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Fascial Space Infections: A Case Series

[1]Dr. Sunil Vasudev, MDS, Professor and HOD, Department of Oral and Maxillofacial surgery, D A Pandu Memorial R V Dental College, Bangalore

[2]Dr.Gowrishankar R, Post Graduate, Department of Oral and Maxillofacial Surgery, D A Pandu Memorial R V Dental College, Bangalore

[3]Dr.Sahana M S, MDS, Fellow (ICOI), Senior Lecturer, Department of Oral and Maxillofacial Surgery, D A Pandu Memorial R V Dental College, Bangalore

[4]Dr.Sarayu Gopal, MDS, Senior Lecturer, Department of Oral and Maxillofacial Surgery, D A Pandu Memorial R V Dental College, Bangalore

[4]Dr.Bhumika R, Post Graduate, Department of Oral and Maxillofacial Surgery, D A Pandu Memorial R V Dental College, Bangalore

Corresponding Author: Dr. Sunil Vasudev, MDS, Professor and HOD, Department of Oral and Maxillofacial surgery, D A Pandu Memorial R V Dental College, Bangalore

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Introduction

Space infections are a group of severe bacterial infections in potential spaces and fascial planes of the neck. Abscesses, cellulitis and phlegmons can spread along these fascial planes from the skull base to the mediastinum and cause serious and potentially life-threatening complications.[1] The occurrence of these infections have increased over time due to the inevitable battle that has ensued between discovering new antibiotics vs antibiotic resistance. However, most space infections require the following of basic and simple principles of surgery and medicine at the crucial moment of its incidence in order to prevent subsequent life threatening complications.

The most common etiology is odontogenic (35–42%) and pharyngotonsillar infections. Other causes include salivary gland infections, penetrating or blunt trauma, a foreign body, iatrogenic factors such as prior surgery and dental procedures, neoplasm, lymphadenitis and infected cysts. Unknown etiology varies in the literature and remains around 8–57% of cases. Here we discuss three cases of infections of various spaces and their surgical management.

Keywords: Cellulitis, Lymphadenitis, Odontogenic, Pharyngotonsillar Infections, Spread

Case 1

A 57 year old male patient reported to OUR CENTRE with a chief complaint of a swelling with respect to the right side of face which lasted for a week (Figure 1). The swelling was sudden in onset and gradual in progression. Localized tenderness and local rise in temperature over the swelling was noted. The patient was febrile. The patient consulted a local clinic nearby for the same and was prescribed antibiotics unbeknownst to him which did not reduce his symptoms. He was a known case of Type 2 Diabetes Mellitus, Hypertension and was also undergoing dialysis. After Obtaining Physician and anaesthetic fitness, patient was taken in for surgery.

Figure 1: Pre Operative Records

(A diffuse swelling is noted over the right malar region with underlying erythma. Obliteration of nasolabial angle is noted with asymmetry and swelling of the upper lip)

Treatment Done

The surgery performed was an incision and drainage via the intra oral route.

General anaesthesia was achieved via left oral intubation with the tube shifted to the left. The patient was promptly painted and draped following standard aseptic protocols. Local anaesthesia with vasoconstrictor was administered to the proposed surgical site. A vestibular incision was placed spanning the right canine (13) to the first molar (16) roughly measuring 4cm in greatest dimension. Soft tissue planes were dissected in order to reach the locules that underly the infectious zone. Using a lister's sinus forcep, the infectious locules were broken and the pus was drained and sent for culture and antibiotic sensitivity. A corrugated rubber drain (Figure 2) was placed in situ to allow for continuous and slow drainage of any residual pus. The drain was secured to the oral mucosa via an intra oral approach using 2 - 0 silk sutures. The incision was closed via 3 - 0 silk sutures. The patient was then extubated and shifted to recovery Uneventfully.

Figure 2: Intra Operative Photos

(After incision and drain AGE, a corrugated rubber drain was placed in situ and sutured using 2 - 0 silk sutures)

The post operative period in the hospital was uneventful. Dressings were done every day followed by every alternate day dressing for a period of 2 weeks. The wound was left open and antibiotic creams were applied. Post 1 month of the procedure, the patient regained full normalcy and functioning capacity with restoration of normal facial symmetry, lack of pain or tenderness, no fever spikes or any discomfort facially (Figure 3).

