

# The referral and management process of patients sustaining peri-anaesthetic dento-alveolar trauma: an audit

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## Key points

Highlights that the most common time of injury appeared to occur during intubation.

Highlights the need for an improved referral pathway for patients who sustain dento-alveolar trauma during general anaesthetics.

Suggests a positive correlation between periodontal disease and peri-anaesthetic dento-alveolar trauma.

**Background** Newcastle Dental Hospital receives referrals regarding patients who sustained dento-alveolar trauma during general anaesthesia (GA). This audit was undertaken to assess whether referrals are managed appropriately and if improvements could be made, to improve the quality of patient care. **Aims** To assess the proportion of patients who were referred and assessed within the timeframe laid down by the Trust. To establish whether patients would benefit from an improved pre-anaesthetic dental assessment. To determine if there is a possible correlation between pre-existing dental disease and peri-anaesthetic dento-alveolar trauma. **Standards** Ninety percent of patients to be treated appropriately; meeting the timeframes, following correct referral mechanisms and given the appropriate information. **Methods** Patients were identified following dento-alveolar trauma during GA by referrals to the Restorative Dentistry Department. **Results** The current referral pathway is not being followed appropriately. There was a variable timeframe to wait until initial consultant clinic appointment and the standard was not met. The most common time of injury occurred during intubation. There is a suggested link between periodontal disease and a greater risk of sustaining dental injury. **Recommendations** This audit highlighted the need for a revised referral policy and for staff to ensure it is followed.

## Introduction

The most common malpractice claim against anaesthetists is dental trauma,<sup>1</sup> with some authors reporting an incidence as high as 1% of general anaesthetics resulting in iatrogenic dental injuries.<sup>2</sup> Periodically, referrals are received to the Restorative Dentistry Department at Newcastle Dental Hospital regarding patients who sustained dento-alveolar trauma during general anaesthesia. There is currently a pathway for clinicians to refer to restorative colleagues after trauma has been sustained but this is not always followed.<sup>3</sup> There are currently no pre-operative guidelines in place for medically trained staff to fully assess the patient's dental risk before a general anaesthetic. This paper reports the results of a clinical audit which was undertaken to determine if referrals are managed

appropriately and if improvements could be made, in order to improve the quality of patient care.

One paper found that dental injury resulting from intubation made up one-third of potential anaesthetic claims received by the Medical Protection Society during a nine year period.<sup>4</sup> It was recommended that, where possible, patients undergo a dental check before anaesthesia and those deemed high-risk undergo a dental examination by a dentist. They suggested constructing a custom-made mouth guard to be worn for surgery, as a prophylactic measure.<sup>4</sup> Another study discovered that the teeth most likely to suffer trauma during anaesthesia were upper incisors, in patients aged 50–70 years.<sup>5</sup>

## Materials and methods

The aims and objectives of this audit were:

- To assess the proportion of patients who were referred and assessed within the timeframe laid down by the Trust, between initial referral, consultant clinic appointment and treatment provision
- To ensure dento-alveolar trauma sustained

during general anaesthesia is managed appropriately at the time of injury/follow up

- To determine if there is a correlation between pre-existing dental disease and peri-anaesthetic dento-alveolar trauma
- Post-audit aim is to ensure subsequent referrals from local hospitals follow a designated management pathway.

