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Submental Intubation in Cases of Panfacial Fractures: A Retrospective Study

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Surgical treatment of panfacial fractures usually requires intraoperative temporary occlusion of the teeth and simultaneous access to the nasal pyramid. In such cases, the standard method of airway management is to perform a tracheostomy, but this may be associated with a significant number of perioperative and late complications. This study aimed to determine if submental endotracheal intubation (SEI) is a viable alternative to tracheostomy, especially when short-term postoperative control of the airway is foreseen. This was an observational retrospective study, carried out between 2012 and 2014, which involved 32 consecutive patients who sustained panfacial fractures and were surgically treated during a 3-year period in a level I trauma center hospital. Only those who required SEI were included in the sample. Four cases were excluded because of incomplete registries, follow-up period less than 4 months after hospital discharge, or other unrelated complications. The medical charts of all patients involved in the sample were carefully reviewed in order to qualify and quantify perioperative and postoperative complications related to anesthetic management. We hypothesized that SEI would not interfere with the surgical procedures and would present less morbidity and reduced complication rates. Twenty-eight patients, 24 male and 4 female, met all the inclusion criteria. The mean age was 29.5 ± 9.05 years (range, 18–56 years). The mean duration time of surgery was 8.07 ± 4.0 hours (range, 4–16 hours). There were no perioperative complications. Postoperatively, only 1 patient (3.57%) experienced a cutaneous infection at the submental region, which was easily treated. Additionally, only 1 case (3.57%) of hypertrophic scar was reported. SEI appears to be a safe, simple, and effective technique of immediate perioperative airway management in selected cases of panfacial fractures.

Key Words: Airway management; Intubation; Submental; Maxillofacial trauma.

Complex fractures simultaneously involving the upper, middle, and lower thirds of the face are defined as panfacial fractures and usually require individualized treatment plans. The approach to facial reconstruction must focus on reestablishing proper 3-dimensional relationships in the facial frame as well as restoration of orbital, oral, and nasal cavity volumes. The main concerns of the oral and maxillofacial surgeon must be nasal projection and patency, facial soft tissue support, and keeping the teeth in proper occlusion.[1,2]

To achieve optimum reduction of bone fragments in panfacial fractures, most cases require perioperative intermaxillary fixation (IMF). Thus, patients often cannot be managed with standard orotracheal intubation.[3] Nasotracheal intubation would be a good alternative for airway management if the presence of the tube did not hamper the surgical reconstruction of the midface in cases of naso-orbital ethmoid (NOE) complex fractures.[4] Moreover, Le Fort fractures type II and III

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are frequently associated with skull base fractures involving the cribriform plate of the ethmoid, potentially creating a communication between the nasal cavity and the anterior cranial fossa with cerebrospinal fluid leakage.[4,5] In such cases, attempts at nasotracheal intubation may lead to a major complication such as passage of the tube into the cranium.[5,6] Other potential complications include meningitis, sepsis, sinusitis, and epistaxis.[7]

The most widely cited method for airway management in patients with complex maxillofacial fractures is to perform a tracheostomy.[8] However, this might involve a significant number of immediate and late complications.[8–13] This technique may be associated with early systemic issues such as cardiac arrest caused by stimulation of the 10th cranial nerve, posthypercapnic shock due to sudden lowering of the carbon dioxide level, acute pulmonary edema, and air embolism.[9] Local perioperative complications may include complex hemorrhages due to perioperative trauma of cervical vessels or the thyroid gland, subcutaneous or mediastinal emphysema, pneumothorax, and damage to laryngeal nerves.[10,11] Late complications include tracheal stenosis associated with the healing of the tracheal wound, tracheomalacia, tracheoesophageal fistula, extensive granulation with inflammatory complications, wound infections, and unesthetic scars.[10–13] Nevertheless, tracheostomy remains an accepted method of airway management in patients requiring long-term ventilatory support to avoid injuries to the vocal cords and in those with acute airway obstruction.[14]

Numerous alternative methods have been described, including switching the tube from the nasal to the oral route at a certain stage of the operation,[15,16] retrotuberosity or retromolar intubation,[17,18] use of an indexed splint allowing for IMF around an orotracheal tube,[19] placing the tube through an edentulous area,[20] or, lastly, performing the surgical treatment in 2 or more stages.[3] All of these alternatives present limitations and drawbacks such as technical difficulties, greater morbidity, or higher costs.

