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Original Article

A retrospective evaluation of 44 patients followed-up with a diagnosis of deep neck infection

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Abstract

Aim: he purpose of this study was to evaluate the demographic data and clinical features of patients diagnosed with deep neck infection over a one-year period and hospitalized for treatment in a tertiary training and research hospital.

Material and methods: Files for cases treated and followed-up for deep neck infection in our pediatric department during 2017 were evaluated retrospectively. Age, sex, month of presentation, presentation symptoms, physical examination findings, laboratory results, radiological imaging, consultations requested from other departments, treatments administered, number of days of hospitalization, and complications developing were assessed from these case files.

Results: Twenty-eight (63.6%) of the 44 patients hospitalized for treatment for deep neck infection in the pediatric department were boys, and 16 (36.4%) were girls. Patients' mean age was 57.45 ± 44.35 (5-191) months. Mean duration of hospitalization and treatment was 8.2 ± 2.8 (4-14) days. The most common presentation symptom was swelling in the neck (65.9%), and the most common physical examination finding was cervical lymphadenopathy (81.8%). Tooth decay was present in 27.3% of patients. Consultations were most commonly requested with the ear, nose and throat department, while consultations were requested with the external diseases department for five patients (11.3%).

Conclusion: The prevalence of deep neck infection has increased in recent years.Further studies are needed on the subject of deep neck infection, which may involve life-threatening complications. Physicians should pay closeattention to the relation between tooth decay and deep neck infection in all patients followed-up with a diagnosis of such infection.

Keywords: Deep Neck Infection; Tooth Decay; Consultation; Childhood.

INTRODUCTION

Deep neck infection (DNI) is an important clinical condition affecting the retropharyngeal, peritonsillar and parapharyngeal areas, the cervical fascia, and the surrounding spaces (1-3). Widespread antibiotic use is reported to alter the flora in the oropharyngeal region, and to increase antibiotic resistance in bacteria, and thus to increase the incidence of childhood DNI (1,4,5). Since it gives rise to non-specific findings in young children, greater attention is required over diagnosis than in adolescent and adult patients (6). In contrast to adult patients, lymphadenopathy is the most common presentation symptom in children. Patients diagnosed with DNI must be closely monitored due to the possible development of life-threatening complications such as airway obstruction, jugular vein thrombosis, mediastinal spread, and pericarditis (7).

The purpose of this study was to evaluate the demographic data and clinical features of patients diagnosed with DNI and hospitalized for treatment over a one-year period in a tertiary training and research hospital.

MATERIAL AND METHODS

Files for cases diagnosed and treated between 01.01.2017 and 31.12.2017 at theAdıyaman University Training and Research Hospital Pediatric Department, Turkey, were

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evaluated retrospectively. Age, sex, month of presentation, presentation symptoms, physical examination findings, laboratory results (complete blood count, serological tests (such as Epstein Bar Virus IgM/IgG], and culture results), radiological imaging [ultrasound (USG), computerized tomography (CT) and magnetic resonance imaging (MRI)] consultations requested from any other department, treatments administered, length of hospitalization for treatment, and complications developing in the cases included in the study were evaluated from the files. Patients whose files could not be accessed despite being diagnosed with DNI and patients with diagnoses other than DNI were excluded from the study.

The data obtained were subjected to statistical analysis on SPSS software (IBM, version 24.0, Chicago, IL, USA). Categorical data were expressed as number and percentage, and constant variables as mean plus standard deviation. Approval for the study was received from the Adıyaman University Non-Interventional Clinical Research ethical committee (No. 2018/4-11).

RESULTS

Forty-eight patients hospitalized for treatment with diagnoses of DNI in our pediatric department between January 1st, 2017 and December 31st, 2017 were included in the study. Four of these were excluded from the study since their recordswere unavailable. Twenty-eight (63.6%) of the 44 patients finally enrolled were boys and 16 (36.4%) were girls. Patients' mean age was 57.45 ± 44.35 (5-191) months. Mean duration of treatment under hospitalization was 8.2 ±2.8 (4-14) days. Fourteen (31.8%) patients presented in winter, 11 (25%) in fall, 10 (22.7%) in summer, and 9 (20.4%) in spring.

The most common presentation symptom was swelling in the neck (65.9%), and the most common physical examination findings was cervical lymphadenopathy (81.8%). Tooth decay was remarkable, being observed in approximately one-third of patients. Twenty-nine (65.9%) patients were started on combined ampicillin-sulbactam and metronidazole therapy. Ultrasound imaging was performed in 32 (72.7%) cases. Three (6.8%) patients underwent CT imaging, and retropharyngeal region involvement was reported in all these patients. The department from which consultations were most commonly requested was the ear, nose and throat (ENT) department; the records showed that controlled drainage was performed by an ENT specialist in six cases (13.6%). Cases' demographic and clinical data are shown in Table 1.

