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Original article

Deep Neck Space Abscesses; a Study of 51 Cases at Al-Thowra Hospital in El-Beyda City, Libya

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ABSTRACT

Aims*. The aim of this investigation was to identify the clinical outcomes, risk factors, and management strategies of deep neck abscesses (DNAs) at Al-Thowra hospital in El-Beyda City.* ***Methods****. This study was conducted on 51 patients diagnosed with DNAs, from January 2020 to October 2021 at the Department of Otolaryngology, in Al-Thowra hospital in El-Beyda City.* ***Results****. This study showed that males are most likely to have DNAs, the majority of patients were in the 16-30- and 0-15-year age groups. Fever and dysphagia were the most common symptom identified with 76.47 % and 74.51 % patients respectively. Tonsillopharyngitis and Odontogenic infection with 45.10 % and 31.37 % respectively were the most common etiological factor. Peritonsillar abscess 47.06 % was the common site of presentation. Surgical intervention incision and drainage was carried out in 39 patients (76.47 %).* ***Conclusion.*** *Odontogenic infections were the most common etiological factor for DNAs. Close attention must be paid to the management of patients with deep neck infections, especially children's patients. The surgical incision and drainage remain the main method of treating DNAs.*

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INTRODUCTION

The advent of modern antibiotics and surgical techniques has resulted in fewer complications and deaths following deep neck abscesses (DNAs). However, the number of DNAs encountered remains the same, due to the lack of infrastructure at the primary health level. The unhygienic living conditions in urban slums and lack of awareness among the patients contribute to the high incidence of patients presenting with large abscesses [1]. DNAs are significantly less common today than in the past. The impact of antibiotic treatment and improved dental care are the most probable reasons for this change. However, studies have shown that violence, substance abuse, and lack of proper primary medical and dental care have made DNA a relatively frequent entity in inner city populations. A study has demonstrated changing trends in the causes, bacteriologic findings, diagnosis, and management of DNAs [2]. Deep cervical abscesses (DCAs) are defined by the presence of pus in the spaces and fasciae of the head and neck. DCA can be categorized into retropharyngeal, peritonsillar, masseteric, pteropalatine maxillary, parapharyngeal, submandibular, parotid and floor of mouth abscesses [3]. Despite the improvements in diagnostic tests and the availability of modern antibiotic therapy, those infections continue to cause significant morbidity and mortality rates, especially when there is no early treatment [4].

Deep neck infections are bacterial infections originating from the upper aero-digestive tract and involving the deep neck spaces. Although uncommon, these infections are severe, and if not treated adequately, may lead to death. The incidence of this disease was relatively high before the advent of antibiotics, requiring prompt recognition and early interventions [5]. Delays in countering the infection may result in riskier issues, such as pneumonia, arterial erosion, and mediastinal involvement, even with the incorporation of modern antibiotics. Initially, 70 % of the infections developed from tonsillitis before the introduction of antibiotics. Though tonsillitis remains to be the most significant cause of the disease among children, dental infections are the most prevalent causes of deep neck infections among adults [6]. Infections of the deep spaces of the neck often present a true clinical challenge. Although antibiotics have reduced their incidence, deep neck space infections remain a relevant health problem. The complex anatomic organization of the neck makes diagnosis and precise localization of deep neck infections difficult. Clinical suspicion remains critical in that many deep neck infections

are not evident on palpation or visual inspection [7]. The purpose of this study was to identify the clinical outcomes, risk factors, and management strategies of DNAs at Al-Thowra hospital in El-Beyda City

METHODS

This is a study was conducted at the Department of Otolaryngology, at Al-Thowra hospital in El-Beyda City. After taking approval from local ethical committee, study was conducted and patients between January 2020 to October 2021. A total of 51 cases of DNAs met our inclusion criteria. Patients of all age groups and both genders (32 males and 19 females) were included. The study population comprised of patients with DNAs reporting to the facility and satisfying the following inclusion criteria: symptomatology of DNAs and all age groups.

