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Neck Abscesses: The Impact of Systemic Diseases on Microbiology and Our Experience in Its Management

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Abstract:
Aim:*To evaluate the impact of systemic diseases like diabetes mellitus and tuberculosis on microbiology of neck abscesses and to express the role of conservative treatment in management of neck abscesses.*
Keywords : Diabetic , Tuberculosis , Bacteriology , Dental caries , Neck abscess , Retropharyngeal abscess , Antibiotic . Para pharyngeal abscess.
Abbreviation : MRI- Magnetic Resonance Imaging, AFB- Acid Fast Basilli , CT- Computerised Tomogram , K. Pneumonia- KlebsellaPneumonia .
Materials And Methods: *Out of 44 patients taken up for study, 17 had superficial neck abscess, 13 had retropharyngeal abscess, 11 had Submandibular abscess and 4 had parapharyngeal abscess. Pus for culture sensitivity and smear for AFB were sent for all the patients. Associated Tuberculosis was diagnosed in 7 patients while 5 patients were found to be having diabetes mellitus not adequately controlled. Parapharyngeal Abscesses were managed by intravenous antibiotics, Tubercular abscesses by Anti-tubercular drugs while most of the other abscesses were drained surgically.*
Results: *Out of 44 patients, 19 patients showed sterile culture from pus.Klebsiellapneumoniae was found to be more common amongst the diabetics while staphylococcus aureus was predominant in pus amongst the non diabetics. Only use of intravenous antibiotics was found to treat successfully parapharyngeal abscess and even few retropharyngeal abscesses with complete remission.*
Conclusion: *Diabetes and tuberculosis are important systemic diseases dictating the use of antibiotics. Though most neck abscesses are treated by surgery, exclusive therapy by antibiotics can also play a central role in management of certain types of neck abscesses.*

I. Introduction

Neck Abscesses are a group of infections dealt daily by Otorhinolaryngologists. They are defined as a collection of pus in the fascial planes and spaces of the head and neck. The decrease in the overall incidence of neck abscesses can most likely be attributed to widespread availability of broad spectrum antibiotics and better dental care. Once an abscess occupies one of the deep neck spaces, the infection can spread across the spaces or damage the adjacent vital neural or vascular structures. Hence, they warrant aggressive management in view of possible life-threatening complications like airway compromise, aspiration pneumonia, pericarditis, jugular vein thrombosis, mediastinal involvement and arterial erosion.[1,2] Moreover, a rapidly progressive outcome may be seen, especially in immunocompromised patients like in Diabetes mellitus, HIV infection, steroid therapy, chemotherapy, old debilitated patients. [3,4]Aggressive airway maintenance, intravenous antibiotics and surgical drainage form the cornerstones of management.[5] Although culture-guided antimicrobial therapy is advocated, empirical antibiotics play a critical role in alleviating the clinical course of the disease. This study was aimed to evaluate the role of systemic diseases on microbiology and express the role of exclusive conservative management of neck abscesses.

II. Materials And Methods

The study was prospectively carried out in the Department of ENT, Gauhati Medical College Hospital between May 2012 and May 2013. Patients were diagnosed based on clinical presentation. Superficial cervical lymphadenitis, limited intraoral abscesses, parotid abscess, peritonsillar abscesses, preauricular abscess, facial cellulitis, cervical necrotising fasciitis and deep neck space cellulitis alone were excluded from the Study. Pus was aspirated and sent for culture and sensitivity, and smear for Acid Fast Bacillus, in all patients.All patients were subjected to blood investigations including Complete blood count, Routine Blood Sugar, Fasting Blood sugar, 2 hour Post Prandial Blood sugar and Serum Creatinine. In few patients, diagnostic imaging modalities included Plain Radiography, Ultrasound, Orthopantomogram, Computerized Tomography Scan and Magnetic

Resonance Imaging Scan were used, mainly to delineate the extent of infection and spread to adjacent spaces. All patients were then started on empirical intravenous ceftriaxone and metronidazole. All patients who presented with difficulty in breathing or painful swallowing or whose clinical condition did not improve or deteriorated 24-48 hrs after the initiation of antibiotics, were subjected to incision and drainage of the abscess. Based on the report of microbiologic culture and sensitivity, and smear for acid fast bacillus, further antibiotic therapy was administered. Patients with presence of dental caries were referred to Department of Oral Surgery, Regional Dental College where carries teeth were extracted. Cervical brace was also prescribed for patients diagnosed with Pott's spine.