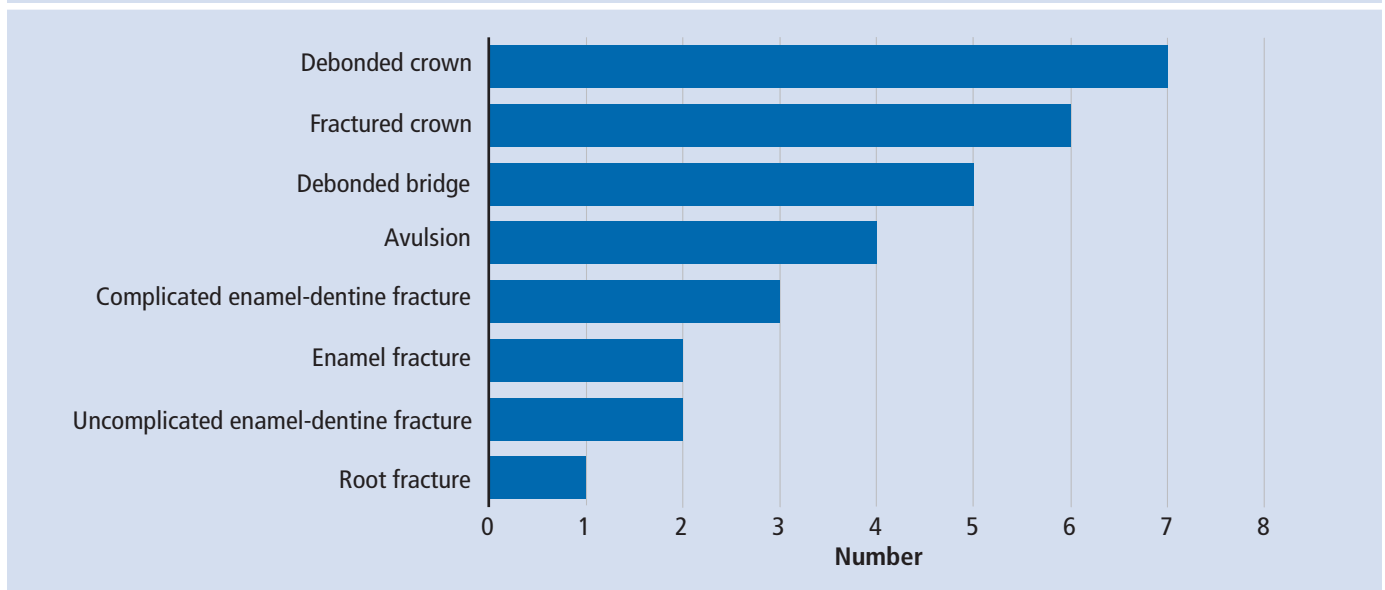
The incidence of dento-alveolar injury sustained during general anaesthesia has a wide variation reported in the literature. A literature review was undertaken to obtain guidance to set a standard. There was quite a variation but the Royal College of Anaesthetists found one in 45,000 patients undergoing a general anaesthetic procedure sustains dento-alveolar trauma,<sup>6</sup> and elsewhere it was quoted as up to 1% of all general anaesthetics result in dental injury.<sup>2</sup> Accordingly, there is little accurate data on the significance of this type of injury to the dental health of patients undergoing general anaesthetic procedures in the UK at the present time and therefore a need was perceived to look at this on a local basis.

The standards for this audit were to determine whether the timeframes were met,

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Fig. 1 Type of dental trauma sustained



whether the referral mechanism was appropriate and whether patients were given appropriate information. A standard was set for 90% of patients to be dealt with correctly.

A retrospective audit was completed using patient records and radiographs to obtain all relevant information during data collection. Referrals to the Restorative Dentistry Department were studied over a three-year timeframe from 2013 to 2016.

Patients were identified as having sustained dento-alveolar trauma during general anaesthesia by receipt of referrals by the Restorative Dentistry Department. The audit was undertaken retrospectively based on referred patient data collected by one of the authors (SCB) from departmental referrals received over this period. Dental, medical and anaesthetic patient records were examined.

Patient records were located in order to gain information about the injuries sustained, over what time frame they were treated and who provided the treatment.

The following information was collected for each patient: patient medical record number; procedure requiring a general anaesthetic; aspect of operation that caused the dental injury; dental trauma sustained; time frame from referral letter to consultant clinic appointment; treatment provided; and whether the patient had pre-existing periodontal disease. Records were examined to determine if patients were aware of their injury, for example if they had initiated a referral to the dental hospital while in hospital for their GA, or if treating clinicians had informed the patient of trauma,

for example informed them of a debonded crown. It was analysed whether patients had an expectation for treatment or not.

## Results

Thirty patients were included in this audit, 18 females and 12 males. The patient dental hospital records were reviewed in detail and the following observations made. The most common time of injury appeared to occur during intubation. The surgery undertaken for each patient was different, with only six general anaesthetics for the patients identified undertaken specifically for the head and neck region. There was a wide variation in the amount and detail of information recorded, so for many aspects of the table 'not documented' had to be used if the requisite information was not written in the notes.

