A Shared Care approach of managing Complex Dental Trauma

ABSTRACT

Traumatic dental injuries (TDIs) account for 5% of all injuries in children and young adults.[1] Road traffic accidents are a known but less common aeitology for TDIs which can result in severe injuries to the dento-alveolar region, often involving multiple teeth.[2]

Following dental trauma, prompt examination and immediate treatment is required, with long-term follow up essential to improve outcomes.[1] In addition, for complex dental injuries an integrated, multidisciplinary team approach can optimise patient care.

In this report we present a case of a 15-year-old patient who sustained significant dento-alveolar injuries following a car accident. The patient's care has been delivered in primary, secondary and tertiary care settings and has involved a shared care approach with an emphasis on appropriate treatment, follow up and longer-term management planning delivered in services close to home. Treatment has included immediate trauma management, root treatment and restoration of fractured teeth, clinical and radiographic trauma reviews, prosthetic replacement of missing teeth and onward transition to restorative care.

INTRODUCTION

TDI's commonly affect the paediatric population, with crown fractures and luxations of permanent teeth the most common dental injuries.[3] Dental trauma can lead to a life-long burden for patients and families, with multiple appointments required, time off school and parental work, and aesthetic or functional implications for the patient. An emphasis should therefore be placed on specialist-led care delivered in services closer to home, if possible, to aim to reduce the burden of care.

CASE DETAILS

History

- 15-year-old male complaining of missing and damaged teeth, involved in a road traffic accident 24/12/22.
- Medical history – fit and well, no medications, no known allergies.
- Trauma history:
    - The patient attempted to exit a moving vehicle and became crushed between the car and an electric gate. Loss of consciousness at the time of injury. Avulsed teeth were not located.
- Social history: lives with parents and brother, in year 11 of high school. No social services involvement for the family.
- Past dental history: previous restoration of LR6 LL6 under local anaesthetic with GDP, LR6, LL6 were planned for extraction at age 9 with CDS however the patient was not brought to a consent appointment and thus was lost to follow up.
- Referral pathway:
    - OMFS admission (Royal Manchester Children's Hospital, RMCH) for 11 days post injury.
    - Referral to University Dental Hospital of Manchester (UDHM) and assessment on the day of discharge from RMCH (4/1/23).

Examination

Figure 1 (A-C) – **Initial presentation at UDHM (injury + 11 days)**

Clinical photographs showing the patient in the permanent dentition with multiple missing teeth, buccally luxated UL4, UL5, palatally luxated UR4. LL1 had sustained a complicated crown fracture. Occlusal contact was on UL2 and UR4 only due to tooth displacement. Soft tissue examination revealed sutured lacerations present, generalised gingival inflammation with poor oral hygiene and plaque and calculus deposits around the lower anterior teeth. The LR6, LL6 are hypomineralised with extensive restorations.