III. Results

Forty four patients were included in the study. The age of patients ranged between 10 months and 55years with the mean age being 26.5 years. The male:female ratio was 1.3:1.

Figure 1: Age-wise distribution of patients

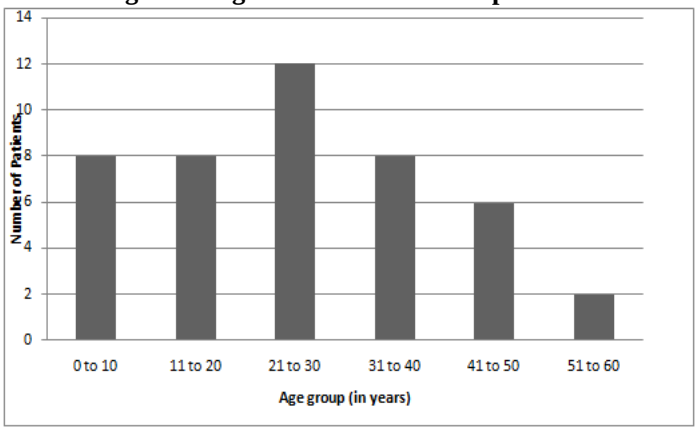

Figure 1: Age-wise distribution of patients

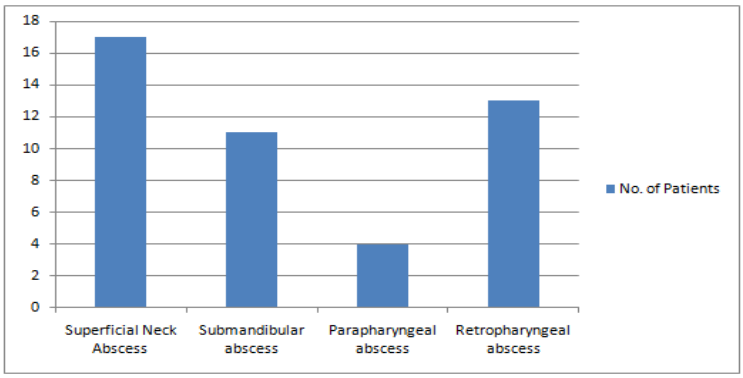

Figure 2: Type-wise Distribution of patients of Neck Abscesses

Out of 44 patients taken up for study, 17 had superficial neck abscess, 13 had retropharyngeal abscess, 11 had Submandibular abscess and 4 had parapharyngeal abscess.

Out of 13 patients with retropharyngeal abscess, 4patients (30.8%) had a history of foreign body ingestion, prior to development of retropharyngeal abscess while 1patient had developed retropharyngeal abscess following attempted rigid oesophagoscopy. It is noteworthy that one patient who had presented with parapharyngeal abscess developed retropharyngeal abscess after initiation of treatment. Odontogenic infection was established as the cause in 7 out of 11 (63.63%) patients of submandibular abscess, and was also found in 3 patients of superficial neck abscess (27.3%) and one patient each of retropharyngeal and parapharyngeal abscess.

A total of 7 patients (15.9%) were found to be having Tuberculosis while Diabetes mellitus was diagnosed in 5 patients (11.4%). Out of 7 patients diagnosed with tuberculosis, 4 patients (57.2%) had presented with Retropharyngeal abscess and 3 patients (42.8%) had presented with superficial neck abscess. The pus culture was found to be sterile in a total of 20 patients (45.5%), out of which one patient was diabetic. Staphylococcus aureus was the most common organism isolated from pus culture of abscesses in non diabetics.

Presence of gas producing anaerobes as demonstrated by presence of air bubbles at the time of incision and drainage was found in 3 patients. Amongst the diabetic patients, Klebsiellapneumoniae was the most common organism isolated while no organism was isolated in pus from 1 patient.

