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Original Research Article

Head and neck infection, clinicopathological outline

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ABSTRACT

Background: Despite the antimicrobial drugs, a significant percentage of head and neck infection still can be recorded, this study try to identify the causes of recorded cases of head and neck infection in antibiotics era by focusing on the clinical presentation and the predisposing factors.
Methods: A retrospective study was conducted in the department of otolaryngology in university of Benghazi including 84 patients who were diagnosed as head and neck infection. Clinical data, risk factors and managements were discussed in this study.
Results: The 84 patients with deep cervical infection were studied. The mean age of our patients was 33 years, most of them were males. Some had other co-diseases. Their main complains was severe throat pain. The most common space involved was peritonsillar space and the most common source of infection was tonsillar infection. Only third of the cases showed positive culture results. The most common organism cultured was *Staphylococci*. The range of hospital stay was 4-11 days. There was no mortality in our series of patients.
Conclusions: Cervical infection is associated with high rate of morbidity and mortality specially in immune-compromised patients, therefore early detection of the disease followed by quick and appropriate management are life-saving measurements. All patients need early broad-spectrum intravenous antibiotics, and most of them need different surgical intervention. As bad oral hygiene, smoking and low immunity are the major risk factors for neck infection, education of the community, especially in rural area, is required.

Keywords: Neck infection, Dental infections, Peritonsillar abscess

INTRODUCTION

Infections of the deep spaces in neck are serious form of abscesses associated with high risk of life threating complications in the absence of early diagnosis and good management.[1,2] Deep cervical infection sometimes is difficult to diagnose and treat because of the complicated anatomy of the neck with many critical structures and major nerves and blood vessels located in that region.[3] The incidence of these infections has decreased with the use of broad-spectrum antibiotics but despite of the extensive use of antibiotics, cervical infection still has significant morbidity and mortality.[4] Deep neck infection is commonly polymicrobial and the causative organisms include a range of gram-positive organisms such as *Streptococcus viridans, Staphylococcus epidermidis, Staphylococcus aureus;* and gram-negative organisms, such as *Escherichia coli, Klebsiella oxytoca, and Haemophilus influenza*.[5] The source of the infection is mainly from peritonsillar abscess or oral infection as the infection spreads by lymphatic system.[6] The Delays in diagnosis and treatment may lead to life-threatening complications like respiratory obstruction, mediastinitis, jugular vein thrombosis, pleural empyema, cavernous sinus thrombosis, pericarditis, septic shock, and even death.[7] Potentially life-threatening complications of deep neck infection have been reported to be 10 to 20% even in recent literature.[8] Once the diagnosis of deep neck

abscess is confirmed either clinically or radiologically, rapid surgical drainage with the administration of broad-spectrum antibiotic can be lifesaving which decreases morbidity and prevent mortality.[9,10] The aim of this study is to identify the causes of recorded cases of head and neck infection in antibiotics era by focusing on the clinical presentation and the predisposing factors.

METHODS

This study was conducted at department of otorhinolaryngology, university of Benghazi, 84 cases of deep neck infection presented from January 2017 to October 2020 were included in the study**.** Any patients with an infection related to foreign body injuries or head and neck malignancy were excluded. The age and the gender of the patients were recorded, clinical data included co-morbidities like diabetes mellitus, cardinal symptoms, past medical history and any drugs history were recorded. All patients underwent routine investigation and CT-scan of the neck. The management started with needle aspiration for culture and sensitivity test, some cases required surgical intervention by incision and drainage. In addition, tissue biopsy was done for histopathology. After the drainage of the infection, a triple antibiotics' regimen was started, and later on, it was modified according to culture and sensitivity results.

Statistical analysis

The obtained data were statistically analysis, and were demonstrated as number and percentages using statistical graphs.

RESULTS

Out of the total number of 84 patients, 55 (65.5%) were male and 29 (34.5) were female, the age of the patients ranged from 12 to 63 with mean age of 33.09±3.75 (SD) years (Figure 1). Only 27.2% of the patients had diabetes mellitus, 22.6% had hypertension, 35.9% of them had anemia and 40% were smoker, and only 2.4% with congestive heart failure. More than 70% of the patient were from rural areas, and 30% were from big cities. The main presenting symptoms was severe throat pain seen in 33.3% of cases followed by neck mass in 27.3% of cases, dysphagia and odynophagia in 20.24% of cases and fever in 9.53% while neck spasm and airway obstruction form about 5% and 3.5% respectively (Figure 2).

The most common space involved by the infection was peritonsillar space which was affected in 40.7% of cases followed by submandibular space in 30.9% of cases, then parapharyngeal space in 14.2% of cases, and finally, parotid space and retropharyngeal space were affected in 9.4% and 5.7% of cases respectively (Figure 3).

