

## Regenerative Healing of Periapical Lesion Using Amniotic Membrane: Review of Literature

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#### Abstract

*Aim and objective: To conservatively manage foreign objects like separated instruments within the pulp space with the help of CBCT. Background: Foreign objects entangled in the root canal space required to be removed as it can pose a complication encountered in endodontic retreatment and may risk the supporting tissues. In most cases, the entangled foreign is tried to retrieve or bypassed. Case presentation: In this case report, conservative approach has been advocated for the retrieval of metal posts and cotton from upper anterior teeth to ease the retreatment procedure. This conservative approach released the entangled metal posts, and further the periapical infection was resolved by a regenerative technique using amniotic membrane after which the endodontic treatment was completed successfully. Conclusion: A 2-year follow-up of the case ensured complete healing of periapical lesion clinically and radiographically. Clinical significance: Use of magnification and regenerative material like amniotic membrane has change the course of the treatment of this case from surgical intervention to conservative approach. This procedure has given a light to improve the success of the treatment with minimal invasive approach. Trial registration: 'retrospectively registered'.*

**Keywords:** Canal obstruction, Silver posts, nonsurgical endodontic retreatment, ultrasonics, amniotic membrane, stem cells

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#### Introduction

Non-surgical endodontic retreatment may involve removal of metallic objects from the root canal space. Metallic foreign objects can be in the form of metal posts, separated instruments, etc. A lot of data has been published with the respect to the retrieval of the foreign objects from the root canal space.[1] Considering the type of endodontic instrument used, the prevalence rates for fractured endodontic instrument is reported as 0.4% to 7.4%.[2] Intracanal blockage with metallic things can jeopardize the cleaning and shaping of the root canal and result in compromising the treatment outcome. When a post is placed and retreatment is advised for an already treated tooth, as a rule of thumb the post should be retrieved and tooth should be retreated to receive a post endodontic restoration. The most fetching procedure for the retrieval of metallic objects should be as conservative as possible where there is minimal reduction of radicular dentin thereby preventing any lateral perforations.[3]

Meanwhile, it has been affirmed that retained fractured instrument does not have any effect on the success outcome of endodontic treatment, but however few literature studies has shown to have reduced success rates with retained fractured instrument.[4] Presence of retained metal posts with existing periapical infection has

shown to have negative impact on the treatment outcome. But with the retrieval of the endodontic fragment and the resolution of periradicular pathosis, the treatment outcome will be successful. Other factors which can complicate or reduce the success rates involve the curvature of the canal, position of the fractured fragment, extrusion beyond apical constriction, non-healing periapical lesion.

There are various approaches for retrieval of metallic posts or fractured instruments. Orthograde approach of instrument retrieval is tedious and difficult with limited access. Commercially lot of instrument retrieval kits like Masserann kit, IRS, etc have been advocated. Single approach for retrieval has always been technique sensitive. Combination of one or more systems with adequate illumination is advantageous than single approach. Use of ultrasonics in endodontics is currently in vogue which has led to phenomenal success rates.[5]

The present case report delineates the successful retrieval of metal posts and cotton from the root canal space of upper right central and lateral incisor with the conservative management using ultrasonics and operating microscope. This case also shows the healing of periapical lesion using amniotic membrane which helped in the success of the retreatment.

### **Case description**

A 40year old male patient reported to the department of conservative dentistry and Endodontics with the chief complaint of discolored crowns with respect to upper right anterior teeth. Medical history of the patient was non- contributory. On clinical examination, the patient had acrylic crowns which were poorly contoured with respect to 11, 12 (Figure 1a). Intraoral periapical radiograph of 11, 12 revealed presence of metal posts with inadequately obturated root canal treatment and periapical radiolucency (Figure 1b). CBCT (Planmeca Promax 3D Mid) was also taken to confirm the size of the lesion (Figure 1 c, d and e). CBCT image revealed evidence of inadequate obturation with respect to 11 and 12 with well-defined periapical radiolucency. Following the clinical and radiographic examination, the diagnosis was ruled as previously treated root canal therapy with asymptomatic apical periodontitis with respect to 11, 12.

### **Management**

After administering local anesthesia, crowns were removed using split technique. Rubber dam couldn't be secured as the tooth structure was less. Then metal posts were retrieved by conservative approach using ultrasonics by moving it around the metal posts to loosen them and then hand wrench was used to retrieve them (Figure 3). Care was taken not to remove unnecessary root dentin. After the retrieval of the metal posts, the pulp space was copiously irrigated with 3% sodium hypochlorite (Vishal Dentocare Pvt Ltd, India) and normal saline (0.9% wt/vol sodium chloride). The retreatment was initiated using 30 size H file (Dentsply Inc, Maillefer, Dentsply India) and Endosolv Gutta Percha solvent (Septodont, Germany).