Given this scenario, Hernandez Altemir[21] proposed in 1986 a new technique called submental endotracheal intubation (SEI), which consisted of passing the tube through a submental skin incision into the anterior floor of the mouth. The author suggested it would provide a secure airway and an unobstructed intraoral surgical field, and that it would allow IMF whilst avoiding the aforementioned drawbacks and complications of nasotracheal intubation and tracheotomy.

Historically, the anesthetic management of patients with panfacial injuries has always been a challenge both to anesthesiologists and to oral and maxillofacial surgeons.[22] There is no consensus to date as to which method of securing an airway is best when orotracheal and nasotracheal intubation are contraindicated.

Thus, this study aimed to substantiate that SEI is a viable alternative to the classic methods for anesthetic management in patients with panfacial fractures, especially when only short-term postoperative control of the airway is foreseen. The authors therefore carried out an evaluation of the records of patients surgically treated and managed with this technique during a 3-year period by the oral and maxillofacial surgery service in a level I trauma hospital.

METHODS

Study Design/Sample Identification and Selection

The investigators designed and implemented a retrospective study that was approved by the institutional review board of the Mandaqui Hospital Complex, which is a level I trauma center and a reference hospital complex for trauma in the northern area of São Paulo city, Brazil.

The population involved in the study consisted of patients who had suffered high-energy facial trauma with multiple bone fractures simultaneously affecting the upper, middle, and lower thirds of the face (panfacial fractures) and were referred to the Mandaqui Hospital Complex for evaluation and treatment at the Division of Oral & Maxillofacial Surgery in the period between January 2012 and December 2014. Only subjects whose airways were managed with standard[21] SEI technique were included in the sample.

Patients were excluded as study subjects if mechanical ventilation had to be extended for more than 8 days after surgery, as this situation would require tracheostomy by protocol.[23] Other exclusion criteria were incomplete information registered in the patient's medical chart and postoperative follow-up period of less than 4 months.

SEI Technique

After appropriate care of associated injuries and preanesthetic evaluation, patients were brought to the operating room for surgical treatment of their severe maxillofacial fractures.

Following induction of general anesthesia, patients had their trachea intubated orally by standard direct laryngoscopy with a 7.0- or 8.0-mm internal diameter reinforced (spiral embedded) tracheal tube (Mallinckrodt Medical, Inc, St Louis, Mo). Because the tube

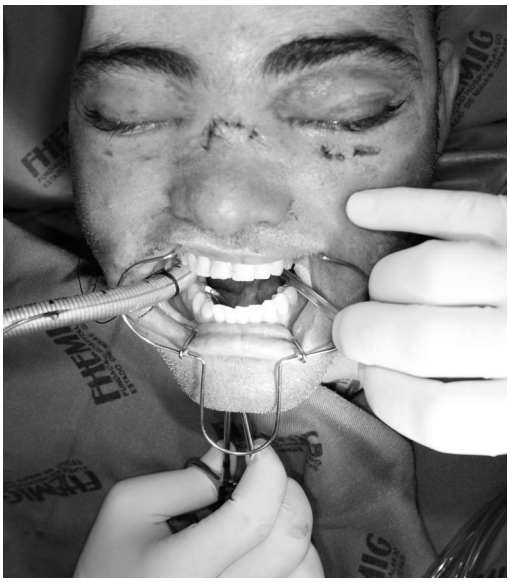

Figure 1. A curved hemostat is inserted through a skin incision in the anterior submental area and a passage is created through the mylohyoid muscle by blunt dissection.

