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Surgical Endodontic Management of Sure Short Extraction Cases of Aggressive Root Resorption - A Case Series

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Abstract

Tooth resorption is a common sequela following injuries to or irritation of the periodontal ligament and/or tooth pulp. The course of tooth resorption involves an elaborate interaction among inflammatory cells, resorbing cells, and hard tissue structures. The key cells involved in resorption are of the classic type, which include osteoblasts and odontoclasts. Permanent teeth are usually not attacked by osteoclasts despite their situation in a site where active bone resorption constantly takes place as a result of local and systemic osteoclast activating factors. This fact points to anti-resorption factors residing in both the periodontal ligament (PDL) and the pulp. If there is loss of this tissue integrity, root resorption may occur; especially if non-PDL derived cells gain access to the site.

Summary: A case series of surgical management of external root resorption with MTA, Nano bone graft complemented by PRF. Periapical radiograpgh after 1 year revealed there was healing of the periapical lesions. While in other case management of internal resorption by biodentine with 6 month followup revealed there was complete healing of periapical lesion and patient was asymptomatic.

Keywords: MTA, Bio dentine, PRF, External Root Resorption, Bone graft and Internal resorption.

Introduction

Resorption of hard dental structures was first described in the 16th century and root resorption (RR) in deciduous teeth is a typical physiologic response. However, in permanent dentition, RR has a pathologic basis and the aetiology requires two phases: an injury and stimulus [1-3]. RR types can be classified into internal (pulp source) and external (periodontal ligament origin). Dentine is lined internally from the pulpal surface by the odontoblastic layer and predentine and externally from the periodontium by the cementoblastic layer and precementum. Both layers form the barrier that prevents resorption and odontoclasts (similar to osteoclasts) from adhering or reabsorbing unmineralized matrix. Because of the inhibitory effects of organic precementum and predentine, even in the presence of inflammation, an intact root is resistant to resorption. However, with an initial stimulus (infection or trauma) at one or more of the four barriers [3], mineralized dentine is vulnerably exposed, and for RR to occur, two events are necessary: loss or alteration of the precementum [1] or predentine protective layer [2] and injury of the unprotected root surface [4].

The RR process may be self-limiting and go undetected clinically; however, once initiated and with the initial injury and stimulus sustained, destruction of hard dental tissue will continue, and tooth tissue loss may occur [5]. External RR (ERR) has various causes and is more prevalent than internal RR (IRR), which is relatively rare [6]. Several classifications have been proposed, with distinctive terms and categories used to describe RR.

The current case reports are surgical endodontic management of sure short extraction cases of aggressive root resorption; a series of two case reports.

Case report 1

A 32-year-old patient Manju Kumari reported to the Department of Conservative Dentistry and Endodontics Himachal Dental College, Sundernagar with the chief complaint of pain in upper front right region of the teeth and history of trauma three years back. On clinical examination teeth were found to be non vital with electric pulp testing, discoloration (Figure 1.1) and mobility was present with 11 and 12. Radiographically, there was large radiolucency between roots of lateral incisor and central incisor along with external root resorption on mesial aspect of lateral incisor root at the junction of middle one third and apical one third (Figure 2.1). A diagnosis of chronic apical periodontitis w.r.t 11&12 and external root resorption with 12 was established.

Treatment plan of conventional root canal treatment w.r.t 11 & 12 was planned followed by surgical management of the periapical defect & sealing of root apex & lateral root defect with MTA.

Administration of local anesthesia (2% lignocaine and adrenaline 1:200,000; Lox, Neon Laboratories). Non surgical root canal treatment was initiated. Coronal flaring was done using Gates Glidden burs (Mani Inc., Japan) and apical patency was checked with #15 K-file (Mani Inc., Japan). An immediate radiograph was taken and it was found that instrument went out through the defect which indicate lateral root perforation due to resorption of canal wall with respect to lateral incisor (Figure 3.1).

