



Original Contribution

Soft tissue injuries after direct laryngoscopy



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Abstract

Study objective: The study objective is to determine the incidence of oral soft tissue trauma during classic direct laryngoscopy for tracheal intubation and the risk factors associated with it.

Design: This is a prospective observational study.

Setting: The setting is at a ward.

Patients: The patients are adults submitted to elective interventions in general surgery requiring tracheal intubation by classic direct laryngoscopy.

Interventions: During 6 months, all patients were interviewed 12–24 hours before anesthesia and after surgery and underwent a detailed oral examination performed by an anesthesiology blind to anesthetic management details and preoperative patient care.

Measurements: Evaluation of oral soft tissue injuries includes oral mucosa including the gums; the alveolar mucosa in the edentulous patient, palate, and the buccal mucosa; lips (mucosa and skin); and the tongue. Injury severity was assessed using the severity scale presented routinely in Portuguese legal medicine research: grade 0, no injuries had; grade 1, mild severity injuries; grade 2, medium severity injuries; and grade 3, major severity injuries.

Main results: Soft tissue trauma was observed in 278 (52.1%) patients. Soft tissue injury occurred once in 204 (38.2%) patients, 2 in 64 (38.2%) patients, and 3 times in 10 (1.9%) patients. Tongue injury was the most common type of soft tissue trauma (36.3%) followed by lower lip injury (22.3%), upper lip injury (7.1%), and oral mucosa injury (2.1%). All the lesions were grade 1 or 2. Only oral mucosa injury was found to be associated with age group ($P = .021$).

Conclusions: Our study reveals a high incidence of lesions grade 1 or 2 in soft tissue.

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1. Introduction

Injuries in the airways are well-recognized complications both in laryngoscopy and intubation [1,2].

The most frequent airway injuries are placed in the larynx (33%), pharynx (19%), esophagus (18%), and temporomandibular joint (10%), according to the analysis of the complaints [3-5]. However, prospective studies evaluating minor and serious injuries to the oral soft tissues (lips, gums, tongue, palate, uvula, and tonsils) are scarce and limited [6-8].

The aim of this study was to determine the incidence of oral soft tissue trauma during classic direct laryngoscopy for tracheal intubation and the associated risk factors.

2. Material and methods

The protocol for this prospective study was reviewed and approved by the Health and Ethics Committee of the Hospital São João (reference no.: 179/09). The informed consent was gathered from all patients.

The patient population consisted of individuals aged >18 years scheduled for elective interventions in general surgery who went under orotracheal intubation using Macintosh blade number 3 or 4 during 6 months. The excluded patients were pregnant women; patient undergoing facial surgery or any procedure involving surgical manipulation of the upper airway; patients with no orotracheal intubation using a Macintosh blade 3 or 4, with transesophageal echo probes; or being a day case patient.

A pilot study with 30 patients was carried out to evaluate airway assessment, diagnostic criteria of the lesions, and methodology. During the pilot study, we carried out intra-examiner calibration; the intrareliability score was <10%.

Before surgery, all patients were evaluated and underwent a detailed oral examination performed by an anesthetist; in this stage, we collected the following data: sex, age, height, weight, oral tissues condition (lips, tongue, gums, buccal mucosa—lips), Mallampati classification (modified by Samsoun and Young) [9], interincisor gap measured with fully open mouth, thyromental distance (centimeters) measured in sitting position with the extended neck, neck circumference (centimeters) measured at the thyroid cartilage level, and head and neck extension measured from the neutral erect position to maximal tilt.

Body mass index (BMI) was calculated according World Health Organization [10].

The intraoperative plan was decided by the attending anesthesiologist. All patients received general anesthesia with a neuromuscular block agent.

A second oral examination was performed by the same investigators, 12-36 hours postoperatively, and no oral soft tissue injuries were recorded. Oral injuries were defined as those involving the following areas: oral mucosa including the gums, the alveolar mucosa in the edentulous patient, palate, and the buccal mucosa; lips (mucosa and skin); and tongue. To examine oral injuries, the anatomic location and nature of the injury were identified; if the same area sustained >1 kind of injury, only the severe ones were registered.

Injury severity was assessed using the severity scale presented by the Portuguese legal medicine research [11,12]: grade 0, no injuries had; grade 1, mild severity injuries such as scratches, bruises, echymoses, and cuts; grade 2, medium severity injuries, such as skin lacerations, fractures, and other injuries (not requiring open treatment); grade 3, major severity injuries (not considered life threatening, although they require open treatment).

The investigators were blinded to airway management during surgery.

Subsequently, the anesthetic records were reviewed considering the difficulty of intubation (yes/no), the number of attempts, the type of neuromuscular blocking agent used (depolarizing or nondepolarizing), and the anesthesia duration.

The definition of difficult airway used in this anesthesia department is consistent with the Practice Guidelines of the American Society of Anesthesiologists Task Force for Managing the Difficult Airway [13]. The anesthetic technique and the airway management plan were left to the attending anesthetist, who was blinded to this study.

When appropriate, the χ^2 and the Fisher exact tests were used to appraise the association between oral injuries and patients' characteristics (sex, age, BMI, Mallampati score, interincisor gap, thyromental distance, neck circumference, head and neck extension, difficulty of intubation, number of attempts, type of neuromuscular blocking agent, and anesthetic time).

When differences were significant, the Bonferroni method was applied for pairwise comparisons.

Data processing was carried out with the SPSS Software (Statistical Package for Social Sciences) version 21.0. The significance level was set at 0.05.

3. Results

From the 895 patients who met the inclusion criteria, 322 (36%) were excluded because they refused consent and/or were lost during follow-up.

Of the observed 573, 1 individual died in the postunit care due to acute myocardial infarction, 31 missed because surgery was cancelled, 5 were excluded because the tracheal intubation was not performed with a Macintosh blade, and 2 because of locoregional anesthesia.

Table 1 Severity of soft tissue trauma

Severity	Oral mucosa	Lower lip	Upper lip	Tongue
None	521 (97.9) ^a	415 (77.7) ^b	496 (92.9) ^c	341 (63.7) ^d
Grade 1	2 (0.4) ^a	27 (5.1) ^b	1 (0.2) ^a	121 (22.6) ^c
Grade 2	8 (1.5) ^a	92 (17.2) ^b	37 (6.9) ^c	72 (13.5) ^b
Other	1 (0.2) ^a	0 (0.0) ^a	0 (0.0) ^a	1 (0.2) ^a
Total	532 (100.0)	534 (100.0)	534 (100.0)	535 (100.0)

Statistical test used was χ^2 .

Different letters (a, b, c, and d) represent statistically significant differences between soft tissue trauma for each severity (or none) after Bonferroni correction for multiple comparisons.

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