The most common source of deep neck infection was tonsillar diseases seen in 61.7% of cases followed by dental diseases in 23.8% whereas 15.4% of cases was of unknown source of infection (Figure 4).

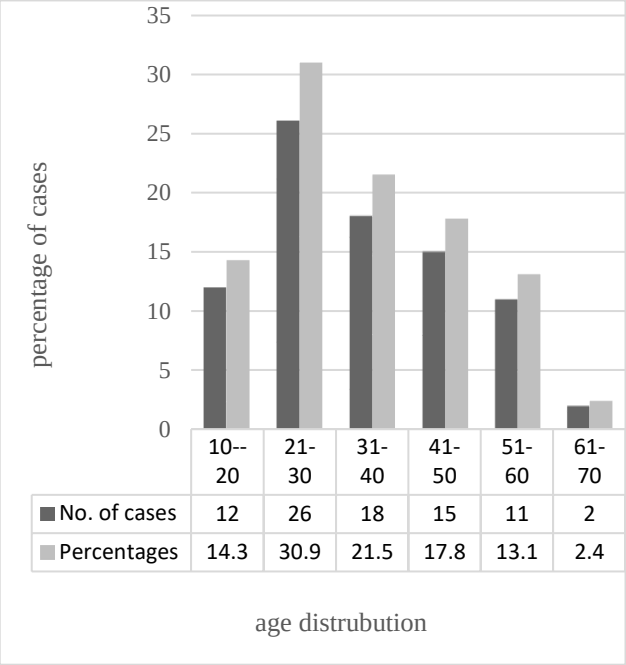

Figure 1: The age distrubution. Most of the patinets were in the age group of 21-30 years followed by 31-40 year, where as the minuminm percentge of cases was seen in patients older than 60 years.

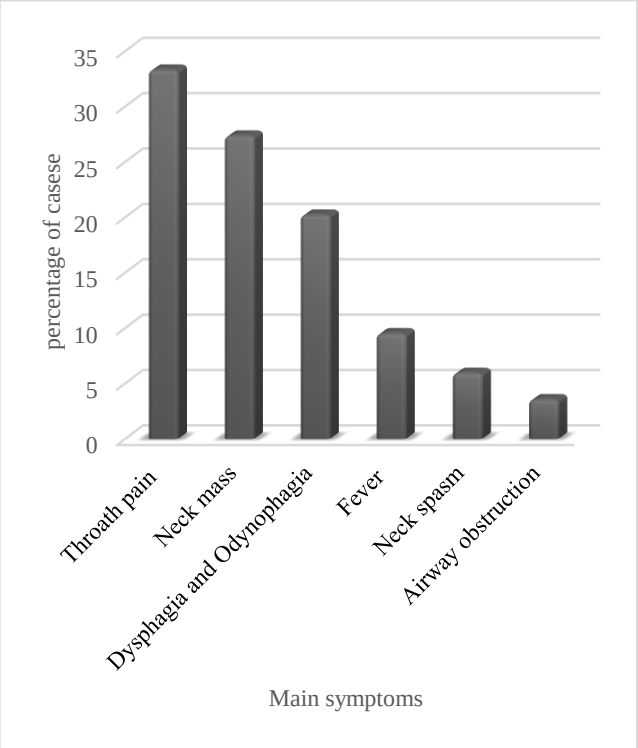

Figure 2: The main presenting symptoms of deep neck infection. Sore throath and neck mass were the most common presenting symptoms followed by dysphagia and fever.

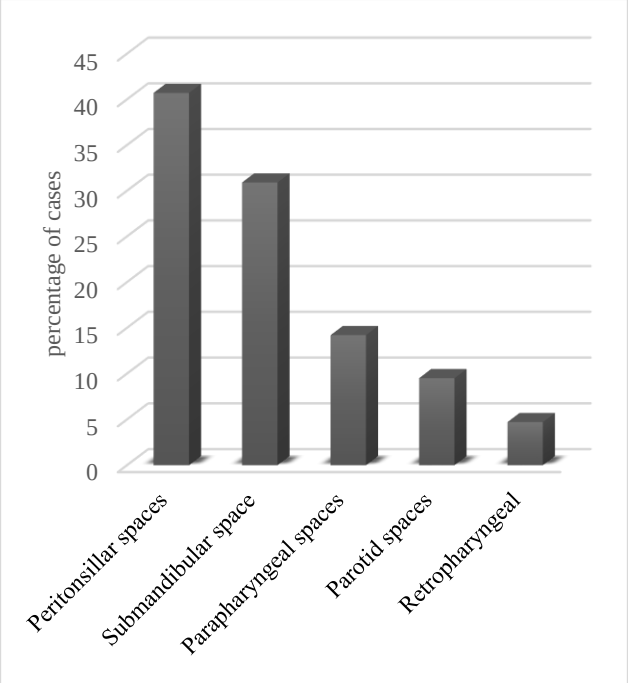

Figure 3: Sites of involvement in neck infection. The major sites were peritonsillar and submandibular spaces, whereas the parapharyngeal, the parotid and the retropharyngeal spaces were less common sites.