Data collection involved demography (age and gender) and abscesses site. In addition, the clinical presentation of the disease, the etiology, radiology, the managements, antibiotics treatment and the duration of hospital admission were studied. Also, computed tomography (CT) scanning, ultrasonography and x-ray were done as an imaging study was done when required. All descriptive data were interoperated in tables; the numerical data were shown as number and percentage. To find the significant difference between the observed variable studied, P value was taken as level of significance at <0.05. Statistical analysis was carried out in Minitab software (version17).

RESULTS

The study group was included 51 patients with DNAs, 32 (62.75%) were male and 19 (73.75%) females. Three patients admitted to intensive care unit (ICU). However, no mortality was found in any patients with DNAs.Patients from births to age 45 years and above were included in the study.

Majority of patients were seen in second decade of life (16-30) with 19 patients (27.45 % male and 9.80 % female), followed by the first decade (0-15) with 13 patients (15.69 % male and 9.80 % female. Meanwhile less in occurrence was seen in forth decade of life (45- Above) with 7.84 % in the female (Table 1).

Table 1: Distribution of patients according to age group

Age	Sex	Number of cases. (%)
0-15	M	8 (15.69)
	F	5 (9.80)
16-30	M	14 (27.45)
	F	5 (9.80)
31-45	M	5 (9.80)
	F	5 (9.80)
45- Above	M	5 (9.80)
	F	4 (7.84)

Upon Pearson Chi-Square = 4.762, DF = 3, P-Value = 0.190

Fever was found the most common symptoms in 39 patients (76.47 %) at second decade of life (16-30). It was the most common presented in 12 male (23.53 %) and 4 female (7.84 %). Dysphagia was observed in 38 patients with (74.51 %). Other symptoms were reported as neck swelling (26 patients, 50.98%), Trismus (20 patients, 39.22 %), Otalgia (9 patients, 17.65 %) and Torticollis (1 patient, 1.96 %) as shown in (Table 2).

Table 2: Distribution of patients according to symptoms, (Number of cases. (%))

Age	Sex	Fever	Dysphagia	Trismus	Neck swelling	Torticollis	Otalgia
0-15	M	5 (9.80)	5 (9.80)	3 (5.88)	7 (13.73)	1 (1.96)	0
	F	4 (7.84)	2 (3.92)	1 (1.96)	5 (9.80)	0	0
16-30	M	12 (23.53)	11 (21.57)	7 (13.73)	5 (9.80)	0	2 (3.92)
	F	4 (7.84)	5 (9.80)	4 (7.84)	2 (3.92)	0	2 (3.92)
31-45	M	4 (7.84)	4 (7.84)	0	2 (3.92)	0	1 (1.96)
	F	3 (5.88)	4 (7.84)	2 (3.92)	2 (3.92)	0	1 (1.96)
45- Above	M	5 (9.80)	4 (7.84)	2 (3.92)	0	0	2 (3.92)
	F	2 (3.92)	3 (5.88)	1 (1.96)	3 (5.88)	0	1 (1.96)
Total		39 (76.47)	38 (74.51)	20 (39.22)	26 (50.98)	1 (1.96)	9 (17.65)
Od ratio		2.0000	1.0714	0.8250	0.4537	1.8571	0.6944
P. Value		0.34	0.91	0.74	0.18	0.70	0.62

Regarding etiology of DNAs, tonsillopharyngitis were diagnosed as the most common etiological factor and found in 45.10 % of patients. Odontogenic infections in the form of carious teeth were recorded in (31.37%) of patients. Sialolithiasis, skin lesion and Unknown were recorded in 5.88 %. Trauma was observed in 3.92 %. Deep neck infections due to foreign body impaction was seen in only one case (1.96 %) (Table 3).