Figure 1.1

Figure 2.1

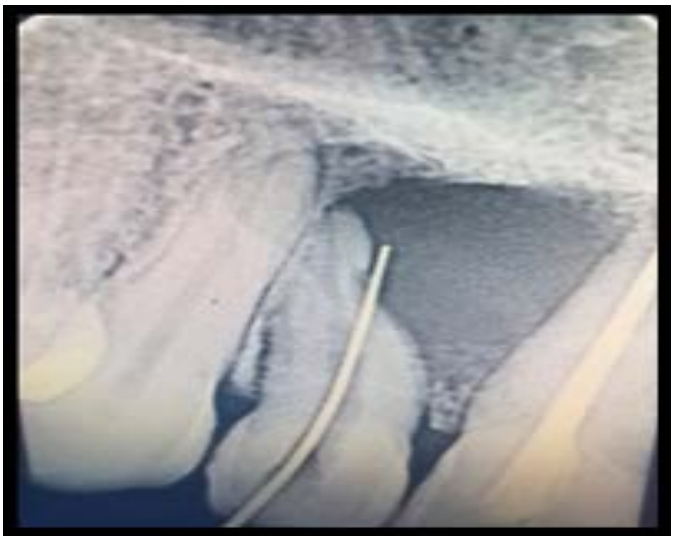


Figure 3.1

The access was slightly widened while canal renegotiated and working length was established with #15 K-file (Mani Inc., Japan) (Figure 4.1). Crown-down preparation was done using Protaper Universal, (Dentsply Maillefer, Switzerland) safe guarding the lateral root perforation and 5 ml of 3% NaOCl (Prime Dental, India) was used in between instrumentation followed by final irrigation with 2 ml 17% EDTA (Prevest Denpro, India) and final rinse was done with 5 ml of distilled water. Calcium hydroxide dressing was given for two weeks and then obturation was done with Sealapex using lateral condensation technique (Figure 5.1).

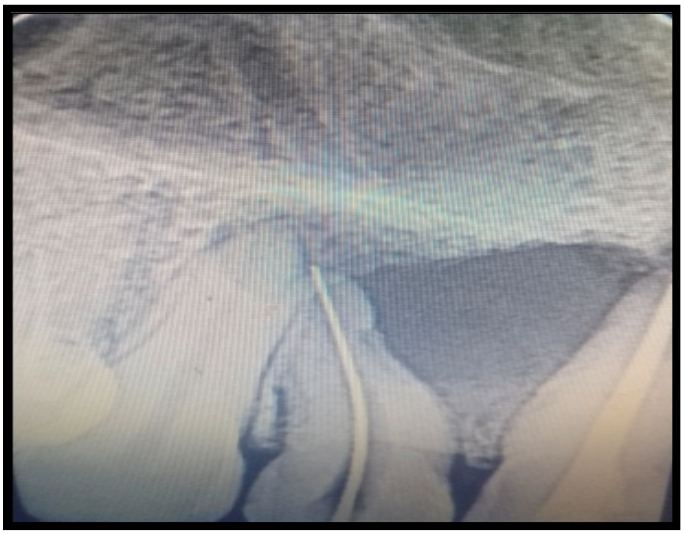


Figure 4.1

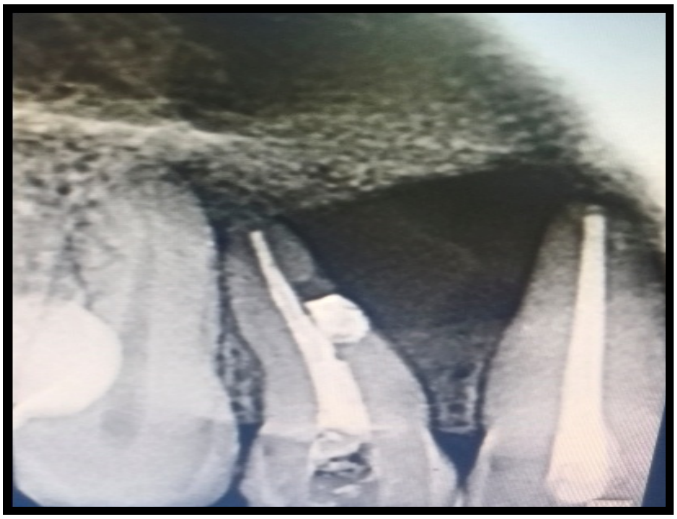


Figure 5.1

After administration of local anesthesia (2% lignocaine and adrenaline 1:200,000; Lox, Neon Laboratories) one

