Inter - Disciplinary Management of an Iatrogenic Perforation : A case report

Vanitha U. Shenoy * # ●
Nisha Sharma ** ## ●
Sumanthini **** # ●

ABSTRACT

Perforation is a procedural accident that occurs during root canal treatment, creating an artificial communication between the root canal and the supporting periodontal apparatus. Root perforation results in the loss of integrity of the root and further destruction of the adjacent periodontal tissues. This case report is the management of a large perforation at the junction of the coronal and middle third of the root on the palatal surface of the root that was using composite resin. Successful treatment depends on immediate sealing of the perforation and prevention of infection.

Key Words: Root Canal, Perforation, Composite Resin.

Introduction

Perforation is a mechanical or pathological communication between the root canal/pulp space and the supporting apparatus of the tooth, which leads to a compromise on the health of the periradicular tissue. Perforation can be of two types, one that results from a resorptive process and the other, that is iatrogenically produced, which can occur during the bio mechanical preparation of the root canal or during a post endodontic procedure. Factors of significance to prognosis for treatment are time, size, and shape of the perforation as well as its location impacts the potentials to control infection at the perforation site.

Case Report

A 36 year old female patient was referred to the out patient section of the Department, with chief complaint of pain and a previous history of root canal treatment in relation to the maxillary right first premolar (15). On clinical examination 15 had a large temporary restoration on the occlusal and distal proximal surface. On removal of the same, an ovoid shaped perforation was noticed in the palatal wall extending subgingivally with a diameter measuring 5mm bucco- palatally and 2mm mesio-distally fig 1A. However there was no communication of the perforation with the root canal. On probing the area, bleeding was noticed from the perforation site. Intra oral periapical radiographic analysis of 15 showed a large radiolucency extending obliquely, from the cervical 1/3rd of the crown to the coronal 1/3rd of the root of
15 fig 1B. As the perforation was extending subgingivally, a surgical method was opted to access the perforation and seal it, following obturation of the root canal. The patient’s medical history was non contributory.