Special investigations

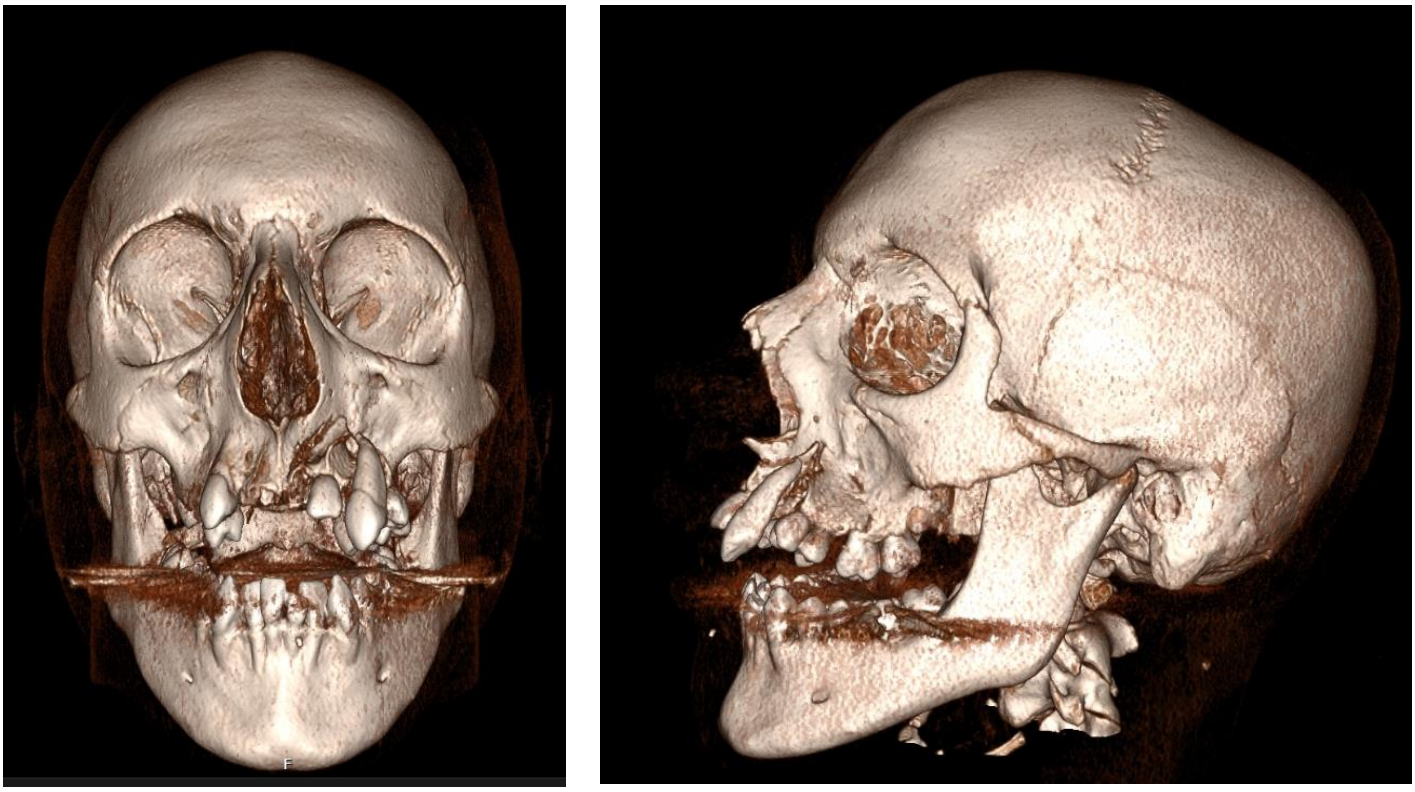

Figure 2 (A-B) – 3D reconstruction of CT head taken on the day of injury showing complex, comminuted, displaced left maxilla fracture involving alveolar process with displaced teeth. Fracture complex involves left upper teeth up to and including UL6. UR6 UR5 UR2 UR1 UL1 are missing. UL2 is angulated horizontally. UL3 is buccally luxated out of the buccal plate.

Figure 3 – OPT taken on initial presentation at UDHM 4/1/23 showing multiple missing teeth, complicated crown fracture LL1 and heavily restored LR6 LL6.

Figure 4 – Long Cone Periapical Radiographs (LCPA) taken UDHM 4/1/23.

	UR4	UR3	UL2	UL4	UL5	UL6	LR2	LR1	LL1	LL2

Colour	-	-	-	-	-	-	-	-	-	-
Mobility	II	-	II	I	I	-	-	-	-	-
TTP	-	-	-	-	-	-	-	-	-	-
Sinus	-	-	-	-	-	-	-	-	-	-
Sensibility testing (Endofrost)	-VE	-VE	-VE	-VE	-VE	-VE	+VE	+VE	+VE	+VE

Figure 5: Trama stamp 4/1/23

Additional special tests – A chest X ray was completed in A+E as the avulsed teeth were not accounted for. No teeth had been inhaled.

Diagnoses

1. Complex comminuted fracture of left maxilla including alveolar process
2. Avulsion – UR6 UR5 UR2 UR1 UL1
3. Lateral Luxation - UR4, UL2, UL4, UL5, UL3 (UL3 later extracted by OMFS)
4. Facial and intraoral lacerations
5. Complicated crown fracture LL1
6. Molar incisor hypomineralisaton (heavily restored with post-eruptive breakdown) LR6 LL6
7. Poor oral hygiene
8. Severe lower arch crowding

Treatment plan

1) Immediate management (OMFS):
   Under General Anaesthetic 26/12/22:
   - Suturing of facial and intra-oral lacerations
   - Stabilisation of mobile alveolar fragments
   - Repositioning of teeth - UR4, UL2, UL4, UL5
   - Extraction of mobile UL3

   Provision of a vacuum formed splint (4 week wear)

2) UDHM:
   - Full clinical and radiographic trauma assessment
   - Coronal pulpotomy LL1

- Referral to Specialist led Community Dental Service (CDS) locally

3) CDS
    1) Composite restoration LL1
    2) Replacement of missing teeth with maxillary partial denture
    3) Repair of restoration LL6
    4) Ongoing trauma reviews as per IADT guidelines

Treatment completed:

UDHM:

Following the full clinical and radiographic trauma assessment within UDHM a pulpotomy was attempted on LL1 under local anaesthetic. The pulp however was hyperaemic and not suitable for either partial or full pulpotomy and thus a full canal extirpation and dressing with non-setting calcium hydroxide was undertaken.

Laterally luxated teeth (UR4, UL2, UL4, UL5) had been repositioned by OMFS, a decision was made to accept their position as opposed to further repositioning orthodontically in the acute phase.

As the patient lived over 45 miles from the Dental Hospital, the Specialist -led community dental service locally was engaged and the patient referred for continued treatment. As my Specialty Registrar training post is split between UDHM and the local CDS I was fortunate to be able to personally transition the patients care.