connectors for spiral embedded tracheal tubes are extremely resistant to removal, this step was facilitated by loosening the connector from the reinforced endotracheal tube before oral intubation. The second step after the airway had been secured was to complete submental intubation. Thus, a 2.0-cm skin incision was performed medial to and parallel to the inferior border of the mandible and a passage for the endotracheal tube was then created from the submental region to the floor of the mouth by blunt dissection through subcutaneous tissue, platysma, deep cervical fascia, and mylohyoid muscle using a curved hemostat. To avoid damage to the lingual nerve or the salivary glands and their ducts, the dissection path adhered as closely as possible to the lingual surface of the mandibular body and was superficial to the periosteum (Figure 1).

The pilot balloon was first grabbed with the hemostat and pulled out through the passage. Then, the endotracheal tube was briefly disconnected from the breathing circuit and the tube connector was separated from the endotracheal tube. Although the reinforced tube was pulled out extraorally with the hemostat, the endotracheal tube had to be firmly secured in the mouth manually in order to prevent accidental extubation during the procedure.

Then, the endotracheal tube was reconnected to the tube connector and to the anesthesia breathing circuit (Figure 2). After confirmation of its adequate tracheal position by capnography and bilateral auscultation of the lungs, the tube was attached to the skin with 1-0 nylon sutures.

Figure 2. The reinforced tracheal tube is pulled extraorally.

Management of Panfacial Fractures

The main objective of the surgery was to obtain a definitive anatomic reduction of all maxillofacial fractures with internal fixation by using miniplates and miniscrews as osteosynthesis method. Temporary IMF was used in order to optimize maxillofacial reconstruction and was released at the end of surgery. Immediately after the surgical procedure was finished, the reinforced endotracheal tube was pulled back intraorally in reverse order (first the reinforced tube, then the pilot balloon), maintaining the artificial airway by standard orotracheal intubation. The submental skin and intraoral incision were closed with 5-0 nylon sutures. Patients were followed daily during their intensive care unit and hospital stays. After hospital discharge, the follow-up of each patient extended over at least 4 months.

Data Collection

To address the research purpose, the respective medical charts of all patients involved in the sample were carefully investigated. The following perioperative intercurrences and postoperative complications registered were designated as primary outcome variables:

- perioperative bleeding at the incision site (submental region);
- difficulties or complications regarding to passage of the tube through the floor of the mouth;
- mechanical interference of the submental tube hindering the IMF or any other surgery aspect;
- displacement of the endotracheal tube in the perioperative period;
- desaturation episodes with oxygen levels less than 90% measured by pulse oximetry, which would mean a worrying relative hypoxemia;[24]

- any nerve ending lesion causing a motor deficit or paresthesia;
- gland or duct gland injuries;
- development of salivary fistula or mucocele;
- skin and mucosa healing failures;
- late tracheal complications;
- nonacceptance of extraoral scar on submental region.

Demographic data such as gender, age, etiology, and types of facial fractures suffered by the patients included in the sample were thoroughly recorded. Time duration of surgery and postoperative mechanical ventilation period were also considered as variables of interest because if they were extended they would increase the chances of perioperative complications.

Data Analyses

Data were analyzed by means of descriptive and correlational statistics with the support of the software Statistical Package for Social Sciences (SPSS 18.0 for Windows, SPSS Inc, Chicago, Ill). Where appropriate, a chi-square test was performed in order to verify the possible dependence between 2 qualitative variables. The results were considered relevant at $p < .05$.

RESULTS

A total of 32 subjects with panfacial fractures were surgically treated and managed with SEI within the stipulated period, for the study but only 28 met all the inclusion criteria. One of the identified patients died 8 days after surgery because of multiple organ failure and 1 patient later required a tracheotomy because of prolonged respiratory failure. Two other subjects were excluded because of incomplete registries in their respective medical charts.

