Avulsion in Paediatric Dentistry: Management of a Double Dental Emergency in a Child

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Introduction

General dental practitioners and paediatric dentists face real dental emergencies that effect children, especially dental trauma. Avulsion is considered, in terms of severity, the worst of all dental-aloever injuries. This is when the tooth is completely displaced out of its socket and the socket is found empty or filled with a blood coagulum. We report a case that describes the management of an avulsed maxillary central incisor (21) in a fit and healthy 8-year old boy, accompanied by a lower lip laceration. The management of 21 took place up over a period of 12 months.

Case Report

An 8-year old child presented to the department of paediatric dentistry at the Hamdan Bin Mohammed Col- lege of Dental Medicine (HMBCDM) at the Mohammed Bin Rashid University (MBRU) in Dubai Healthcare City. He allegedly fell off a climbing wall, and knocked out his upper left maxillary incisor (tooth 21) in a fit and healthy 8-year old boy, accompanied by a lower lip lac- eration. The management of 21 took place up over a period of 12 months.

Extra oral examination

• No TMJ, alveolar or facial bone fractures detected.
• Lower lip through and through laceration of the lower lip (Figure 1).
• Class 2 skeletal profile.

Intraoral examination

• 21 empty socket with coagulum.
• Laceration of the buccal gingiva near 21.
• Incisor relationship Class 2 Division 1 (OJ= 10mm). Mum informed us of her son having proclined incisors and 1 (OJ= 10mm). Mum informed us of her son having proclined incisors.

Diagnostic summary

21 avulsed with immature root.
• Concussion 12, 11, 22.
• Through and through lower lip lac- eration involving the vermilion.
• Inverted conical supernumerary/ mesiodens.
• Behaviour: Mildly anxious at initial presentation, very cooperative through the treatment visit. Aims and objectives of treatment
Management of acute traumatic in- jury and replant the avulsed 21.
• Suture the lacerated lip.
• Monitor the vitality and periodon- tal healing of 21.
• Preserve 21 in the short and me- dium term aiming to maintain the bone level in the long term.
• Inform patient and parents about the poor long-term prognosis of 21 and the available de- finitive future treat- ment options.

Treatment Plan

After the patient’s ini- tial assessment, we ad- ministered LA to his upper anterior sextant and lower lip. During this time, both the tooth and socket were gently irrigated with physiological saline. 21 was found to have an immature root and open apex. (Figures 5 and 6).

Within the hour, tooth 21 was gently replanted into the socket (Figure 6) and a flexible 0.5mm wire/compos- ite passive splint of teeth #12, 11, 22 was secured (Figure 7). We sutured the lacerated lower lip in multiple layers (mucosa, deep and superfi- cial) using Vicryl® (Sizes 4-0 and 6-0) resorbable fine sutures (Figure 8 and 9). This took place after thorough de- bridgement of the wound with physi- ological saline. Care was taken to as- sure alignment of the lip’s vermilion involved in the laceration.

The patient was advised to maintain a soft diet, and analgesics (Paracetamol 1000mg PBN) and antibiotics (Amoxicillin 250mg TDS for 5 days) were prescribed. Chlorhexidine glu- conate 0.2% to milk BD mouth rinse was advised. After discussing the short and long-term consequences, a follow up appointment was ar- ranged on a week, and the patient was discharged. We advised the patient to attend his general medical prac- titioner (GMP) to obtain a Tetanus booster injection straight after the appointment.

A second trauma within two hours

Within two hours of leaving our clinic, the patient suffered another tra- uma affecting the injured area. This happened at the GMP receptionist’s office. As the receptionist was ask- ing the patient’s mother where her son was, she pointed to him (he was standing behind her) and accidentally hit her in the mouth. There was no LOC, nausea, vomiting or disor- ientation. This caused the GMP con- cern so she sent the patient back to us for a reassessment. To our sur- prise, the patient showed up in our clinic (at 18:25 hours) with renewed bleeding from his mouth (Figure 10 a & b).

