Factors influencing paediatric neck abscess and treatment at Hospital Tuanku Jaafar, Seremban

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ABSTRACT

Background: This is a descriptive study of in-patient paediatric population with the diagnosis of neck abscess. The objective of this study was to calculate the number of children who require conservative (antibiotic) management compared to surgery for neck abscess. A second objective was to identify the factors influencing the choice of the treatments selected.

Methods: A retrospective review was performed on a group of paediatric population aged 0 till 12 years of age, with a history of admission to paediatric ENT ward from the year 2010 till 2015 in HTJS. Initially, 69 children with the diagnoses of various neck infections were identified. Then, the sample amount was narrowed to 30 patients with neck abscesses only.

Results: The data analysis was performed using descriptive statistics, Chi-squared test and Fisher's exact test. Twenty-five out of the 30 patients required operative drainage of abscess (83.3%). In this group, children aged ≤2 years old were the largest group to have undergone surgical drainage. Only five patients were successfully treated with antibiotic therapy alone. Nineteen children came only after developing neck swelling for more than a week, in which 18 of them required surgery.

Conclusion: Younger group of children are more likely to undergo surgical drainage than older children for neck abscess. Also, children who came in after two weeks of symptoms have a higher probablity of requiring surgery than antbiotic alone. Nonetheless, every child who comes in with neck abscess should be evaluated and treated early to avoid any sinister complications.

KEY WORDS:
Neck abscess; Factors and treatment; Neck infections; Paediatrics; Surgical drainage; Antibiotic

INTRODUCTION

In the paediatric population, infections involving the neck spaces are very common as these symptoms can be a part of multisystemic disorders. Also it is often difficult to determine which patient requires surgical intervention as there are a wide spectrum of closely related diagnoses apart from neck abscess, e.g., suppurative or non-suppurative cervical lymphadenitis, deep space neck infections, mumps, congenital malformations, lymphomas and malignant tumours.

The aetiology of these neck infections in children are mostly due to upper respiratory tract infections, like tonsillitis, pharyngitis and otitis media. Fever, neck pain and swelling with poor oral intake are the reasons why parents bring their children for medical treatment. But, the exact clinical presentation does depend on the site and type of the neck infection.[1] Moreover, the incidence of neck infections in Malaysia with the number of admissions related to these diagnoses are on the rise especially in children. A number of potential complications may arise if these infections are left untreated or mismanaged, such as upper airway obstruction and sepsis.[2]

In treating head and neck space infections in children, empiric antibiotic therapy must be able to cover a wide range of organisms, including the commonly isolated gram-positive organisms, anaerobes, as well as gram-negative, and beta-lactamase producing organisms.

By diagnosing these infections early, morbidity and mortality arising from neck abscesses can be eliminated. In Malaysia, several authors have reported the success rates of conservative treatment with antibiotics alone though the mainstay of treatment for neck abscesses is surgical drainage. Wong et al., have shown that a high dose of intravenous antibiotics are effective in treating deep space neck abscesses and may obviate the need for surgical treatment, particularly in small abscesses.[3]

On the other hand, according to an observational paediatric study done in India on deep neck space abscesses, blind aspiration and empirical therapy in the treatment of deep neck abscesses are not recommended even if the abscess is small. It should be drained by surgical incision and drainage as it minimises the duration of hospital stay and accelerates recovery.[4]

The objectives of this study are to describe the management and outcome neck abscesses among paediatric children in our institution and also to identify the factors associated with the choice of the treatments selected.

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Table I: Duration of presentation, size of swelling, histopathological results, gender, age, location of neck swelling, history of antibiotic intake prior to hospital admission, and choice of intravenous antibiotics comparing conservative and surgical treatment