Table 3: Distribution of patients according to etiological factors, (Number of cases. (%))

Age	Sex	Odontogenic	Tonsillopharyngitis	Trauma	Sialolithiasis	skin lesion	Foreign body	Unknown
0-15	M	4 (7.84)	0	1 (1.96)	0	2 (3.92)	0	3 (5.88)
	F	0	0	1 (1.96)	0	1 (1.96)	0	0
16-30	M	4 (7.84)	9 (17.65)	0	1 (1.96)	0	1 (1.96)	0
	F	3 (5.88)	3 (5.88)	0	0	0	0	0
31-45	M	2 (3.92)	3 (5.88)	0	0	0	0	0
	F	2 (3.92)	3 (5.88)	0	0	0	0	0
45-Above	M	0	4 (7.84)	0	0	0	0	0
	F	1 (1.96)	1 (1.96)	0	2 (3.92)	0	0	0
Total		16 (31.37)	23 (45.10)	2 (3.92)	3 (5.88)	3 (5.88)	1 (1.96)	3 (5.88)
Od ratio		0.9848	1.7143	0.5806	0.2742	1.2000	1.8571	4.6271
P. Value		0.95	0.36	0.70	0.30	0.85	0.70	0.31

Distribution of patients according to abscesses site was illustrated in (Table 4). Peritonsillar abscess was found as the most common site amongst all DNAs and is seen in (9 male patients, 17.65%) and (3 female patients, 5.88%) at second decade of life (16-30). 6 patients (11.77%), were seen in third and fourth decade of life. Submandibular abscess was reported in (6 male patients, 11.77%), (2 female patients, 3.92 %) in first decade of life (0-15) and (5 patients, 9.80 %) in second decade of life (16-30). Meanwhile, 2 patients (3.92 %), were seen in third and fourth decade of life. This condition was diagnosed mostly due to odontogenic in origin. Cheek abscess were seen in (2 patients, 3.92 %) in first decade of life (0-15) and (2 patients, 3.92 %) in third decade of life (31-45). Retro-pharyngeal was noted in two patients (3.92 %) in first decade of life (0-15). Finally, Ludwig's angina, Sub-mental, Para-pharyngeal and Parotid abscess were recorded one patient (1.96%).

Table 4: Distribution of patients according to abscesses site, (Number of cases. (%))

Age	Sex	Cheek	Sub-mandibular	Sub-mental	Ludwig's angina	Para-pharyngeal	Retro-pharyngeal	Parotid	Peritonsillar abscess
0-15	M	1 (1.96)	6 (11.77)	0	0	0	1 (1.96)	0	0
	F	1 (1.96)	2 (3.92)	1 (1.96)	0	0	1 (1.96)	0	0
16-30	M	0	3 (5.88)	0	1 (1.96)	1 (1.96)	0	0	9 (17.65)
	F	0	2 (3.92)	0	0	0	0	0	3 (5.88)
31-45	M	2 (3.92)	0	0	0	0	0	0	3 (5.88)
	F	0	2 (3.92)	0	0	0	0	0	3 (5.88)
45- Above	M	0	0	0	0	0	0	0	5 (9.80)
	F	0	2 (3.92)	0	0	0	0	1 (1.96)	1 (1.96)
Total		4 (7.84)	17 (33.33)	1 (1.96)	1 (1.96)	1 (1.96)	2 (3.92)	1 (1.96)	24 (47.06)
Od ratio		0.5667	0.8478	1.8571	1.8571	1.8571	0.5806	1.8571	1.9429
P. Value		0.58	0.79	0.70	0.70	0.70	0.70	0.70	0.26

Distribution of patients according to management was shown in (Table 5). Drainage of abscess via an external incision and drainage was found the most modality of treatment in DNAs in 39 patients (76.47 %) followed by initial needle aspiration in 10 patients, 19.61 %. Spontaneous drainage was done in 3 patients, 5.88 %. There were not any cases need to Emergency tracheostomy expect one case was need to emergency tracheostomy but the family refused to do it.

