Management of Multiple Traumatic Injuries in General Dental Practice

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Abstract

20% of adults have sustained a traumatic dental injury, with lateral luxation accounting for 23.3% of these. This case report describes the presentation, diagnosis, and management of a 32-year-old female presenting to general dental practice with multiple traumatic injuries, including lateral luxation, uncomplicated fracture, and avulsion. Traumatic presentations will commonly first present to primary care providers and can be effectively managed within the framework of NHS general practice, with referral when necessary for ongoing or complex care.

Introduction

The global incidence of dental trauma is reported as 4.5% annually, with 20% of adults having sustained a traumatic dental injury (1). This is likely to initially present to a general dental practitioner or a general hospital emergency department. Lateral luxation is the most common traumatic injury, and enamel-dentine fractures are the most common fracture. (2) Management of multiple traumatic presentations in general practice can be supported using international guidelines. (3)

Case Details

History

A 32-year-old female presented as an emergency patient following trauma sustained the evening before at home. The patient was reportedly struck with a metal vacuum pole, resulting in the avulsion and loss of 41, fracture of 42, palatal luxation of 11, and enamel infraction of 21.

The patient presented to an out-of-hours dentist the same night, who referred to a general hospital emergency department, where repositioning of 11 and splinting was provided. A chest x-ray was taken to exclude inhalation of 41. The patient was cleared for concussion and discharged with a prescription of amoxicillin 500mg three times daily for five days.

The patient had previously attended regularly for routine examinations and reported no tobacco or alcohol intake. Medically, the patient had a history of hospitalisation for asthma and uses a salbutamol and beclometasone inhaler daily.

Examination

Figures 1 (top), 2, and 3: Pre-operative photographs taken at the initial presentation. Anterior, lower, upper respectively.

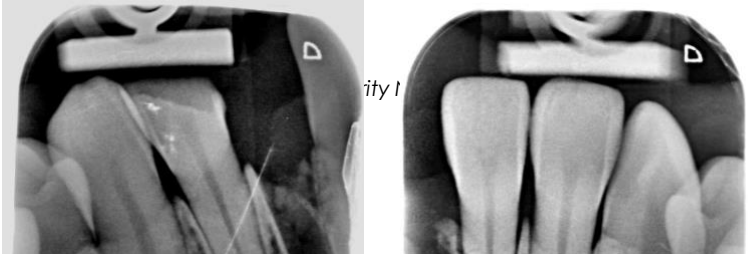
On examination, there were no injuries to the face, head, or neck. Laceration of the lower lip was noted. The extraoral examination was otherwise unremarkable.

Intraorally the patient had contusions and lacerations around the 41 socket and 11. A rigid wire splint was in-situ from 13 to 23, giving no mobility to the upper anterior teeth. 11 and 21 were tender to palpation. Physiological mobility was noted of the lower teeth.

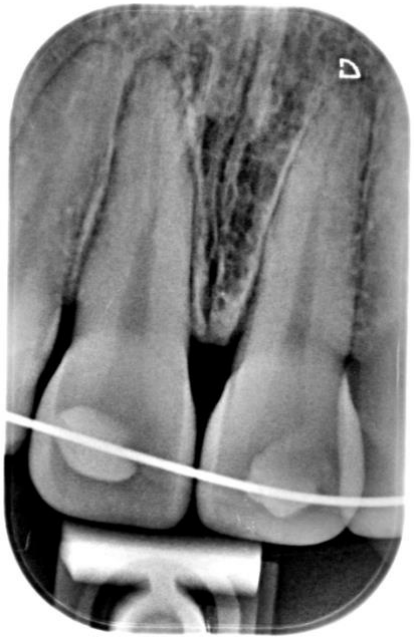
11 was extruded 1.5mm, 42 had an uncomplicated enamel-dentine fracture, and 31 was missing. Calculus was present on all teeth, with generalised bleeding on probing (BPE 2 in all sextants). Class 1 incisor relationship, buccal recession (Miller's class I) most prominently on 11 and 21.

All teeth except 11 gave a positive response to cold sensibility testing. Hairline fractures were visible in the crown of 11 and 21 under transillumination.

Figures 1 and 2: Periapical radiographs showing 13-23 taken at the initial presentation. Widening of the PDL space of 11 mesial is visible, with corresponding loss of the distal PDL space.



Figures 3 and 4: Periapical radiographs showing 33-23 taken at the initial presentation. The socket 41 and uncomplicated fracture 42 are visible.



Figures 5 and 6: Periapical radiographs taken at the 2- and 4-week review appointments respectively. Progressive restoration of the normal PDL space around 11 is visible.

	UR2	UR1	UL1	UL2
Colour	Normal	Normal	Normal	Normal
Mobility	Splinted	Splinted	Splinted	Splinted
Displacement	Nil	~1.5mm extrusion	Nil	Nil
Tenderness to percussion	No	Yes	Yes	No
Percussion note	Normal	Normal	Normal	Normal
Sinus	No	No	No	No
Cold pulp test	+	-	+	+

Figure 7: The 'trauma stamp' approach used at each appointment to evaluate changes. The above stamp is for the first appointment.

At the 2-week review, the 11 regained a positive response to cold, and endodontic treatment was postponed. At the 4-week review, the 11 and 21 both gave delayed (8 second) responses.

Figure 7: Contrast-adjusted post-operative photograph showing enamel infractions 11 21.

Diagnoses

The following diagnoses were made at presentation: Palatal luxation 11, enamel infraction 11 21, uncomplicated enamel-dentine fracture 42, avulsion 41, generalised gingivitis with buccal gingival recession due to toothbrush trauma.

