

# Right Submandibular Abscess Extended to the Right Neck and Right Auricular with Upper Airways Obstruction Grade 1 and Cerebral Palsy Spastic Quadriplegic: A Case Report

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**Abstract:** ***Introduction:** The submandibular abscess is one of the forms of a deep neck abscess. The abscess of the inner neck may be a peritonsillar abscess, retropharyngeal abscess, submandibular abscess, and Ludwig's Angina. Cerebral palsy is a disorder or disorder that occurs in a period of time in the development of children, about motor cells in the central nervous system, is chronic and not progressive due to abnormalities or defects in brain tissue unfinished growth. Patients with submandibular abscess in children with cerebral palsy with Upper airways obstruction grade 1 are rare, requiring special handling at emergency especially in pediatric patients. **Case Report:** A 13-year-old boy was complained of swelling on the right cheek without fever, the patient was given paracetamol syrup by the patient's parents and the swelling shrank. Then the patient complained about the swelling reappearing in the right neck and then the patient was taken to Hasan Sadikin Hospital Bandung and performed of urine catheter insertion for dehydration observation then drainage incision and application of penrose drain at submandible region. Medications given antibiotics, and intravenous analgesics. **Discussion:** The most important treatment of infections is removal of the offending source and proving path of drainage. Ancillary measures such as pharmacotherapy are aimed as supportive measures for the host, especially in cases of immune compromise. They are not meant to replace surgical intervention unless the infection is very early in its stages of development. Infections should be treated as soon as possible. To avoid respiratory failure, we should observe the patient's vital signs per 30 minutes. **Conclusion:** Successful results can be achieved for pediatric patients who can be treated with Incision and Drainage, removal of etiologic factor followed by a combo of three antibiotics.*

**Keywords:** Submandibular abscess, Cerebral palsy, Upper airways obstruction

## 1. Introduction

Dental disease is the underlying cause of most of inflammatory swellings which occurs either in or around the jaws. Inflammation may commence either at the root apices or gingival margins of erupted teeth, or in the soft tissues which surround and overlie the crown of an unerupted or partially erupted tooth. Inflammation around the apices of tooth root may result in the formation of pus. The pus tracks along the line of least resistance and perforates the bone at the site where it is thinnest and weakest and involves the surrounding soft tissues. Once the infection enters the tissues it may resolve, become localized or spread. These infections may range from superficial to deep neck infections [1]. The infections generally spread by following the path of least resistance through connective tissues and along facial planes. The infections can also spread to a site, distant to its origin causing considerable morbidity and occasionally death. In cases of acute odontogenic infection, the oral and maxillofacial surgeon needs to know whether the inflammatory process is in a stage of abscess formation, requiring primary evacuation of pus and administration of antibiotics or a cellulitis that can generally be treated with antibiotics alone. [2]

Submandibular space infection is a rapidly spreading, bilateral, indurated cellulitis occurring in the suprahyoid soft tissues, the floor of the mouth, and both sublingual and submaxillary spaces without abscess formation. Although not a true abscess, it resembles one clinically and is treated similarly. The condition usually develops from an odontogenic infection, especially of the 2nd and 3rd

mandibular molars, or as an extension of peritonsillar cellulitis. Contributing factors may include poor dental hygiene, tooth extractions, and trauma (e.g., fractures of the mandible, lacerations of the floor of the mouth). The aims of this study were to determine the pathways of odontogenic infection spread into the submandibular space and their relationship to the clinical symptoms. CT and MR imaging clearly demonstrated different pathways of the spread of odontogenic infection into the submandibular space, which influenced the manifestation of clinical symptoms. [2], [5]

Cerebral palsy (CP) refers to a group of permanent disorders of the development of movement and posture, causing activity limitations, which are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. Damage to the central nervous system cause disorders in neuromuscular, musculoskeletal and sensorial systems. These disorders result in posture and movement deficiencies. The causes of motor disorders are developmental retardation, abnormal muscle tone, muscle weakness, postural control deficiencies, sensorial problems, behavioral problems, orthopedic problems, abnormal movement patterns and reflex, activity, asymmetry and deformities. Within the scope of the assessment to be performed in terms of motor, besides the changes in the muscle tone, co-contraction capacities of the muscles, involuntary extremity and body movements, stabilization of the extremities, correction, balance and protective reactions, sitting balance, upper extremity and hand functions and sensory-perception problems; orthotics, need of mobilization tools and other aid tools, cooperation of the family and their knowledge on the disease also needs to be assessed. Modern therapy methods

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in CP rehabilitation aim to develop the maximum functionality and independence possible for the child by using the present neuromotor potential.

