Full-Thickness Facial Pressure Injury and Buried Dentition from Prone Positioning in a Patient with COVID-19

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ABSTRACT
Prone positioning is recognized for its efficacy in the treatment of acute respiratory distress syndrome related to COVID-19. Here the authors present a case of a facial pressure injury and buried dentition that occurred as a result of prolonged prone positioning in a patient who was COVID-19 positive. The patient was treated with primary closure of the injury and pressure offloading.

KEYWORDS: COVID-19, prone position, pressure injury, dentition, pandemic

INTRODUCTION
The respiratory benefits of prone positioning were first noted in 1974. Lying supine leaves the dependent areas of the lungs without acceptable ventilation, whereas prone positioning improves arterial oxygenation. Since then, prone positioning has been used to improve outcomes in patients with hypoxemic respiratory diseases such as acute respiratory distress syndrome (ARDS) and pneumonia.1 Because the most severe and common complication of COVID-19 is ARDS (reported in up to 67% of patients), prone positioning has recently seen massive use on a global scale.2

Despite its benefits, and as with any prolonged positioning, pressure injury (PI) formation is a formidable risk with prone positioning. This complication often leads to longer lengths of hospital stay and increased cost, pain, and superinfection.3 Here the authors present the case of a patient with COVID-19 who experienced a facial PI and buried dentition as a result of prolonged prone positioning.

CASE REPORT
A 74-year-old man with a medical history of uncontrolled insulin-dependent diabetes (hemoglobin A1c > 5.2), hypertension, and chronic kidney disease was admitted to the authors’ ICU from the community with acute hypoxemic respiratory failure. He was experiencing acute altered mentation along with troponemia and lactic acidosis. Of note, he complained of diffuse abdominal pain and had refused to eat for 10 days prior. His SARS-CoV-2 polymerase chain reaction test was positive.

The patient was emergently intubated. Appropriate interventions were initiated on the day of admission including BP support and manual prone positioning. He was positioned with support from a prone pillow for 16 hours daily with axial rotation head repositioning every 2 hours. He initially received trophic nasogastric feedings and was later converted to percutaneous
endoscopic gastrostomy tube feeding. Repeat SARS-CoV-2 polymerase chain reaction tests remained positive until hospital day 12.

The patient experienced skin breakdown on the right upper lip (Figure 1) on hospital day 19 when his tooth herniated through a full-thickness defect of the superior lip. Plastic surgery was consulted on day 24 to evaluate the lip defect. On physical examination, the patient had a full-thickness defect immediately lateral to the right philtral column and overlying tooth #8. On further inspection, teeth #10 and #11 were found embedded in the left superior lip and were extricated via downward traction on the lip. Teeth #1 to #7, #9, and #12 to #16 were absent. The three remaining upper teeth were decayed but firmly rooted in the gums (Figure 2).

The defect was debrided at the patient’s bedside by plastic surgery and measured 3 × 4 mm with healthy bleeding edges. It was closed horizontally in three layers, elevating the defect from the tooth edge (Figure 3). The closure had a similar, if less dramatic, lifting effect on the erosion of the left lip mucosa. The left-sided defect was copiously irrigated and loosely closed with dissolvable suture.

The patient’s surrogate decision-maker consented to medical photography and treatment, as well as the publication of the case and associated images. The patient subsequently died of COVID-19 complications.

**DISCUSSION**

This case report describes a patient with COVID-19 who developed a full-thickness facial PI following extended prone positioning. Prone positioning has been shown to optimize lung mechanics and gas exchange in patients with acute hypoxemia. Given that ARDS can develop in 67% of patients with COVID-19 admitted to the ICU, prone positioning has become a mainstay of ICU treatment in this population. Experts suggest placing the patient in a prone position early in the course of the disease for...
optimal outcomes.4 Given this, the case patient was probed at the beginning of his hospital course.

Prone positioning for intubated patients consists of resting the patient’s face in a plastic-covered foam cradle. This puts the weight of the head on the cheeks, forehead, and chin. In contrast with supine positioning, which results in PIs on the sacrum and ischium, prone positioning results in PIs on the anterior thorax and face, although there are limited reports in the literature on the latter.3,5

This case illustrates a PI that developed in a unique location—the upper lip. It is likely that the patient’s lack of dentition facilitated the formation of this PI, given that the weight of the head was distributed across a small surface area as opposed to a full row of maxillary teeth.

Another critical factor that leads to PI formation is time. A longer time spent in one position is associated with more skin breakdown at susceptible, high-pressure areas on the body.2 This patient was prone for two-thirds of the day, allowing ample time for his tooth to apply pressure to the upper lip, compromising blood flow to the soft tissue and ultimately leading to herniation of the tooth through the lip altogether.

Aside from positioning and time, known independent risk factors for development of PIs include immobility, malnutrition, and conditions that affect blood flow such as diabetes and vascular disorders. This patient’s lack of oral intake for the 10 days prior to admission and history of insulin-dependent diabetes and hypertension, coupled with the immobility from his critical condition and prone position, all likely contributed to the development of this PI.

Nutrition status has an effect on PI formation. Weight loss or feeding difficulties that lead to nutrition deficiencies can encourage breakdown of skin and ultimately lead to PIs. A study conducted in 2015 found decreased incidence of PI formation in patients who were well-nourished. Although there is controversy surrounding prone patients’ ability to tolerate enteral nutrition without aspiration, this patient could tolerate goal tube feeds. That said, this was likely insufficient to overcome the hypermetabolic state combined with a preexisting nutrition deficiency secondary to food refusal prior to seeking medical attention.

Because of the risk of PI formation, patients in the prone position require positional change every 2 hours. This itself is not without risk, however; with each move, there are risks of dislodging or impeding the endotracheal tube as well as loss of vascular access and changes to catheter placement.

Despite preventive measures, international data suggest that 57% of patients in a prone position develop a PI.7 One way to reduce PIs is with prophylactic skin dressings. A small case-control series by Kim and Mullins from 2016 examined the potential benefit of skin dressings in patients undergoing prone positioning for treatment of ARDS. They compared two patients who received prophylactic silicon-based foam dressings around the endotracheal tube and two patients who did not. They found that dressings not only reduced the friction and shear from the medical devices, but also protected the skin from maceration. As a result, both patients who received the dressings were spared from the development of necrotic facial injuries, whereas the two patients without prophylactic skin dressings developed multiple deep-tissue facial injuries.

Given the growing healthcare burden of COVID-19, prone positioning is becoming increasingly common, and the prevention of complications that increase length of stay and ICU occupancy is paramount to ensure effective utilization of healthcare resources. It is imperative to account for patients’ baseline characteristics such as comorbidities that may affect wound healing, as well as nutrition status. Patients with greater baseline risk should be medically and nutritionally optimized with diligent monitoring for soft tissue ischemia. The lessons learned from PI prevention in supine patients can be applied to prone patients as well. Frequent repositioning of the head and thorax as well as prophylactic skin dressings can benefit this unique patient population and reduce complications.

CONCLUSIONS
The authors report the case of a patient who suffered a full-thickness PI overlying tooth #8. The combination of prolonged prone positioning and malnutrition while on pressor support is common in ARDS and now uniquely prevalent given the COVID-19 pandemic. This patient had an unusual presentation because of his poor dentition. This should serve as a reminder for clinicians that PIs are not confined to the sacrum and ischium. Patients in a prone position should be evaluated for developing PIs from head to toe, and special attention should be paid to areas overlying bony prominences. Thorough physical examination of bony prominences that are liable to bear significant pressure in nontraditional locations such as the dentition can decrease the likelihood of PI.

REFERENCES

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