

Restorative management of a ceramic crown fractured during general anaesthetic intubation

A CLINICAL CASE REPORT

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Abstract

This case study demonstrates the restorative management of dental trauma arising during GA intubation. The Royal College of Anaesthetists provide a patient information leaflet which sets the incidence of dental trauma at 1:4500 GAs, so it is a risk which is worthwhile dentists being aware of, especially those working in a secondary care environment.

The restorative complexities were evident at the original emergency appointment with a lack of inter-occlusal space for the lost crown 11. Following thorough investigations and treatment planning the patient's occlusion was stabilised by composite build ups and 11 restored with re-RCT, including an MTA plug, and replacement ceramic crown 11.

Case Details

Patient details: 30yo male

History

Presenting Complaint

Broken upper crown whilst under GA because of an ankle break. Crown was repaired in hospital (letter Annex A).

Medical History

Fit and well

Previous Dental History

Regular attender. mountain bike accident aged 17yo causing trauma to upper central incisor with root canal treatment and crown placement.

Social History

Army Officer. Non-smoker. Alcohol low intake very low.

Examination and Records

Extra-Oral:

TMJ – NAD
 Swellings or gland enlargement – nil
 Asymmetry – nil
 Smile line – low

Intra-Oral:

Soft tissues – plaque induced gingivitis
 Salivary function – NAD



Figure 1: shows initial presentation 11 after removal of dislodged ceramic crown and glass ionomer cement repair

Dentition

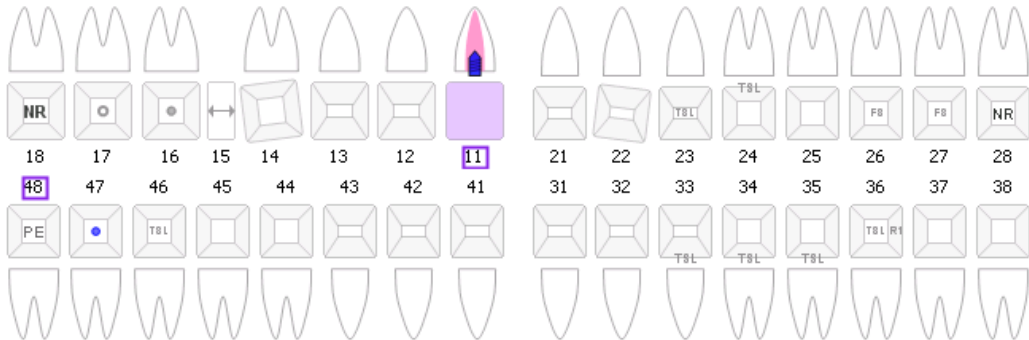


Figure 2: dental chart as at 12/02/2021

Existing ceramic crown 11 failed with GIC repair visible, see figure 1 for presentation after removal.

Occlusion

Skeletal class: I
 Incisal relationship: mild class II div II
 Bi-lateral canine guidance

Periodontal Condition

BPE:

1	1	1
1	2	1

Bleeding on probing score = 20%
 Plaque score = 5%

Non-Carious Tooth Surface Loss

Localised (anterior and 6s) NCTSL which appears abrasive and erosive in nature.
BEWE = 7

Investigations

Radiographs

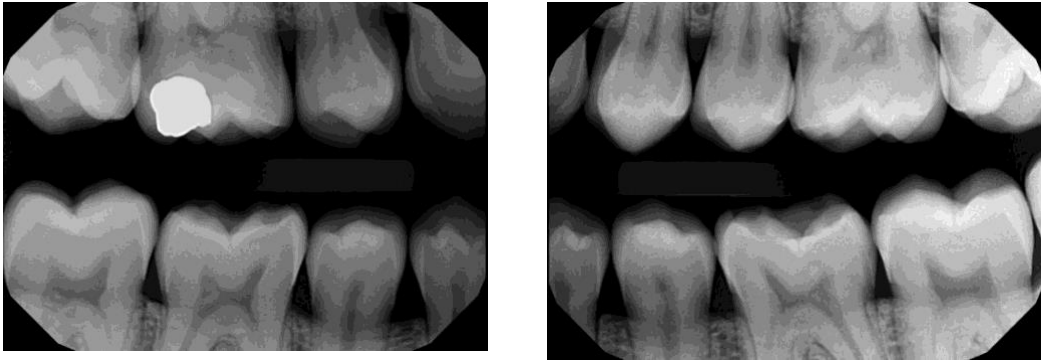


Figure 3: right and left bitewing radiographs 01/11/2019



Figure 4: LCPA radiograph of 11 12/02/2021

Special Tests 11

TTP – nil
Tenderness to apical and lateral pressure – nil
Heat & cold – NA
EPT - NA

Diagnoses

- Generalised plaque-induced gingivitis with supragingival calculus
- Localised mild NCTSL, abrasive and erosive, modified by historic carbonated drink intake and nail biting
- Fractured ceramic crown 11 with overextended root filling and apical root resorption
- Loss of inter-occlusal space 11

Treatment

Aims of Treatment

Improve the patients periodontal health. Restore 11 to health in a way which considers the NCTSL and loss of intra-occlusal space to ensure a predictable long-term solution. Meet patients' expectation of restoring appearance pre trauma.