Quadriplegia is also defined as involvement of the whole body, however upper parts being more involved than, or at least as equally involved as, the lower parts. Spasticity dominates in all four extremities. The children develop very minimal functional movements and they are at great risk of contractures and deformities. Distribution is usually asymmetrical. Due to the greater involvement of the upper body, head control and eye coordination poor. In general, children with quadriplegic distribution have severe CP, frequently associated with seizure and severe cognitive impairment. These children usually have feeding problems, and some involvement of speech and articulation. If their care is not good, they have tendency to develop both scoliotic and kyptotic problems in adult life. Beside these deformities, may develop dislocation of their hip joints and spinal curvature. The subluxation or dislocation of hip joint may cause significant morbidity in terms of pain and difficulty with postural control, creating limitations in sitting, standing and walking, and personal care problems which include hygiene. Children who do not walk independently, approximately 60% of this group will have hip dislocation by age 5 years. It is recognized that dislocation continues to occur well into adolescence offered a protocol for the surveillance of hips in young children, which recommends a baseline X ray at 30 months to determine risk. [2], [7]

Children with cerebral palsy quadriplegy and submandible Infections may spread by odontogenic infections often related to the mandibular molar teeth. This is due to the fact that the attachment of mylohyoid (the mylohyoid line) becomes more superior towards the posterior of the mandible, meaning that the roots of the posterior teeth are more likely to be below mylohyoid than above. Signs and symptoms of a submandibular space infection might include trismus (difficulty opening the mouth), inability to palpate (feel) the inferior border of the mandible and swelling of the face over the submandibular region. In cerebral palsy patient should be more attention to the airway because patients with cerebral palsy have anatomic structural abnormalities in the mandible, tongue and neck so as to aggravate the patient's situation during drainage incision. Observation of the patient's airway then immediately can be done drainse incision. If the space contains pus, the usual treatment is by incision and drainage. The site of the incision is extra-oral, and usually made 2-3 cm below, and parallel to, the inferior border of the mandible. Ludwig's angina is a serious infection involving the submandibular, sublingual and submental spaces bilaterally. Ludwig's angina may extend into the pharyngeal and cervical spaces, and the swelling can compress the airway and cause dyspnoea (difficulty breathing). [3]

## 2. Case Report

A 13 y.o. male patient referred from Private Hospital at Garut area with swelling on the right lower jaw and right neck.  $\pm$  7 days prior to admission the patient complained of swelling at his right cheek without fever, and was given

paracetamol syr by his parent, the swelling was decreased.  $\pm$  5 days prior to admission, the patient complained of swelling at right neck then he was brought to Private Hospital at Garut area and performed with neck soft tissue and chest x-ray, infusion of electrolyte, given 4 kind of medicines (cefotaximinj, amoxicilininj, ibuprofen syrup, and lyncomicinsyr) and was hospitalized for 4 days.  $\pm$  1 day prior to admission, there was no improvement and swelling extended to behind of right ear. Then the patient was referred to Hasan Sadikin Hospital Emergency Department. Neck stiffness (-). History of toothache, hoarseness and difficulty in swallowing was difficult to assess due to cerebral palsy.



