Characteristic of Deep Neck Abcess in Patient Teratai Surgical Hospitalization at Dr. Soetomo General Hospital Center

Zaki Mubarok[a], Bakti Surarso[b]*

[a] *zakimub12@gmail.com*
[a]Resident in Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Dr. Soetomo General Hospital, University of Airlangga 60132, Surabaya, Indonesia
[b] Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Dr. Soetomo General Hospital, University of Airlangga 60132, Surabaya, Indonesia

Abstract

Background: A deep neck abscess is an abscess that forms 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 sinuses, ears and neck**. Methods:** This study used a retrospective descriptive research design using secondary data derived from medical records of deep neck abscess patients who went to Dr. Soetomo Hospital. This research was conducted in the Teratai Surgery hospitalization at the ENT outpatient RSUD Dr. Soetomo Surabaya from January to December 2018. **Result:** Obtained 23 samples in 2018 medical records of Deep Neck Abscess, including the location, etiology, bacterial cultures, and complications. **Conclusion:** More men patient's than women, with the most age group 51-60 years. The most common locations are submandibular, parapharyngeal and combined submandibular, parapharyngeal & retropharyngeal as well as the mediastinum.

Keywords: *Characteristics, Deep Neck Abcess, Surgical hospitalization*

1. Introduction

Deep neck abscess is a collection of pus (pus) in the potential space between the deep neck fascia due to the spread of infection from various inflammations such as infections of the teeth, pharynx, tonsils, paranasal sinuses and ears or due to trauma. The clinical symptoms of deep neck abscess are generally the same as the symptoms of infection in general, namely, fever, pain, swelling in the affected deep neck space. The deep neck potential space is a very complex area, so knowledge of the anatomy of the deep neck potential space is needed in order to be able to treat deep neck abscess properly [1].

There is no definite estimate for the incidence of deep neck abscesses. Still, it is estimated that deep

neck abscesses have decreased significantly since the era of antibiotic use [2]. Before the antibiotic era, 70% of deep neck infections originated from spreading infection in the pharynx and tonsils to the parapharynx. Deep neck infections in children mainly originate from the tonsils, while in adults, it is caused by dental infections accompanied by diabetes mellitus [3] [4]. The bacterial that cause deep neck abscesses usually consist of a mixture of aerobic and facultative anaerobes [2] Pelaez et al., conducted a study in Spain to obtain deep neck abscess culture results with pathogens originating from the oral cavity and associated with odontogenic disorders (43.80%). Not related to odontogenic disorders (21.10%), bacteria not found in the oral cavity (34.20%) [3][4]. Murray et al. cite Asmar's research, in India, getting the results of cultures from retropharyngeal abscesses 90% of patients contain aerobic bacteria and 50% of patients have anaerobic bacteria [5].

Management of deep neck abscess is to optimal drainage of the abscess and culture of bacteria from pus. The results of the culture examination take a long time, so it is necessary to give antibiotics based on empirical data. In addition, several researchers reported the effectiveness of giving broad-spectrum antibiotics in combination (ceftriaxone-clindamycin and ceftriaxone-metronidazole), giving better results which were high around 70% [6][7].

This research aims to report deep neck abscess sufferers in the Department of otorhinolaryngology head and neck surgery RSUD Dr. Soetomo during the period from January to December 2018 including the location, etiology results of bacterial cultures and their complications.

2. Method

This study used a retrospective descriptive research design using secondary data derived from medical records of deep neck abscess patients who went to Dr. Soetomo Hospital. This research was conducted in the Teratai Surgery hospitalization at the ENT outpatient RSUD Dr. Soetomo Surabaya from January to December 2018. Sampling was carried out by consecutive sampling, namely, every patient who met the research inclusion criteria was included as the study sample. Approval for this study was provided by the Ethical Committee of Dr. Soetomo General hospital Center, Surabaya. The research results are presented descriptively in the form of tables and narratives.

3. Result

This research was conducted at the Dr. Soetomo General Hospital Surabaya, Indonesia. This research obtained 23 samples year 2018 medical records of Deep Neck Abscess.

Tabel 1. Distribution of Sex and Age Deep Neck Abscess patients

Variabel	Frequency (n)	Percentage (%)

Sex		
Male	13	56,5
Female	10	43,5
Total	23	100
Age		
20-30	2	8,69
31-40	2	8,69
41-50	6	26,08
51-60	7	30,43
60-70	5	21,73
>70	1	4,34
Total	23	100

This study found 23 patients with deep neck abscesses, 13 patients (56.5%) and 10 women (43.5%). The ratio of men to women is 1.3:1 (table 1). The youngest age is 21 years old, and the oldest is 73 years old (table 1). The age group was 51-60 years with 7 patients (30.43%).