Characteristics	Treatment option				Total		p-value
	Conservative		Surgery		n=30	n(%)	
	n=5	n(%)	n=25	n(%)			
Duration of presentation (days)							
≤3	4	80.0	4	16.0	8	26.7	0.032
4-7	0	0	2	8.0	2	6.7	
>7	1	20.0	18	72.0	19	63.3	
Unknown	0	0	1	4.0	1	3.3	
Size of swelling (cm)							
<2	0	0	4	16.0	4	13.3	0.092
2-5	2	40.0	17	68.0	19	63.3	
>5	3	60.0	4	16.0	7	23.3	
Histopathological results							
Abscess wall	0	0	15	60.0	15	50.0	0.018
Granulomatous inflammation	1	20.0	0	0	1	3.3	
Inflammed granulation tissue	0	0	1	4.0	1	3.3	
Unknown/Not available	4	80.0	9	36.0	13	43.3	
Gender							
Male	1	20.0	12	48.0	13	43.3	0.249
Female	4	80.0	13	52.0	17	56.7	
Age (years)							
0-2	1	20.0	13	52.0	14	46.7	0.352
2-4	1	20.0	4	16.0	5	16.7	
4-6	1	20.0	2	8.0	3	10.0	
6-8	0	0	3	12.0	3	10.0	
8-10	2	40.0	2	8.0	4	13.3	
10-12	0	0	1	4.0	1	3.3	
Location of neck swelling							
Level I	1	20.0	10	40.0	11	36.7	0.698
Level II	4	80.0	13	52.0	17	56.7	
Level III	0	0	1	4.0	1	3.3	
Level IV	0	0	1	4.0	1	3.3	
History of antibiotic intake prior to hospital admission							
Yes	0	0	3	12.0	3	10.0	0.549
No	1	20.0	2	8.0	3	10.0	
Unknown	4	80.0	20	80.0	24	80.0	
Choice of intravenous antibiotics							
Cefuroxime	3	60.0	15	60.0	18	60.0	0.923
Cefuroxime + Metronidazole	2	40.0	8	32.0	10	33.3	
Augmentin	0	0	1	4.0	1	3.3	
Cefuroxime + Metronidazole+ Imipenem+Cotrimoxazole	0	0	1	4.0	1	3.3	

METHODS

A retrospective review was performed on a group of paediatric patient aged 0-12 years old, with a history of admission to paediatric ENT ward from the year 2010-2015. Initially, 69 children with the diagnoses of various neck infections were identified. Then, the sample of the data was narrowed to those with neck abscesses only, which were about 30 patients. These figures were obtained after eliminating cases which lacked sufficient data. The inclusion criteria were clinical finding of a fluctuant neck mass and an imaging evidence of neck abscess via ultrasound or computed tomography (CT) scan. Children with cervical lymphadenitis, peritonsillar abscess, parapharyngeal/retropharyngeal abscess, nasal and ear-related abscess were excluded from this study.

The categories discussed in this study were: age, gender, duration of presentation/symptoms, size of neck swelling, location of neck swelling, history of antibiotic intake prior to hospital admission, choice of intravenous antibiotics given in the ward, culture and histopathological results, and choice of treatment; i.e., conservative or surgery. These factors were tabulated into specific categories.

From the total sample of 30 patients, the size of abscesses of two patients were detected only using CT scan.

Statistical analysis

Statistical analysis was carried out using SPSS 22.0 (SPSS Inc., Chicago, USA). The data analysis was performed using descriptive statistics, with both Chi-squared test and Fisher's exact test.

RESULTS

During the 5-year period studied, 25 (83.3%) from a total of 30 children required surgical drainage of abscess. Only five patients were successfully treated with antibiotic therapy

alone. The most frequent paediatric age group having neck abscess was in the range of 0-2 years old. Inadvertently, they were the largest group of children to have undergone surgical drainage. There was no gender preponderance. The most frequent abscess size was 2-5cm, whilst level II neck node region seems to have the highest tendency of abscess formation.

About 19 children came to the hospital only after a week of neck swelling, in which 18 of them required surgical drainage. No proper information was available regarding history of antibiotic intake prior to admission. Meanwhile, a total of 3-7 days were the average range of duration of intravenous antibiotic given in the wards. Intravenous cefuroxime was given to about 15 patients and it is the most widely given antibiotic to these children. About 10 patients received a combination of both cefuroxime and metronidazole. Ten patients had no cultured organism in their samples sent for microbiology testing. However, the predominant organism was *Staphylococcus aureus* (six cases, 20%) followed by B-haemolytic *Streptococcus* Group A. The growth of Serratia marcescens was found in one of the neck abscesses.

In addition, most of the histopathology reports showed the findings of abscess which proves the accuracy of the initial diagnosis. Overall, only two variables showed statistically significant p-values (<0.05), which were the duration of presentation and histopathological results. Meanwhile, other factors like size and location of the swelling were not statistically significant in deciding the choice of treatment involved.