Figure 1: Profile

Intra oral examination was difficult to assess because patients are difficult to open the mouth and often experience seizures. On extra oral examination Asymmetrical face, swelling at right submandible region extended to right neck region and behind right auricular with 7x4x2 cm in size (Figure. 1), reddish (+), febrile temperature (+), fluctuation (+), localized (+), pain on palpation (+). From Neck Soft Tissue x-ray (Figure. 2) There was swelling with gangrene gas depiction at right neck region. Air column was still open. From Chest x-ray there was no sign of Cardiomegaly and no sign of active pulmonary tuberculosis. From Laboratory finding there was leukosistosis, trombosistosis, anemia, and asidosis metabolic (Table.1). Based on the entire examination, the diagnosa that is established in the patient is Right submandible abscess extended to right neck and post right auricular region due to pulp gangrene of tooth 46, Upper airway obstruction grade 1, Cerebral Palsy spastik quadriplegia, Marasmus with Hypernatremia.



Figure 2: Neck Soft Tissue and Thorax X-Ray

Table 1: Laboratory Findings

Hematologi	29/04/17	30/04/17	02/05/17
PT	10.4		-
APTT	22.8		-
INR	0.99		-
Hb	9.1		10.7
Eritrosit	3.61		4.16
Hematokrit	28		33
Leukosit	7.900		8.800
Trombosit	265.000		277.000
SGOT	81		53

SGPT	50		46
GDS	115	139	41
Natrium	154	156	0.40
Kalium	3.5	3.4	102
Kalsium		5.19	142
Laktat	1.5		3.8

In Emergency room, the patient has a urinary catheter and an infusion for dehydration correction. Then tapping the pus first (Figure. 3) to determine the location of the area to be in the incision other than that tapping pus in use to see the results of bacterial culture, and then drainage incision (Figure. 3) on the right submandibular on the most fluctuations, there is drum pus from the right submandibular. For the last application of penrose drain at right submandible region (Figure. 3). In addition, patients performed penrose drain installation on the right submandibular to maintain drainage on the patient's right submandibular. Furthermore, patients observed vital signs, mild rehydration, and pus production.



Figure 3 : Intraoperative

Seeing from general condition of patients who are increasingly declining day and appear redness in the patient's right infraauricular extends. Consultation to the anesthesia and pediatric department of Hasan Sadikin Hospital is done to further prepare emergency surgery for handling source control in the patient because it is feared the infection spreads to the neck because the focus of the infection has not been removed. Prior to surgery, complete blood tests are performed first and observations of tolerance, acceptability and weight of the patient and the provision of mucoliticflumycil syrup.

Stages of surgery include: the patient is prepared on the operating table with general anesthesia and nasal intubation, performed aseptic action on the extra oral and intra oral patient, then closing the patient with sterile duk, reincidition drainage incision in the right submandibular region. After the drainse incision and re-exploration on the right submandibular part. Through the oral approach, tooth extraction 55, 65, 75, 73, 85, 46 to eliminate the focus of infection in patients. After the surgery is completed, the patient is observed in the lecture room and back in the room.



Figure 4: P ostoperative

Day one postoperative, reddish look on the patient's at right infraauricular has decreased, necrosis in soft tissue is reduced asymmetric and the swelling at right face is reduced. Patients were treated with Cefotaximinj 3x600 mg, Ketorolac inj 2x30 mg, Ranitidine inj 2x50 mg, Metronidazole 1x 200mg drip, Flumycil 3x1 cth. Treatment in the ward was continued for posttraumatic drainage wound care and improvement of the patient's general condition.



Figure 5 : Profile Postoperative Day 3

Evaluation on the third day postoperative (Figure 5) of patient's condition has shown improvement, the administration of liquid nutrition has begun to increase as it is given liquid nutrition via silicone NGT, post drainage drainage well injury, pussy production begin to decrease. Then the patient is discharged with the approval of the doctor and the patient is treated for outpatient to replace drain and observation of pus production.