CDS:

Within the CDS I completed RCT of LL1and restored the tooth coronally with composite (Figure 6). I also undertook regular clinical and radiographic assessment of all traumatised teeth following IADT guidelines. All teeth have remained vital with no evidence of resorption (Figure 7-9). To restore the missing teeth a maxillary partial denture was provided.

MDT planning:

I referred the patient for Consultant-led orthodontic/restorative dentistry MDT planning at the local district general hospital regarding long term replacement of his missing teeth and transition of care after the age of 16. The patient did not want to undergo orthodontic treatment to and thus a restorative only approach was adopted with a maxillary partial

denture (Figure 10). When the patient reaches adulthood, implant restorations could be considered.

Figure 6 – LCPA showing RCT LL1 and composite restoration

Follow-up

Clinical and radiographic follow up was undertaken as per IADT guidelines (2 weeks, 4 weeks, 8 weeks, 12 weeks, 6 months, 1 year). The patient should then be reviewed annually for 5 years post trauma.

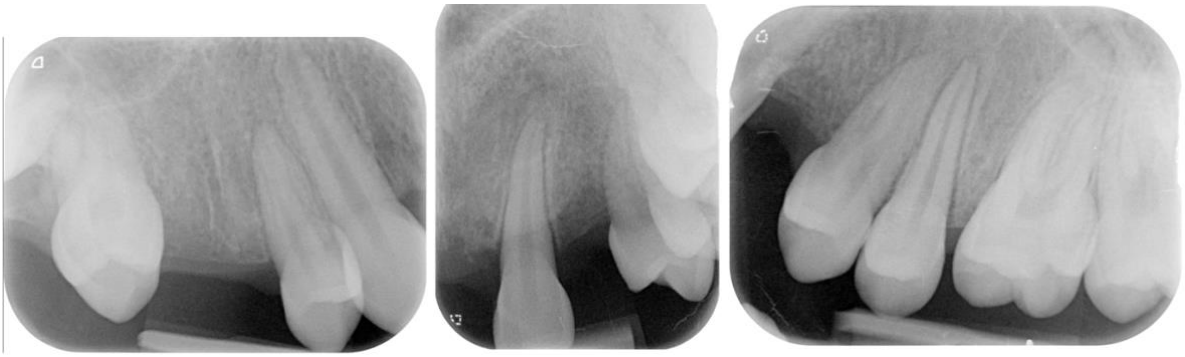

Figure 7: LCPA of maxillary teeth March 2023 (3 months post trauma)

Figure 8: OPT taken February 2024 (14 months post trauma)

Figure 9: Clinical photographs taken March 2024, the patients oral hygiene has remained poor throughout treatment/ reviews. The occlusion has stabilised. He presents with a class III incisor relationship, severe crowding and space loss in the region of the avulsed teeth. The

UR7 UR4 UR3 UL2 are in buccal crossbite. The LR6 LL6 are restored with post eruptive breakdown affecting LR6 buccally.

Figure 10: Clinical photograph of maxillary partial denture in situ. This was the patients second denture and has been provided by restorative dentistry. Note – no clinical photograph available of initial denture made within CDS as the patient stopped wearing denture after 4 weeks leading to space loss/ non-fitting at review.

DISCUSSION

Patient compliance is an important factor in all dental treatment. This patient often missed appointments and did not engage in the improvement of his oral hygiene, despite continued reinforcement of prevention advice as per the DBOH prevention toolkit.[4] In addition, a further set of partial dentures were required as the patient failed to wear the original set leading to space loss around previously avulsed teeth.

Furthermore, the patient did not want to pursue orthodontic treatment, wishing to accept the position of his teeth thus leading to a poorer aesthetic outcome. This highlights that without optimal patient compliance a compromised result ensues.

IADT guidelines state that for teeth with mature root development which have been laterally luxated, extirpation and root canal treatment should be completed.[3] This is to reduce the risk of infection related root resorption.[5] In this case however, at assessment within UDHM all teeth showed signs of vitality and thus a decision was made to closely monitor the teeth. Surprisingly, no teeth showed evidence of loss of vitality or resorption.

Finally, there is a lack of specialists in paediatric dentistry within the UK, with 44% of postcodes having no access to specialist care.[6] Thus, there is a push to increase the workforce within the specialty and to improve access children should receive care as local to the family as possible.[7] I feel that a smooth transition of care was facilitated for this patient and I was able to treat him initially within UDHM, and locally within the CDS. In addition, his MDT planning and transition to restorative dentistry has occurred in the local district general hospital. Linked up services and improved access is highly beneficial for optimised patient care.

CONCLUSION AND CLINICAL IMPLICATIONS

This case demonstrates immediate, mid- and long-term treatment planning for a patient who has sustained complex dental trauma. A holistic approach to patient care and wishes are important to consider when managing such cases.

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