The selected group included 24 male and 4 female subjects. The mean age was 29.5 ± 9.05 years (range, 18–56 years). The mechanisms of injury were trauma resulting from motor vehicle accident ($n = 22$) and interpersonal aggression ($n = 6$). Patients' demographic data, the most prevalent types of facial fractures, time duration of surgery, and period of postoperative mechanical ventilation are presented in Table 1.

The mean duration time of surgery in the whole sample was 8.07 ± 4.0 hours (range, 4–16 hours). Patients who required the longest surgical time were those in which there was an association between NOE and Le Fort II fractures (mean = 13.43 ± 2.3 hours; range, 10–16 hours). Patients with mandibular bilateral fractures did not have an increased duration of surgery ($\chi^2 = 0.44$, $p = .50$).

Twenty subjects were extubated while still in the operating room, but patients 7, 11, 12, 14, 17, 22, 25, and 27 ($n = 8$) had late extubation on first to third postoperative days. The mean duration of postoperative mechanical ventilation in the whole sample was 1.875 days (no more than 2 days). There was no association between gender and extended postoperative ventilation ($\chi^2 = 0.03$, $p = 0.86$). Statistical analysis showed no relation between the etiology of trauma and extubation period of patients ($\chi^2 = 0.08$, $p = .77$). All patients who required an extended postoperative ventilation period presented bilateral mandibular fractures. However, there were no differences regarding postoperative ventilation period between patients who had suffered associated NOE ($\chi^2 = 0.36$, $p = .54$) or Le Fort II fractures ($\chi^2 = 0.07$, $p = .79$).

During the procedure of passing the tube through the floor of the mouth there were no difficulties or complications, and no episode of endotracheal tube displacement or perioperative bleeding at submental region was reported. Thus, desaturation episodes with oxygen levels less than 90% and associated relative hypoxemia did not occur in any patient during the perioperative period.

In all patients, SEI permitted simultaneous reduction and fixation of all maxillofacial fractures and perioperative IMF without interference from the submental tube during the procedure. The absence of a nasotracheal tube allowed good reduction of nasal and NOE fractures.

Structures anatomically related to the submental intubation procedure were completely preserved. No patient developed salivary fistula or experienced injury to the submandibular or sublingual glands or their respective ducts. Also, there was no lesion of any nerve branch causing a motor deficit or paresthesia.

All subjects presented normal healing in the mucosa of the mouth floor. In general, the submental skin incision healed uneventfully, except for patient 27, who presented a superficial infection of the submental wound on the seventh postoperative day (3.57%). The extraoral scar on the submental region was generally well accepted by the patients. Only 1 case (3.57%) of hypertrophic scar was reported (patient 14). There were no late tracheal complications.

DISCUSSION

Patients who sustain panfacial fractures are usually inappropriate for standard oral or nasotracheal intubation because, for optimal surgical management, they almost always require perioperative maxillomandibular fixation and simultaneous surgical approach to the nasal-orbital-ethmoidal region or to the skull base. At

