

# การติดเชื้อของช่องว่างใต้ขากรรไกรในเด็กจากการติดเชื้อที่ไม่เกี่ยวข้องกับฟัน

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## Abstract: Pediatric submandibular space infection from non-odontogenic cause

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Submandibular space infection is a serious infection that can occur as a result of odontogenic or non-odontogenic infections. The infection should be treated promptly, as it can spread rapidly, resulting in airway obstruction. The author reported an eight-month-old boy without any systemic diseases presenting with a swelling of the lower right facial region for three days that rapidly grew in size for one day despite intravenous antibiotic administration, suspected source from submandibular gland abscess. Intravenous fluids, more proper empirical antibiotics, and analgesics were administered to the patient. The incision and drainage were done extraorally under general anesthesia. The patient improved gradually and full recovery was within 10 days.

**Keywords:** Submandibular space infection, submandibular gland infection, non-odontogenic infections, incision and drainage.

### บทคัดย่อ

การติดเชื้อของช่องว่างใต้ขากรรไกรเกิดจากการติดเชื้อจากฟันหรือไม่เกี่ยวข้องกับฟันก็ได้ การติดเชื้อที่ตำแหน่งนี้ควรต้องรีบรักษาทันทีเนื่องจากสามารถติดเชื้อลุกลามจนทำให้เกิดภาวะทางเดินหายใจอุดตันได้ ผู้เขียนรายงานผู้ป่วยชายอายุ 8 เดือน ไม่มีโรคประจำตัวมาก่อน มีอาการคอตันขวาบวมนาน 3 วัน และบวมมากขึ้นอย่างรวดเร็ว 1 วัน แม้จะได้ยาฆ่าเชื้อทางหลอดเลือดดำแล้ว ซึ่งอาจมีสาเหตุมาจากต่อมน้ำลายใต้ขากรรไกรอักเสบเป็นหนอง ผู้ป่วยได้รับการรักษาโดยให้สารน้ำทดแทน เปลี่ยนยาฆ่าเชื้อให้เหมาะสม และได้รับการผ่าตัดระบายหนองจากคอภายนอก ผู้ป่วยมีอาการดีขึ้นตามลำดับ และหายภายใน 10 วัน

**คำสำคัญ:** การติดเชื้อของโพรงต่อมน้ำลายใต้ขากรรไกร, การติดเชื้อของต่อมน้ำลายใต้ขากรรไกร, สาเหตุการติดเชื้อที่ไม่ได้เกิดจากฟัน, การผ่าตัดระบายหนอง

sialadenitis of the submandibular gland, lymphadenitis, peritonsillar/para-pharyngeal abscess, trauma, and surgery.<sup>1,3</sup>

Infections can spread rapidly in children, resulting in significant symptoms such as fever, dehydration, and airway compromise. For a good result, early detection and proper management are most important.<sup>4</sup> This case revealed the management of submandibular space infection in a child resulted from submandibular gland infection by empirical antibiotic, hydration and incision and drainage.

### CASE-REPORT

An eight-month-old boy with no systemic disease consulted to ENT department with a swelling of the lower right facial region for three days that rapidly grew in size for one day despite the intravenous cloxacillin administration. The retrospective history revealed a 3-day history of coughing, clear nasal discharge without fever, dyspnea, or stridor. And the swelling of the right lower face was detected within 3 days. He was previously healthy and fully immunized. Based on history and

### Introduction

The submandibular space is a potential space beneath the floor of the mouth that is divided into two spaces by the mylohyoid muscle. It is composed of two spaces, sublingual and submaxillary.<sup>1</sup> The majority of submandibular space infections are caused by odontogenic bacteria.<sup>2</sup> Additional causes include

symptoms, it was suspected that he had an infection in the right submandibular space. The treatment plan was explained to the parent, and parental informed consent for publication was also obtained.

At the time of examination, the patient had a temperature of 37.7°C, a pulse rate of 133, and a respiratory rate of 36. Extraoral examination revealed a 5\*3 cm swelling involving the right lower facial region. It was tender to the touch and accompanied by redness and a locally elevated temperature. (Figure 1)

Except for the normal upper and lower central incisors, no teeth were found during the intraoral

examination. There was no evidence of injection, bulging, or swelling on the floor of the mouth or in other areas of the oral cavity. There were no signs of facial nerve palsy or airway obstruction. The white blood cell count was 26,420 cells/mm<sup>3</sup>, and the hemoglobin concentration was 32.2 g/dl. Due to the patient's dehydrated status from decreased oral intake, intravenous fluids were started immediately. The patient's previous antibiotic was then changed to amoxicillin/clavulanate 90 mg/kg per day.



Figure 1: Preoperative photograph



Figure2: Preoperative ultrasound neck

Ultrasound of the neck was done. The result showed heterogeneous echogenicity with some cystic change and minimal internal vascularity within enlarged, swelling right submandibular glands; probably the liquefied right submandibular abscess was guessed. The cavity was measured approximately 2.7x4.6x3.1 cm in transaxial and vertical dimensions, and diffuse subcutaneous swelling was observed at the submental and the right submandibular region. (Figure 2)

Under general anesthesia, the incision was made two fingerbreadths below the lower mandibular border to avoid injuring the marginal branch of the facial nerve. The pus discharge was removed from the right submandibular space. (Figure 3)

The pus samples were sent for Gram staining, acid-fast bacillus (AFB), and bacteria culture.



