

# **Management of avulsed maxillary central incisors by MTA apexification**

**A Clinical Case report**

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## **Abstract**

Avulsion accounts for 1-16% of all dental injuries (4) and is described as the complete displacement of a tooth from its socket owing to trauma. One of the most common reasons for emergency appointments, maintaining the survival of these teeth is of utmost importance. Treatment is complex due to the extensive damage caused. Understanding poor prognostic factors and how to sustainably manage patients will have significant effects on outcome success. This case report discusses treatment of maxillary central incisors, which have previously avulsed and been re-implanted. Taking into account management of chronic trauma and alternative considerations.

## **Case details**

A 12-year-old male attended the joint orthodontic-restorative clinic at Queen Alexandra Hospital, Portsmouth with his father in January 2017 following trauma to his maxillary central incisors.

## **History**

In February 2016, a playground accident resulted in trauma to both of the central incisors: 11, 21 had avulsed and were placed in milk. The patient and his father attended the maxillofacial department for emergency treatment. Extra-oral dry time > 60 minutes. The on call SHO re-implanted and splinted the incisors as per guidelines (fig 2). The patient was discharged and advised to see their GDP for follow up.

The patient's GDP carried out RCT on 11 and 21, 3 weeks post trauma (fig 3). No change to medical history was noted.

## Examination

### Extra oral

No extra-oral wounds or injuries.

No TMJ, alveolar or facial bone fractures detected

### Intra oral

OH: adequate with mild marginal gingivitis

16 GIC	15	14	-	12	11 RCT	21 RCT	22	C	24	25 GIC	26
46 GIC	45	44	43	42	41	31	32	33	34	E GIC	36 GIC

Occlusion:

- Class II div I malocclusion with a 3mm overjet and 60% complete overbite.

Clinical presentation:

- 11 appeared supra-occluded with some mild discoloration
- 11, 21 root canal treated by GDP
- Grade I mobility: 11, 21, 22

## Radiographs

Periapical radiographs were taken of 11 & 21 post splinting in the max fax department and on presentation to the joint ortho-restorative clinic.

Fig. 4: severe bone loss in association with 11 and 21 as well as periapical pathology evident on both teeth. The splint can be seen in situ.

Fig. 5: poorly condensed root filling on the 11 and 21 to the radiographic apex. Voids evident in the canal, periapical lesion has appeared to decrease. Severe bone loss is present.

## Special investigations

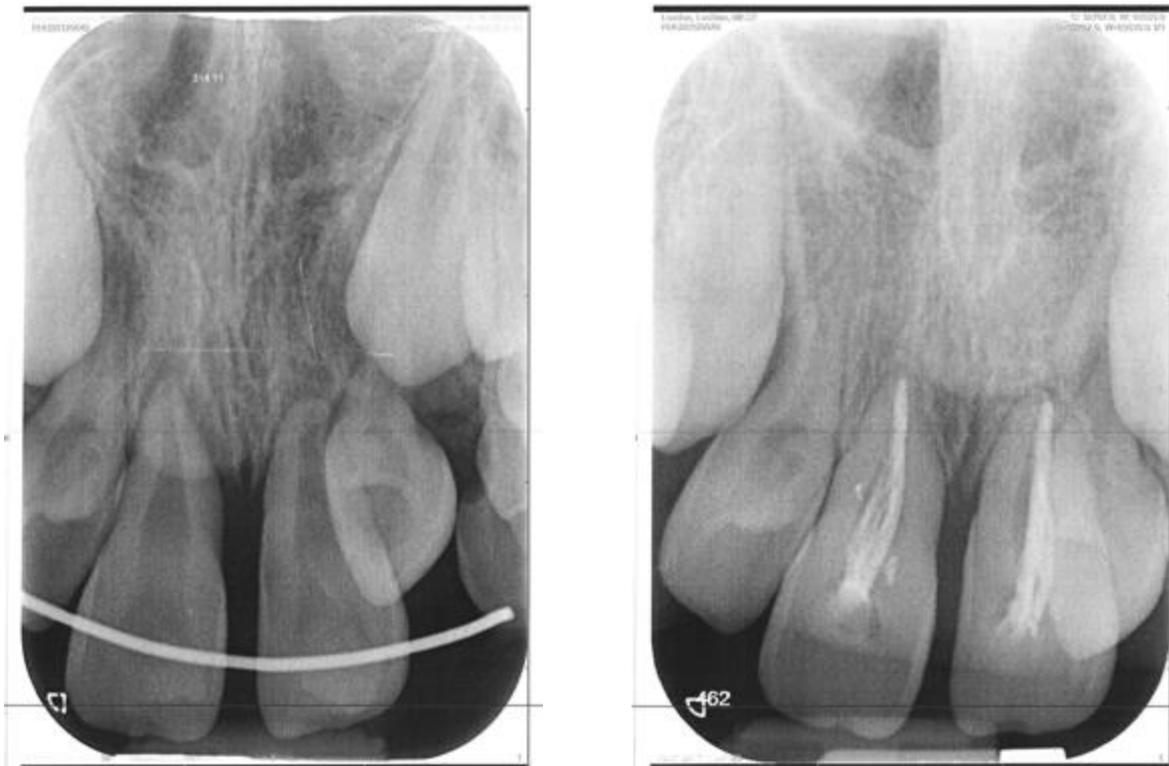
- 1) No TTP 11, 12, 21, 22
- 2) Electric pulp test and Ethyl Chloride tests negative on 11 & 21. The remaining anterior teeth gave positive responses.
- 3) Radiographs