Table 1. Patients' Demographic and Clinical Data*

Patient	*Gender†*	*Age, y*	*Etiology*	*Facial Fracture Type*	*DS, h*	*Postoperative Ventilation, d‡*
1	M	34	MVC	Md + Le Fort I + zygoma	5	0
2	M	21	IPA	Md (bilateral) + Le Fort II	4	0
3	M	23	MVC	Md + Le Fort II + NOE	12	0
4	F	29	MVC	Md + Le Fort I + nasal	4	0
5	M	18	IPA	Md + Le Fort II + nasal	5	0
6	M	18	IPA	Md + Le Fort I + zygoma	6	0
7	M	20	MVC	Md (bilateral) + Le Fort I	5	1
8	M	27	MVC	Md + dentoalveolar + nasal	4	0
9	M	30	MVC	Md + Le Fort II + NOE	13	0
10	M	33	MVC	Le Fort III + skull base + orbital	5	0
11	M	31	MVC	Md (bilateral) + Le Fort I + zygoma	11	1
12	F	22	MVC	Md (bilateral) + Le Fort II	7	1
13	F	25	MVC	Md + Le Fort I + NOE	14	0
14	M	28	IPA	Md (bilateral) + Le Fort II + NOE	16	2
15	M	32	MVC	Le Fort II + skull base + orbital	5	0
16	M	56	MVC	Md + Le Fort I + zygoma	7	0
17	M	37	MVC	Md (bilateral) + Le Fort I + nasal	6	2
18	M	42	MVC	Md + Le Fort II + orbital + nasal	8	0
19	M	35	MVC	Md + Le Fort II + zygoma + NOE	16	0
20	M	47	MVC	Le Fort III + skull base	3	0
21	M	22	MVC	Md + Le Fort I + zygoma	8	0
22	M	21	IPA	Md (bilateral) + Le Fort II + orbital	8	2
23	F	32	MVC	Md + Le Fort II + NOE	12	0
24	M	33	MVC	Md + Le Fort II + NOE	10	0
25	M	40	MVC	Md (bilateral) + Le Fort II	7	3
26	M	28	MVC	Md + Le Fort I + nasal	4	0
27	M	30	MVC	Md (bilateral) + Le Fort II + NOE	15	3
28	M	19	IPA	Md + Le Fort II + orbital	6	0
Mean ± SD		29.5 ± 9.05			8.07 ± 4.0	1.875

* DS indicates duration of surgery; M, male; MVC, motor vehicle crash; Md, mandible; IPA, interpersonal aggression; NOE, naso-orbital ethmoid fracture; and F, female.

† There were 24 male and 4 female patients.

‡ 0 indicates extubation was done while patient was still in the operating room.

the same time, a secure patent airway must be maintained throughout the operative period.[3,4]

Currently, the standard procedure in such cases is to perform tracheostomy. However, this technique needs special perioperative care because of possible moderate or life-threatening complications, and it lengthens hospital stay. A complication rate range of 5–45% and an approximately 2% mortality have been reported.[25,26] Meticulous surgical and intraoperative management helps to avoid most of these drawbacks, but tracheostomy may not be the ideal method for airway control in patients with isolated facial fractures who do not require requiring long-term ventilatory support.[11,25,27]

Alternative techniques for airway management in panfacial fractures have been described, but all of them carry their own limitations and morbidity.[3,15–20] Although possible, converting between the oral and nasal endotracheal routes during surgery, with or without extubation, is not the first option because securing the airway may be difficult because of edema and bleeding.[3] If teeth are missing, placing the tube through an edentulous area may be a solution, but the space is not always sufficient for passive adaptation of the tube.[20] The use of an indexed splint allowing for intraoperative control of the occlusion around an orotracheal tube increases costs and the waiting time for surgery. The retrotuberosity technique may be limited by bulbous tuberosities or the presence of lower third molars, which generally prevents the surgeon from achieving the proper occlusion.[18] When the option is retromolar intubation, a semilunar osteotomy is usually required in this area of the mandible to gain the necessary space for the tube. However, it takes a mean duration of 25 minutes to perform this procedure, and bony anatomy is not preserved. Paradoxically, this method seems to add further morbidity to a technique designed to avoid it.[18,22] Finally, one can perform the surgical treatment in 2 or more stages, which increases the treatment risks and morbidity, besides increasing costs.

Since it was first described by Hernandez Altemir[21] in 1986, the SEI technique has been increasingly recog-

nized as an acceptable alternative for airway management of patients with panfacial fractures when short-term postoperative control of the airway is predictable.[3,4,14,22,28,29] However, a relative paucity of literature in certain surgical specialties where tracheostomies and facial trauma are common procedures may reflect unfamiliarity with the procedure or an inclination towards tracheostomy, which suggests potential underutilization.[30] Thus, it is necessary to carry out more studies with larger numbers of patients to obtain scientific validation and diffusion of the technique.[27,31]

Therefore, this study aimed to substantiate, by a retrospective evaluation of the outcomes, if SEI is a viable alternative to tracheostomy.

