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Case Report

Space Infections in Children- A Case Report Series

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Abstract

Head and neck area infections in children can be severe, necessitating an immediate diagnosis and course of treatment. These infections are frequently brought on by periapical abscesses, dental trauma, untreated dental caries (cavities), or consequences from dental operations. Poor oral hygiene practices and postponed dental treatment in children might raise the risk. Swelling, discomfort, fever, trouble swallowing, trismus (inability to open the mouth), and occasionally difficulty breathing or speaking are common symptoms in children with head and neck region infections. Clinical examination, patient history, and imaging tests like dental radiographs (X-rays) and CT scans to map out the extent and location of the infection are commonly used by paediatric dentists and healthcare professionals to identify these illnesses. To manage the illness, broad-spectrum antibiotics are frequently administered. These infections, if ignored, can result in potentially fatal consequences such as cellulitis, Ludwig's angina, mediastinitis, and sepsis.

Keywords: Buccal space infection; Temporal space infection; Space infections.

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Introduction

Odontogenic infections occur when the pulpal or periodontal tissues of a tooth or teeth become infected. These infections are usually the result of untreated necrotic pulpal tissue (e.g., from caries or trauma) or significantly involved periodontal or pericoronal disease [1]. Failure to treat odontogenic infections rapidly can lead to their spread, which can result in potentially life-threatening situations [2]. Complications of odontogenic infections include airway obstruction, mediastinitis, necrotizing fasciitis, cavernous sinus thrombosis, sepsis, thoracic empyema, Lemierre's syndrome, cerebral abscess, orbital abscess, and osteomyelitis [3,4]. This is especially pertinent for paediatric patients, whose underdeveloped immune systems and lesser cardiopulmonary reserve

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render them particularly vulnerable to fast decompensation in the face of severe illnesses [5].

Deep neck space infections can occur in children and require more intimate management due to their rapidly progressive nature [6-8]. These infections can present with symptoms such as fever, neck pain, dysphagia, drooling, and stridor, and can lead to airway compromise or spread into the chest to cause mediastinitis [7]. The most common deep neck space infections in children are parapharyngeal and retropharyngeal space infections, which are usually preceded by an upper respiratory infection [7,8].

Treatment of head and neck space infections in children should consist of accurate physical diagnosis aided by imaging studies, empiric antibiotic therapy that covers gram-negative and beta-lactamase-producing organisms as well as gram-positive organisms and anaerobes, and timely surgical intervention if necessary [8]. It is important to note that deep neck space infections are potentially dangerous complications of upper respiratory tract or odontogenic infections and can be life-threatening if not diagnosed properly [9].

Dental diseases, such as dental caries and gum disease, and weakened body resistance, caused by Infections most typically spread from the teeth and alveolar process to the lateral and retropharyngeal spaces through the submandibular region to the pterygomandibular space, and then to the lateral pharyngeal space [10,11]. The infection might move from the lateral pharyngeal region to the retropharyngeal area. Lymphatic drainage from odontogenic sources to the retropharyngeal region is uncommon.

Case reports

Case 1

An 8-year-old boy had come to the Department of Pediatric and Preventive Dentistry, KVG Dental College and Hospital, with the chief complaint of pain, swelling in the lower right back region and fever since 2 days. According to history of present illness, pain used to be of sudden onset and continuous in nature and it aggravated while having food, Swelling was mild on onset. There was no relevant prenatal and medical history. On extraoral examination, patient had normal gait, height, and weight, was well oriented to time and place, the mesencephalic shape of head, mesoprosopic facial form. Facial asymmetry was noted with restricted mouth opening path. On palpation, the right side of face was swollen with tenderness over the body of mandible and the lymph nodes were palpable.

Figure 1: Postoperative vestibular obliteration.

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Figure 2: (a) Vestibular obliteration; (b) Radiolucency suggestive of pulp involvement.

On intraoral examination, there was slight welling in the vestibular region around the teeth in respect to 84,85. The muccobuccal fold was obliterated which involved the submandibular region. Deep dentinal caries w.r.t 84,85,74,75. IOPA w.r.t 84 and 85 showed radiolucency suggestive of pulp involvement along with PDL widening.

The treatment planned was incision and drainage followed by pulpectomy and stainless-steel crown placement. Inferior alveolar nerve block was administered, and small incision was given buccally for pus drainage and the pus was aspirated. The was prescribed antibiotics and analgesics.

Figure 3: Postoperative stainless steel crown placement.

Case 2

A 5-year-old girl had come to the Department of Pediatric and Preventive Dentistry, KVG Dental College and Hospital, with the chief complaint of pain, swelling in the lower right back region and fever since 4 days. According to history of present illness, pain used to be of sudden onset and continuous in nature and it aggravated while having food, Swelling was mild on onset. There was no relevant prenatal and medical history. On extraoral

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examination, patient had normal gait, height and weight, was well oriented to time and place, the mesencephalic shape of head, mesoprosopic facial form. Facial asymmetry was noted with restricted mouth opening path. On inspection, Food lodgement was present in respect to 85 while probing. On palpation, the right side of face was swollen with tenderness over the body of mandible and the lymph nodes were palpable.