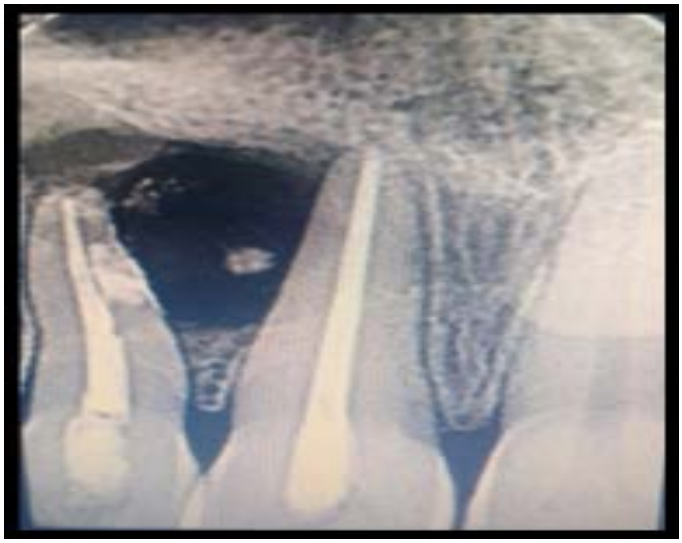
crevicular and two vertical releasing incisions were given with the help of 15 No. B.P blade at an angle of 45 degree and full thickness trapezoidal mucoperiosteal flap was raised using periosteal elevator. An open defect was detected with the help of William's periodontal probe. All the granulation tissue was scooped out with the help of curettes. Then the root tips were isolated and resected at 45-degree angulation to the long axis of tooth upto 3mm using tapered fissure bur. Retro cavity preparation done using micromotor, contra angle handpeice and round bur (BR 31). Retrograde root filling and lateral wall defect sealed by MTA (Angelus MTA) with the help of contrangled MTA carrier. Then, PRF and nano bone graft (Sybograft - Plus) were placed in bony defect, flap repositioned and sutured with the help of 3-0 silk suture and intrerrupted suturing was done.

Patient was sent back with medications, post operative instructions and recalled appointments were scheduled after 1 week, 4 weeks, 3 months, 6 months and 1 year.

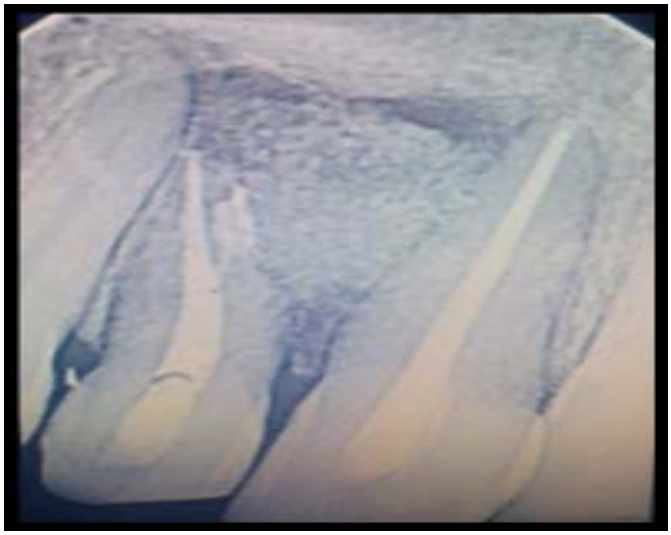
On clinical examination after 6 months there was no pain, mobility and discomfort w.r.t 11,12. On radiographic examination periapical lesion was healed and there was significant bony fill in the defect and healing was found to be adequate so prosthesis were delivered w.r.t 11 and 12. (Figure 6.1 a-f).

6.1 (a)

6.1 (b)



6.1 (c)



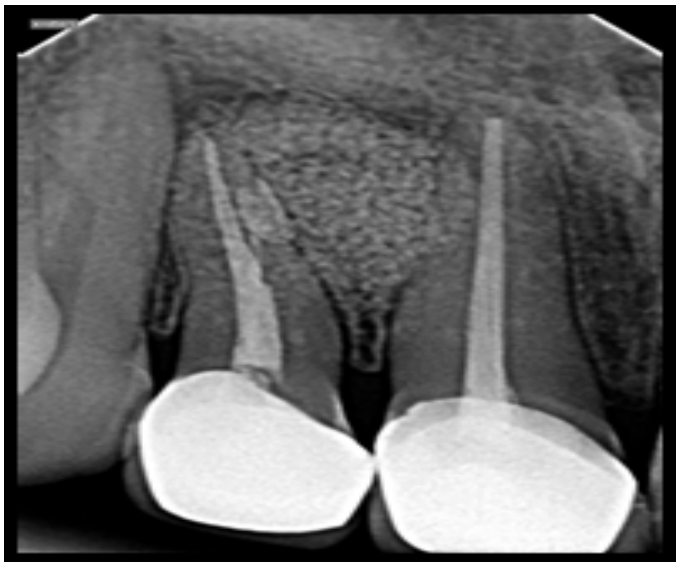
6 (d)

6.1 (e)

6.1 (f)

6.1 (g)

6.1 (h)



6.1 (i)

6.1 (j)

Figure 6.1 (a) Preoperative (b) defect sealed with MTA (c) external root resorption sealed with MTA (d) Nano bone graft placed (e) Flap sutured (f) 1 week follow up (g) 4 weeks follow up (h) 3 months follow up (i) 6 months followup with prosthesis delivered and (j) 1-year followup

Case report 2

A 21-year-old patient reported to the Department with the chief complaint of pain in upper front left region of the teeth and history of trauma seven years back.