Figure 3: Pre Operative vs Post Operative Profile

(Reduction in both the cheek and lip swelling is noted on the right side of the face. Restoration of facial symmetry and external lip lines are visible. Reduction of external flare of the nares is also visible)

Case 2

A 65 year old male patient presented with a chief complaint of a swelling with respect to the left side of his face since 3 days. The swelling was sudden in onset, gradual in progression and was associated with fever which lasted for 2 days. The patient did not have any medical comorbidities. He was a habitual gutka and pan chewer and underwent a recent extraction after which he continued to chew gutka and pan as a result of which the extraction site showed signs of infection. Intra oral examination revealed a dry socket in relation to 43 and 44 teeth region. Bilateral submandibular lymph nodes were palpable and tender. The extent of the swelling was not confined to one space. CT of the face and neck, revealed infection having spread to the paratracheal, carotid and parotid spaces as well chiefly on the right side with some contralateral lymph node involvement. A cutaneous opening was seen over the right side of the neck near the anterior border of the sternocleidomastoid muscle which exuded a purulent discharge. After obtaining prompt medical and anaesthetic fitness, the patient was taken up for surgery.

Figure 1: Pre Operative Records

(Deep neck space infection involving multiple spaces spanning from parotid above to carotid space below. Note the poor overall periodontal support of all the teeth on the OPG)

Treatment Done

The surgery performed was an incision and drainage under general anaesthesia via intra and extra oral approaches. General anaesthesia was achieved via left nasal intubation. Painting and draping was done following standard protocols. Local anaesthesia with vasoconstrictor was administered to the proposed surgical site. A simultanous intra and extra oral incison was placed. The extra oral incision was placed through the cutaneous opening in the neck. A second lateral incision was placed 2 cm behind the primary incision and the tracts were cojoined. Introduction of the lister's sinus forceps allowed for careful disintegration of the purulent locules of infection. Pus was chiefly drained extra orally. Two corrugated rubber drains were placed into the existing incisions and sutured in place using 2 - 0 silk. The extra oral site was closed using 3 - 0 silk. Patient was extubated and shifted to recovery.

Figure 2: Intra Operative Photos

(After placing an incision the lister's sinus forceps is introduced to break the locules of purulent collection in order to relieve the deep neck space infection)

The post operative period was uneventful. As the patient did not suffer from any comorbidities, the healing period

was quick and the cutaneous incisions closed rather quickly in less than 6 weeks of time.

Figure 3: Pre Operative Vs Post Operative
(Significant reduction in facial swelling and no visible external scar)

Case 3

A female patient named Radhamma aged 56, had reported with a chief complaint of swelling in the neck since 3 days. The patient had undergone extraction of her lower teeth (41 region) 5 days prior to the current day. The swelling was sudden in onset, gradual in progression (Figure 1). No previous history of swelling noted. On palpation the swelling displayed a local rise in the temperature and was tender on palpation. The patient reported a few episodes of fever. On medical examination, her history was suggestive of Type 2 Diabetes Mellitus since 10 years and was on medication for the same. However, her Diabetic control was poor with a mean average random blood sugar of 503mg/dl. Post clinical examination a diagnosis of submental space infection was surmised. Post controlling the Diabetes and obtaining medical and anaesthetic fitness, the patient was taken up for surgery.

Figure 1: Note The Submental Swelling And Erythma Surrounding The Swelling

Treatment Done

General anaesthesia was achieved via oral intubation with the tube shifted to the right side of the face. Painting and draping was done following standard aseptic protocols. A single stab incision was placed using a No 11 blade, roughly measuring 2 x 1cm in greatest dimension (Figure 2). Lister's sinus forceps was introduced in order to break the locules and drain the purulent discharge. The purulent discharge was sent of culture and antibiotic sensitivity. A corrugated rubber drain was placed and sutured in place using 3 - 0 silk. A dressing was placed over the drain. The patient was extubated uneventfully.