Figure 4: Preoperative Buccal mucosal obliteration.

On intraoral examination, there was slight welling in the vestibular region around the teeth in respect to 84,85. The muccobuccal fold was obliterated which involved the submandibular region (buccal mucosal obliteration).

The treatment planned was incision and drainage followed by pulpectomy and stainless-steel crown placement. Inferior alveolar nerve block was administered, and small incision was given buccally for pus drainage and the pus was aspirated. The was prescribed antibiotics and analgesics.

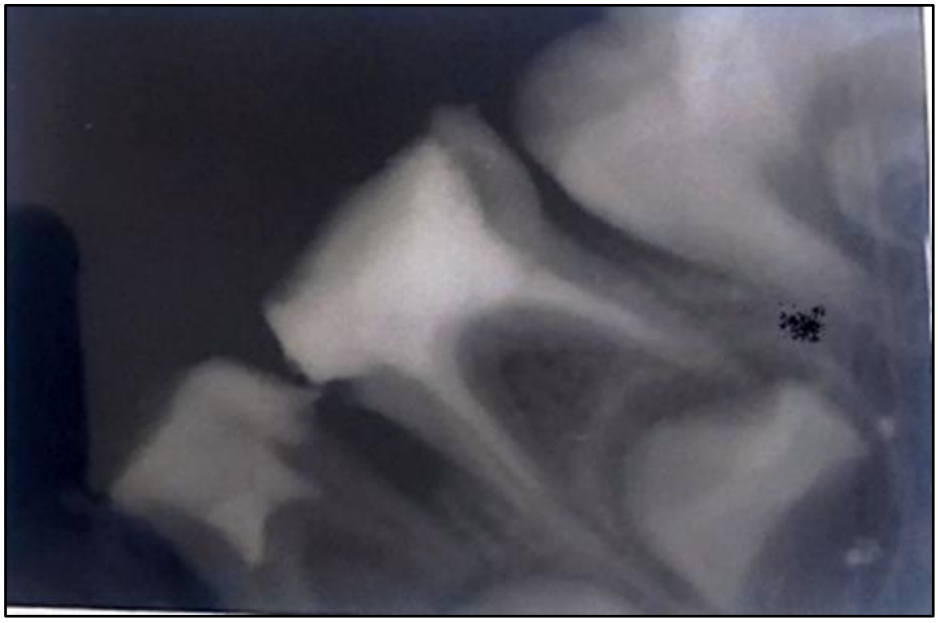

Figure 5: Obturation.

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Figure 6: (a) Stainless steel crown placement; (b) Postoperative.

Case 3

A 6-year-old girl had come to the Department of Pediatric and Preventive Dentistry, KVG Dental College and Hospital, with the chief complaint of pain, swelling in the lower right back region and fever. According to history of present illness, pain used to be of sudden onset and continuous in nature and it aggravated while having food, Swelling was mild on onset. There was no relevant prenatal and medical history. On extraoral examination, patient had normal gait, height, and weight, was well oriented to time and place, the mesencephalic shape of head, mesoprosopic facial form. Facial asymmetry was noted with restricted mouth opening path. On palpation, the left side of face was swollen with tenderness over the body of mandible and the lymph nodes were palpable. On intraoral examination, there was slight welling in the vestibular region around the teeth in respect to 74,75. The muccobuccal fold was obliterated which involved the submandibular region. Deep dentinal caries w.r.t 74 and 75. IOPA w.r.t 74 and 75 showed radiolucency suggestive of pulp involvement along with PDL widening. The treatment planned was incision and drainage followed by pulpectomy and stainless-steel crown placement. Inferior alveolar nerve block was administered, and small incision was given buccally for pus drainage and the pus was aspirated. The was prescribed antibiotics and analgesics.

Figure 7: (a) Obturation placement; (b) Stainless steel crown.

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Discussion

Anaerobic infections can occur in children and may be serious and life-threatening [12-14]. Anaerobes are part of the indigenous flora, which resists colonization and invasion from non-indigenous flora. However, infections from anaerobes do occur and usually result from a breakdown of the mucocutaneous barrier or immunosuppression. Anaerobic infections in the skin and soft tissue can be caused by the cutaneous anaerobic flora, mainly Peptostreptococcus, but are most often caused by mixed anaerobic infections. Anaerobes can cause a perirectal abscess or facial abscess in children [12]. In a survey of anaerobic infections in children, blood cultures have been found to be the second most frequent source of anaerobic organism. Anaerobes can be the main cause of infection in the pleural spaces and lungs, intra-abdominal, gynaecologic, central nervous system, upper respiratory tract, and skin and soft-tissue diseases [12,13]. The bacteriology of deep neck space infections tends to be polymicrobial, involving both aerobic and anaerobic bacteria from the primary source. Initial empiric antimicrobial therapy should include broad coverage for aerobic bacteria, including gram-positive organisms such as Staphylococcus aureus and Streptococcus pyogenes, and gram-negative bacteria such as Haemophilus influenzae and Klebsiella pneumoniae. Anaerobic bacteria, including gram-positive organisms such as Peptostreptococcus species, and gram-negative bacteria such as Prevotela species, should be broadly covered as well [12].