After obtaining a new history and carrying out an assessment, the wound was debried. The splint and sutures were examined and were found to be intact. Although the splint was slightly mobile (Grade 3), it was securely bonded to the teeth. No new radiographs were taken. The patient and family were reassured and the above advice was reaffirmed.

They went back to the GMP for the...
Figure 11: A periapical radiograph taken one week post-op showed the correct positioning of the replanted tooth. Note the open apex.

Figure 12: Healing of the lip one month post-op. Some oedema and scarring were noted.

Figure 13: One-month post-op after removal of the splint. The tooth was responsive to EC & EPT.

Figure 14: One year follow up. The patient and parent were pleased with the aesthetic result. Tooth 21 was vital and positively responsive to EC & EPT. The tooth was non mobile and produced a metallic sound indicative of ankylosis.

Trauma follow-up appointment (one-week post op)
The aim of the visit was to review 12, 11, 21, 22 and to assess soft tissue healing. The patient had no complaint whatsoever. Observations revealed a slight mobility of 21 and good healing lower lip and buccal gingiva of 21 with good oral hygiene but some visible plaque on 22. The splint was intact. We obtained a periapical radiograph of 21, which showed it to be in a favourable position (see Figure 10) with a large wide-open apex. At this appointment, and in the subsequent appointments (3, 5, 6, 9 and 12 months post-op) we completed a ‘Dental Trauma Stamp’ (see Table 1 for an example) which included assessment for mobility, tooth colour (direct and transillumination), tenderness to percussion (TTP), sinus presence, swelling presence, percussion sound, electric pulp tester (EPT), ethyl chloride (EC) and radiographic assessment. The latter was essential to assess for apical pathology, root resorption (internal and external), arrested/continued root development, pulp obliteration and replacement resorption/ankylosis. The dental trauma stamp was repeated at every visit. It helps in assessing periodontal ligament (PDL) and pulpal healing.

Trauma follow-up appointment (one-month post op)
The healing of the lip appeared satisfactory (Figure 12). We gently removed the dental splint (Figure 13) and a new dental trauma stamp was completed. Tooth 21 was +ve to EC & EPT suggesting possible revascularization, although this was not absolute.

Subsequent appointments (at 3, 6, 9 and 12 months post op)
Healing of the lip and periodontal soft tissues continued satisfactorily and the patient and mother were happy with the aesthetically pleasing result (see Figures 14, 15 & 16). A mouth guard was made to prevent further dental injuries to the same area. Dental caries was treated appropriately.

However the dental trauma stamp revealed that tooth 21, despite remaining vital (+ve to EC and EPT), non-discoloured and asymptomatic, became ankylosed. At 3 months a decision whether to initiate root canal treatment or not was debated, but no intervention was decided upon, as the tests suggested its vitality. The tooth was non-mobile and was producing a ‘crack plate metallic’ sound on percussion. At 6 months, radiographically, there was evidence of replacement resorption (Figure 17 a, b & c). This worsened at 12 months. This tooth will inevitably be lost.

