



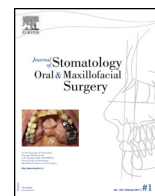
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Case Report

Medical device related pressure ulcer of the lip in a patient with COVID-19: Case report and review of the literature

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ABSTRACT

Pressure ulcers of the lip constitute a rare entity faced by plastic surgeons and there is a relatively paucity of data regarding optimal management. In this study we present one case of upper lip pressure ulcer related to prone intubation for respiratory distress due to SARS-CoV-2 infection, treated with surgical excision and reconstruction. We also performed a review of the literature to identify other studies on pressure lip ulcers. Six studies were considered relevant. Conservative management constitutes the most common method of treatment; however, little is known about the aesthetic, and functional morbidity related to either surgical or non-surgical treatments.

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1. Introduction

Pressure ulcers of the lip are not a common entity but are almost always related to endotracheal tubes, comprising a small portion of the medical device related pressure ulcers (MDRPU). In particular, MDRPU are considered to account for 34.5% of all hospital-acquired pressure ulcers (HAPU) and more specifically mouth or lips are involved in 3.4% of those [1]. In this study we present a case of full thickness upper lip pressure ulcer related to endotracheal tube intubation in prone position and a review of the literature on lip pressure ulcers.

2. Case report

Patient was a 82 year old female who was transferred to our institution from an outside facility for acute respiratory distress syndrome likely due to SARS-CoV-2 infection. Patient's pertinent past medical history included hypertension, and hyperlipidemia. She was intubated at presentation and remained intubated for a total of sixteen days, and intermittently for ten days in prone position. Her course was complicated by new onset atrial fibrillation. Following extubation, a full thickness pressure ulcer of the upper lip was identified (Fig. 1) and the plastic surgery service was consulted for further management.

We initially considered healing by secondary intention. However, because of the location of the wound, which is prone to bleeding, and due to the need for initiation of therapeutic anticoagulation that could worsen a possible bleeding episode from the lip wound, a decision was made to proceed with operative management of the lip wound in the operating room under local and monitored anesthesia care. A full thickness excision of the ulcer was performed. To prevent dog ear formation a full thickness wedge resection was performed cranial to the ulcer lateral to alar base and nasal sidewall. The wound was finally closed in layers respecting the natural borders of the lip (Fig. 2). The patient was satisfied with the outcome and the wound showed appropriate healing with no complications two weeks later (Fig. 3).

3. Methods

We performed the literature search of the PubMed, Medline, and Google Scholar databases from inspection through May 6, 2020 for studies on MDRU of the lip. Two authors (CS, KS) independently completed the article selection. Discrepancies were arbitrated by the senior author (AD).

4. Literature review

The initial search after removing duplicates revealed 1401 unique titles which were screened for eligibility by title and abstract. Eleven studies were selected for further evaluation, of

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Fig. 1. Preoperative picture of lip pressure ulcer.



Fig. 2. Immediately post-operative picture.



Fig. 3. Two weeks follow up post-operative picture.

which four were deemed relevant. Two additional studies were identified by screening the list of references of the previously selected relevant studies.

The treatment of traumatic lip pressure injuries is variable in the literature with mainly non-surgical options described with varying success rates and surgical treatment only peripherally referenced. There is paucity of prospective trials assessing the effectiveness of preventative devices or the effectiveness of surgical and non-surgical treatments. This may be due to the relative infrequency of these injuries.

A study by Yamashita et al. [2] described the development of lower lip pressure injuries intra-operatively in two patients undergoing rhinoplasty. The operative times for these patients were 270 and 273 min, respectively. Patients were intubated with preformed endotracheal tubes which were inserted and secured over the mandible with polyurethane film. Both patients were treated with conservative therapy. One patient developed a noticeable scar at six months follow-up, while the other patient had complete resolution of the lip injury. The authors emphasized that plastic surgeons and anesthesiologists pay close attention to nasotracheal tube position and securement, to avoid nasal alar rim necrosis. Authors noted that lip injuries in orotracheal intubation are often neglected and certainly underreported. They recommended the surgeon to re-check the position of the tube and adhesive tape after being placed by the anesthesiologist and advocated for preventative dressings to reduce the risk of these injuries.

In a letter to the editor in response to the previously discussed article by Yamashita et al., Pitak-Arnop discussed his experience with lip pressure ulcers [3]. Author noted that oral commissural fixation of the tube during rhinoplasty results in less pressure of the lower lip against the mandibular teeth especially when adhesive material such as tape is avoided. Another advantage of commissural fixation is that the central incisors remain visible as a midline reference for comparison of the nasal septal position. Author also emphasized that dressings (e.g. gauze or sponge) must be placed directly between the lip and the tube rather than on the infra-oral skin where the dressing will not prevent pressure on the lip. In addition, author noted that in Germany there is a widespread practice of wrapping the tube in gauze with tape or plaster to avoid any direct contact between the tube and the soft tissues. Pitak-Arnop noted excellent non-surgical treatment success of lip pressure ulcers with moderate potency topical corticosteroids such as 1% hydrocortisone hemisuccinate or 0.1–0.2% triamcinolone acetonide (3–4 times/day). Referencing a trial of the use of dexpanthenol for accelerated wound healing and demonstrating enhanced epithelialization and collagen fiber synthesis in the skin and oral mucosa [4], author proposed dexpanthenol as potentially therapeutic agent for lip pressure injuries. Other important topical agents include photoprotection (i.e., sunscreen) to avoid hyperpigmentation of the healing lesions, as well as depigmenting agents, such as tyrosinase inhibitors (hydroquinone, azelaic acid, licorice

extracts), chemical peels, and lasers in the treatment of hyperpigmented lip pressure-related injuries. Antiseptic mouthwash should be used for all and/or oral antibiotics for select cases.