Odontogenic infections are often polymicrobial, with exacting anaerobes and facultative anaerobes accounting for 59% to 75% of cases. The viridians and streptococci are the most prevalent facultative anaerobes. These groups are found in the oral microbiome and are known as opportunistic pathogens. Streptococci, Fusobacterium, Prevotella, Bacteroides, and Porphyromonas species are the most prevalent anaerobic bacteria involved [14,15].

Buccal and submandibular space infections are types of deep neck space infections that can be caused by anaerobic bacteria. The most involved space in deep neck space infections is the submandibular space, followed by the buccal space. The predominant anaerobic organisms isolated in deep neck infections are Prevotella, Porphyromonas, Fusobacterium, and Peptostreptococcus spp [15]. The frequency of beta-lactamase production by oral anaerobes has also been reported in submandibular space infections. The most prevalent anaerobic bacteria in these infections include gram-positive cocci, such as Peptostreptococcus spp., and gram-negative rods, such as Bacteroides [14].

Buccal and submandibular space infections caused by anaerobes can present with the following symptoms:

- Pain in any involved teeth
- Severe, tender, localized submental and sublingual induration
- Boardlike firmness of the floor of the mouth
- Brawny induration of the suprahyoid soft tissues
- Drooling
- Trismus
- Dysphagia
- Stridor caused by laryngeal edema
- Elevation of the posterior tongue against the palate

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- Fever
- Chills
- Tachycardia

The treatment of buccal and submandibular space infections involves incision and drainage with placement of drains deep into the mylohyoid muscles to relieve the pressure. Antibiotics should be chosen to cover both oral anaerobes and gram-negative rods [16]. The most frequently used antibiotics for submandibular space infections are amoxicillin/clavulanate potassium, clindamycin, and ampicillin-sulbactam [17].

Inoculation causes ill-defined, squishy, and slightly painful swelling. The cellulitis stage describes the afflicted area's surrounding cellular reaction and eventual cellular edema. This stage is characterized by distinctive swelling, which may result in airway compromise. Cellulitis has indistinct boundaries and is widespread, hard, and painful. This cellulitic swelling compresses adjacent blood arteries, compromising tissue nutrition and oxygen delivery, leading to liquefactive necrosis (abscess) when combined with cellular host defences. In comparison to the firmer and more extensive cellulitis stage, the lesion becomes more localised and fluctuant.

As the infection progresses, it can spread to adjacent and deeper locations, drain spontaneously by tissue perforation, or be surgically drained, which, in conjunction with host defence systems, aids in the beginning of the healing process known as the resolution stage. Infections from anaerobes result from breakdown of mucocutaneous barrier or immunosuppression.

Endodontic odontogenic infections often begin by degrading bone in the periradicular area of the problematic tooth. Infections propagate through potential spaces after the cortical bone is perforated. Infections can travel from one possible area to another, frequently developing to deeper voids that could endanger the host defence system, airway, or both.

A comprehensive history aids in narrowing the differential diagnosis and determining the severity of a disease condition. The major complaint should be expressed by the patient, and it should include the location, intensity, duration, and quality of pain, all of which are key markers in predicting the severity of the infection. Fever and malaise, breathing problems, stridor, trouble swallowing with discomfort, dysphonia, and trismus are signs and symptoms of deep space infections [18].

A physical examination that evaluates the patient before checking the oral cavity. Following vital signs (temperature, blood pressure, heart rate, and respiratory rate), a general examination of the patient should be performed to search for symptoms of discomfort (e.g., weariness, lethargy, difficulty breathing, trouble speaking, and stridor). A head and neck exam should be performed to check for general asymmetry, edoema, lymphadenopathy, or erythema.

A study was conducted by David S to evaluate the management of abscessed teeth that were previously left open. The researchers found that instrumenting and closing these abscessed teeth at the same appointment resulted in favourable outcomes [19].

The study confirmed previous findings from another study, which showed that instrumenting and closing an abscessed tooth at the same appointment led to minimal exacerbations (complications).

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Additionally, it supported previous results indicating that teeth with periapical radiolucent areas (areas of bone loss around the root tip) were more likely to experience exacerbations compared to teeth without such areas.

In 1977 study reports by Weine, et al., stating high incidence of acute exacerbation when instrumenting and closing abscessed open teeth during the same visit.

In this study, researchers compared the outcomes of treating abscessed open teeth by instrumenting and closing them with a dressing change versus without a dressing change. The study, involving 311 patients, found a slightly higher incidence (0.3%) of reopened teeth when a dressing change was performed. However, the results indicate that instrumenting and closing abscessed open teeth at the same appointment does not significantly increase the risk of acute exacerbations, suggesting it as an effective and efficient treatment approach for managing such cases.

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