### 3. Discussion

The submandibular abscess is defined as the formation of an abscess in the potential space in the submandibular region accompanied by sore throat, fever and limited open mouth movement. The submandibular abscess is part of a deep neck abscess. A deep neck abscess is formed in a potential space between the deep neck fascia as a result of the spread of infection from various sources, such as teeth, mouth, throat, paranasal sinus, middle ear and neck. Clinical symptoms and signs are usually pain and swelling in the inner neck space involved. Treatment includes securing the airway, adequate antibiotics, abscess drainage and eliminating sources of infection. Complications of concomitant diseases should also be well managed. Infection can be sourced from the teeth, the floor of the mouth, the pharynx, the salivary glands or the submandibular lymph nodes. Others can be a continuation of another inner neck space infection. Before antibiotics are found, the commonest cause of deep neck infections is pharynx and tonsils, but now it is a tooth infection. Bottin et al., Tooth infection was the most common cause of Ludovici angina (52.2%), followed by submandibular infections (48.3%), and parafaring. [2], [3]

The most important treatment of infections is removal of the offending source and proving path of drainage. Ancillary measures such as pharmacotherapy are aimed as supportive measures for the host, especially in cases of immune compromise. They are not meant to replace surgical intervention unless the infection is very early in its stages of development. Infections should be treated as soon as possible. No benefit is gained by waiting for an abscess to for, as this delay may carry consequences and may be potentially fatal. Due to the typical acidic pH of infected

tissue, injected local anaesthetics, which are more alkaline, become ionized and therefore would not be able to cross the nerve membrane and provide profound anaesthesia. The use of nerve blocks as well as adjunctive sedation may be beneficial in management of the apprehensive patient. Sound knowledge of the anatomy of the affected area, will ensure that the infection is treated appropriately, efficiently, while morbidity and complications are minimized. This will allow for optimal drainage of infection and avoidance of damage to vital structures. [5]

Other investigations are magnetic resonance imaging (MRI) imaging that can locate abscesses, extensions and sources of infection. While Ultrasound (USG) is a diagnostic investigation that is not invasive and relatively cheaper than kindergarten, it is fast and can assess the location and extension of the abscess. Panoramic photos are used to assess the position of the teeth and the absence of teeth. This examination is performed primarily in cases of neck abscesses in which suspected source of infection comes from the teeth. [3]

In this case a soft tissue neck examination was performed to determine the extension of the abscess, while for dental examination was not done panoramic because the patient's condition is not possible so that the patient immediately extraction in general anesthesia to eliminate the focus of infection in the patient.

Regular blood tests can see an increase in leukocytes that are a sign of infection. Blood gas analysis can assess the presence of airway obstruction. Examination of culture and resistance of germs should be done to determine the appropriate types of germs and antibiotics.

Incision and drainage allows for decompression of infection, which will provide significant relief for the patient. It will also provide a portal for irrigation and placement of the drain. It only has to be deep enough to pass through the epithelium and underlying connective tissue. The subsequent blunt instrumentation will then explore all spaces including periosteal spaces. This method will prevent unnecessary injuries to the vital structures. Additionally, it allows for obtaining appropriate samples for culturing the offending microorganisms. More importantly, Incision and drainage alter the chemical environment to one that is more aerobic, thus less optimal for the more virulent anaerobic bacteria. successful management of odontogenic infections depends heavily upon changing the environment through decompression, removal of etiologic factor and by choosing proper antibiotic. Principles suggested by Topazian et al were employed for incision and drainage in our case. [3]

The inclusion of submandibular abscesses for drainage is made at the most fluctuating place or as high as hyoid os, depending on the location and extent of the abscess. Exploration is done bluntly until it reaches sublingual spaces, then penrosedrain is installed. In this case the drainage incision is already done in the emergency room then the patient is re-explored and the extraction of the teeth in general anesthesia.

Even though, infection is a surgical disease, antibiotics have changed the way clinicians manage infections. These drugs are a crucial adjunct in appropriate treatment of patients. The cost of the antibiotic, spectrum of coverage as well as toxicity, and side effects are all-important considerations in the choice of antibiotic use. Antibiotics can be classified into two main categories; bacteriostatic and bactericidal. Ceftriaxone is a bactericidal antibiotic with good absorption. It also has a good spectrum of coverage against the main oral virulent microflora. It is well tolerated by patients and has a low toxicity profile. Ceftriaxone has a broader spectrum of coverage, but it is an acceptable alternative. Its dosing regimen may lead to better compliance. In most of the studies, it is proven that all the anaerobic strains are sensitive to Metronidazole.<sup>4</sup> For serious anaerobic bacterial infections, intravenous Metronidazole 500 mg OD was infused as documented by Goodman and Gilman.<sup>6</sup> Metronidazole is the drug of choice.<sup>6</sup> Ceftriaxone remains the drug of choice in the management of most odontogenic infections being reported with increasing frequency; however, if the infection fails to respond to the initial antibiotic choice, one must have a high index of suspicion that a resistant organism is involved. [7], [10]