On clinical examination teeth was found non-vital with electric pulp testing, discoloration w.r.t 21&22 (Figure 1.2).

Radiographically, radiolucency in middle-third of root surface of the 22 indicating a case of internal resorption and an associated radiolucency in the periapical area and widening of periodontal ligament w.r.t 21&22 (Figure 2.2).

Figure 1.2

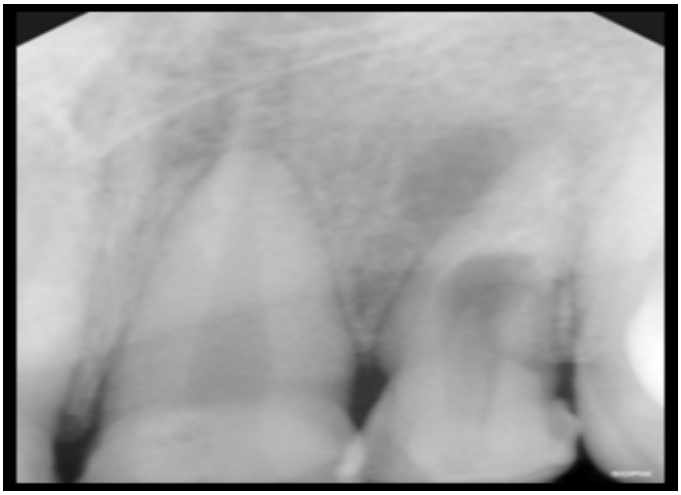


Figure 2.2

A diagnosis of chronic apical periodontitis w.r.t 21 and internal resorption with 22 was established.

Conventional root canal treatment w.r.t 21 & sealing the internal resorption defect with biodentine w.r.t 22 was planned.

Access opening was initiated without local anaesthesia since the tooth was non-vital.

Working length was taken with 15 no. K file (Mani Inc., Japan) (Figure 3.2). Apical preparation was done upto 45 no. K file and step back upto 80 no. K file (Mani Inc., Japan) w.r.t 21 while in 22 apical preparation was done upto 40 no. K file & step back upto 60 no. K file (Mani Inc., Japan) with intermittent irrigation with saline and sodium hypochlorite (Prime Dental, India).

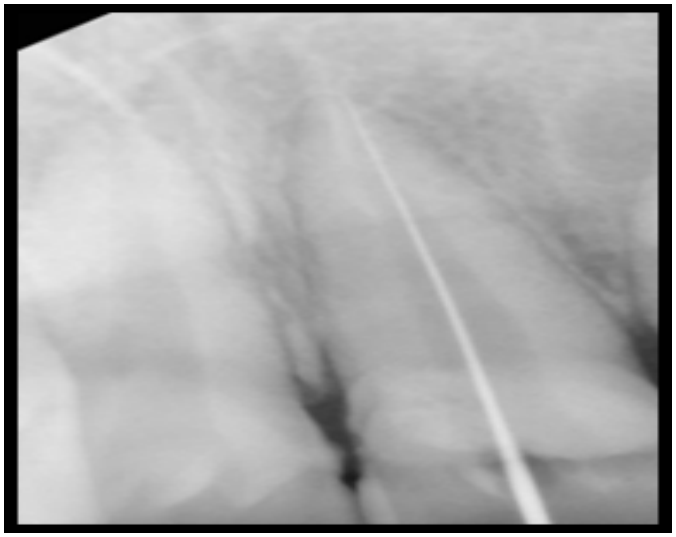


Figure 3.2

On next visit, Calcium hydroxide dressing was given w.r.t 21 and 22 and patient was recalled after 21 days (Figure 4.2).

Calcium hydroxide dressing was removed and master Gutta-Percha 45 no. was verified and obturation was done with sealapex sealer by using lateral condensation technique w.r.t 21 followed by post obturation restoration with composite.

While in 22 segmental obturation was done apical to the defect and Biodentine was placed upto cement-o-enamel junction by using MTA carrier followed by Light Cured GIC (GC Gold 2LC) and flowable composite (Tetric N Flow) (Figure 5.2).