The root canal was negotiated, biomechanical preparation completed, calcium hydroxide saline paste was used as the intra canal medicament in between appointments and the root canal obturated using AH plus sealer (Dentsply DeTrey GmbH) and Gutta percha cones (Dentsply Maillefer), using a lateral condensation technique. The access cavity was temporized using type II Glass ionomer cement. (GC Fuji). Following obturation the patient was scheduled for surgery. The temporary restoration from the access cavity was removed and the pulp chamber cleaned of all the glass ionomer cement. Buccal and Palatal full thickness mucoperiosteal flap was raised extending from the maxillary right first molar to the first premolar (16, 15, 14). A full thickness mucoperiosteal flap was raised buccally and palatally, with gingivectomy of 2mm on palatal aspect. Palatal osteoplasty of about 2mm was performed to reach the base of the perforation at coronal 1/3rd of the root Fig1C. Degranulation and root debridement were done. Endodontic perforation repair was then carried out. Size of the perforation measured 5mm buccopalatally and 2mm mesio-distally, depth extending upto 4mm from the Cemento-Enamel Junction. The perforation site was subsequently sealed using composite resin Fig1D. The flap was then repositioned and sutures were placed apically to create intentional attachment loss. The occlusion was checked and a periodontal pack was placed buccally and palatally. Patient was recalled after one week for suture removal. After a month, 15 was post endodontically restored with a full coverage metal ceramic crown. After 3 months, no pathological changes were observed on radiographs fig2C. The patient was recalled every 3months. The tooth was clinically and radiographically symptom free. At the end of the 18 months the periodontal probing depths were within normal limits fig2D.
Diagnosis and localization of the perforation of the root is difficult when located on the buccal or lingual aspect of the root. The diagnostic value of radiographs is limited due to superimposition of the perforation on the root surface. The more apical the perforation the more favorable the prognosis. Perforation occurring relatively close to the crestal bone and the epithelial attachment is critical, as it may lead to bacterial contamination, from the oral environment, along the gingival sulcus. This location has been described as the “Critical crestal Zone”. Tooth perforations occurring below the crestal bone in the coronal 1/3 of the root generally has the poorest prognosis. The attachment recedes and periodontal pocket forms with attachment loss, extending apically to at least the depth of the defect. The crestal bone needs to be resected to reposition the bone apically if needed. The treatment goal therefore, should be to position the apical portion of the defect above crestal bone. In the present case, the perforation was below the alveolar crest and an apically positioned flap was chosen to reposition the crestal bone and soft tissue at the base of the lesion on the tooth so that there would be no communication between the healthy periodontium and hard tissue lesion, on healing. This compromises the esthetics, but it was of minimal consideration in this case due to the low smile line and the tooth being 15. Perforation has to be recognized early to avoid subsequent damage to the periodontal tissues. Lantz and Persson experimentally produced root perforation in dogs and then treated the perforation either immediately or after a delay. The most favorable healing occurred when the perforation was sealed immediately, thus reducing the likelihood of an infection being established, resulting in a better periradicular environment around the perforation. Seltzer et al in their study observed that the periodontium was damaged in all the teeth involved, but the most severe destruction was found in the untreated perforation and in the teeth where the treatment was delayed. Other workers observed consistent periodontal healing even when treatment was delayed as long as aseptic technique was used. Fuss and Trope classified root perforation according to size, stating that a small and fresh, lateral or furcal root perforation has a good prognosis when it is placed apically rather than coronally on the root and the prognosis is poor in an old, large crestally placed perforation. Himel et al found that the prognosis of treatment was directly proportional with the size of the tooth, the larger teeth with proportionally smaller perforation has best results. The purpose of the surgical treatment is to achieve a tight and permanent seal that will prevent bacteria and their byproducts in the root canal from entering the surrounding periodontal tissues and to avoid irritation of the periodontal tissues by extrusion of sealing materials, it appears that small perforations have a better prognosis, because they are easier to seal effectively without forcing filling materials into the surrounding tissues. The indications for surgical intervention are large inaccessible perforation. In this case the size of the perforation was large and as the extent could not be gauged thus surgical repair was undertaken. A wide variety of materials have been used to seal the perforation, which include amalgam, Cavit, Super EBA, glass ionomer, composite resin, gutta percha, zinc oxide eugenol and Mineral Trioxide Aggregate (MTA). Currently MTA has been the choice of material for perforation.
repair, but the high cost, delayed setting time, discoloration reported made light cure composite resin the material of choice in this case\textsuperscript{13}. Acid etching procedures also significantly reduce MTA microhardness\textsuperscript{14}. Composite resin material has some desirable properties and has been considered for use as root end filling materials. When assessed for sealability, composite resin performs well in in-vitro studies. Composite resin tends to leak less than amalgam, super EBA, IRM and glass ionomer cement\textsuperscript{15} however blood contamination during the bonding process reduces bond strength and increase leakage\textsuperscript{16}. The marginal adaptation varies depending on conditions and bonding agents\textsuperscript{17}. Al-Qathami and Al-Nazhan S studied the effects of root perforation materials on morphology and attachment behavior of human PDL fibroblasts in vitro and concluded that composite resin one of the tested materials had good adaptation to the cementum surface though it was the most toxic material used\textsuperscript{18,19} and once the composite resin sets, cells can grow on its surface\textsuperscript{20}. Rud et al found that sealing root perforation with dentin-bonded resin-composite (Retroplast), bone regenerated and a periodontal ligament space was partly formed with a lamina dura against the material\textsuperscript{21}. The healing response of the periradicular tissue to composite resin in general appears to be very diverse, ranging from poor to good, which varies according to the type of material used\textsuperscript{22}. Calcium hydroxide saline paste was used due its antimicrobial activity, related to release of hydroxyl ions in an aqueous environment. The lethal effects on bacterial cells are probably due to its damage to the bacterial cytoplasmic membrane, protein denturation and the damage to the DNA of the bacteria\textsuperscript{23}.

**Conclusion**

Repair of perforation must include the cleaning and obturating the canal segment apical to the perforation as well as possible and the perforation must be repaired to the extent that does not lead to the chronic deterioration of the surrounding tissues.

**References :**