Untreated or rapidly spreading odontogenic infections can be potentially life threatening secondary to airway compromise or septicemia. Trismus, a common feature of odontogenic infection, was seen in our patient, which is in contrast to the study of Bridgeman et al where 46 % of trismus was seen in his study. This clinical sign is commonly seen when the infection involves the masticatory spaces.<sup>8</sup> Staphylococci are frequently associated with abscess formation. These microorganisms produce coagulase, an enzyme that is deposited which can cause fibrin deposition in citrated or oxalated blood. Streptococci are associated more often with cellulites, which produce enzymes such as streptokinase (fibrinolysin), hyluronidaze, and strepto- dornase. These enzymes break down fibrin and connective tissue ground substance, and lyse cellular debris, thus facilitating rapid spread of bacterial invaders. Although there are barriers, these are violated by the end products of the microorganisms and guide the infection to spread into deeper planes. An odontogenic infection spreads to fascial spaces because the anatomy of the fascial planes of the head and neck is such that it has an ineffective barrier to the spread of infection, and plays a vital role in the clinical localization of an abscess. The involvement of the facial planes by cellulitis, aids in the surgical drainage. [9]

The basic beta lactum antibiotics are key antibiotics to be started for treating odontogenic infections as these infections are predominantly of gram-positive aerobes. Metronidazole or Tinidazole should not be just started because anaerobic microorganisms are normal flora of oral cavity; they should be started purely on the clinical presentation in the form of chronic abscess, massive cellulitis, presence of crepitus (gas), evidence of tissue necrosis, sloughing, presence of thick foul smelling pus. In our case there was presence of thick foul smelling pus, chronic abscess, skin necrosis which correlates with the study done by Kuriama et al. [10]

The antibiotic susceptibility of the gram-negative microorganisms was seen predominantly with Amikacin. E.

Coli and Klebsiella were found 100 % susceptible to Amikacin which correlates with our case.<sup>11</sup> The key issue here, which needs to be remembered, is that antibiotic alone cannot resolve odontogenic infection satisfactorily. Quick recovery of patients results with proper basic management comprising of early drainage decompression which is equally important. Therefore, with odontogenic infections it is always appropriate to always begin with the empiric antibiotic regimen with correlation to clinical presentation thinking of the most likely suspected microorganisms involved in the infections, which are usually the normal flora of the region, without forgetting the importance of early surgical intervention to reduce morbidity and complications. Once incision and drainage of fascial space abscess is performed, drain is placed and the wound is dressed which is changed several times over subsequent days and irrigated daily. Irrigation with saline and antibiotic solution has been reported to be effective in the elimination or reduction of infection. [12]

In this case, there was swelling of the right submandibula accompanied by redness and the presence of upper airway obstruction grade 1. In addition, medicamentosa was performed by the child for airway obstruction by using flumicyl syr, and the installation of oxygen through nasal canul 3lpm. Patients are given antibiotics Cefotaxime 3x600mg intravenous, Metronidazole 1x200mg intravenous, Ketorolac 2x30mg intravenous, Ranitidine 2x50mg intravenous.

#### 4. Conclusion

Fascial space infections of the head and neck region, though potentially life threatening, can be prevented by regular dental visits. Early recognition and treatment of the infections are necessary to prevent considerable morbidity and mortality, especially in younger patients where more care should be given for oral health. Successful results can be achieved for pediatric patients who can be treated with Incision and Drainage, removal of etiologic factor followed by a combo of three antibiotics.

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