Makimoto et al. [5] described early non-surgical treatment of an upper lip pressure ulcer in a preterm neonate. The study authors cited a 90% incidence of medical device-related pressure ulcers in premature neonates with an average time for ulcer development of 61 days [6]. They reported the successful treatment of a female born at 24 weeks who required intubation and surfactant therapy and developed a pressure ulcer on day 12 of mechanical ventilation in the neonatal intensive care unit. The pressure ulcer was found under the adhesive tape securing the endotracheal tube and measured 6 × 3 mm. *Aspergillus niger* was isolated on culture from the ulcer secretions. The ulcer was treated conservatively with an unspecified ointment and healed by 7 days of treatment initiation and patient was discharged from the hospital on day 128 with a depressed scar notch deformity which remained present at 1-year follow-up. The authors further discussed the importance of cutaneous *Aspergillus niger* growth in the pathogenesis of lip pressure ulcers in mechanically-ventilated pre-term neonates due to the humid environment in neonatal incubators, the widespread use of adhesive tape to secure endotracheal tubes, as well as the prevalent use of antibiotics and the resultant disruption of bacterial skin flora and potential for fungal overgrowth in this patient population. The authors noted that several other studies have published case reports of lip pressure ulcers developing in premature neonates secondary to adhesive tape use. In the case report by Amod et al. [7] two preterm infants developed lip pressure ulcers as a result of adhesive tape on day 5 and day 10 of endotracheal intubation, both had received antibiotic therapy prior to ulcer development.

Fujioka et al. [8] described seven patients who developed upper lip or oral commissure ulcers secondary to endotracheal tube adhesive tape. They proposed that the pathogenesis of these injuries was related more to the shearing forces of the adhesive tape rather than a pressure-related injury from the endotracheal tube. Authors noted that the routine use of an endotracheal tube holder protects against traumatic lip ulcers in their experience.

Finally, Calazans et al. [9] described a protocol of low-level laser therapy (LLLT) to treat traumatic ulcers of the lower lip after inferior alveolar nerve block anesthesia. They studied this treatment protocol in a single case report of a 3-year old male patient undergoing a dental procedure who developed a left lower lip ulcer the following day. The investigators applied two sessions of LLLT. Their protocol involved sequential applications of infrared diode laser (Whitening Lase II) targeted to the ulcerated area with a punctual application device on continuous mode at a wavelength of 808 nm, 100 mW power, and fluence of 105 J/cm² for five seconds. The treatment also included prescription of 0.12% chlorhexidine gluconate to the ulcerated area. Significant improvement was reported at 7 days with complete resolution at 30 days.

5. Discussion

In a short period of time since the recent COVID-19 outbreak, there have been a multitude of non-pulmonary complications reported. Perrillat et al. [10] recently published their experience of two patients with mainly cheek ulcers after prolonged intubation and prone positioning and highlighted the issue of facial ulcers in patients with COVID-19.

Medical device related pressure ulcer (MDRPU) is not unique to the current pandemic, nor is it a novel entity. It is well-described in the literature and is thought to account for at least one-third of all pressure ulcers in the acute care setting. In their review, Black et al.¹ found that mouth/lips ulcers accounted for only 3% of

MDRPU cases. Two-thirds of MDRPUs were stage I or stage II and another 24% were classified as unstageable.

Amrani and Gefen [11] investigated the biomechanical effects of endotracheal tube positioning using bioengineering technology known as finite element modelling. In comparing a central versus corner-of-the-mouth site for ETT placement, they were unable to identify a “safer” location due to the complexity of the forces and tissues involved. They suggested that efforts should be focused on dressing materials applied prophylactically or more optimal securement of the tube. Landsperger et al. [12] at Vanderbilt University sought to evaluate the safety of adhesive tape versus an endotracheal tube fastener. Based on their pragmatic, randomized trial, ETT-related lip ulcer occurred in 2.6% versus 7.3% ($p = 0.05$) of patients for rates of 6.8 versus 19.3 per 1000 patient ventilator days ($p = 0.052$) when comparing the fastener and tape groups, respectively. The specially designed fasteners are safer than adhesive tape when it comes to MDRPU. Regardless of securement method, their reported incidence of 2.6–7.3% is relatively favorable. This is likely the result of detailed oral hygiene protocols in place for ventilated patients along with the diligent work of nursing staff and respiratory therapists. However, intubated patients requiring prone positioning present additional pressure points and new problems more seldom addressed.

Prone positioning has been shown to be associated with pressure ulcers. Nevertheless, the burden created by the novel coronavirus has led to novel measures in respiratory care. Many critical care teams are turning to prone positioning to decrease the number of intubated patients and duration of intubation in a system that has been pushed to its resource limits. Prone positioning has been shown to improve oxygenation by improving V/Q relationships, reduce intubation rates when combined with high flow nasal cannula, and reduce mortality in severe ARDS [13]. Similarly, intermittent period of prone intubation have been shown to potentially have mortality benefits in patients with respiratory distress [14]. The same principles are now becoming useful in the management of patients with severe ARDS related to SARS-COV-2.

Kim and Mullins [15] have advocated for the use of thin silicone foam dressings applied in areas of high pressure, including the forehead, chin, and lips with good results, however their experience is limited by the small number of patients included in the study. Based on our experience and literature review we recommend intermittent periods of prone intubation when possible, using of fasteners rather than tape for securing breathing tubes, foam dressings or cushion in areas of pressure, education of medical and nursing staff for prevention of facial and lip ulcers, and involvement of orofacial surgeons early in the process for appropriate monitoring and treatment of facial ulcers if present.

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Ethical approval

This study conforms to the Declaration of Helsinki ethical principles for medical research. Appropriate consent was obtained for the presented patient for use of the information and the pictures.

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