen JA, Martinoff JT. Intracoronal reinforcement and coronal coverage: a study of endodontically treated teeth. The Journal of prosthetic dentistry. 1984 Jun 1;51(6):780-4.

[2.] Cheung W. A review of the management of endodontically treated teeth: Post, core and the final restoration. The Journal of the American Dental Association. 2005 May 1;136(5):611-9.

[3.] de Alcântara CE, Corrêa-Faria P, Vasconcellos WA, Ramos-Jorge ML. Combined technique with dentin post reinforcement and original fragment reattachment for the esthetic recovery of a fractured anterior tooth: A case report. Dent Traumatol 2010;26:447-50

[4.] Remires-Romito AC, Wanderley MT, Oliveira MD, Imparato JC, Corrêa MS. Biologic restoration of primary anterior teeth. Quintessence Int 2000;31:405-11

[5.] Swarupa CH, Sajjan GS, Bhupahupathiraju VL, Anwarullahwarullah A, Sashikanth YV. Biological dentin post for intra radicular rehabilitation of a fractured anterior tooth. Journal of Clinical and Diagnostic Research: JCDR. 2014 Feb;8(2):242.

[6.] Mishra N, Narang I. Bio-reconstruction of root canal using dentin post. Saudi Endod J 2013;3:87-9.
[7.] Kinney JH, Marshall SJ, Marshall GW. The mechanical properties of human dentin: a critical review and re-evaluation of the dental literature. Critical Reviews in Oral Biology & Medicine. 2003 Jan;14(1):13-29.
[8.] Jantarat J, Palamara JE, Lindner C, Messer HH. Time-dependent properties of human root dentin. Dental materials. 2002 Sep 1;18(6):486-93.
[9.] Kishen A, Asundi A. Investigations of thermal property gradients in the human dentine. Journal of Biomedical Materials Research: An Official Journal of The Society for Biomaterials, The Japanese Society for Biomaterials, and The Australian Society for Biomaterials and the Korean Society for Biomaterials. 2001 Apr;55(1):121-30.
[10.] El Mowafy OM, Watts DC. Fracture toughness of human dentin. Journal of dental research. 1986 May;65(5):677-81.
[11.] Newman MP, Yaman P, Dennison J, Rafter M, Billy E. Fracture resistance of endodontically treated teeth restored with composite posts. The Journal of prosthetic dentistry. 2003 Apr 1;89(4):360-7.
[12.] Martelli R. Fourth-generation intraradicular posts for the aesthetic restoration of anterior teeth. Practical periodontics and aesthetic dentistry: PPAD. 2000 Aug 1;12(6):579-84.
[13.] Ambica K, Mahendran K, Talwar S, Verma M, Padmini G, Periasamy R. Comparative evaluation of fracture resistance under static and fatigue loading of endodontically treated teeth restored with carbon fiber posts, glass fiber posts, and an experimental dentin post system: an in vitro study. Journal of endodontics. 2013 Jan 1;39(1):96-100.
[14.] Kathuria A, Kavitha M, Khetarpal S. Ex vivo fracture resistance of endodontically treated maxillary central incisors restored with fiber-reinforced composite posts and experimental dentin posts. J Conserv Dent 2011;14:401-5
[15.] Diana HH, Oliveira JS, Ferro MC, Silva-Sousa YT, Gomes ÉA. Stress distribution in roots restored with fiber posts and an experimental dentin post: 3D-FEA. Brazilian dental journal. 2016 Mar;27:223-7.