Table 1: Organisms isolated on Culture and Smear

Organisms	Non-Diabetic patients (n=39)	Diabetic patients (n=5)
Staphylococcus aureus	9	1
Escherchia coli	2	0
Klebsiellapneumoniae	0	3
Mycobacterium tuberculosis	7	0
Anaerobes	3	0

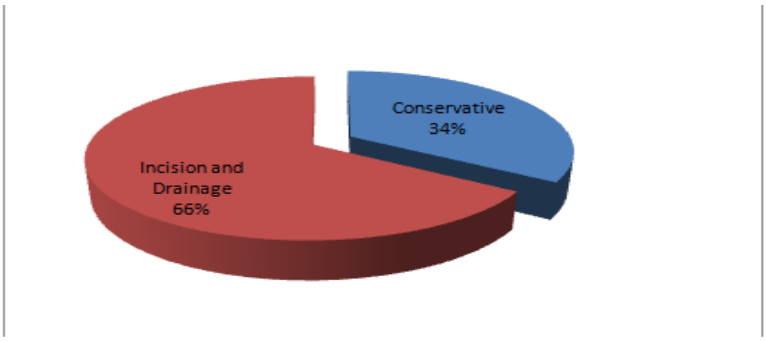

Figure 3: Distribution of Management

Out of 44 patients, 15 patients, including all patients with parapharyngeal abscess and few patients with retropharyngeal abscess, were treated with conservative management by exclusive intravenous antibiotics while 29 patients required Incision and Drainage.

It is noteworthy that one patient of submandibular abscess was mentally retarded and pus showed presence of Escherchia coli sensitive only to cotrimoxazole while resistant to all cephalosporins, penicillins and aminoglycosides. Culture sensitivity of pus from other patients mostly showed organisms sensitive to cephalosporins and aminoglycosides.

IV. Discussion

When the normal flora of the head and neck region are introduced into a sterile site of the body, itresults in formation of abscess; the bacteriologic pattern is usually polymicrobial in nature, including aerobes, facultative aerobes, and anaerobes (Brook 2002a). Thus, neck abscesses result from infection by a variety of aerobes, microaerophilic organisms and obligatory anaerobes. However, what is more interesting is the effect of geographical and cultural factors on the microbiology of neck abscesses. In several Western studies,[6, 7] the Staphylococcus (S.) species was a major causative pathogen of deep neck infections, while K. pneumoniaehad a limited role. In Asian studies, however, the importance of K. pneumoniaein deep neck infections was emphasized while S. aureusisolations were much lower.[8, 9] This disparity could be attributed to the lower rates of violence and substance abuse as well as higher diabetic rates in Asian societies.

As reported in many Asian studies,[9, 10]there was a close association between diabetes mellitus and K. pneumoniaeinfection.Diabetic patients were reported to be more susceptible to infection by gram-negative rods and staphylococci (el-Sayed and al Dousary 1996). Diabetic patients are known to have impaired neutrophilic functions and complement activation [11]. It is believed that the virulence of this gram-negative rod is decided by the host's macrophage function (Chen et al 1998, 2000). This reduced immunity, coupled with the increased oropharyngealK. pneumoniaecolonisation in immunocompromised hosts [6], could possibly explain the predominance of K. pneumoniaein the pus cultures of deep neck abscesses among the diabetic group. As K. pneumoniae is a common pathogen in patients with diabetes mellitus, Chen et al (2000) proposed that empiric antimicrobial regimens must include antibiotics against K. pneumoniae in diabetic patients. Complications are affected by both host immunity and abnormal Hemoglobin level[12]. Old age and diabetes are risk factors for developing deep neck abscesses and their sequelae[13]. Patients with multi-space abscesses, diabetes mellitus and complications usually have prolonged hospitalizations.

The high proportion of negative culture results in the study is probably due to the prompt use of high-dose antimicrobials early in the course of the disease, prior to admission. The culture rate for anaerobes could be underestimated owing to the difficulty in isolating these organismsand their fastidious nature.[14] Anaerobic

bacteria are common inhabitants of the oropharyngeal and gastrointestinal tracts. The close relationship between these organisms and dental infections has also been reported in other studies.[6,10] The gas producing anaerobes include clostridia, bacteroides, fusobacterium. Infections of submandibular space commonly originate from an odontogenic source which explains the high percentage of dental caries amongst patients of submandibular abscess in our study; other sources of infection include submandibular siloadenitis, lymphadenitis and trauma.