Table 5: Distribution of patients according to management, (Number of cases. (%))

Age	Sex	Aspiration	IID	Spontaneous drainage	Tracheostomy
0-15	M	5 (9.80)	2 (3.92)	1 (1.96)	0
	F	2 (3.92)	3 (5.88)	0	0
16-30	M	1 (1.96)	13 (25.49)	0	0
	F	1 (1.96)	4 (7.84)	0	0
31-45	M	0	6 (11.76)	0	0
	F	0	4 (7.84)	1 (1.96)	0
45- Above	M	0	5 (9.80)	0	0
	F	1 (1.96)	2 (3.92)	1 (1.96)	0
Total		10 (19.6)	39 (76.47)	3 (5.88)	0
Od ratio		0.8654	1.6667	0.2742	
P. Value		0.84	0.46	0.30	

All patients received antimicrobial therapy. Metronidazole (Flagyl) was the most used antibiotics as first-line treatment with 60.78 % of cases, followed by Rocephin (Ceftriaxone) with 52.94 % of cases, Augmentin (Amoxicillin +clavulanic acid) with 45.10 % of cases, Meronem (Meropenem) with 5.88 % of cases, Claforan (Cefotaxime) with 3.92 % % of cases and vancomycin with 1.96 % of cases. In this study cultures of bacteria were not performed in all cases (Table 6).

The duration of hospital stay ranged from 0 to >14 days. The greatest numbers of patients who stay in hospital were 45 patients, 88.24 % where stay from 0-7 days, while 3 patients, 5.88 % stay at 7-14 days and prolonged hospital stay (≥14days) was observed in 1 (1.96 %) case (Table 7).

Distribution of patients according to systemic diseases was shown in (Table 8). Among all 51 patients, 5 patients (27.45 %) were diabetes mellitus where were observed 3 patients (2 male and 1 female) in the third decade of life (31-45) and 2 female patients in the fourth decade of life (45 - Above). However, there were 3 patients (5.88 %) had hypertension were observed 1 male patient in the third decade of life (31-45) and 2 female patients in the fourth decade of life (45 - Above).

Ultrasound was performed to 23 patients (45. 10 %), 6 patients (11.76 %) were required CT scan and 2 patients (3.92 %) done by X- ray (Table 9).

Table 6: Distribution of patients according to type of drugs (Antibiotics), (Number of cases. (%))

Age	Sex	Augmentin (Amoxicillin + Clavulanic acid)	Rocephin (Ceftriaxone)	Flagyl (Metronidazole)	Claforan (Cefotaxime)	Vancomycin	Meronem (Meropenem)
0-15	M	3 (5.88)	5 (9.80)	5 (9.80)	1 (1.96)	1 (1.96)	1 (1.96)
	F	3 (5.88)	0	4 (7.84)	1 (1.96)	0	1 (1.96)
16-30	M	5 (9.80)	9 (17.65)	6 (11.76)	0	0	1 (1.96)
	F	1 (1.96)	5 (9.80)	2 (3.92)	0	0	0
31-45	M	3 (5.88)	2 (3.92)	4 (7.84)	0	0	0
	F	2 (3.92)	3 (5.88)	4 (7.84)	0	0	0
45- Above	M	3 (5.88)	2 (3.92)	3 (5.88)	0	0	0
	F	3 (5.88)	1 (1.96)	3 (5.88)	0	0	0
Total		23 (45.19)	27 (52.94)	31 (60.78)	2 (3.92)	1 (1.96)	3 (5.88)
Od ratio		0.8642	1.2500	0.4615	0.5806	1.8571	1.2000
P. Value		0.80	0.69	0.19	0.70	0.70	0.88

Table 7: Distribution of patients according to stay in hospital, (Number of cases. (%))

Age	Sex	0-7	7-14	>14
0-15	M	4 (7.84)	1 (1.96)	0
	F	4 (7.84)	1 (1.96)	0
16-30	M	14 (27.45)	0	1 (1.96)
	F	6 (11.76)	0	0
31-45	M	5 (9.80)	0	0
	F	4 (7.84)	1 (1.96)	0
45- Above	M	6 (11.76)	0	0
	F	3 (5.88)	0	0
Total		46 (90.20)	3 (5.88)	1 (1.96)
Od ratio		1.1373	0.2742	1.8571
P. Value		0.89	0.30	0.70

Table 8: Distribution of patients according to systemic diseases, (Number of cases. (%))