DISCUSSION

In this study, we can conclude that the younger aged children, ≤2 years are the largest group of patients to be admitted for paediatric neck abscess and subsequently requiring surgical drainage, in addition to the antibiotic therapy. This observation shows that these group of children have not acquired sufficient immunity as yet to fight against more aggressive infections such as neck abscess. They also have a higher probability to require surgical drainage than the older children. The delayed presentation to the tertiary center was also observed in this study. Besides, the average day of presentation of the neck swelling was about 7 days and beyond delay indicates that the level of awareness amongst parents to seek medical treatment is unsatisfactory. Fever and neck swelling are the commonest features of neck abscesses which should raise suspicion of parents or caretakers. Thus, more awareness-related activities should be conducted to emphasize the urgency of these infections in children. An earlier presentation to the hospital can prevent the complications related to a neck abscess, like sepsis and airway obstruction. Fortunately, in our 5-year period of study, there was no such complication encountered.

Meanwhile, looking into the aspect of the location of neck abscesses, we found that the levels I and II of the neck were the commonest regions. This is true as most of the lymphatics drain into the submandibular and the deep cervical nodes, leading to more than a three-quarter of children having cervical nodes as the source of neck lymphadenitis.[5] Regarding the choice of antibiotics, cefuroxime, which is the second generation of cephalosporins, is the first line of empirical therapy that is commonly started in our institution, following the local microbiological resistance. Studies have concluded that the commonly occurring microorganisms in neck infections are *S.aureus* and *S.pyogenes*, representing about 40-80% of cases.[6] This is as shown in this study, as the predominant organism was S.aureus (20%), Nevertheless, infections are usually polymicrobial with the difficulty to culture anaerobic microorganisms being one of the cause why they are not found as easily as aerobes.[7]

The usage of imaging like lateral neck radiograph, ultrasound and CT scan help clinicians to quickly establish the diagnosis of neck abscess or presence of infections in deep spaces of the neck. According to a comparative study done in 1999, a sensitivity of 100% was demonstrated in CT scanning to diagnose paediatric deep neck infections, compared to a sensitivity of 83% in lateral neck radiographs.[8] Moreover, CT films are able to guide which surgical approach to be performed if more complicated or deeper neck drainage is required. In CT images, an abscess is confirmed by the presence of a homogeneous area, which has low attenuation with surrounding rim of enhancement. Meanwhile, soft tissue oedema and loss of fat planes are features of cellulitis. But, mostly the cases encountered in the clinical setting often present in between these two types of infections, whereby clinical judgement is needed to either continue antibiotic therapy or deciding on a surgical drainage.[9] In addition, a proper guideline must be followed on when a CT scan should be done on a child suspected or having a neck abscess to avoid unnecessary risk of radiation exposure.

Although neck infections like cervical lymphadenitis and abscess are common in any age group, the occurrence in a child needs to be highlighted as they are more prone to rapid deterioration if left untreated or mismanaged. Therefore, prompt recognition of life-threatening conditions is crucial. These children include those with cervical lymphadenitis leading to suppuration, recurrences, partially treated infections, or those who have come in with acute complications like dehydration, sepsis, mediastinitis or upper airway obstruction.[10]

Finally, the proper management of paediatric neck abscess comprises of maintaining patency of airway, adequate hydration, pain control, antibiotic therapy and surgical drainage. Rarely, tracheostomy may be indicated in cases of severe airway compromise. Based on a review of 210 cases of deep neck abscess, 75% of patients with Ludwig's angina had undergone tracheostomy.[11] In this study, none of the children required such intervention.

Deep neck space infections, on the other hand, need a longer course of intravenous antibiotic and prompt surgical drainage to achieve best outcomes. Although the timing of such drainage is still debatable, a study done in Portugal in 2008 observed clinical improvements in the first 24 hours after drainage in 82% of the patients with parapharyngeal and retropharyngeal abscesses.[12]

One of the main limitations of this study is the small sample size of 30 patients. This is partly due to missing or incomplete medical data. There was also no proper recording of the history of antibiotic intake before the admission leading to insufficient information. Another limitation of this study is it was a single-centred study. Thus, a multicentre study with a larger sample size should be conducted as a continuation to this study. This can subsequently lead to a proper management guideline to treat these neck abscesses. Also the main weakness is the retrospective nature of the study where certain data was lacking such as previous history and type of antibiotic used, proper culture results, duration of antibiotic therapy given, the duration of admission in the ward and for how long was the follow-up till full recovery.

CONCLUSION

From this study we identified the factors influencing paediatric neck abscesses and the choice of treatment, which are age and duration of presentation. Younger group of children, especially who are ≤2 years of age are more likely to undergo surgical drainage compared to kids who are older. Also, children who came in after two weeks of symptoms pertaining to neck abscess have a higher probability of requiring surgery than antibiotics alone. Nonetheless, every child who comes in with neck abscess should be evaluated and treated early to avoid any sinister complications.

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DISCLOSURE

The authors declare no conflict of interests.

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