Due to the lack of limiting boundaries, the Parapharyngeal space is secondarily infected from the surrounding spaces, and likewise, its infection can spread rapidly to other spaces, as was seen in a patient in our study.Parapharyngeal Space infections tend to liquefy the fat rapidly, forming large amounts of pus. Hence, active intervention in the form of surgery or image-assisted drainage was usually warranted.[15,16] However, recent recommendations are prompt surgical drainage in cases who fail to respond to conservative treatment or those who show clinical deterioration. [17]

The retropharyngeal space lymph nodes are prominent in young children but involute in late childhood. This explains the prevalence of retropharyngeal abscesses in the paediatric age group, which develop secondary to the suppuration of these lymph nodes following upper respiratory tract infections, mostly seen in the age group of six months to six years.[18] In adults, the cause is often traumatic. Recently, there are reports of Retropharyngeal abscess being treated by exclusive conservative management, saving surgical management only for patients with respiratory distress or that due to foreign body.[17]

Ultrasonography is useful as an initial or alternative modality for identification of abscesses. It evaluates whether the abscess is liquefied enough to be drained and may also assist in the drainage itself.[5] However, deep-seated infections are not accessible by ultrasonography, and cross-sectional imaging is necessary for better localisation of the infections. Although CT is helpful both in determining the presence and location of neck infections in children, it is less helpful than Ultrasound or MRI Scan in differentiating abscess from lymphadenitis and cellulitis.[19]

As shown in our study, a wide variety of pathogens are involved in deep neck abscesses. To administer effectively antimicrobial agents to a patient, microbiologic data on the abscess must be obtained. However, it usually takes several days or longer to get the necessary data, and consequently broad spectrum empiric antimicrobial therapy is frequently launched before the definite culture result is available.[20]Even in the cases involving monomicrobial infection, it is impossible to find a single effective antibiotic before the culture results are available. Therefore, combination of antimicrobial agents covering the gram-positive aerobes, gram-negative aerobes, and anaerobes should be chosen as empiric antibiotic treatment. Specific antimicrobial therapy can be selected after obtaining the culture results.

In our study, Ceftriaxone with Metronidazole was administered for empirical therapy. Third-generation parenteral cephalosporins have a broad spectrum of activity against enteric gram-negative rods. Compared with first-generation agents, they are less active against gram-positive cocci, such as methicillin-susceptible staphylococci, and anaerobes. Ceftriaxone has desirable activity against streptococci. Besides, ceftriaxone has an excellent gram-negative spectrum and is active against Hemophilus, most Streptococcus pneumonia strains and penicillin-resistant Neisseria(Kasper et al 2005, p 798).Metronidazole is active against almost all obligate anaerobes, including the genera Peptostreptococcus,Bacteroides, Prevotella, Fusobacterium, and Clostridium, but it is not active against aerobes. When administered as an empiric antibiotic for deep neck abscess, metronidazole needs to be combined with antibiotics effective against aerobes to achieve broad coverage.

Surgical drainage and adequate antibiotic coverage remains the cornerstone of treatment of deep neck abscesses. Therapeutic needle aspiration may successfully replace surgical drainage, if the abscesses are small and no complications are imminent.[13] Some workers have reported the relapse of retropharyngeal abscess despite drainage.[21] Even when adequately draining the abscess, the treatment of deep neck abscess in old-age patients more than 65 years, or the patients with ineffective empiric antibiotics or underlying systemic diseases should be more aggressive because life-threatening complications happen more frequently.[22]

The microbiology of deep neck infections might change with time, and the resistance to antibiotics might influence the selection of empiric antibiotics.[20]. This correlates with the one patient in our study in whose pus Escherchia coli was cultured that was sensitive to only Cotrimoxazole. Conventionallytuberculous neck abscess was treated with conservative treatment by Anti-tubercular drugs. However, a few recent studies have suggested that tuberculous retropharyngeal abscess should be aggressively treated with transoral decompression, occipito-cervical fusion and triple coverage anti-tuberculous therapy. [17]

V. Conclusion

Neck Abscesses are a common disease to be dealt daily by otorhinolaryngologists. Systemic diseases like diabetes and tuberculosis can dictate the microbiology of neck abscesses and can thus influence the antibiotic coverage and need and timing of surgical intervention. Although surgical management still forms the

mainstay of treatment for most of the neck abscesses, a trial with exclusive conservative management by appropriate antibiotics can prove to be curative for certain neck abscesses.

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