Figure 3 : Exudate sample from Drainage site



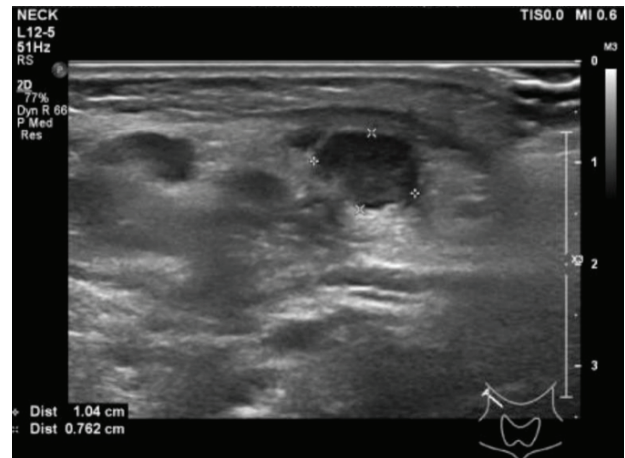
Figure 4: Penrose drain secured with silk 3-0

A Penrose drain was placed to ensure the drainage patency. (Figure 4) There was evidence of mild right

marginal mandibular branch palsy following the operation. (Figure 5)



*Figure 5: Right marginal mandibular branch palsy*



*Figure 6: Postoperative day8 ultrasound*

On the fifth day of admission, AFB showed negative results. Gram stain revealed a cluster of gram positive cocci. Staphylococcus aureus was identified as the predominant bacteria in the aerobic culture. It was found to be resistant to Penicillin but susceptible to Clindamycin, oxacillin, and erythromycin. Clindamycin (25 mg/kg per day) was started according to the sensitivity report.

On the eighth day of admission, an ultrasound was requested to evaluate the residual lesion. it revealed that there was a much-decreased size of the previous irregular infiltrative hypoechoic lesion within the right

submandibular space, now appearing as 1.4x0.8x1.2 cm (the previous was 2.7x4.6x3.1 cm). (Figure 6)

Throughout the admission, the vital signs remained stable. The swelling had subsided, and the Penrose drain was then removed. The patient was admitted and then discharged after ten days of intravenous antibiotics. The patient was recalled after two weeks. There were no signs of pain or infection at the wound site on clinical examination. (Figure 7) Following a six-month follow-up, the facial nerve palsy was completely recovered. (Figure 8,9)



*Figure 7: Two-week follow up*



*Figure 8: Six-month follow up*



*Figure 9: Six-month follow up*

## DISCUSSION

The authors present an 8-month-old boy infant who developed a deep neck infection after a three-day-long respiratory tract infection. According to the literature, submandibular space infections are typically odontogenic.<sup>3</sup>

Eighty-one (87.1%) of the cases were odontogenic causes, while 12.9 percent were not.<sup>3</sup> Non-odontogenic causes included mouth trauma, mandibular fracture, complication of frenuloplasty, tonsillar infection, sialadenitis, and gingival infections, according to Perkins(2018) study.<sup>3</sup>

In this case, Differential diagnosis includes submandibular lymphadenitis that may have a similar clinical presentation.<sup>5, 6</sup> Lymphangioma, haemangioma, and congenital tumors should also be considered, but they are less likely since signs of inflammation are usually absent, unless there is a secondary infection.

There was no evidence of an odontogenic source in our case, still there was a history of prior respiratory tract infection, poor oral intake, and dehydration, all of which can result in submandibular sialadenitis, which can progress to an abscess and serious complication, Ludwig's angina, if not treated properly.

Spreading infections is a serious concern in children due to the resulting Ludwig's angina. It is a severe emergency in children due to severe dyspnea (children have a greater tongue fall back), a narrower airway, and asphyxia. All of these factors can precipitate a severe emergency, which must be avoided.<sup>7</sup>

Before surgical intervention, radiological evaluation is necessary to confirm the diagnosis and evaluate the extent of the inflammatory process.

In comparison to other diagnostic tools, ultrasound is considered completely safe and has no known side effects. It does not involve ionizing radiation, making it a safer alternative to CT scans and X-rays. Ultrasound is a suitable imaging investigation for showing and anatomically identifying abscesses, stones, and lymph nodes in this case.

The microbiology of these infections is usually polymicrobial with mixed aerobic, such as group A Streptococcus and Staphylococcus aureus, and anaerobic organisms. The Anaerobic bacteria predominance is believed to be underestimated but these species include Fusobacterium, Peptostreptococcus and Porphyromonas.<sup>8</sup>

Staphylococcus aureus, a skin contaminant, may be found in cultures of anterior and posterior neck abscesses including submandibular abscesses as these drainage sites are different from those of the oropharynx.<sup>9</sup>

Thus, the combination of penicillin and beta-lactamase inhibitor (amoxicillin/clavulanate, ticarcillin/clavulanate, piperacillin/tazobactam), cefoxitin, carbapenem, or clindamycin are considered the most effective antimicrobial agents. Antimicrobial treatment should be started as soon as possible after a diagnosis and before the surgery to shorten the infection cycle and reduce the chances of bacteremia.<sup>10</sup> Empirical antibiotics must be initiated before the culture results, with adjustments followed once culture reports are available. In the present case, intravenous amoxicillin/clavulanate was used and the culture report came to be penicillin resistance. The patient was then placed on clindamycin according to sensitivity. The infection, at last, was brought to control due to proper selection of broad-spectrum antibiotics, local drainage of infection.

## Conclusion

Despite the use of antibiotics, submandibular infections can progress to serious complications within a few hours. As a result, any infection of the facial soft tissues should be treated promptly. While antibiotic therapy may be sufficient in the early stages, it must

be emphasized that it does not substitute for effective incision and drainage. Thus, treatment of fascial space infections in our study included admission, appropriate empirical antibiotics, incision and drainage, and the etiologic cause should be identified and eliminated.

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