The results corroborate the evidence that the SEI technique has low morbidity, because no perioperative drawbacks were reported and only 2 patients had mild late postoperative complications.[1,3,4,13,14,22,29,32,33] Only 1 skin infection of the submental wound was found; it was well treated by performing cutaneous drainage combined with oral antibiotic therapy, and it did not lengthen patient hospital stay. Only 1 subject experienced a hypertrophic scar, which was managed locally using in situ steroid therapy. There was no statistically significant relationship between secondary outcome variables such as gender, age, etiology of trauma, fracture type, or time duration of surgery and the incidence of these few complications.

In a recent systematic review that included 41 articles, the most frequently reported complication associated with SEI was superficial skin infection (2.73%).[30] The risk of an abscess development in the submental tunnel is real and this may be linked to the fact that the procedure is "clean/contaminated" because of possible contamination of the submental tract by oral fluids. Moreover, it could be related to the passage of the possibly contaminated balloon during extubation.[31] Thus, attention to good oral hygiene, perioperative antibiotic cover, and strict aseptic care are strongly recommended, including carrying out balloon disinfection before reversion of submental intubation.[1,31]

Submental scarring is usually far less visible than a tracheotomy scar and almost undetectable except upon close inspection of the chin with head hyperextension.[31,34] Indeed, the extraoral scars were generally well accepted by the patients in our sample. Additionally, no subject developed orocutaneous fistula or had late tracheal complications. This is in line with recent literature, which reports an average incidence of 1.19% for these postoperative complications.[30,32–34]

Consistently with the results of other studies,[13,14,21,22,28,32–34] potential drawbacks including perioperative bleeding in the submental region, injuries to the submandibular and sublingual glands or ducts, and damage to sensitive or motor nerve branches were not registered. Low complication rates were probably due to a surgical route prepared from the skin to the oral cavity[18] and careful supraperiosteal blunt dissection with a hemostat clamp performed anteriorly and close to the lingual side of the mandible, avoiding injuries to critical structures.[22,27,34] The main change proposed in literature regarding the original technique by Hernandez Altemir[21] was avoidance of subperiosteal dissection on the lingual side of the mandible.[3,35]

In all cases, this aspect of the original technique was obeyed and a more lateral incision located about 2 cm to the midline was registered. The midline approach proposed by MacInnis and Baig[29] was not used because it would interfere with attachment of the genioglossus and geniohyoid muscles[18,33] and would injure mandibular lingual perforating vessels, which are present in the midline in 98% of instances,[36] leading to bleeding and sublingual hematoma. Additional research is necessary to validate new modifications reported in the literature.

No case of mucocele formation was reported in our sample. This benign cystic lesion can be caused by the introduction of mucosal fragments in the region of the floor of the mouth while establishing the mucocutaneous path.[35] Thereby, it was very important to prepare the surgical route from the skin to the oral cavity and to incise the oral mucosa before the blunt dissection of the track.[18,35]

No episode of compromised airway or arterial desaturation (oxygen saturation as measured by pulse oximetry $< 90\%$) during the surgical procedure was reported. In all cases, the planned surgery was completed with minimal interference of the submental tube. As suggested by other studies, SEI technique provided a secure airway and an unobstructed intraoral surgical field and allowed IMF while avoiding the possible drawbacks and complications of nasotracheal intubation and tracheotomy.[3,4,28,32,37,38]

A decision not to extubate in the operating room was always made by consultation between the surgeons and the anesthesiologists based on the clinical condition of the patient at the end of the surgical procedure. Patients who sustained bilateral mandibular fractures had increased soft tissue manipulation and lengthened duration of surgery, leading to formation of greater submandibular swelling during the surgical procedure. For this reason, the team has chosen to generally extend the postoperative mechanical ventilation period.[4,33,34] As described earlier, in every patient in our sample, once the surgery was over, the SEI was immediately converted back to a standard orotracheal intubation. Thus, there was no statistically significant relationship between late extubation and the incidence of SEI postoperative drawbacks.