Examination of laboratory results of the cases included in the study revealed a mean white cell count of 17,392 ± 6727 (6550-34,100) /mm3 and a mean C-reactive protein level of5.24 ± 5.91 (0-27). Throat cultures were taken in eight cases (18.2%) and wound site cultures from two (4.5%), and growth was observed in only three of these cases(two throat, one wound site culture). Streptococcuspyogenes was identified as the agent in one of the two throat cultures, while Staphylococcusaureusgrew in the other and in the wound site culture. Examination of patients' serological results revealed that EBV VCA IgM was studied in 21 (47.7%) patients, and that positivity was determined in only one(2.3%). Cytomegalovirus IgM was studies in 14 (31.8%) patients, and positivity was again determined in only one (2.3%). Cases laboratory results are shown in Table 2, and serological test results in Table 3.

Table 1. Demographic and clinical data obtained in the study

	n (%)
Total number of patients	**44**
Sex	
Male	28 (63.6)
Female	16 (36.4)
Culture	
Throat	8 (18.2)
Wound site	2 (4.5)
Growth in culture	3 (6.8)
Presentation symptom	
Fever	15 (34.1)
Swelling in the neck	29 (65.9)
Neck pain	6 (13.6)
Swallowing difficulty	3 (6.8)
Treatment	
Ampicillin Sulbactam, Metronidazole	29 (65.9)
Ampicillin-Sulbactam, Metronidazole, Amikacin	4 (9.1)
Ampicillin-Sulbactam, Clarithromycin, Clindamycin	11 (25)
Physical examination findings	
Cervicallymphadenopathy	36 (81.8)
Throat inflammation findings	24 (54.5)
Tooth decay	12 (27.3)
Tonsillarhy pertrophy	9 (20.5)
Otitis media findings (Otoscopy)	4 (9.1)
Consultation	
Ear, nose, throat	14 (31.8)
Dentistry	3 (6.8)
Ear, nose, throat + Dentistry	2 (4.5)
Imaging	
Ultrasound (USG)	32 (72.7)
Computerized tomography (BT)	3 (6.8)
Magnetic resonance imaging (MRI)	2 (4.5)

Table 2. Laboratory results of the cases in the study

Total number of patients: 44	Mean ± Standard Deviation (Min-Max)	Normal values
White Cell Count (/mm3)	17.392 ± 6727 (6550-34100)	4300-10,300
Neutrophil	3654±3034 (395-9642)	
Lymphocyte	3661 ± 2728 (9423-207)	
Hemoglobin (g/dL)	12.13 ± 1.44 (9-16)	12-16
Hematocrit	36.34 ± 4.48 (28-48)	
MCV (fL)	76.48 ± 6.54 (65-90)	80-90
MCH (pg)	25.63 ± 2.86 (21-33)	25-35,5
MCHC (g/dL)	33.12 ± 2.08 (26-37)	30-35,6
Platelet Count (/mm3)	318.035 ± 136.375 (41.900-693,300)	150,000-450,000
MPV (fL)	6.68 ± 1.21 (5-10)	6.8-10.8
C-reactive Protein (mg/dL)	5.24 ± 5.91 (0-27)	0-0,8

Table 3. Patients' serology results

	Positive (n/%)	Negative (n/%)	Total (n/%)
EBV VCA IgM	1 (4.7)	20 (95.3)	21 (100)
EBV VCA IgG	5 (38.4)	8 (61.6)	13 (100)
EBNA IgG	4 (40)	6 (60)	10 (100)
Anti-CMV Ig M	1 (7.1)	13 (92.9)	14 (100)
Anti-CMV Ig G	2 (100)	-	2 (100)
CMV Ig G avidity	2 (100)	-	2 (100)
Anti-Rubella IgM	-	11 (100)	11 (100)
Anti-Rubella IgG	4 (100)	-	4 (100)
Anti-Toxoplasma IgM	-	11 (100)	11 (100)
Anti-Toxoplasma IgG	4 (100)	-	4 (100)
HSV Tip 1 IgM	-	5 (100)	5 (100)
HSV Tip 1 IgG	3 (60)	2 (40)	5 (100)

EBV: Epstein Bar virus, CMV: Cytomegalovirus, HSV: Herpes Simplex virus

DISCUSSION

The prevalence of childhood DNI is increasing compared to previous years (1,4). This increase in the prevalence of DNI is reported to be associated with more drug-resistant bacteria in the oropharyngeal mucosa as a result of widespread antibiotic use (5). Since the condition may involve life-threatening complications, the importance of early diagnosis and treatment must not be underestimated (8).

