

JAKUB JĘDRYCHOWSKI¹, MARIA WOLNIEWICZ², *LIDIA ZAWADZKA-GŁOS³

Retropharyngeal abscess as an example of a deep neck infection in children

Ropień przestrzeni zagardłowej jako przykład infekcji przestrzeni głębokich szyi u dzieci – opis przypadku

¹Students' Medical Association of Pediatric Otolaryngology "Otorhino", Medical University of Warsaw, Poland

²Supervisor of the Students' Medical Association of Pediatric Otolaryngology "Otorhino", Medical University of Warsaw, Poland

³Department of Pediatric Otolaryngology, Medical University of Warsaw, Poland

Head of the Department: Associate of Professor Lidia Zawadzka-Głos, MD, PhD

KEYWORDS

deep neck infections, complicated pharyngitis, retropharyngeal abscess, pediatric otolaryngology, diagnostic methods, antibiotic therapy

SUMMARY

Deep neck infections are severe complications of the inflammatory processes in the upper respiratory tract. They can be divided into retropharyngeal, parapharyngeal, peritonsillar and submandibular abscesses, depending on the affected region. Deep neck infections are considered as acute bacterial complications with a progressive course and life-threatening character and that's why they require immediate wide-range, intravenous antibiotic therapy.

A 7-year-old female patient presented to her general practitioner with persistent, recurrent fever lasting for 3 days. Fever subsided after 2 days of antibiotic therapy, but she developed trismus, severe sore throat, especially on the right side, radiating to the right ear and dysphagia. The patient was referred to the Pediatric Otolaryngology Department as a matter of urgency. On examination she had enlarged lymph nodes on the right side of the neck with limited head and neck movements to the right side and posteriorly. There was also an asymmetry of the pharynx behind the right palatopharyngeal arch observed. Laboratory blood tests showed high CRP level (3.84 mg/dl, $n < 0.5$). CT scan was performed and showed multiloculated abscess in right retropharyngeal space. Our patient was qualified for the surgical procedure – drainage of the abscess under general anaesthesia together with wide spectrum antibiotic therapy in a form of cefuroxime and clindamycin. During procedure a large amount of pus was evacuated, and a sample was sent for microbiological results. It showed growth of *Staphylococcus hominis*, probably multiplication of local physiological colonization. She also received anti-inflammatory drugs and has had physiotherapy throughout the hospitalization period to prevent torticollis. We observed gradual local and general improvement, together with normalization of the inflammatory markers. She was discharged from the hospital after 7 days of intravenous treatment.

Accurate diagnosis and immediate proper treatment of deep neck infections are essential in prevention of further local (to the surrounding regions) and general expansion (like thrombosis, sepsis, meningitis) of the inflammatory process and of persistent changes (like stenosis of the respiratory tract). Fortunately, in the post-antibiotic era most patients are fully healed, further complications are almost unseen and mortality rates are low.

SŁOWA KLUCZOWE

infekcje przestrzeni głębokich szyi, powikłane zapalenie gardła, ropień przestrzeni zagardłowej, otolaryngologia dziecięca, metody diagnostyczne, antybiotykoterapia

STRESZCZENIE

Infekcje przestrzeni głębokich szyi stanowią poważne powikłania procesów zapalnych w obrębie górnych dróg oddechowych. W zależności od lokalizacji można je podzielić na: ropnie okołomigdałkowe, ropnie przestrzeni przy- i zagardłowej oraz ropnie okolicy podżuchwowej. Infekcje przestrzeni głębokich szyi są uważane za ostre powikłania bakteryjne o postępującym przebiegu i zagrażającym życiu charakterze, dlatego wymagają natychmiastowej antybiotykoterapii dożylniej o szerokim zakresie działania (z wyjątkiem ropni okołomigdałkowych – możliwe drenaż w znieczuleniu miejscowym i leczenie w warunkach ambulatoryjnych).

