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Original research

Dental injuries caused by endotracheal intubation – A retrospective study

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ABSTRACT

Objective: Dental injury is the most common complication of general anaesthesia. The primary purpose of this study was to report the occurrence, location, type, and treatment of dental injury caused by endotracheal intubation.

Methods: This retrospective study evaluated 36,627 cases of general anaesthesia at our hospital from January 2008 through December 2015. The examination items included risk factors such as age; sex; surgical department; type of intubation(orotracheal or nasotracheal intubation); presence of preoperative trismus; Cormack–Lehane classification; experience of the attending anaesthesiologist; intubation appliance; mouth guard use; tooth mobility diagnosed by attending anaesthesiologist before surgery; the location, type, and treatment of injured teeth; and forensic implications.

Results: The incidence of dental injury was 0.06% (22 of 36,627 patients). There was a significant difference in the rate of dental injury according to age (0.026% among those <60 years of age vs. 0.096% among those ≥60 years; $P < 0.05$) and according to surgical department (0.189% among neurosurgery patients; $P < 0.05$). The most common Cormack–Lehane classification of laryngeal view in the 22 patients with dental injury was grade 2 (50%). Tooth mobility was diagnosed by anaesthesiologists in 50% of injured patients before surgery. There was no preoperative dental consultation in our department in any of the patients with injured teeth.

Conclusions: Dental screening is recommended for patients in whom anaesthesiologists find mobile teeth and difficult intubation. A system to facilitate cooperation between anaesthesiologists and dental surgeons should be established.

1. Introduction

Traumatic dental injury is one of the most frequent complications of endotracheal intubation during general anaesthesia [1,2]. The most common forms of dental injury are crown and root fractures, followed by dislocations and avulsions [3]. The reported incidence of dental injury is 0.02% to 0.07% in retrospective studies [4–7], but 12.1% to 25% in prospective studies [8,9]. One of likely reasons for this discrepancy between retrospective and prospective studies is underestimation of dental injury following general anaesthesia. Notably, a previous large case-control study found that 14% of dental injury was discovered by the patients themselves [7].

To decrease the incidence of dental injury related to endotracheal intubation, understanding the risk factors and methods of tooth protection is essential. Poor dentition, intubation difficulty, and alternative airway device use are reported risk factors [7,10]. A case-control study reported that the incidence of dental injury was higher in the ear, nose, and throat department compared with other surgical departments [10]. Although dental trauma caused by direct small-force contact with the laryngoscope blade is considered preventable with mouth guard placement, only 2% of anaesthesiologists use dental shields [11].

When dental injury occurs during general anaesthesia, dental surgeons are called for treatment. Therefore, dental surgeons should understand the pathology of dental injury occurring during general anaesthesia. The objective of this study was to investigate the occurrence, location, type, and treatment of dental injury caused by endotracheal intubation.

☆ AsianAOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

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Table 1
Calculated risk of dental injury during general anaesthesia in different departments.

Surgical department	Number of intubation(%)	Patients experiencingdental injuries (%)	*P*
Orthopaedic	5671 (15.5)	4 (0.071)	NS
Gynaecology	4024 (11)	1 (0.024)	NS
Urology	3495 (9.5)	3 (0.086)	NS
Gastroenterological surgery	2761 (7.5)	4 (0.145)	NS
Plastic surgery	2429 (6.6)	1 (0.041)	NS
Hepato-Billary-Pancreatic surgery	2368 (6.5)	2 (0.084)	NS
Neurosurgery	2111 (5.8)	4 (0.189)	<0.05
Oral and Maxillofacial surgery	1760 (4.8)	2 (0.114)	NS
Paediatric surgery	116 (0.3)	1 (0.862)	<0.01

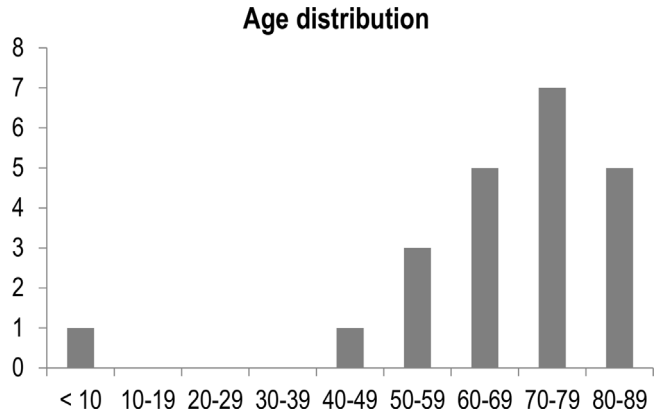

Fig. 1. Age distribution of patients experiencing dental injury caused by intubation during general anaesthesia (n = 22).