Tabel 2. Location of Deep Neck Abscess patients

Location	Frequency (n)	Percentage (%)
Submandibula	3	13,04
Submandibula & parafaring	9	39,13
Peritonsil, submandubula,parafaring	3	13,04
Parotis, submandibula, parafaring	2	8,69
Submandibula, parafaring retrofaring	3	13,04
Submandibula,parafaring, retrofaring, mediastinum	3	13,04
Total	23	100

Pure location in the submandibular is 3 patients (13.04%), the most locations in the submandibular & parapharyngeal 9 patients (39.13%). Deep neck abscess can occur in several locations at once (more than 1 potential neck space), namely a combination of submandibular, parapharyngeal, retropharyngeal spaces in 3 patients (13.04%) while abscesses occupying all potential deep neck spaces to the mediastinum in 3 patients (13 ,04%). (table 2).

Tabel 3. Etiology of Deep Neck Abscess patients

Etiology	Frequency (n)	Percentage (%)
Tooth infection (Odontogenic)	10	43,47
Dental infection & Type 2 DM	2	8,69
Tonsil infection	5	21,73
Tonsil infection & type 2 DM	1	4,34
parotid infection	3	13,04
Oropharyngeal infection	2	8,69
Total	23	100

The most common cause was dental infection (odontogenic) as many as 10 patients (43.47%), tonsil

infection 5 patients (21.73%), parotid infection 3 patients (13.04%), other causes were Type 2 DM & odontogenic 2 patients (8.69%), type 2 DM & tonsil infection in 1 patient (4.34) and oropharyngeal infection in 2 patients (8.69%) (table 3).

Table 4. Results of bacterial culture (pus specimens)

Bacterial culture	**Pus**	**%**
Klebsiella pneumonia	4	17,39
Coccuria kristinae	1	4,34
Staphylococcus aureus	2	8,69
Acinobacter baumanii	3	13,04
Streptococcus constellatus	1	4,34
Streptococcus sp	1	4,34
Gamella mobillium	1	4,34
Salmonella sp	1	4,34
Corrynaebacterium stratum	1	4,34
Pseudomonas aerouginosa	1	4,34
Steril	7	30,43
Total	23	100

From 23 patients (table 4), the most bacteria growth from pus culture was Klebsiella pneumonia (17.39%), Acinetobacter baumanii (13.04%), Staphylococcus aureus (8.69%) and sterile (30.43%).

Tabel 5. Complications of Deep Neck Abscess patients

Complications	**Frequency (n)**	**Percentage (%)**
Sepsis	1	4,34
Upper airway obstruction (tracheotomy)	1	4,34
Mediastinitis	4	17,39
Die	1	4,34
No complications	16	69,56
Total	23	100

Of the 23 patients with deep neck abscess, the most complications were mediastinitis in 4 patients (17.39%), followed by upper airway obstruction so that a tracheotomy was performed in 1 patient (4.34%), sepsis in 1 patient (4.34%) and died 1 patient (4.34%). There were no complications found in 16 patients (69.56%) (table 5).

4. Discussion

This study obtained 23 patients with a male to female ratio of 1.3: 1. Research by Pelaez, et al., in Spain in 2017 was 1.7: 1, Motahari, et al., in Iran in 2014 it was 1: 1.5, Imanto in Bandung in 2015 was 1:2.1. However, deep neck abscesses are more common in men than women, probably because men pay less attention to oral hygiene, especially teeth, than women[4][7][8].

Deep neck abscesses were found at 20 years to more than 70 years, mainly in the 51-60 year age

group (30.43%). The results of research by Motahari, et al., showed that the age range was from 5 months to 90 years, the most age range was 7-44 years, according to Imanto's research in 2015, the most age range was 20-39 years. Research The cause of deep neck abscesses mostly comes from dental infection by 25%, possibly because at a young age, the patient did not take care of his dental health so that over time the emergence of chronic dental infections that caused abscess complications [2][7][8].

Several potential spaces are limited by the cervical fascia in the neck region. The cervical fascia is divided into the superficial fascia and the deep fascia. The two fascia are separated by a thin platysma muscle that extends anteriorly to the neck [10] [11]. The platysma muscle inferiorly originates from the deep cervical fascia and the clavicle and extends superiorly to insert inferiorly to the mandible. The superficial fascia lies beneath the dermis. This includes the musculoaponeurotic system, extending from the epicranium to the axilla and chest and not including parts of the deep neck region [5][12]. The deep fascia surrounds the deep neck area and consists of 3 layers: the superficial, medial, and deep. The deep neck potential space is divided into the length involving the area along the neck, the suprahyoid space and the infrahyoid space. The distance involved in deep neck abscess is along the neck consisting of retropharyngeal space, danger space (danger space) and prevertebral space. The suprahyoid space consists of the submandibular space, parapharyngeal space, parotid space, masticator space, peritonsil space and temporal space. The infrahyoid space is the pretracheal space [10][11].

The mechanism of extension of the abscess from the submandibular space to the parapharynx and oropharynx is due to pressure (contraction) of the floor of the mouth which seems to push pus into the parapharyngeal and retropharyngeal cavities [6].