Siedmioletnia pacjentka zgłosiła się do swojego lekarza rodzinnego z uporczywą, nawracającą gorączką trwającą od 3 dni. Gorączka ustąpiła po 2 dniach zaleczonej antybiotykoterapii, ale rozwinęły się: szczękościsk, silny ból gardła, szczególnie po prawej stronie, promieniujący do prawego ucha, oraz dysfagia. Pacjentka została skierowana do Oddziału Otolaryngologii Dziecięcej w trybie pilnym. Podczas badania przedmiotowego stwierdzono powiększone węzły chłonne szyi po prawej stronie z ograniczeniem ruchomości głowy i szyi przy ruchach w prawą stronę oraz ku tyłowi. Zwracała uwagę również asymetria gardła w postaci uwypuklenia za prawym łukiem podniebionogardłowym. Badania laboratoryjne krwi wykazały podwyższony poziom CRP (3,84 mg/dl, $n < 0,5$). Wykonano tomografię komputerową z kontrastem celem dokładnej oceny okolicy szyi. W badaniu opisano ropień wielokomorowy w prawej przestrzeni zagardłowej. Pacjentka została zakwalifikowana do zabiegu chirurgicznego – drenaż ropnia w znieczuleniu ogólnym wraz z antybiotykoterapią o szerokim spektrum działania w postaci cefuroksymu z klindamycyną. Podczas zabiegu uzyskano znaczną ilość treści ropnej, oczyszczono starannie jamę ropnia oraz pobrano materiał na posiew do badania mikrobiologicznego. Badanie mikrobiologiczne wykazało wzrost *Staphylococcus hominis*, prawdopodobnie hodowla z namnożenia. Przez okres hospitalizacji dziecko otrzymywało także sterydy ogólnoustrojowo i leki przeciwzapalne oraz prowadzono fizjoterapię celem prewencji kręczy szyi. Obserwowano stopniową poprawę miejscową i ogólną wraz z normalizacją markerów stanu zapalnego. Pacjentka została wypisana ze szpitala po 7 dniach leczenia dożylnego, z zaleceniem kontynuacji antybiotykoterapii doustnie. Trafna diagnoza i natychmiastowe odpowiednie leczenie zakażeń przestrzeni głębokich szyi są niezbędne w zapobieganiu dalszej ekspansji procesu zapalnego: lokalnie (do okolicznych regionów) i ogólnoustrojowo (jak np. zakrzepica, posocznica, zapalenie opon mózgowych), w tym także powstawania zmian przetrwałych (np. zwężenie dróg oddechowych). Na szczęście w erze szerokiej dostępności do antybiotyków większość pacjentów udaje się wyleczyć z dobrym efektem, dalsze przetrwałe powikłania odległe są rzadkie, a śmiertelność stosunkowo niska.

INTRODUCTION

Deep neck infections are severe, nowadays fortunately rare, but possible, complications of the inflammatory processes in the upper respiratory tract. They can be divided into retropharyngeal, parapharyngeal, peritonsillar and submandibular abscesses, depending on the affected region (fig. 1). The most exposed are children under 5 years old, especially patients after bacterial infections with neck lymphadenitis. Parapharyngeal lymph nodes constitute for the lymphatic drainage from this region for this age group until its atrophy is observed, what happens physiologically around the age of 5. Moreover, patients with diabetes mellitus or immunodeficiency disorders are at higher risk of abscesses' development. The most frequently occupied area is retropharyngeal space.

Patient suffering from deep neck infection may present with typical symptoms like trismus, asymmetrical oedema of the neck and/or restrictions in the neck movements, which should always arouse suspicions of the complicated

pharyngitis. Some nonspecific symptoms as fever, fatigue, dysphagia, respiratory disorders and more may also be present. First-line diagnostic tool in such cases is usually ultrasound examination, but definitive diagnosis is based on the results of CT-scan with contrast examination. A typical radiological image of an abscesses is characterised by low-attenuation central necrotic component, well-defined fibrous capsule (that can be irregular or thickened when compared with a simple cyst), surrounding inflammatory changes and a mass effect (translocating surrounding structures or restricting the lumen of natural pathways, like respiratory tract).

Deep neck infections are considered as acute bacterial complications with a progressive course and life-threatening character. That is why they require immediate wide-range, intravenous antibiotic therapy. In most cases treatment also includes a surgical drainage to reduce the extent of the inflammatory concentration by evacuating pus formation. It is essential, as based on its nature, abscesses are poorly