Treatment Options and Discussion with Patient

1. OHI, PMPR, do nothing 11
2. OHI, PMPR, replace ceramic crown 11
3. OHI, PMPR, replace RCT 11, replace ceramic crown 11
4. OHI, PMPR, replace RCT 11, replace ceramic crown 11 in conjunction with NCTSL restoration to increase inter-occlusal space for 11 restoration

Valid Consent – obtained and updated throughout

Treatment Plan

1. OHI – TBI, inter-dental advice, diet advice
2. PMPR
3. Restorability assessment 11 +/- re-RCT, core and crown 11
4. Alongside item no. 3, resin composite build ups of 13 23 36 46 and discing of 31 41
5. Review

Treatment Provided

Stabilisation Phase

- OHI, TBI, inter-dental cleaning adv, PMPR.
- matrix for 11 temporary crown
- study models, clinical photos

Restorative Phase

- Review
- Restorability assessment – remove crown, core and assess. If restorable, two visit re-RCT 11. If unrestorable, review and consider options with patient.
- Remove existing GP and review size of canal to inform whether GP or MTA is appropriate. Temporarily.
- Complete MTA plug and re-RCT 11
- Replace resin composite core and prep for lithium disilicate crown 11
- Resin composite veneers 13 23, discing 31 41, resin composite build ups 36 46
- Cement lithium disilicate crown 11

Maintenance Phase

- Review OH
- 12m review
- 1yr LCPA radiographic review 11 (FGDP guidelines)

Final records and photographs



Figure 7: 36 46 resin composite build ups



Figure 5: 13 23 resin composite build ups & winged bis-acrylic composite (3M™ Protemp™)



Figure 6: 31 41 disced level



Figure 8: 11 lithium disilicate crown preparation occlusal view



Figure 9: 11 crown preparation for lithium disilicate crown anterior view



Figure 10: anterior view 11 lithium disilicate (IPS e.max™) crown

Follow-up

The outcome of this case was good with the treatment aims and patient's expectations met.

The prognosis of tooth 11 is good with the 1yr LCPA radiograph at figure 11 showing periapical stability, albeit with a marginal radiolucency on the distal aspect 11.



Figure 11: LCPA radiograph taken by another GDP at PDI - 17/01/2023

Discussion

Two studies have reviewed the instance of dental trauma associated with GA intubation. Vogel et al. (2009) found 170 teeth damaged in 130 patients and Newland et al. (2007) found dental injury for 1:2073 GAs from a cohort 161,687 cases. The Royal College of Anaesthetists provide a patient information leaflet which sets the incidence at 1:4500 GAs, so it is a risk which is worthwhile dentists being aware of, especially those working in a secondary care environment.

The seminal papers on RCT and re-RCT outcome success by Ng et al. (2008), found re-RCT success at 77% irrespective of operator level of training. This provided a decent evidence base for re-RCT justification in this case, however, the challenge was the resorbed or immature apex and the large canal size; a master file of 100. This led to an MTA plug being justified and carried out to achieve a calcific apex barrier to prevent bacterial ingress and stabilise the resorptive process.

Within my clinical practice I had two options for achieving apical healing by using MTA or bio dentine. I chose MTA for clinical reasons in that I am more familiar with its handling properties and at the time I had only used BioDentine for pulp therapy and not within root canal systems. I am aware that there is a risk of tooth discolouration with MTA but I weighed this disadvantage up against achieving a predictable result. Lin et al. (2016) systematic review and meta-analysis found that MTA was associated with the quickest apical barrier formation when compared with GP and calcium hydroxide alternatives.

I opted not to utilise a fibre reinforced post in this case as I was confident of a good resin composite bond under rubber dam to the remaining enamel and dentine as well as a ferrule of greater than 3mm, Sarkis-Onofre et al. (2014). I think a fibre post would have been justified to provide some internal strength to the resin composite core but I was confident in my resin composite bonding protocol.

Tooth 11 already had a ceramic crown in place before it was fractured during GA intubation, so removal of healthy tooth tissue was a less relevant consideration and, as a result, I opted for a lithium disilicate crown to ensure good strength through bonding coupled with achieving an aesthetic result which met the patient's expectations. The aesthetics in this case could have been improved by trying to match the mild fluorosis on the patient's adjacent teeth, however, he was unconcerned about this.

Conclusion and Clinical Implications

This case is relevant to dentists in practice or secondary care environments and demonstrates the complexities of managing dental trauma. It highlights the need for a holistic approach to consider patients diagnoses alongside their occlusal factors to ensure reliable dentistry.

References

Vogel J, Stubinger S, Kaufmann M, Krastl G, Filippi A. (2009) Dental Injuries Resulting From Tracheal Intubation – a retrospective Study, *Dental Traumatology*, 25(1), pp. 73-77

Newland M, Ellis S, Peters K. (2009) Dental Injury Associated with Anaesthesia: A Report of 161,687 Anaesthetics Given over 14 Years, *Journal of Clinical Anesthesia*, 19, pp. 339-345

Ng Y, Mann V, Gulabivala K. (2008) Outcome of secondary root canal treatment: a systematic review of the literature, *Int Endod J*, 41(12), pp. 1026-46

Lin J, Lu J, Zeng Q, Zhao W, Li W, Ling J. (2016) Comparison of mineral trioxide aggregate and calcium hydroxide for apexification of immature permanent teeth: A systematic review and meta-analysis, *J Formos Med Assoc*, 115(7), pp. 523-30

Sarkis-Onofre R, de Castilho Jacinto R, Boscato N, Cenci M, Pereira-Cenci T. (2014) Cast metal vs. glass fibre posts: a randomized controlled trial with up to 3 years of follow up, *J Dent*, 42(5), pp. 582-7