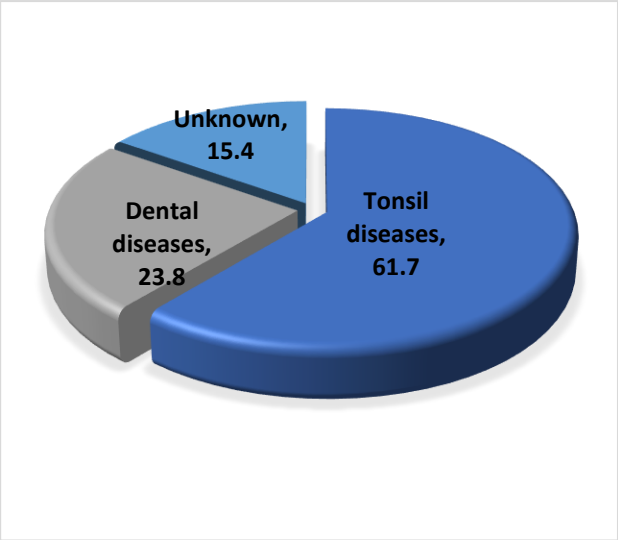

Figure 4: Common sources of deep neck infection. Tonsillar disease represented the most common source of head and neck infections followed by dental diseases.

The cultures from most of the cases were sterile with no bacterial growth, and the causative organisms were isolated in only 24 cases (29%) of head and neck infections, with *Staphylococcus aureus* as the most commonly identified bacteria followed by *Streptococcus* with few other identified species (Figure 5). Surgical intervention either by direct aspiration or external approaches was carried out in 67.6% of cases, while 32.4% of the patients required medical treatment only, those who had surgical treatment were also treated by antibiotics. Tracheostomy to safe the airway was done in 3 cases (3.5%). The range of hospital stay was 4 to 10 days, no mortality was recorded in any of the patients.

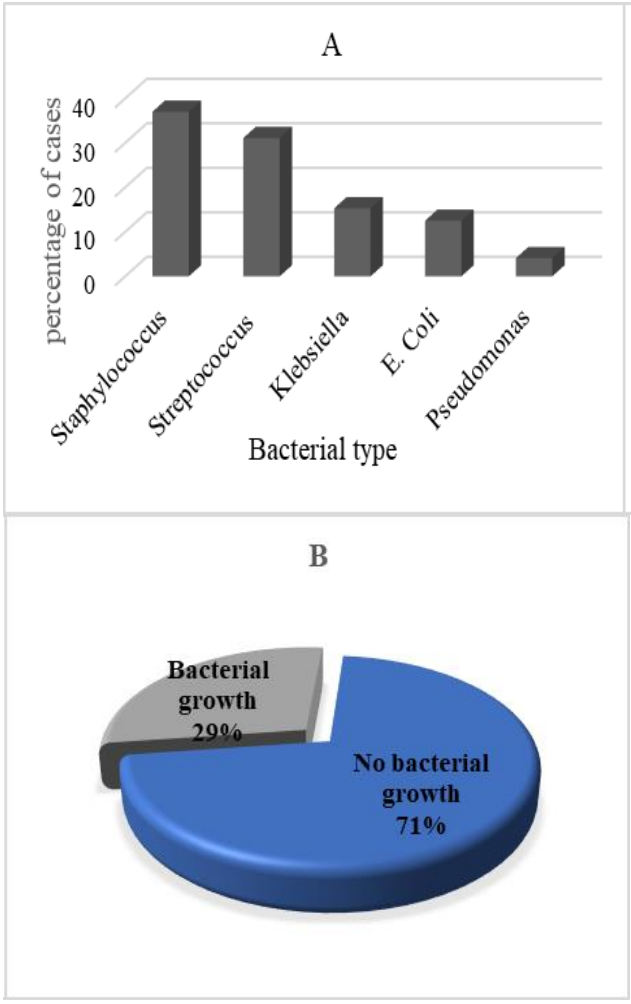

Figure 5 (A and B): Results of bacteriology: Most of bacterial cultures were negative, with no growth, only 29% of cultures showed positive bacterial growth and the *S. aureus* was the most common identified organism.