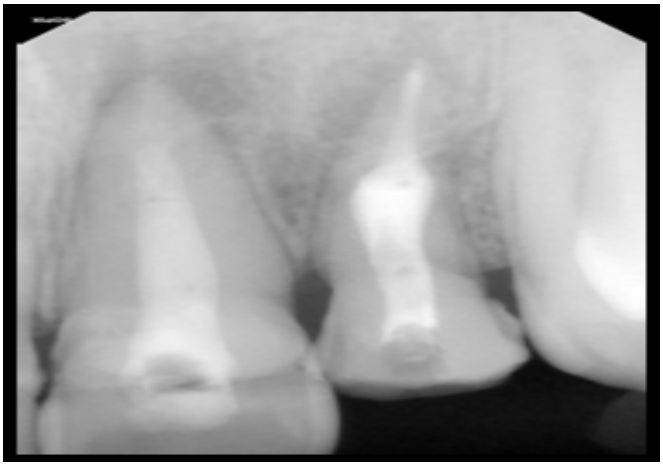


Figure 4.2

Figure 5.2

Then, patient was kept on followup. After one month patient was recalled and radiographic examination revealed slight healing of periapical pathosis, then prosthesis were delivered w.r.t 21 and 22 (Figure 6.2).

Figure 6.2

On radiographic examination after 3 and 6 months revealed complete perapical healing and patient was asymptomatic (Figure 7.2).

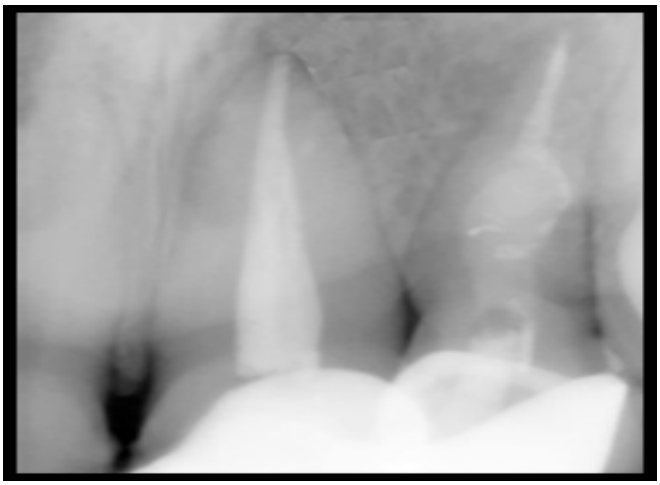


Figure 7.2

Discussion

Root resorption occurs when natural protection of predentin and odontoblasts in the root canal is damaged. Multinucleated giant cells initiate and activate the resorption process at the internal aspect of the root canal [7]. The problem detection at the beginning of this development, the exact removal of the resorption tissue, endodontic treatment when indicated and the restoration of the defects with an adequate isolation of the operating field determine the prognosis of the affected tooth [8].

The combination of PRF in platelet gel form along with bone graft promoted wound healing, bone growth, maturation, graft stabilization and hemostasis, leading to an overall improvement in the handling properties of graft materials.

In present case, the external root resorption was inflammatory type due to trauma. It was present on the mesial aspect of the root of right lateral incisor at the junction of middle third and apical third. It was associated with large periapical radiolucency between the roots of 11 and 12 along with pathological migration of roots. Hence, it was decided to repair the defect surgically with MTA along with the endodontic treatment. While Internal resorption present in the middle portion of the root canal of 22. So, the defect was repaired nonsurgically with Biodentine.

The use of bioactive materials such as mineral trioxide aggregate (MTA) and Biodentine induces remineralization and helps in healing, thereby playing a pivotal role in the rehabilitation of the resorbed teeth.

A tightly sealed repair in the resorption site is the key to successful treatment as it disrupts path of microbial contamination and guards the periodontium apparatus for optimal healing.

Conclusion

In order to stop the resorption process, an early diagnosis and treatment is crucial. The commencement of endodontic treatment at the earliest is imperative to arrest the progression of the resorptive process to prevent further weakening of tooth structure.

Success in management of a case of external resorption and internal resoprtion attributed to the history of trauma depends on early detection, appropriate treatment planning, removal of inflammatory pulp tissue, reinforcement of weaker tooth structure, and a three-dimensional obturation.

The choice of restorative material also plays an important role. MTA has proved to be a favorable restorative material due to its high mechanical properties and excellent sealing ability. An important biological property is the stimulation of new bone formation. It

provides a very effective biological seal. This is mainly due to ability to set itself in presence of moisture. While Biodentine is a new inorganic restorative cement which possesses better physical and biological properties compared to other commercially available cements. It has Similar mechanical properties and mechanical behaviour as human dentine for similar stress distribution.

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