At the 4-week review, a further diagnosis of pulpal necrosis with symptomatic apical periodontitis 11 and 21 was made.

Treatment

The patient was prescribed chlorhexidine mouthwash 0.2% to rinse twice daily while brushing was difficult due to tenderness. For each diagnosis, the treatment options were discussed, and a joint, patient-led decision was reached. The splint was removed after 4 weeks.

Fragment Reattachment (42)

After rehydration in saline for 15 minutes, the fragment and tooth were selectively etched, and universal adhesive applied. The fragment was then recemented with cotton roll isolation using flowable composite.

Resin-bonded Bridge (41)

For the avulsed 41, an initial course of professional mechanical plaque removal was carried out before a silicone one stage putty and wash, and an opposing alginate impression for a resin-bonded bridge were taken. At the patient's request, a temporary direct composite bridge was placed. The definitive porcelain fused to metal bridge was cemented in place under cotton roll isolation with RelyX Unicem cement.

Figures 8, 9 (top) and 10: The direct composite bridge placed, and the definitive PFM bridge cemented in place with lingual view. The reattached fragment 42 is also visible.

Root Canal Treatment (11 21)

Rubber dam was applied isolating the 11 and 21. On access, both pulps were non-vital. Working length was obtained using an apex locator. Irrigation was carried out using 3% sodium hypochlorite. After gauging at a size 30, preparation was carried out using X1, X2, X3 Protaper Next files.

A final irrigation with manual activation of the hypochlorite using a GP point was carried out, the canals were dried, and both teeth were obturated using AH+ Jet sealer and cold lateral condensation. The access was restored using composite with a total-etch technique.

Figures 11 and 12: Cone fit and post-operative radiographs. A possible resorptive lesion is visible on the distal of 11 and the mesial of 12.

As of the 6-month review, the patient is asymptomatic and is awaiting consultation for ongoing restorative management and CBCT imaging following referral.

Figure 13: Periapical radiograph taken at 6-month review.

Figures 14, 15, and 16: Post-operative photographs taken at the 3-month review appointment. Frontal (top), upper (bottom left), lower (bottom right) views shown.

Follow-up

The patient will continue to be reviewed at 12 months, and then according to their risk status for dental disease but at most yearly. This patient has been referred for specialist management regarding potential resorption.

Discussion

Lateral luxation accounts for 23.3% of dental injuries (4), but generally carries a more positive prognosis than other displacements. Loss of vitality is the most common complication at 44.2%, with replacement resorption occurring in 0.9% of cases. (5)

The presence of cracks in 11 and 21 may compromise long-term prognosis, along with the potential resorption taking place. Overall tooth survival at 60 months for teeth with cracks is estimated at 84.1% (6), and evidence shows that all cracks have the presence of bacterial biofilm, which may ultimately lead to microleakage and reinfection of the root canal system. (7)

Depending on the long-term outcome, aesthetic solutions for the extruded 11 include orthodontic repositioning (unless ankylosed), and indirect/direct restorative reshaping. Replacement options for 11/21 include an upper removable appliance, resin retained bridges, and implants. Further options for 41 include a removable appliance, replacement of the resin bonded bridge to improve aesthetics, or a narrow diameter implant.

Conclusion and Clinical Implications

Patients who experience trauma will commonly present to general practitioners. Although follow up and complex management may take place in secondary care, emergency management and even aesthetic definitive management can be provided in an NHS primary care setting to restore patients to health.

References:

(1) Lam, R. (2016), Epidemiology and outcomes of traumatic dental injuries: a review of the literature. Aust Dent J, 61: 4-20. https://doi.org/10.1111/adj.12395

(2) Djemal, S., Aryafar, M., Petrie, A. et al. Traumatic dental injuries in adults attending a London-based trauma clinic in the UK: a seven-year survey. Br Dent J 233, 1022–1028 (2022). https://doi.org/10.1038/s41415-022-5313-4

(3) Bourguignon, C, Cohenca, N, Lauridsen, E, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations. Dent Traumatol. 2020; 36: 314– 330. https://doi.org/10.1111/edt.12578

(4) Kallel, I, Lagha, M, Moussaoui, E, Douki, N. Lateral luxation: Is root resorption an unavoidable complication? Clin Case Rep. 2022; 10:e05880. doi:10.1002/ccr3.5880

(5) Clark D, Levin L. Prognosis and complications of mature teeth after lateral luxation: A systematic review. J Am Dent Assoc. 2019 Aug;150(8):649-655. doi: 10.1016/j.adaj.2019.03.001. Epub 2019 Jun 5. PMID: 31176453.

(6) Nikoui M, Kenny DJ, Barrett EJ. Clinical outcomes for permanent incisor luxations in a pediatric population. III. Lateral luxations. Dent Traumatol. 2003 Oct;19(5):280-5. doi: 10.1034/j.1600-9657.2003.00209.x. PMID: 14708653.

(7) Leong, D.J., de Souza, N.N., Sultana, R. et al. Outcomes of endodontically treated cracked teeth: a systematic review and meta-analysis. Clin Oral Invest 24, 465–473 (2020). https://doi.org/10.1007/s00784-019-03139-w

(8) Ricucci D, Siqueira JF Jr, Loghin S, Berman LH. The cracked tooth: histopathologic and histobacteriologic aspects. J Endod. 2015 Mar;41(3):343-52. doi: 10.1016/j.joen.2014.09.021. Epub 2014 Oct 30. PMID: 25447500.