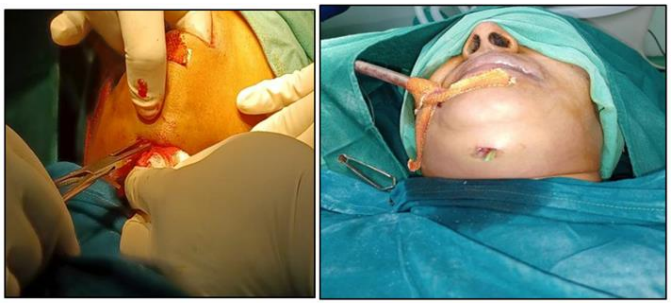

Figure 2: A median submental stab incision is placed and a Lister’s sinus forceps in introduced to break the purulent locules following which a rubber drain is placed
The post operative period showed no recurrence of the swelling, nor any significant induration of any form. Regular dressings on alternate days were done in order to drain the remaining purulent discharge in the cavity. An open dressing was placed after 1 week of surgery and

the patient regained normal facial symmetry and form in 2 weeks post operatively (Figure 3).

Figure 3: Note the reduction in facial swelling and restoration of facial form. The incision has also healed well.

Discussion

Odontogenic infections are one of the most commonly encountered conditions in the field of oral and maxillofacial surgery. These infections may range from low-grade, well-localized like a periapical abscess that require minimal treatment to severe, life-threatening fascial space infections. [1]

The fascial spaces that may be directly affected by odontogenic infections are called 'primary spaces', such as the canine, buccal, infratemporal, submental, sublingual, or submandibular spaces. Failure to control primary spaces infection may cause them to spread to 'secondary spaces', such as the submasseteric, pterygomandibular, and temporal spaces. Infections that are not treated properly can spread beyond secondary spaces to deep neck fascial spaces such as the lateral pharyngeal, retropharyngeal, and prevertebral spaces. It is difficult to treat patients who have these space infections without drainage of the purulent exudates, since those areas are surrounded by connective tissues that have poor blood supply. Patients with Diabetes Mellitus have higher risks of infection due to abnormal phagocytosis, persistent reduction of blood flow, and cell-mediated immune abnormalities typical of diabetic patients. Geerlings and Hoepelman suggested that the function of neutrophils, such as chemotaxis or production of cytokines, is reduced under high blood sugar levels. These defects of the immune system along with vascular abnormalities render diabetic patients at higher risk for a variety of invasive infections. [2]

The anatomy of the head and neck is complex, with many spaces that are connected to each other. The incidence of deep neck infections is decreasing with the use of antibiotics. However, they may still lead to lethal complications, such as airway obstruction, mediastinitis or septic shock. The mainstay of treatment for deep neck infections is adequate surgical drainage of the abscess cavity coupled with appropriate antibiotic coverage and securing the airway.

Close attention must be paid to the management of patients with deep neck infections, especially patients with diabetes mellitus and cardio/pulmonary diseases or patients with multiple space infections. [3]

Most outpatient odontogenic infections are treated with β-lactam antibiotics. The β-lactam ring is crucial to the bactericidal activity of the medication because of their inhibition of bacterial cell wall biosynthesis. β-Lactam antibiotics include penicillin derivatives, cephalosporins, monobactams and carbapenems.[4]

The accepted conventional technique has been described by Berman (1950) as follows: 'Should the surgeon elect to open the abscess, he will do so through the centre'.

Thoma states: 'The incision should be made where the pus is closest to the surface'.

It is a well-known fact that during abscess formation, as the pressure mounts, the pus breaks through the bone, periosteum, muscle, deep fascia, and outer surface of the skin. This causes the skin over the abscess to become tense, shiny, thin, and cherry-red, and it may become necrotic. In view of this, if the incision is made in the

'pointing' or at a soft spot in or near the centre of the abscess, naturally the wound will either heal by second intention or result in an undesired scar which leads to considerable deformity. [5]

Conclusion

When discussing space infections, the physician/surgeon's mind is acclimated to high risk events and is usually alerted to advanced care and techniques in order to provide an environment that pulls the patient out of significant danger. However, dealing with space infections, as shown above, once the patient has been medically stabilized is a matter of basic principles. A simple incision and drainage covers a wide area of space infections of different parts of the face quite well. The timing of the intervention becomes key as certain medical conditions can exacerbate simple clinical scenarios as the body just cannot cope with simple antibiotics. In those scenarios, surgery first approach may be the way to go as the medical condition may be a consequence of the swelling. Despite the conundrum, prompt care with IV antibiotics followed by simple clinical examination can give us an insight into the progression and stages of these space infections which can then invariably be simply incised and drained. Simple dressing post operatively and medical management is the key and paramount in deciding the ultimate fate of the patients health post the development of a space infection.

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