The working length was established and confirmed using intraoral periapical radiograph (Figure 2 c). Cleaning and shaping of the root canals was done using crown down technique with Protaper rotary system (Dentsply Inc, Maillefer, Dentsply India) and enlarged till F3 Protaper rotary file (Dentsply Inc, Maillefer, Dentsply India). During the cleaning and shaping, cotton piece was retrieved with respect to 12 using 35 H file (Dentsply Inc, Maillefer, Dentsply India) (Dentsply Inc, Maillefer, Dentsply India). Copious irrigation protocol was followed with normal saline (0.9% wt/vol sodium chloride) and 3% sodium hypochlorite (Vishal Dentocare Pvt Ltd, India). Four rounds of calcium hydroxide dressing as intracanal medicament in the form of Calciur (Voco) was given for a period of 4 weeks. Following this, amniotic membrane (Tata Memorial Hospital, Mumbai, India) was placed at the apex and pushed slightly beyond the apex in an attempt to reduce the periapical infection and the access cavity was sealed. (Figure 2 d) After 2 weeks, intraoral periapical radiograph was taken to check for the reduction in the size of the lesion. Intraoral periapical radiograph revealed considerable reduction in size of periapical lesion (Figure 2 e-h). The root canals were irrigated with 3% sodium hypochlorite and saline 0.9% and then dried using paper points (Dentsply Inc, Maillefer, Dentsply India). Obturation was completed using lateral condensation technique with Protaper F3 Gutta Percha (Dentsply, Sirona, Dentsply India) and AH Plus sealer (Dentsply, Sirona, Dentsply India). The post space preparation was done for 11, 12 using ReforPost#1 = Peeso #1(Reforpost® Angelus, Londrina, PR, Brazil) and the corresponding fiber post (Reforpost® Glass Fiber, Angelus, Londrina, PR, Brazil) was cemented using flowable composite (Filtek Z 350XT, 3M ESPE, St, Paul,

MN, USA). The core build up was done with composite resin (Filtek Z 350 XT, 3M ESPE, St, Paul, MN, USA). Porcelain fused to metal crown was cemented as the definitive restoration for 11 and 12 (Figure 2 i).

## Results

This case was followed up at regular intervals of 2 weeks, 1 month, 3 months, 6 months, 1 year and 2-year intervals. At all the course intervals, clinical and radiographic examinations were performed and the case was devoid of any symptoms clinically and radiographically. A 2 year follow-up showed no clinical signs or symptoms and the radiographic lesion had healed (Figure 2 k).

## Discussion

Cases with endodontic retreatment presents with technical difficulties. The capability to retrieve the metallic objects from the root canal in a conservative manner is the most important factor in the selection of instrument or procedure. Non-surgical retrieval of foreign objects from the root canal space depends on variety of factors. Amongst them are length and the accessibility of the foreign object, the curvature and the diameter of the root canal, position of the impacted object. The removal of previously done post endodontic restorations will facilitate easier access for retrodentics. Besides, the post endodontic prognosis, any existence of fracture line, and the remaining amount of tooth structure will justify the success of the treatment. Various authors have described the use of Masseran kit for the retrieval of broken metal posts.[6,7] The literature has also shown the use of Ultrasonic Scaler for the removal of metal posts.[8,9]

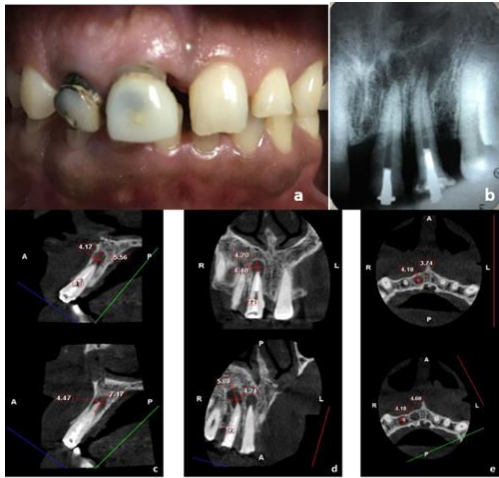
Successful retrieval of metallic obstructions from the root canal space is ascribed to various aspects like the skill of the operator and anatomic variations of the root canal space. In this present case report, ultrasonic scaler was used to loosen the metal posts and conservatively removed it and the cotton piece present in the lateral incisor was removed using H file.[9,10] This method was used as it is highly conservative and no special equipment was required. The impaction of the metal posts and straight canal anatomy advocated the use of aforementioned method.