Age	Sex	Diabetes	Hypertension
0-15	M	0	0
	F	0	0
16-30	M	0	0
	F	0	0
31-45	M	2 (3.92)	1 (1.96)
	F	1 (1.96)	0
45- Above	M	0	0
	F	2 (3.92)	2 (3.92)
Total		5 (27.45)	3 (5.88)
Od ratio		0.3556	0.2742
P. Value		0.28	0.30

Table 9: Distribution of patients according to an imaging required, (Number of cases. (%))

Age	Sex	Ultrasound	CT scan	X-ray
0-15	M	7 (13.73)	2 (3.92)	2 (3.92)
	F	3(5.88)	1 (1.96)	0
16-30	M	5 (27.45)	1 (1.96)	0
	F	3 (5.88)	0	0
31-45	M	1 (1.96)	1 (1.96)	0
	F	1 (1.96)	1 (1.96)	0
45- Above	M	0	0	0
	F	3 (5.88)	0	0
Total		23(45. 10)	6 (11.76)	2 (3.92)
Od ratio		0.6158	1.2143	3.1967
P. Value		0.40	0.83	0.46

DISCUSSION

Previous studies show many similarities and few differences in comparison with current study. With 32 of 51 patients (62.75) % being male, a modest predominance of men was observed in other studies [6, 8]. Whereas, other studies were showed an equal distribution of patients in term of gender [9, 10]. The age ranged from 0 to 45 years to above, which is comparable to other analysis [11, 12]. The DNAs occurred in a wide age range. However, about 63 % of the patients were in their first and second decade, probably because of the relatively high rates of dental infection in this age group [13]. These findings correspond to other reports in the literature [11, 14]. The most common symptom in present study was Fever (76.47 %) and Dysphagia (74.51 %). This study agreement with a study by Yang et al. who showed that Fever, trismus, neck pain, and odynophagia were the most common symptoms in both children and adults' groups [14]. However, observation in present study has little difference with Meher et al. [1] who showed that pain was the most common presenting symptom, followed by fever and dysphagia. Another study recorded dysphagia as the most complained-about symptom, accounting for 66 % of patients, followed by neck pain and neck swelling at 59 % each [15].

A previous study showed similar results to this work where the majority of their patients complained of neck pain, followed by odynophagia and dysphagia. Pharyngotonsillitis was the most common cause followed by dental infection [16]. This finding correlates with the study done before that showed that the bacterial tonsillitis was the most common cause followed by odontogenic infection and totaling [17]. Another study has shown an increase associated with intravenous drug abuse and neck trauma infections, although present work has not identified these etiologies [18].

Furthermore, pervious reviews reported that, odontogenic was the most common etiological factor [19-21]. Another study also described a significant prevalence of deep neck infections caused by dental infections [13]. Likewise, the present report found the most common cause to be dental infection (42 %). The most frequent dental source was periapical infection of the mandibular molars (usually the second or third), as the roots of these teeth extend inferiorly to the mandibular insertion of the mylohyoid muscle, adjacent to the submandibular and parapharyngeal spaces [22]. Most patients in this study had peritonsillar abscesses followed by submandibular abscess of the cases which is in agree with [23]. However, our study contrasted with Parhiscar and Har-El where they found a submandibular abscess in 36 % of their patients, a pharyngeal abscess in 30 %, and Ludwig's abscess in 21 % [13]. In addition, the submandibular space was the most common site in a study by Ncogoza et al followed by the peritonsillar space [11]. This is consistent with what have been found in Nigeria where submandibular location was the most prevalent with 43.9 %. The submandibular space is the first deep neck space to be affected by spread of infection of dental origin. This finding serves to emphasize the importance of dental hygiene, and DNSIs can be thought of as an extreme complication of poor oral hygiene [24]. Kamath et al. observed that most abscesses in the parapharyngeal space, followed by the submandibular space then the retropharyngeal space [15]. However, Gargava et al. observed that Ludwig angina was most common site for abscess formation, followed by submandibular abscess then peritonsillar abscess [20]. It is believed that due to close proximity of mandibular dental roots to the submandibular space can readily involve by dental infections, and anatomically proximity spread to another space.

