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Abbreviations

I&D: Incision and Drainage; CT:
Computed Tomography; CVL: Central
Venous Line; ICU: Intensive Care Unit

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Novel Approach for Management of Deep Space Neck Infections: a Case Report

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Abstract

When patients present with deep space neck infections, typically the treatment involves Incision and Drainage (I&D) with an extraoral incision that could measure several centimeters in length, as well as antibiotic administration. While this approach is effective in managing these types of infections, it is not without limitations. Most notably, patients treated with I&Ds often are subject to prolonged hospitalization due to sepsis and they complain of a permanent, unsightly scar in the facial or cervical region once healed. In this case report, a 28-year-old male patient presenting to the emergency room with a right mandibular space collection of supuration is treated with a modified version of the Seldinger technique which provided adequate abscess drainage and a more cosmetically-pleasing outcome once healed. Furthermore, this patient was treated bedside under local anesthesia as opposed to in an operating room under general anesthesia. While this technique may not be indicated for every patient presenting with deep space neck infections, it is a less-invasive approach that was effective for this patient.

Introduction

Deep space neck infection is a commonly encountered clinical diagnosis affecting a wide range of individuals. Retrospective studies show that the most common predisposing factor is a dental infection affecting the mandibular second or third molar [1], and the most affected patient demographic are men in their third-fourth decade of life [1-3]. The space most frequently involved is a submandibular space, causing symptoms including trismus, fever, pain, dysphagia and swelling [1,2,4,5]. Aside from the socioeconomic factors, there seem to be no other notable contributory factors affecting the incidence rate of infections [1]. Historically, the gold standard of care has been surgical incision and drainage under general anesthesia combined with antibiotic therapy [6]. In this case report, an alternative technique of treatment based on a modification of the classic Seldinger venous access technique is described and its efficacy in managing a patient's infection detailed.

Note: The technique described requires knowledge of maxillofacial anatomy as well as familiarity with the Seldinger technique.

Case Presentation

A 28-year-old male patient presented to the emergency room at Memorial Hermann Hospital in the Texas Medical Center. The patient reported a 2-week history of pain and progressive swelling associated with the right submandibular space. The patient indicated a 3-month history of pain and infection associated with tooth 47, and that he had been unable to attend a dentist due to work commitments. On clinical examination, the patient was noted to have a large fluctuant swelling associated with the right submandibular space. The lower border of the mandible was palpable, although the patient was tender to palpation. The patient had slightly reduced mouth opening at 32mm inter-incisal distance, and tooth 47 was noted to be severely carious. The floor of the mouth was not elevated, and the patient did not report dysphagia nor dysphonia.

A CT scan with contrast elucidated a large right submandibular space collection which confirmed our differential diagnosis of right submandibular space infection associated with tooth 47. The patient was consented for incision and drainage of the right submandibular space collection under general anesthesia as well as extraction of tooth 47. The patient was informed that we will be using a conservative approach to avoid the traditional 3-5cm full thickness skin incision over the right submandibular space as well as extracting tooth 47. The patient was informed that he may require a full thickness incision should we be unsuccessful in obtaining gravity dependent drainage or encounter any brisk bleeding. After securing the airway, tooth 47 was surgically extracted, the socket was irrigated thoroughly using normal saline, and the gingiva was sutured with 3.0 chromic sutures. The skin of the neck was prepared with an antiseptic solution (Chlorhexidine), and an entry site into the submandibular space was chosen after a thorough physical exam. Local anesthetic (1% Lidocaine with 1:100000 epinephrine) was infiltrated into the skin prior to introduction of an 18-gauge needle attached to 5cc syringe into the right submandibular space (Figure1).

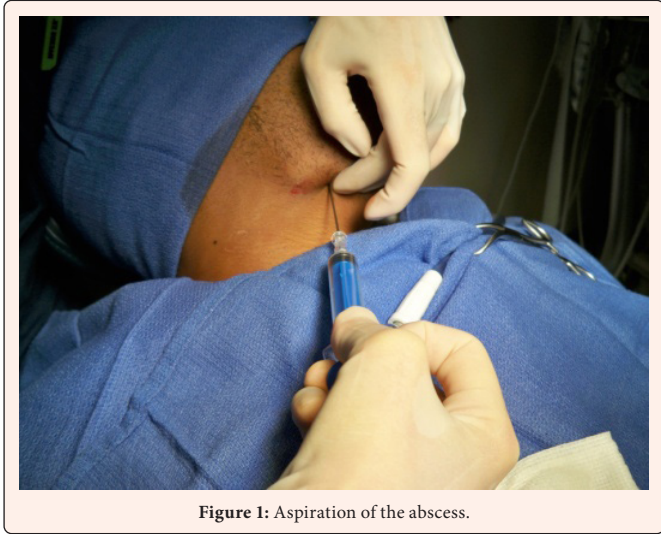


Figure 1: Aspiration of the abscess.

Return of purulent or sero-purulent discharge confirmed proper needle placement (Figure 2).



Figure 2: Purulent discharge evident.

