A Case Report of a Fractured Healthy Tooth during Use of Guedel Oropharyngeal Airway

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ABSTRACT

A young Chinese male with healthy dentition was admitted for haemorrhoidectomy. General anaesthesia was administered using facemask and a Guedel oropharyngeal airway with patient breathing spontaneously on nitrous oxide, oxygen, desflurane. Except for a brief episode of laryngospasm, no adverse events were noted intraoperatively. Postoperatively however patient was found to have a fractured upper incisor. Mechanism of possible events that caused the fracture are postulated. Problems associated with the use of Guedel airway are discussed and alternatives proposed.

Keywords: Anaesthesia, complications, oral, prevention

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INTRODUCTION

Dental injuries account for one third of all medicolegal claims against anaesthesiologists[1]. The frequency of perianaesthetic dental injuries was reported as 1 per 4500 patients in a recent study[2]. Many reports of fractured tooth were associated with use of laryngoscope during tracheal intubation. Teeth involved are usually the left upper incisors, which correspond to site of greatest contact and force of transmission from the laryngoscope to the teeth[3]. The majority of the damaged teeth were known to have been previously restored or weakened through periodontal diseases prior to the damage[4]. Subluxations usually occurred in children, whereas different types of damage were found in older age group[3]. However, we would like to report a case of a transverse fracture of the root of a healthy tooth resulting from anaesthesia in which no laryngoscopy or intubation was performed and anaesthesia was uneventful except for a brief period of laryngospasm. The only device inserted orally was a Guedel oropharyngeal airway. We postulate the likely mechanism in this patient and reassess the use of the Guedel airway.

Fig.1 Radiograph showing transverse fracture of right central incisor.

CASE HISTORY

A 41-year-old, 70 kg, ASA I Chinese male patient was admitted to the surgical department for an elective haemorroidectomy. Caudal anaesthesia using 20 ml of 1.5% lignocaine was administered. However, the block was incomplete and hence converted to a general anaesthesia. Anaesthesia was induced with 17 ml of 1% propofol, supplemented with 100 ug of fentanyl. A #3 Guedel airway was easily inserted after induction. Intraoperatively, there was a transient episode of laryngospasm, which was promptly relieved with deepening of anaesthesia. Otherwise, anaesthesia was uneventful with the patient breathing nitrous oxide, oxygen and desflurane spontaneously on facemask.

At the end of the operation patient was transferred to the recovery area with the oropharyngeal airway. The airway was subsequently removed by an anaesthetic nurse when the patient was awake. The patient complained of soreness of his upper gum to

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the surgeon the following morning. Upon discharge he was referred to a dental surgeon who noted a complete horizontal fracture at the root portion of the tooth just below the gum margin which effectively severed the crown from the root. Radiograph of the tooth showed that there was a transverse fracture at the right central incisor (Fig. 1). The dental surgeon noted that the crown portion of the tooth was loosely held in place by the surrounding gum tissue which had become inflamed as a result. The tooth itself was free of decay and gum disease, therefore a pre-existing gum condition was unlikely. The adjacent upper front teeth and the rest of his dentition were intact and in good condition, indicating an isolated injury to the tooth. Initial impression of the dental surgeon was that a sudden horizontal shear force had resulted in the tooth fracture. The forceful avulsion of the tooth could have occurred anytime during anaesthesia, from induction to emergence.

Both the anaesthetist and the anaesthetic nurse involved in the management of the patient's airway were interviewed and confirmed that at no time was the airway forcefully manipulated. Further discussion with the dental surgeon suggested that a strong vertical force could have caused the fracture when the patient bit forcefully on the airway, which could have happened during the transient period of laryngospasm or at emergence. The central incisor might be the site of greatest contact with the centrally placed airway.

The patient filed a medical claim and the case was settled with a moderate sum of payment from the hospital. The broken tooth was subsequently replaced with a permanent implant.

DISCUSSION

The Guedel airway consists of three contiguous parts: a flange, a straight reinforced bite portion and a curve channel. The reinforced bite portion is placed between the incisors and the curve channel rests between the posterior wall of the oropharynx and the base of the tongue. By lifting the tongue off the posterior pharyngeal wall it prevents the tongue from falling backwards and obstructing the oro-pharyngeal space[5].

The airway is therefore generally used as a device to maintain a patent upper airway in the unconscious and sometimes as a bite-block.

Complications associated with its use were reported from time to time and they included lacerated lips, laryngospasm, coughing and retching during its insertion. A report based on data from a liability insurance company in 1979 reported that 20% of dental injuries during general anaesthesia were caused by the Guedel oropharyngeal airway[3]. However we could not find any reports of a complete transverse fracture of a healthy tooth caused by biting on it.

Tooth fracture during laryngoscopy was frequently reported to be on the left upper incisor tooth[1]. The tooth could be fractured, chipped or avulsed from its root[3,4]. In our patient the fracture that occurred transversely across the base of the centre upper incisor could only be due to forceful biting on the hard reinforced portion of the airway either during the period of laryngospasm or at emergence from anaesthesia.

RECOMMENDATIONS

An oral airway should only be inserted when the oropharyngeal reflex is adequately obtunded. It should be used to keep the upper airway patent and be removed as soon as it is not required. Its use as a bite block is of questionable value. An adequate depth of anaesthesia should be maintained intraoperatively.

The incisors are single rooted with a forward dental axis and have small cross-sectional area[6]. They therefore fracture more easily when a strong vertical force is applied on them. During emergence of anaesthesia biting force up to 80 Newton has been recorded[6]. Molar teeth being multiple rooted with wider cross sectional area would withstand the vertical forces better.

During insertion or removal of the Guedel airway, force should not be applied and the airway should follow the curvature of the mouth. A bite block placed over the molar could prevent vertical force from being transmitted to the incisors. Various types of disposable bite-block such as the HUDSONRCI Biteguard have been introduced into the market recently. As explained earlier, the transmitted force would be more evenly distributed over the large cross-sectional area of the molar than the incisor and injury will be less for the molar than the incisor. However routine use of mouthguards has not shown to be useful and is not recommended[7].

The bite block with its flange might render application of facemask over the face difficult during anaesthesia. This however could be inserted at the end of surgery while the patient is still deep under anaesthesia. Alternatively a nasal-pharyngeal airway could be used if this is not contraindicated. This precaution might be necessary when one is dealing with precious set of crowned or implanted teeth.

Given the high incidence of perioperative dental damage, all patients undergoing general anaesthesia should have a preoperative dental check by the anaesthetist and referred to the dentist if there are dental problems that should be corrected prior to the surgery[8].

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