Table 2
Factors studied and intubation tools used in 22 patients with dental injury.

	Number of patient (%)
Type of endotracheal intubation	
Orotracheal intubation	20 (91)
Nasotracheal intubation	2 (9)
Trismus	
Yes	4 (18)
No	18 (82)
Cormack–Lehane classification	
1	8 (36)
2	11 (50)
3	3 (14)
Experience of anaesthesiologists	
Rotator	3 (14)
Resident	15 (68)
Expert	4 (18)
Intubation tool	
Macintosh	14 (64)
Videoscopic	6 (27)
Fiberoptic	2 (9)

2. Materials and methods

This study included all patients who underwent general anaesthesia at our hospital from January 2008 to December 2015. The following data from these 36,627 cases were collected by reviewing the self-reported anaesthesia chart of the anaesthesiologist and computerized medical records: age; sex; surgical department; type of intubation(orotracheal or nasotracheal intubation); trismus diagnosed by attending anaesthesiologist before surgery; Cormack–Lehane classification of laryngeal view (grade 1, full glottis exposure; grade 2, only the posterior commissure of the glottis seen; grade 3, no exposure of the glottis; grade 4, no exposure of the glottis or the corniculate cartilages) [12]; experience of attending anaesthesiologist; intubation appliance; mouth guard use; tooth mobility diagnosed by attending anaesthesiologist before surgery; the location, type, and treatment of injured teeth; and forensic implications. Traumatic dental injury following general anaesthesia was defined as a change in dental status requiring dental consultation for repair of dental injury.

Statistical analyses were performed with R software (R Development Core Team, 2011). The χ^2 test and Student's *t*-test were performed. A value of $P < 0.05$ was considered to indicate statistical significance.

3. Results

The 36,627 patients who underwent general anaesthesia included 22 registered cases of dental injuries (12 in males, 10 in females), corresponding to an incidence of 0.06%. The patient age distribution is shown in Fig. 1. There was a significant difference in the occurrence rate of dental injury during general anaesthesia according to patient age (0.026% among those <60 years of age vs. 0.096% among those ≥60 years; $P < 0.05$). There was no significant difference in occurrence by sex (0.061% in males vs. 0.059% in females). The incidence of dental injury caused by intubation was significantly higher in neurosurgery (0.189%, $P < 0.05$) and paediatric surgery (0.862%, $P < 0.05$) than in other surgical departments (Table 1). Mouth guards were used in 354 patients (0.97%); none of these patients experienced dental injury.

Among the 22 patients with dental injury, two (9%) underwent nasal intubation, four (18%) had trismus. The most common Cormack–Lehane classification of laryngeal view in these 22 patients was grade 2 (50%). Most of the anaesthesiologists in these cases were residents (68%). The most common intubation tool used in these 22 patients was a Macintosh laryngoscope (62%; Table 2).

Table 3 shows the location, type, and treatment of injured teeth. The most common location of dental injury was the maxillary left central incisor (50%). In 11 of 22 patients with dental injury (50%), tooth mobility was diagnosed by anaesthesiologists before surgery. The most common types of dental injury were avulsion (36%) and luxation (36%). Twenty-three percent of patients underwent extraction of the injured tooth. Forty-five percent of patients underwent only reinstallation of a bridge or observation. In all injured teeth with only slight luxation, observation alone was performed. There were two forensic implications (9%).

4. Discussion

The main goal of this retrospective study was to investigate the occurrence of traumatic dental injury during anaesthesia. The incidence of dental injury resulting from endotracheal intubation was 0.06% in this retrospective study, similar to previous retrospective studies [4–7].

We found that dental injury occurred significantly more frequently in neurosurgery and paediatric surgery than in other surgical departments. However, dental injury in paediatric surgery occurred in only one patient in this study. The risk of dental injury in neurosurgery patients is known to be higher because of prone