Use of amniotic membrane for the healing of periapical lesion in this case has shown to be a novel approach. Human amniotic membrane has been extensively used as a biomaterial for the treatment of surgical wounds, burn wounds, surgical reconstructions, and as graft dressing in various fields of specialties.[9,11] Since human amniotic membrane is a reservoir of multipotent stem cells, which has the capacity to differentiate into neighbouring cell types and brings about the healing process. Amniotic membrane acts a stockholder for cytokines which also speeds up the healing process.[12,13] This property has been well documented in clinical trials and has been successfully helped in healing of acute or chronic periapical infections.[14,15]

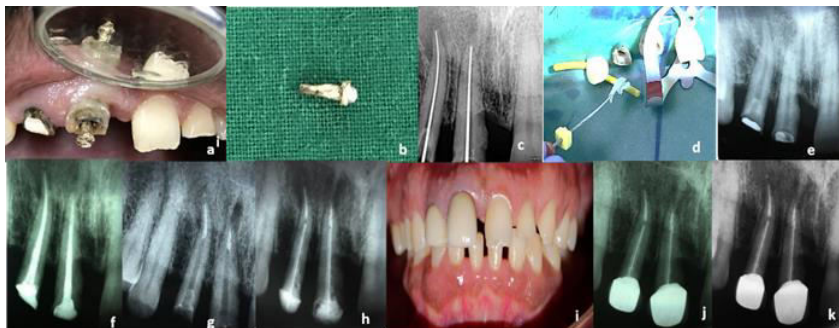
## Review of literature

Amniotic membrane is a membrane that devised from deepest coating of human fetal membrane. In dentistry angiogenesis and epithelization caused by the growth factor of Amnion membrane. Angiogenic factor originate in this membrane are: EGF (Epidermal Growth Factor), VEGF (Vascular Endothelial Growth Factor), FGF (Fibroblast Growth Factor), HGF (Hepatocyte Growth Factor), IGF-1 (Insulin like Growth Factor-1), HB-EGF (Heparin Binding Epidermal Growth Factor). Nonetheless, angiogenic factor is not present in all the portion of this membrane. Amniotic fibroblast layer can increase angiogenesis while the Amniotic epithelial cells impede angiogenesis. The reason why the epithelial cells from amniotic membrane have anti-angiogenic mediators like Interleukin-1 antagonist receptor, TIMP3 (Tissue Inhibitor Metalloproteinase 3) and TIMP4 (Tissue Inhibitor Metalloproteinase 4).[16] Antimicrobial properties of this material acts against pathogenic bacteria like Staphylococcus aureus, Streptococcus pyogenes etc in oral cavity.[17] Immunomodulatory properties of this membrane can regulate the inflammation. Since, Amnion membrane has favorable properties it can be used - oral and maxillofacial surgery for cleft palate, temporomandibular joint surgery, vestibuloplasty and gingival recession treatment.[14, 15] This membrane is also used for treatment of erythema multiforme major and cervical necrotizing fasciitis as it is anti-inflammatory and anti-scarring. Since this membrane is a very imperative material with its useful properties used in dentistry.[18]

*Tables and Figures*



**Figure 1. (a) Preoperative clinical photograph of tooth 11 and 12. (b) Preoperative radiograph showing inadequately obturated root canals with presence of cast metal posts. Preoperative cone beam computed tomography (c) Sagittal view of tooth 11 and 12 showing the presence of periapical lesion measuring 4.12mm and 4.47mm anteroposteriorly. (d) Coronal view of teeth 11 and 21. (e) Axial view of teeth 11 and 21.**



**Figure 2. (a) Clinical photograph showing metal post in 11 following crown removal (b) Photograph of retrieved metal post. (c) Working length estimation with respect to 11, 12. (d) Amniotic membrane being placed in the root canal of 11 and 12 with the help of a K-file. (e) Post treatment Intra oral periapical Radiograph showing the healing process with respect to 11 and 12 after 2 weeks of the treatment. (f, g and h) Intra oral periapical Radiograph showing completed root canal treatment followed by fiber post placement. (i) Postoperative clinical photograph. Progressive healing of periapical lesion of 11 and 12 at (j) 12 month follow up. (k) 2 year follow up.**

**Conclusions**

In this present case, the retrieval of the metal posts was done in a conservative way using magnification and ultrasonics. Cautious evaluation of the tooth structure undergoing endodontic therapy is compulsory. A careful examination of the metal posts is required to make the treatment procedure more foreseeable. The use of magnification for ultrasonics for the retrieval of metal posts helps in irrelevant removal of dentin around the

metal posts and makes it less time consuming. Placement of regenerative material for the healing process of periapical lesions is advantageous as the surgical procedure can be avoided.

#### Authors contributions

Concept, planning, supervision, and manuscript draft were done by RM and SH. Experimental work was completed by RM and SH. The manuscript review and editing were done by the SH. All the authors have read, review and final approval for the completed manuscript.

#### Conflict of interest

The authors declare that they have no conflict of interest.

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