Table 2. Main Indications and Contraindications of Submental Endotracheal Intubation Technique[28,31,37]

Indications	*Contraindications*
Panfacial fractures	Severe neurological deficit
Midface fractures or nasal fractures associated with occlusal alterations	Multisystem trauma
Intranasal pathologies	Need for long-term airway support and maintenance
Posterior nasal bleeding	Bleeding diathesis
Repair of oronasal fistula and selected cleft lip/cleft palate surgeries	Laryngotracheal disruption
Skull base surgery	Multiple mandibular fractures requiring submental or transcervical approaches
Transfacial oncologic procedures of the cranial base	Gunshot injuries in the maxillofacial region
Pediculated craniofacial surgeries	Tumor ablation in maxillofacial region
Orthognathic surgery patients in whom conventional nasotracheal intubation or nasofibroscopic intubation is not possible	Infection at the proposed site
Elective aesthetic face surgeries	History of keloid development

Increased risk of laryngeal damage, postoperative salivary fistula, and pneumonia in cases of mechanical ventilation greater than 72 hours through SEI have been reported.[21,28,29] However, there is a lack of evidence regarding the association with these disorders. Further studies evaluating the effect of SEI in cases requiring longer periods of ventilation support are desirable.[32]

Importantly, a limitation of SEI occurs when IMF needs to be maintained postoperatively. It is mandatory that there be free and immediate access to the oral airway at any time. Therefore, permanent IMF should be instituted only after extubation and confirmation of a secure airway.[4] If it is imperative, as a safety measure, postoperative IMF could be achieved by simple elastics instead of traditional steel wires. These elastics could be cut and removed easily by the patient himself or by any paramedical staff without the need for any specialized instruments.[38]

Each airway management technique in cases of maxillofacial trauma has its indications, advantages, and limitations. The choice will depend on the availability of adequate tools, on the skill of surgeons and anesthetists involved, and, in many cases, on the patient's consent. A single universal technique of intubation is not appropriate in every circumstance.[7,8,11,31]

Although submental reversion of the orotracheal intubation demands a certain amount of surgical skill, this technique presents a very short learning curve, and the operating time, from start to finish, lasts on average 9.9 minutes.[29,30] Thus, this is a simple, quick, safe, and effective method that enjoys the advantages of both orotracheal and nasotracheal intubation at the same time.[14,39] SEI requires less time than a tracheostomy, costs less, has lower morbidity, and results in an esthetically well tolerated scar.[30,39] For these reasons, the scope of this technique has extended far beyond the territory of maxillofacial trauma surgery, and it has been successfully used in orthognathic and elective aesthetic facial surgeries.[39]

Some factors might hinder the Hernandez technique,[21] such as retrognathism, a limited mouth opening, or large mandibular tori.[37] We agree with authors who claim that the rare complications associated with SEI may be more attributable to errors of planning, indications, and failures in performing the technique.[35] The current main indications and contraindications for SEI[14,29,37,39] are listed in Table 2.

The main limitations and weaknesses of this study are related to its clinical design. This is a retrospective study involving observation for a long period of time and with information retrieved from medical charts. On the other hand, some positive points should be highlighted. This is a considerable sample of panfacial fractures managed with SEI, and the clinical and surgical protocols were homogenous. Moreover, the team of surgeons and anesthetists was the same throughout the study period. Therefore, this study contributes to the scientific validation of the technique.

In conclusion, SEI is a viable and attractive alternative to tracheotomy as a method of immediate perioperative airway management in selected cases of panfacial fractures. It is a safe, simple, and effective technique with low complication rates.

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