Kim et al., explained that tonsillectomy increases the risk of retropharyngeal abscess and parapharyngeal abscess in adults compared to children [13]. The most common source of infection in deep neck abscesses is an infection of the tonsils and teeth [12][16]. Dental infections can involve the pulp and the periodontium. Spread of infection can be through the pulp or apical foramen of the tooth to the surrounding area. The apex of the first molar, which is above the mylohyoid muscle, causes the spread of infection to enter the sublingual space first, while the apex of the second and third molars is below the mylohyoid muscle so that the infection will spread more quickly to the submandibular space [8][14].

Chronic inflammation or tooth decay (e.g., dental caries, pulp gangrene) can complicate a submandibular abscess. The mandibular teeth are located very close to the submandibular and sublingual spaces. The two spaces are functionally one space, thus, inflammation of the mandibular teeth can cause complications of deep neck abscess. The collection of pus in the submandibular space then extends to the surrounding space. The risk of deep neck abscess after tonsillectomy in adolescents and adults is 1.4 times

compared to children [13].

In Pelaez et al.'s study, deep neck abscess cultures were divided into three groups. The first group, bacteria from the oral cavity associated with odontogenic disorders, include *Fusobacterium spp, Prevotella spp, Actinomyces spp, Bifidobacterium, Peptostreptococcus, Streptococcus viridans, Streptococcus sanguinis, Enterococcus spp.* The second group, bacteria from the oral cavity that are not related to odontogenic disorders, namely *Bacteroides spp, Staphylococcus aureus, Klebsiella spp, Streptococcus spp, Streptococcus pyogenes, Pseudomonas spp, Escherichia coli, Corynebacterium spp, Acinetobacter spp, Candida albicans.* The third group, germs that are not from the oral cavity, include *Streptococcus pneumonia, Citrobacter, Salmonella enteritidis.* In a high percentage of the third group culture (34.22%), the type of bacteria is not specific, only showing aerobic or anaerobic bacteria, Gram-positive or negative bacteria [4][15].

Abscess formation results from the development of the normal flora in the body. Normal flora can grow and reach sterile areas of the body either directly or through lacerations or perforations. Most deep neck abscess is caused by a mixture of various bacteria (polymicrobial), both aerobic, anaerobic, and facultative anaerobes. In general, deep neck abscesses are caused by a mixed infection of several germs—both aerobic, anaerobic and facultative anaerobic bacteria [16]. In dental diseases, anaerobic bacteria are more numerous than aerobic and facultative anaerobes.

Deep neck abscesses can be life-threatening if not treated properly. Infection can spread to other deep neck spaces so that it can cause complications, including airway obstruction, pneumonia, necrotizing fasciitis, mediastinitis due to abscess spreading inferiorly, vascular complications (Lemierre's syndrome and carotid artery rupture), sepsis, osteomyelitis, neurological deficits and fistulas due to rupture of the abscess [17].

The incidence of deep neck abscess complications has decreased since the wider use of antibiotics. However, one should still be alert for signs of complications that may arise, which can be very dangerous. Airway obstruction and asphyxia are potential complications of deep neck abscesses, especially Ludwig's angina. Rupture of an abscess, either spontaneous or manipulated, can result in pneumonia, lung abscess or empyema—vascular complications such as jugular vein thrombosis and carotid artery rupture. Jugular vein thrombosis is characterized by fever, chills, pain, swelling, and the sternocleidomastoid muscle when the body bends or bends. Bacteremia or sepsis may occur. The incidence of pulmonary embolism reaches 5% in patients with jugular vein thrombosis. Carotid artery rupture is a rare complication. This usually occurs in the poststiloid parapharyngeal abscess; the infection extends to the carotid sheath. Mediastinitis can occur due to the expansion of disease through the anterior visceral, visceral vasculature, the retropharyngeal area and the danger space. Patients will complain of chest pain and difficulty breathing [16].

Patients with deep neck abscesses who are accompanied by sepsis are usually accompanied by comorbidities that are often found, namely diabetes mellitus. In patients with DM, there is a decrease in the immune response function, which makes them more susceptible to various kinds of infections. In DM patients, various complications occur, including angiopathic processes, decreased endothelial function and impaired vital organ functions. Therefore, the management of deep neck abscesses in diabetic patients must be carried out carefully because invasive measures without controlling blood sugar can result in severe infection, sepsis and death [14][15].

5. Conclusion

The study results during the period January - December 2018 in the Teratai Surgery hospitalization at the ENT outpatient RSUD Dr. Soetomo Surabaya data obtained 23 patients. More men patient's than women, with the most age group 51-60 years. The most common locations are submandibular, parapharyngeal and combined submandibular, parapharyngeal & retropharyngeal and mediastinum. The most common etiology is tooth infection followed by tonsil infection. The most common comorbidity is DM. Bacteria often found from pus culture are Klebsiella pneumonia, Acinetobacter baumanii and staphylococcus aureus. The most complications included mediastinitis, upper airway obstruction and sepsis, and 1 patient died.

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