There were a wide variety of dento-alveolar injuries sustained. The anterior dentition was the most common site affected. The most common injuries were crown fracture (extracoronar restoration), debonded or dislodged crown, bridge or post. Some more complicated injuries included avulsions or dento-alveolar fracture. Figure 1 demonstrates the type of dental trauma sustained. An uncomplicated enamel dentine fracture is defined as being confined to enamel and dentine with loss of tooth structure, but not exposing the pulp.<sup>6</sup> A complicated enamel dentine fracture involves enamel and dentine with loss of tooth structure and exposure of the pulp.<sup>7</sup>

Patient attendance to the Restorative

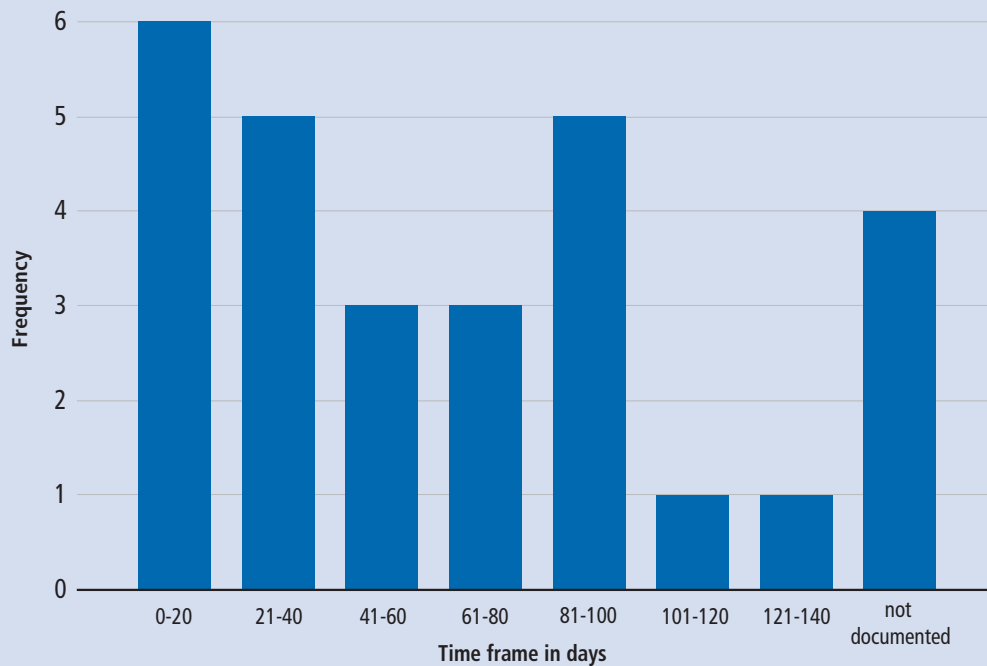
Dentistry Consultant Clinic was analysed. Twenty-two patients attended their appointment, seven did not attend (DNA) and one patient died before their appointment.

There was a large variation in timeframe between receipt of the referral correspondence and the date of the consultant clinic appointment, displayed in Figure 2. Some patients were seen within a week of injury whereas others waited over three months for an appointment. Seven patients DNA their consultant clinic appointments. No reasons were identifiable for the variation in timeframe. The average timeframe was 60 days between receipt of referral and the date of the consultant clinic appointment.

Most patients (65%) attending a restorative consultant clinic appointment had no indication of what they might expect as an outcome of treatment documented in their records. Thirty-five percent of patient expectations were documented or assessed in patient records. Patient expectations included 'fix bridge', 'new crown' and 'fix crown'.

Treatment provision following peri-anaesthetic dento-alveolar trauma demonstrated that a variety of care providers provided follow-up treatment after the dental trauma. Shared care involved the patient's general dental practitioner (GDP) and a member of staff in Newcastle Dental Hospital (NDH), and one case involved shared care. The number of patients discharged to primary care for treatment was three. The number of patients seen at Newcastle Dental Hospital for treatment was 13. The number of cases treated

Fig. 2 Timeframe from referral to consultant clinic appointment



by a community dentist was two. No treatment was required in four cases. The number of DNAs was six.