Historically, retropharyngeal space infections were most common in children less than 10 years old. However, an increase in the immunocompromised patient population has seen these infections become more frequent in adults, the infections

are more common in males than females (2:1) [25]. Patients with retropharyngeal space infections also had fever, odynophagia, dysphagia, sore throat, pains, and stiffness. The patients in this study responded well to incision as the preferred mode of management for DNAs. Various methods were used to manage the different cases of DNAs patients. Incision and drainage were the most preferred, as 39 patients (76.47%) had their case managed by this method. This was similar to the study that reported that incision and drainage was the most common method followed by incision, drainage, then teeth extraction [23]. In addition, in agree with a study by Gujrathi et al. where 55% underwent incision and drainage and 24 % had an incision, drainage, and teeth extraction [7]. Using a needle to drain an abscess reduces the morbidity of open surgery by limiting surgical trauma, minimizing the risk of contaminating surrounding healthy tissue, and reducing healing time. In fact, needle aspiration is rarely mentioned in the literature as a diagnostic modality of DNSIs. It is recalled as a modality of surgical treatment under ultrasound guidance [14]. Adoption of needle aspiration as the primary and immediate mode of diagnosis has assisted to increase speed of treatment, namely incision and drainage [11]. In this study there were not any cases need to emergency tracheostomy expect one case was need to emergency tracheostomy but the family refused because it is an extremely serious and it is often fatal. However, tracheostomy is recommended in the presence of an urgent need for airway control and large abscess due to the risk of rupture and subsequent purulent aspiration during intubation.

With collections that are limited to the retropharyngeal space, above the hyoid bone, and easily visualized; a transoral approach to drainage can be undertaken [26, 27]. This procedure is performed with the patient in the Rose position in order to keep any drainage within the nasopharynx. All patients were treated empirically with broad-spectrum intravenous antibiotics on admission. The most frequent treatment regimens were Metronidazole (Flagyl) followed by Rocephin (Ceftriaxone) then Augmentin (Amoxicillin +clavulanic acid). Whereas Vancomycin was lower. This finding is contrast with other studies that included vancomycin for optimal management of deep neck infections in intravenous drug abusers or in patients with infection near vital structures or the central nervous system [28, 29]. The three keys to successful management of deep neck infections are protection and control of the airway, antibiotic therapy and surgical drainage. The age-old dictum that all abscesses must be surgically drained has recently been tested in studies looking at the medical management of neck abscesses and the use of image guided aspiration of abscesses. However, many still practices by Levitt's thinking that "antibiotics are not a substitute for surgery, they should be used in conjunction with proper surgical drainage" [30].

Current results found that systemic diseases were diabetes mellitus and hypertension. This correlates to the study that reported a 16% to 20% incidence of diabetes [18]. Systemic arterial hypertension, which may be associated with heart and lung diseases, is not given much importance; these factors may have an influence on the morbidity and mortality of DNI. As there is an increase in global obesity as part of the metabolic syndrome, patients with diabetes mellitus and HIV infection are at risk for atypical and more complicated DNIs [31]. Retropharyngeal abscess is not common nowadays with the increasing use of antibiotics in the treatment of upper respiratory tract infections. It is almost exclusively a pediatric diagnosis. Most incidents occur in children ages six months to six years [32].

RPA needs prompt diagnosis and early management which often requires surgical drainage to achieve optimum result. The diagnosis is based on clinical and radiological pictures. The management needs securing of the airway, surgical drainage and antibiotics. The occurrence of complications, particularly retropharyngeal abscess is an extremely rare one and burdened with a high morbidity and mortality. Early diagnosis and prompt treatment are essential for preventing catastrophic complications. Treating physicians should maintain a high index of suspicion when encountering the patient with odynophagia, unexplained neck pain or swelling and should perform detailed history taking of fish bone ingestion and performing the necessary investigations for avoiding the delay in treatment [33].