*Fig. 1 (top, centre) Frontal view of patient's dentition*

*Fig. 2 (bottom left) Side view of right hand side of patient's dentition*

*Fig. 3 (bottom right) Side view of left hand side of patient's dentition*



*Fig. 4 (Left): periapical radiograph taken immediately after splint placement in maxillofacial department*

*Fig. 5 (Right): periapical radiograph taken at MDT appointment (orthodontic-restorative clinic) showing a root canal fillings of 11 and 21 by their GDP*

### **Diagnosis**

Non-vital maxillary central incisors following avulsion

### **Treatment**

OH advice was reinforced at all appointments to ensure compliance.

The decision was made to re-root both the 11 & 21 to gain an optimal seal and increase chance of a successful outcome. The previous DCT treated 21, and the treatment of 11 was passed onto me for completion.

Rubber dam isolation was used throughout the procedure. 11 was re-accessed using a diamond round bur with irrigation. All necrotic remnants were removed from the root canal and the decontamination protocol included careful irrigation with 2.5% Sodium hypochlorite solution. The working length was determined with an apex locator as 16.5mm. The canal was thoroughly dried with paper points and filled using CaOH as an intracanal medicament to produce an apical barrier. The cavity was sealed with IRM.

This procedure was repeated twice prior to the canal having a 5mm MTA plug placed as a root end filling material.

At the final appointment 2 weeks later, 11 was obturated using gutta percha and restored with composite.



*Fig. 6 (Left image): periapical radiograph showing MTA plug and obturation of 21*

*Fig. 7 (Centre image): periapical radiograph showing MTA plug of 11*

*Fig. 8 (Right image): periapical radiograph showing MTA plug and obturation of 11*

*Severe bone loss evident in all radiographs along with well-condensed obturation of the root canals*

### **Follow up**

Subsequent follow up included observation for:

- 1) Pain
- 2) Further discoloration
- 3) Increased mobility
- 4) Sensitivity to percussion
- 5) Infra-occlusion due to ankylosis
- 6) Radiographic signs of replacement root resorption

The patient was reviewed 2 months later and discharged from the restorative department back to the care of the orthodontic department.

## **Discussion**

Once an avulsion injury has occurred every effort should be made to replant the tooth as soon as possible. The dry time and storage medium prior to replantation could have a severe impact on successful healing.

Evidence has shown that >60 minutes extra-oral time, as in this case, replacement resorption is almost always guaranteed. A physiological storage medium such as Hank's Balanced Salt Solution (HBSS) is most ideal, however saliva, saline and milk are acceptable. After re-implantation, it is recommended to splint the tooth using a semi-rigid splint for 7 - 10 days (3).

In this case, where clinical and radiological inflammatory symptoms are present, the endodontic therapy was performed and formation of apex barrier accomplished with CaOH and MTA. Apexification using MTA was chosen to achieve the radicular filling and further reduce the risk of root fracture. Research has shown that at 12-month examination, MTA displayed superior results with regards to apical closure, in comparison to CaOH, which exhibited coronal or radicular fracture in 4/15 teeth after 12 months (2).

It is important to consider the occurrence of replacement resorption with trauma cases.

The pathognomic sign typical of an ankylosed tooth is detected by a high resonant tone and occurs only after 20% of the root surface area is affected by replacement resorption. (1)

In such cases the following management options should be considered:

1. Surgical repositioning and distraction osteogenesis
2. Restoration of the infra-occluded tooth by composite build-up
3. Extraction of a failing anterior tooth with ankylosis or recurrent infection. Space replacement options include; orthodontic space management, partial denture, resin bonded bridge and implant (>18 years old)
4. De-coronation of a tooth undergoing replacement resorption. This aids bone width maintenance.

In this case successful management of the natural teeth ensured; function, aesthetics and space, bone and gingivae maintainer, satisfying physiological functions until and inevitably when further considerations for replacement of the traumatised teeth will need to be established.

## **Conclusion**

When managing such a case it becomes apparent that patients, who undergo trauma, are inevitably patients for life. They require close and consistent follow up, prompt management of complications and are committed both financially and time constrained to complex treatment.

I learnt the importance of multidisciplinary management, especially orthodontic involvement, future and forward planning as well as the challenges of patient management.

### References

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