The mean age of the 44 patients in this study was between 57.45 and 44.35 (5-191) months, with a male:female (M/F) ratio of 1.75. Yang et al. (9) reported a M/F ratio of 0.91, Salı et al. (10) of 1. 25, Belet et al. (11) of 1.4, and Polat et al. (12) of 1.76. Our M/F ratio was higher than that in other studies. Although adult studies on the subject have reported a higher incidence of DNI in men, there are no explicit data showing a greater incidence in male children (13,14). In agreement with the previous literature, the most common presentation symptoms in our study were swelling in the neck (65.9%) and fever (34.1%) (Table 1). Fever and neck swelling are also noteworthy as the main symptoms in other studies (7,10,11,15). Yang et al. (9) reported trismus and Polat et al. (12) reported swallowing difficulty as the second most common presentation symptoms.

Lymphadenopathy and inflammation of the throat have been described as the most common physical examination findings in the literature (11,12,15). Similar physical examination findings were observed in our study, together with tooth decay in 27.3% of patients. Upper airway infections are the disease most commonly reported to accompany DNI(7). Although the comorbidity rate of tooth decay and DNI is reported at 15.4-25.3%, the lack of data for tooth decay in studies from Turkey is particularly striking (2,5,6,7,11,12,15). In addition, the incidence of DNI is known to increase in subjects with dental abscess (16). In contrast to the previous literature, we also analyzed the consultations requested for our cases. Consultations were most commonly requested from the ENT department. In addition, the dentistry department was consulted in only 6.8% of cases, while the ENT and dentistry departments were consulted together in only 4.5%. The majority of studies of DNI naturally involve pediatric department branches and ENT departments, although we think that since tooth decay was observed in almost one case in three, dental faculty opinions will also be of considerable importance in the planning of treatment and follow-up.

Aerobic and anaerobic bacteria are both known as agents in DNI (17). The most commonly isolated micro-organisms in studies concerning DNI are Streptococcus viridans, ß-hemolytic Streptococcus, S.aureus, Klebsiella pneumoniae, Bacteroides and Peptostreptococcus (18-22). Although aerobic agents alone have been determined in very few studies, empiric antibiotherapy must be started without waiting for laboratory and culture results (8,23). The most commonly used drugs in empiric antibiotic therapy are beta lactamase inhibitor in combination with penicillin, clindamycin, or metronidazole (17,23). More expensive drugs (such as third-generation cephalosporins

and carbapenems) are used as the therapeutic option of choice in the treatment of DNI in developing countries, but this may also give rise to antibiotic resistance (24). In our study, as recommended in earlier reviews, patients were most commonly started on combined ampicillin-sulbactam and metronidazole therapy.Analysis of the laboratory results revealed that cases' mean white cell counts and C-reactive protein levels were higher than normally expected values. Analysis of the culture results showed that the agents growing in culture were similar to those described in previous studies. However, our culture collection rate was quite low, at 22.7% (total throat and wound site cultures).

Radiological imaging for diagnostic purposes is used both to confirm diagnosis of DNI and to guide the treatment to be administered (23). Lateral neck radiography, ultrasound, CT and MRI have allbeen used for DNI (25). The level of detection of drainable fluid collection in patients with suspected DNI is 63% when physical examination alone is performed, but rises to 77% with contrast CT (26). Lateral neck x-ray is 83% sensitive in diagnosing DNI, compared to a reported 100% when contrast CT is used (27). However, since MRI is superior to CT in differentiating soft tissue pathology from neighboring tissue, its use is preferred if the conditions are appropriate (such as anesthetic requirements being met, and the availability of a MRI device) (17). The most commonly used imaging technique in our study was USG at 72.7%. Although the place of USG in the diagnosis of DNI is to differentiate cellulite and identify drainable fluid collection, it may fail to fully visualize deep neck areas, and relies on the ability of the physician performing it (25,28). In addition, the low use of CT and MRI in our study was striking. Current authorities recommend the use of contrast CT in the diagnosis of DNI (17).

In a study from Taiwan, Huang CM et al. (7) reported that the mean length of hospital stay of patients with DNI varied depending on the area of the neck involved, ranging between five and 10 days. Yang W et al. (9) investigated adult and child patients and reported a mean hospital stay of 11.9 days. In studies from Turkey, Salı et al. (10) reported a mean hospital stay of 14 days, Belet et al. (11) 9.2 days, Polat et al. (12) eight days, and Hacı C et al. (15) 12 days. In a study of patients diagnosed with DNI in the USA between 2000 and 2009, Novis SJ et al. (1) reported that length of hospital stay increased as patient ages decreased, and that stays were longer in training and research hospitals. Their mean length of hospital stay of 2.68-4.64 days was considerably lower than that in our research (8.2 days) and those in other studies. It was encouraging to observe that no major complications developed in any of our cases, although complication rates of 5-30% have been reported in patients with DNI in other studies in the literature (7,9,29-31).

CONCLUSION

Our study indicates that all physicians monitoring patients with DNI should pay greater attention to the relation between DNI and tooth decay, and that a greater exchange of opinions is required with dentistry departments.

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