The type of dental treatment provided included extractions and prosthesis provision, recementing crowns and bridges, full clearance, replacement crowns, root canal treatment and implants. In cases where no treatment was required, patients were discharged to their GDP for routine care.

There was a wide range of procedures requiring GA, including orthopaedic surgery, lobectomy, dental extractions, neuro-surgery, spinal surgery and abdominal surgery.

An additional aim was to determine if there was a correlation between evidence of pre-existing periodontal disease and peri-anaesthetic dento-alveolar trauma, as many of the notes discussed mobility present in the dentition. Pre-existing mobility and bone loss may increase risk of injury, particularly avulsion. The Basic Periodontal Examination (BPE) recorded in all patient notes was assessed to determine this. Fifty-three percent of patients suffered from periodontal disease of a moderate to severe level with BPE scores being three or greater in the majority of sextants. The expected prevalence of periodontal disease in adults aged 20 to 64 years is 8.52%.<sup>8</sup>

Having reviewed the guidance, changes were suggested as a result of this audit.

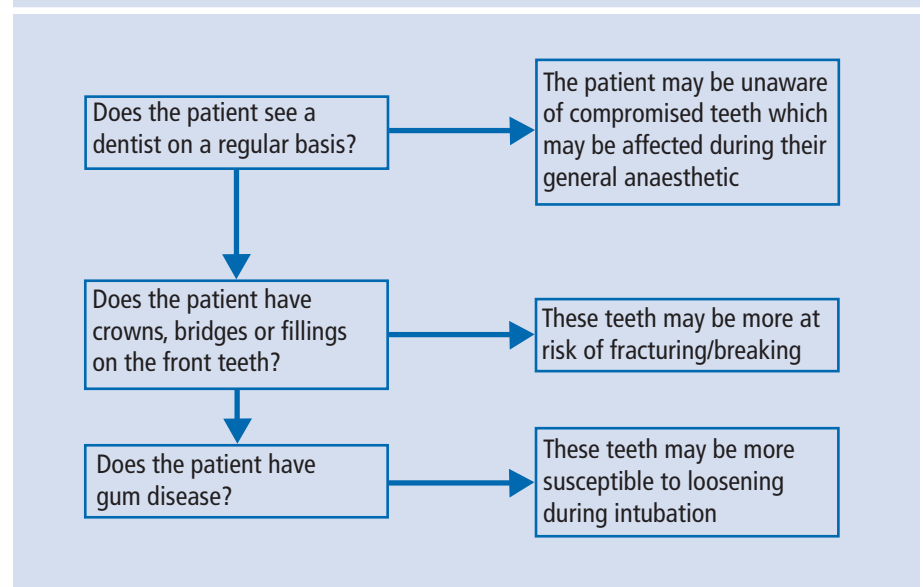
Training sessions are required to teach

our medical colleagues initial management following dento-alveolar trauma. It is possible that the volume of patients identified in this audit might be a significant underestimate of the true nature of the issue. A referral proforma is needed and should be easily accessible on the Trust intranet. A pre-operative dental checklist could be considered as part of pre-GA assessment, which was suggested to our medical colleagues at a multi-disciplinary meeting. We are currently in the process of planning a training

session in order to discuss this audit with medical colleagues and to improve our communication network between specialities, to improve patient care. A draft referral proforma has been constructed and will hopefully be implemented as soon as possible.

Figure 3 shows a possible pre-anaesthetic checklist for medics to work through as part of their pre-anaesthetic checklist to allow medics to determine the level of risk of dento-alveolar trauma during GA. Gum disease is defined as

Fig. 3 Pre-anaesthetic checklist



bleeding gums or loose teeth. The left column is a set of questions while the right hand column is further information on those questions.

## Discussion

Overall, this audit has proven to be very useful, particularly given the suggested link of periodontal disease increasing the risk of dento-alveolar trauma. It is suggested that an awareness is required among those pre-assessing patients undergoing general anaesthetics of the incidence of moderate to advanced periodontal disease, and those patients with periodontal disease should be informed of their increased risk as part of the GA consent process. It is suggested that this could be noted on their pre-operative assessment/consent form.