Discussion
Traumatic dental injuries are common, with between 6-34% of children aged 8-15 experiencing damage to their permanent teeth 1. Over ¾ of all traumatic oral injuries occur in childhood, and in the United Kingdom, the proportion of 12 and 15 year olds with any traumatic damage was recently found to be 12% and 10% respectively 2. Traumatised teeth can have a significant clinical, aesthetic and social impact on an individual. Treatment of traumatised teeth usually requires extensive management, carrying a burden for the patient as well carers and health authorities in the long term. Avulsion is the complete displacement of tooth out of its socket and the socket is found empty or filled with a blood coagulum 3. About 90% of replanted avulsed teeth will undergo ankylosis 4.
According to British Society of Paediatric Dentistry (BSPD) guidelines, factors to take into account in avulsed teeth are dry time (DT) and total extra alveolar time (EAT). In cases with less than 30 minutes DT and less than 90 minutes EAT, when stored in appropriate storage medium, replantation without disturbing the PDL is recommended plus splinting with flexible wire for 7-14 days. This case falls under this condition where the DT was 10 minutes and EAT was 60 minutes. There is limited evidence regarding the benefit of systemic antibiotics on pulp healing. Prescription should be governed by clinical judgment. After evaluation of this patient’s type of trauma with the associated soft tissue injury and contamination, an antibiotic was prescribed as per International Association of Dental Traumatology (IADT) guidelines. The GMP guidelines focus due to the environmental contamination of the tooth. For immature teeth like this, no endodontic treatment was electively recommended due to an open apex, favorable DT and EAT, and we were hoping for continued tooth growth and 21 with pulpal regeneration. However, we must not forget that the tooth was traumatized for a second time with two hours, thus this may have had an impact on the reduction of its prognosis. The tooth was carefully monitored to assess pulpal regeneration or necrosis. The tooth remained vital, however, it underwent ankylosis. Therefore, its prognosis was deemed poor, and its loss was expected. In children and adolescents, ankylosis is frequently associated with infraorption: Decoronation may be necessary later when infraorption (>3mm) compared to its counterpart is seen. The outlined options, in the long term, to replace 21 are highlighted below:

### Long term treatment plan and future considerations

**Tooth 21 future treatment options available will be:**
- Decommission: Removal of the crown and retention of the root.
- Extraction and partial removable denture.
- Extraction and resin bonded bridge.
- Auto-transplantation of a premolar (if crowding occurs).
- Osteo-integrated implant (after the age of 18 years).

As he was a very active boy and loves playing football, and due to his dental history where he had a repeated history of trauma in the same tooth, in addition to his Class 2 Division 1 malocclusion with an overjet of 10mm, a custom fit mouth guard was fabricated to be worn while engaging in any contact sports. Overjet correction will be needed. The patient was referred for an orthodontic and restorative opinion for planning of multidisciplinary treatment options.

### Summary and conclusion

21 was avulsed with a lip laceration. The tooth was replanted, splinted and the lip was sutured. The tooth suffered another trauma after two hours. Radiographic findings showed signs of replacement resorption from 6 months post trauma. Clinically, 21 responded positively to EPT and ICT tests, no other signs of inflammation. Decoronation (removal of the crown and retention of the root with surgical coverage) will be implemented. The lip healed favourably. The patient and his parents were warned about the poor long-term prognosis of 21 and alternative long term treatment options were discussed.

### References

5. International Association of Dental Traumatology Dental Trauma Guidelines, 2012

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**EFP societies celebrate biggest-ever European Day of Periodontology**

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**By DTI**

**MADRID, Spain:** For the third time, the European Federation of Periodontology (EFP) celebrated the European Day of Periodontology on 12 May. The event has grown immensely since its launch in 2014, with 20 national societies of periodontology across Europe taking part this year. The EFP-affiliated bodies organised a day of periodontal screening and free periodontal check-ups at hospitals and dental surgeries. The Société Française de Parodontologie and International Association of Dental Traumatology, the Société Française de Parodontologie and Oral Implantology, organized a multidisciplinary event together with endodontologists, cardiologists and gynaecologists with the aim of educating and raising awareness about the link between periodontal and systemic health.

The Ukrainian Society of Periodontists organized a day of periodontal check-ups at the Shupyk National Medical Academy of Postgraduate Education in Kiev. Patients had the opportunity to learn about different periodontal treatment options, as well as strategies to improve their gingival health, including dental hygiene and lifestyle recommendations, particularly for young patients. "Our association has been encouraging dentists and medical doctors to play their part in the treatment and diagnosis of periodontitis and to raise public awareness of periodontitis and its link to systemic health and general wellbeing," said Daiva Gelažien, EFP delegate of the Draugiai Periodontology Lietuvos, the Lithuanian periodontal association. Among other activities, the society conducted events related to gingival health at schools in Vilnius, with about 200 children participating in a game of comparing their knowledge about and skills in keeping their mouths and bodies healthy. "The EFP’s communication tools have been very helpful," noted Gelažien. "We are very happy to be a part of this excellent initiative."