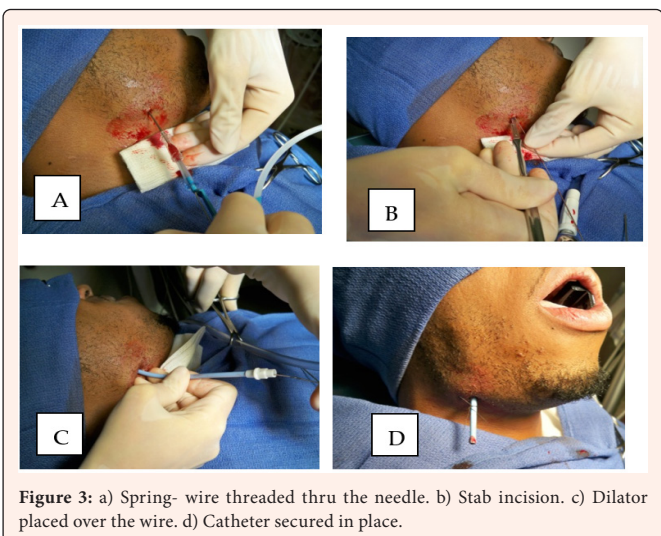


Figure 3: a) Spring-wire threaded thru the needle. b) Stab incision. c) Dilator placed over the wire. d) Catheter secured in place.

At this point, all the steps of the Seldinger technique were followed through: J wire threading, use of dilator, followed by insertion of the catheter and securing it to the skin using 3.0 silk suture (Figure 3).

We used a single cordis central venous line (CVL) catheter as it offered the most potent form of drainage in comparison to other available CVLs. The catheter was thoroughly irrigated with normal saline using a 20cc syringe until the fluid draining out the catheter was noted to be clear.

Results

Following the procedure, the patient was extubated and transferred to the post-anesthesia care unit; on post-operative clinical examination the right marginal mandibular nerve was intact. The patient was placed on a broad-spectrum antibiotic (Cefazolin 1g administered intravenously every 6 hours pending final culture and sensitivity results of the aspirated pus that was submitted). The patient was subsequently sent for a repeat CT scan with contrast to verify the correct placement of the catheter (Figure 4).



Figure 4: (A&B) Pre-operative CT scan showing a right submandibular abscess. (C&D) Post-operative CT scan confirming position of catheter tip.

The patient's recovery was subsequently uneventful; the catheter was removed 24 hours after surgery and the patient was discharged on oral Augmentin 875mg every 12 hours for 7 days. He was scheduled for a follow up appointment 7 days post-operatively. At the follow-up appointment, the patient had no voiced complaints and his right submandibular swelling was greatly reduced with no tenderness upon palpation. The patient had normal mouth opening of 48mm inter incisal distance, and he reported not needing oral analgesia beyond 72 hours of the initial surgery. The patient's recovery was comparable to what can be reasonably expected from a traditional extraoral I&D, although no scar was discernible at the site of drainage. Furthermore, it was not necessary that the patient be scheduled to be treated in the operating room under general anesthesia, as is frequently the case for deep space neck infection patients.

Discussion

Deep space infections in the oral and maxillofacial region remain an important management challenge for the practicing surgeon, especially those in private practice [5]. Private practitioners often choose to treat these patients in an operating room rather than their own clinics due to the potential risks for sepsis or airway complications, although this may result in exorbitant costs for the patient greatly exceeding what would be incurred for clinical management in an outpatient setting [5]. Hospital-based treatment of these infections is associated with the following: an average ICU stay of 1-3 days, an average ward stay of 3-4 days, and an average hospital



cost of approximately \$4000-10,000 [7-9]. Furthermore, Hospital-based treatment of odontogenic infections is on the rise in the US as states restrict Medicare dental benefits to emergency-only [8,9]. These are challenging facts facing many surgeons in the community. Despite several described alternative methods for drainage of deep space neck infections, surgical incision and drainage continues to be the most widely utilized method and the standard of care [5]. CT-guided percutaneous catheter drainage and an ultrasound-guided closed drainage of the head and neck abscesses are examples of techniques developed to minimize the risks of inadvertent injury to the surrounding structures [10]. Although highly effective in well-defined, unilocular abscesses, both techniques require highly trained individuals and additional imaging techniques in order to be properly and safely performed. For those reasons, they are most often a non-viable option during after-hours emergency visits, and in a private office setting. The technique described in this case report is yet another modification of the classic Seldinger technique for venous access. Many modifications of the Seldinger's technique have been deployed by different specialties, with the common goals of decreasing invasiveness and morbidities related to access surgery [11-14]. A potential reason why this technique may not be effective in some cases is that abscesses produce suppuration with varying viscosities. If even a larger needle like a 14-gauge needle is not sufficient to drain an abscess, a traditional I&D incision must be made. However, as was explained to the patient in this case report, the conservative approach can be attempted first and only moved to the traditional approach if indicated.

Conclusion

The technique presented in this case report may offer an alternative drainage strategy for a surgeon tasked with treating patients with an established deep neck infection. As this technique is more minimally-invasive than the traditional extraoral incisions, the facial esthetics are less likely to be compromised while also saving the additional resources and expenses associated with treating an emergency room patient by booking them for an operating room procedure as opposed to treating the patient bedside under local anesthesia. However, additional research is indicated further comparing this technique with the traditional I&D technique before a broad recommendation can be made.

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