DISCUSSION

Deep cervical infection is a life -threating disease with high risk of morbidity and mortality in the absence of immediate surgical and medical treatment.[1,2]

In this study, 84 patients with deep space neck infection were analyzed, males presented 65.5% of the patients. Most of the patients were between 20 and 40 years of age with mean age of 33 years. Some of the studies conducted on the cervical infection showed similarity to this finding as most of the patients were in their thirties or forties.[11-12] In contrast to our finding, the patients in a study by Al-Noury et al belonged to an older age group.[13]

Regarding social history and co-morbidities, more than 70% of the patients were from rural areas, diabetes and hypertension were detected in 27.2% and 22.6% of the patients respectively. Anemias, mainly iron deficiency type, represented the associated illness in more than 30% of our patients, while a history of smoking was recorded in 40% of patients involved in this study who mainly were males. Small percentage (2.4%) of our patients was chronic heart diseases patients. Similar to this finding, diabetes and hypertension were also the main risk factors for deep neck infection in many other studies.[11-16] Unlike our finding, Kauffmann et al found that more than 40% of their Patients had cardio-pulmonary diseases which were the major risk factor followed by diabetes mellitus in 19.0%.[17] This discrepancy probably related to environmental and genetic factors.

Similar to this study, chronic smoking was associated with many cases of deep neck infection in many other studies as well.[11-13] Smoking is a worldwide problem associated with may chronic illness and could have immune suppression effect.

Patients with head and neck infection secondary to malignancy and patients who developed cervical abscesses after COVID-19 infection were excluded in this study as they were involved in another one.

The main presenting symptom in this study was neck pain in 33.3% of cases followed by neck mass and dysphagia in 27.3% and 20.24% of cases respectively. In many studies carried in deep neck infection, the presenting symptoms were nearly the same but they differ in their alignment. Hence, our main presenting symptoms were the same in some studies but the arrangement changed in some other ones.[14,15]

The most common space involved by the infection in this study was peritonsillar space which was affected in 40.7% of cases followed by submandibular space in 30.9% of cases, then parapharyngeal space in 14.2% of cases, and finally, parotid space and retropharyngeal space were affected in 9.4% and 5.7% of cases respectively. In contract to these findings, submandibular space, retropharyngeal and parapharyngeal spaces and not the peritonsillar one, were the most common affected sites in many other studies and these differences were related to the age and the immune state of the patient.[5,6,13,14]

The most common source of deep neck infection in this study was peritonsillar abscess which was seen in 61.7% of cases followed by dental diseases in 23.8% whereas 15.4% of cases was of unknown source of infection. Peritonsillar abscess also was the main source of infection in a study by Klug et al whereas, the unknown causes and the dental infection were the most common sources of deep neck infection in other studies.[11,14,18]

In this analysis, the cultures from most of the cases were sterile with no bacterial growth, and the causative organisms were isolated in only 24 cases (29%) of head and neck infections, with *Staphylococcus aureus* as the most commonly identified bacteria followed by *Streptococcus*. *Staphylococcus aureus* was also the most common isolated bacteria in a study by Al-Noury et al but *Streptococcus* and *Klebsiella* were the most common organisms in other studies.[13,14,19] Other researchers, showed that the type of the isolated bacteria is closely related to some other factors such as diabetes mellitus.[20] Also, the type of the isolated bacteria could be affected by the level of oxygen in the tissue.

Surgical intervention either by direct aspiration or external approaches was carried out in 67.6% of cases, while 32.4% of the patients required medical treatment only, those who had surgical treatment were also treated by antibiotics. Tracheostomy to safe the airway was done in 3 cases (3.5%). The range of hospital stay was 4 to 10 days, no mortality was recorded in any of the patients. Many other studies nearly have mentioned the same protocols of surgical and medical treatment.[13-20]

In summary, any suspected case of deep cervical infection demands immediate admission with airway maintenance and massive intravenous broad-spectrum antibiotics followed by CT scanning. Surgical drainage with samples for culture is mandatory if the diagnosis is confirmed by CT scanning, then antibiotics courses should be adjusted according to result of the bacteriology.

CONCLUSIONS

Deep cervical infection is still a challenging disease in otolaryngology. It is associated with high rate of morbidity and mortality specially in immune-compromised patients, therefore early detection of the disease followed by quick and appropriate management whether conservative/surgical is life-saving measurement to prevent high risk of morbidity and mortality. All patients need early diagnosis by CT scan and an intravenous broad-spectrum antibiotic, and most of them need a different surgical intervention. Bad oral hygiene, smoking and uncontrolled diabetes mellitus play a major role in development of deep neck abscesses therefore, education of community especially for populations in rural area may prevent dangerous infection.

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