Given the variable timeframe from correspondence to consultant clinic appointment, this has highlighted an area of improvement, which would improve the quality of patient care. Such cases should be prioritised for allocation to a consultant clinic assessment to minimise symptoms and fast track care for patients where the damage sustained has occurred in a healthcare situation.

One study found that the teeth most likely to suffer trauma during anaesthesia were upper incisors, in patients aged 50–70 years.<sup>5</sup> This audit also confirmed that upper incisors were most affected.

A review was undertaken of the current referral guidance document used at NUTH. The present referral guidance documentation was introduced in February 2016. It stipulated that referrals should only include

damage noticed within 7 days of operation, that the receiving consultant should make prompt assessment, and care to be provided at Newcastle Dental Hospital was to be a like for like replacement or most suitable restoration considering each individual patient's overall oral health status. A clinical incident (datix) form was expected to be completed. The 'prompt assessment' is not ideal given that some patients waited 60 days to be seen. This highlights a significant area for improvement. The seven day rule was deemed an appropriate timeframe to avoid belated dental pathology being attributed to a GA when it may not have been the precipitating factor.

There is a wide variance in reported figures in the literature. This may be due to the fact that each source does not report on the exact same thing. Some sources may be reporting incidence per anaesthetic while others report incidence per intubation. This would account for differing figures given that sometimes only a fraction of anaesthetised patients are intubated, depending on the speciality.

This audit has highlighted the need for a revised referral policy and for staff to be made aware of the referral pathway to ensure it is followed at all times. A re-audit should be undertaken in 12 months once sufficient time has lapsed for the new referral policy to be implemented.

## Conclusions

There was a variable timeframe to wait until an initial consultant clinic appointment, with some patients waiting an unacceptably long period of time for their injury to be assessed and

managed. The current referral pathway is not being followed as appropriately as is desirable and further dialogue between the dental and anaesthetic directorates is planned to develop a more robust transfer and care pathway. This audit has highlighted the requirement for a more defined referral and management process of patients sustaining peri-anaesthetic dento-alveolar trauma. This could be used to ensure subsequent referrals from local hospitals follow a designated management pathway. A re-audit is recommended in 12 months. The suggested link between periodontal disease with a greater risk of sustaining dental injury poses a future research opportunity.

1. Nie S H, Vaida S J, Prozesky J. Perioperative Dental Injuries: A Retrospective Analysis of Documented Injuries at Penn State Hershey Medical Centre. *Open J Anaesthesiol* 2015; **5**: 57–62.
2. Contractor S, Hardman J G. Injury during anaesthesia. *Cont Educ Anaesth Crit Care Pain* 2006; **6**: 67–70.
3. Newcastle upon Tyne Hospitals NHS Foundation Trust. Repairs to teeth damaged by Trust. 2012. Online information available at: <http://nuthvintranet1:8080/apps/policies/operational/RepairsToTeethDamaged-byTrust201602.pdf> (accessed March 2017).
4. Chadwick R G, Lindsay S M. Dental injuries during general anaesthesia. *Br Dent J* 1996; **180**: 255–258.
5. Givol N, Gershtansky Y, Halamish-Shani T, Taicher S, Perel A, Segal E. Perianaesthetic dental injuries: analysis of incident reports. *J Clin Anaesth* 2004; **16**: 173–176.
6. Royal College of Anaesthetists. Risks associated with your anaesthetic. Section 4: Damage to teeth, lips and tongue. 2016. Available at <https://www.rcoa.ac.uk/system/files/04-DamageTeeth2017.pdf> (accessed March 2017).
7. Dental Trauma Guide. Enamel-dentin fractures. 2016. Available at <https://dentaltraumaguide.org/free-dental-guides/permanent-teeth/enamel-dentin-pulp-fracture/> (accessed March 2017).
8. National Institute of Dental and Craniofacial Research. Periodontal disease in adults (Age 20 to 64). 2014. Available at <https://www.nidcr.nih.gov/research/data-statistics/periodontal-disease/adults> (accessed July 2017).