CONCLUSION

DNAs remains a common and challenging disease for Otorhinolaryngologists, and should be treated on emergency basis. In developing countries, lack of adequate nutrition, poor oral hygiene and smoking has led to an increased prevalence of dental and periodontal diseases. In present study, Odontogenic infections were the second most common etiological factor for DNAs. Therefore, prevention of DNSI can be achieved by making the population aware of dental and oral hygiene, Also, encouraging regular checkups for dental infections. Early diagnosis and treatment is essential, thus, all patients should be initiated on treatment with empirical intravenous antibiotic therapy, which should be change over later according to the culture and sensitivity report. Tracheotomy should be considered if airway protection is needed and surgical drainage is the standard treatment of DNAs. Close attention must be paid to the management of patients with deep neck infections, especially patients with diabetes mellitus and cardio/pulmonary diseases or patients with multiple

space infections. The patient's condition was treated despite the challenges of inadequate resources for its management. We recommend early recognition through adequate evaluation of any oropharyngeal injuries or infection and early referral to the specialist with prompt surgical intervention.

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Disclaimer
The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest
There are no financial, personal, or professional conflicts of interest to declare.

REFERENCES

1. Meher R, Jain A, Sabharwal A, Gupta B, Singh I, Agarwal A. Deep neck abscess: a prospective study of 54 cases. The Journal of laryngology & Otology. 2005;119(4):299-302.
2. Mu-Kuan C, Yung-Sung W, Cheng-Chuan C, Mei-Tang H, Hsin-Chang H. Predisposing factors of life-threatening deep neck infection: logistic regression analysis of 214 cases. Journal of Otolaryngology-Head & Neck Surgery. 1998;27(3):141.
3. Gorjón PS, Pérez PB, Martín ACM, de Dios JCdP, Alonso SE, de la Cabanillas MIC. Deep neck infection: review of 286 cases. Acta Otorrinolaringologica (English Edition). 2012;63(1):31-41.
4. Sakaguchi M, Sato S, Ishiyama T, Katsuno S, Taguchi K. Characterization and management of deep neck infections. International journal of oral and maxillofacial surgery. 1997;26(2):131-4.
5. Durazzo M, Pinto F, da Rocha Loures M, Volpi E, Nishio S, Brandão L, et al. Os espaços cervicais profundos e seu interesse nas infecções da região. Revista da Associação Médica Brasileira. 1997;43:119-26.
6. Kauffmann P, Cordesmeyer R, Tröltzsch M, Sömmer C, Laskawi R. Deep neck infections: A single-center analysis of 63 cases. Medicina oral, patologia oral y cirugia bucal. 2017;22(5):e536.
7. GujrathiAtishkumar B. Deep neck space infection-a retrospective study of 270 cases at tertiary care center. World Journal of Otorhinolaryngology-Head and Neck Surgery. 2016.
8. Gu Q, Li J, Fan J, He G. Clinical analysis of deep neck infection and its relative factors. Lin Chuang er bi yan hou tou Jing wai ke za zhi= Journal of Clinical Otorhinolaryngology, Head, and Neck Surgery. 2013;27(3):150-2.
9. Mayor GP, Millán JMS, Martínez-Vidal A. Is conservative treatment of deep neck space infections appropriate? Head & Neck: Journal for the Sciences and Specialties of the Head and Neck. 2001;23(2):126-33.
10. Stalfors J, Adielsson A, Ebenfelt A, Nethander G, Westin T. Deep neck space infections remain a surgical challenge. A study of 72 patients. Acta oto-laryngologica. 2004;124(10):1191-6.
11. Ncogoza I, Eric E, Mvukiyehe JP, Shaye D. Clinical Presentation and Factors Leading to Complications of Deep Neck Spaces Infections at CHUK. Rwanda Journal of Medicine and Health Sciences. 2021;4(1):8-19.
12. Suehara AB, Gonçalves AJ, Alcadipani FAMC, Kavabata NK, Menezes MB. Deep neck infection-analysis of 80 cases. Brazilian journal of otorhinolaryngology. 2008;74(2):253-9.
13. Parhiscar A, Har-El G. Deep neck abscess: a retrospective review of 210 cases. Annals of Otology, Rhinology & Laryngology. 2001;110(11):1051-4.
14. Yang W, Hu L, Wang Z, Nie G, Li X, Lin D, et al. Deep neck infection: a review of 130 cases in southern China. Medicine. 2015;94(27).
15. Kamath P, Shetty AB, Hegde MC, Sreedharan S, Bhojwani K, Padmanabhan K, et al. Presentation and management of deep neck space abscess. Indian Journal of Otolaryngology and Head & Neck Surgery. 2003;55(4):270-5.
16. Bottin R, Marioni G, Rinaldi R, Boninsegna M, Salvadori L, Staffieri A. Deep neck infection: a present-day complication. A retrospective review of 83 cases (1998–2001). European Archives of Oto-rhino-laryngology. 2003;260(10):576-9.
17. Brito TP, Hazboun IM, Fernandes FL, Bento LR, Zappelini CEM, Chone CT, et al. Deep neck abscesses: study of 101 cases☆. Brazilian journal of otorhinolaryngology. 2017;83:341-8.
18. Sethi DS, Stanley RE. Deep neck abscesses–changing trends. The Journal of Laryngology & Otology. 1994;108(2):138-43.
19. Eftekharian A, Roozbahany NA, Vaezeafshar R, Narimani N. Deep neck infections: a retrospective review of 112 cases. European Archives of Oto-Rhino-Laryngology. 2009;266(2):273-7.
20. Gargava A, Raghuwanshi S, Verma P, Jaiswal S. Deep Neck Space Infection a Study of 150 Cases at Tertiary Care Hospital. Indian Journal of Otolaryngology and Head & Neck Surgery. 2021:1-4.

21. Kataria G, Saxena A, Bhagat S, Singh B, Kaur M, Kaur G. Deep neck space infections: a study of 76 cases. Iranian journal of otorhinolaryngology. 2015;27(81):293.
22. Irani B, Martin-Hirsch D, Lannigan F. Infection of the neck spaces: a present day complication. The Journal of Laryngology & Otology. 1992;106(5):455-8.
23. Almutairi D, Alqahtani R, Alshareef N, Alghamdi YS, Al-Hakami HA, Algarni M. Deep neck space infections: a retrospective study of 183 cases at a tertiary hospital. Cureus. 2020;12(2).
24. Osunde OD, Akhiwu BI, Efunkoya AA, Adebola AR, Iyogun CA, Arotiba JT. Management of fascial space infections in a Nigerian teaching hospital: A 4-year review. Nigerian medical journal: journal of the Nigeria Medical Association. 2012;53(1):12.
25. Al-Noury K, Lotfy A. Deep neck spaces radiology and review of deep neck infections at King Abdulaziz University Hospital. Egyptian Journal of Ear, Nose, Throat and Allied Sciences. 2010;11:69-73.
26. Kirse DJ, Roberson DW. Surgical management of retropharyngeal space infections in children. The Laryngoscope. 2001;111(8):1413-22.
27. Schuler PJ, Cohnen M, Greve J, Plettenberg C, Chereath J, Bas M, et al. Surgical management of retropharyngeal abscesses. Acta oto-laryngologica. 2009;129(11):1274-9.
28. Han JK, Kerschner JE. Streptococcus milleri: an organism for head and neck infections and abscess. Archives of Otolaryngology–Head & Neck Surgery. 2001;127(6):650-4.
29. Lee KC, Tami TA, Echavez M, Wildes TO. Deep neck infections in patients at risk for acquired immunodeficiency syndrome. The Laryngoscope. 1990;100(9):915-9.
30. Levitt GW. The surgical treatment of deep neck infections. The Laryngoscope. 1971;81(3):403-11.
31. Vieira F, Allen SM, Stocks RMS, Thompson JW. Deep neck infection. Otolaryngologic Clinics of North America. 2008;41(3):459-83.
32. Craig FW, Schunk JE. Retropharyngeal abscess in children: clinical presentation, utility of imaging, and current management. Pediatrics. 2003;111(6):1394-8.
33. Swain SK, Singh N, Sahu MC. An unusual presentation of fish bone ingestion in an adolescent girl–A case report. Egyptian Journal of Ear, Nose, Throat and Allied Sciences. 2016;17(2):95-7.