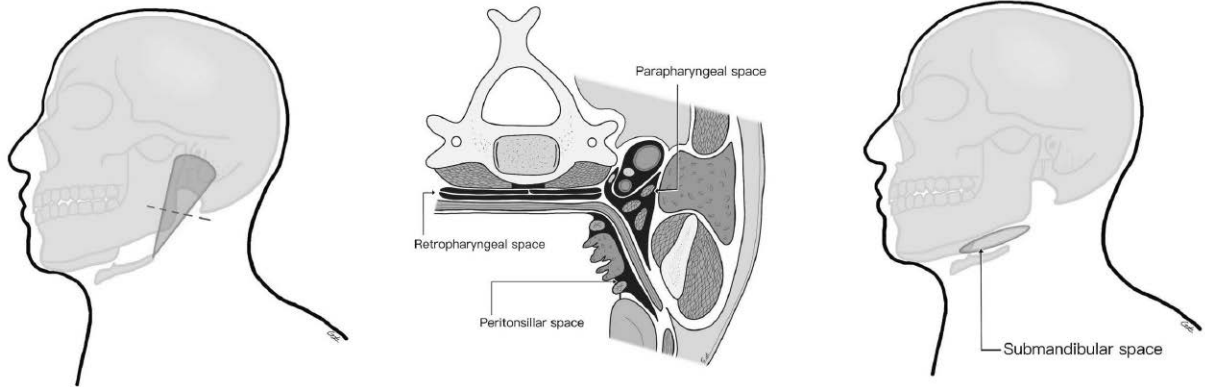


Fig. 1. Anatomical regions of the neck – spaces of the neck that can be affected by deep neck infections as complicated pharyngitis: peritonsillar space, parapharyngeal space, retropharyngeal space, submandibular space/own clinical material, graphics prepared by one of the members of Students’ Medical Association of Pediatric Otolaryngology “Otorhino”, Gabriela Łocik

vascularized, what impairs proper antibiotic distribution and therefore healing processes. Accurate diagnosis and treatment are crucial to prevent children from progression to more severe conditions and to lessen mortality to minimum (1-4).

We searched for the published literature concerning the problem of the deep neck infections, concentrating on its pathogenesis, etiological factors, clinical presentation, diagnosis and treatment, and then analysed. We also investigated a case of a girl with a retropharyngeal abscess that was hospitalized in the Clinical Department of Pediatric Otorhinolaryngology in Warsaw, which we would like to present below.

CASE REPORT

A 7-year-old female patient presented to her general practitioner with persistent, recurrent fever lasting for 3 days. At first, she was treated with amoxicillin with clavulanic acid and anti-inflammatory drugs. Fever subsided after 2 days of antibiotic therapy, but she developed trismus, severe sore throat, especially on the right side, radiating to the right ear and dysphagia. The patient was referred to the Pediatric Otolaryngology Department as a matter of urgency. On examination on admission, she had enlarged lymph nodes on the right side of the neck with limited

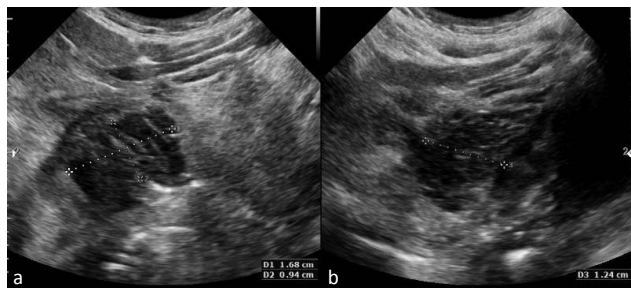


Fig. 2a, b. Ultrasound examination on admission: enlarged lymph nodes due to the inflammatory process, oedema of the surrounding tissues, with no evidence of fluid concentration (abscess formation etc.). Own clinical material



Fig. 3. CT with contrast, horizontal plane and



Fig. 4. CT without contrast, horizontal plane; multilocular abscess in the retropharyngeal space, modeling the lumen of the middle and inferior pharynx



Fig. 5. CT with contrast, sagittal plane, abscess of the retropharyngeal space measuring 4.5 x 3 x 3 cm, ranging from the level of vertebra C1 to C4

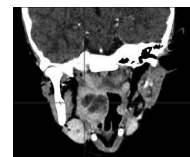


Fig. 6. CT with contrast, frontal plane, multilocular abscess in the retropharyngeal space, ranging the level of the right piriform sinus, modeling the lumen of the larynx, enlarged regional lymph nodes, local oedema of the surrounding mucous tissue

head and neck movements to the right side and posteriorly. There was also an asymmetry of the pharynx behind the right palatopharyngeal arch observed. The ultrasound examination showed inflammatory changes in two lymph nodes laterally and posteriorly to the right submandibular tonsil with oedema around (fig. 2a, b). Laboratory blood tests showed high CRP level (3.84 mg/dl, $n < 0.5$). A deep neck infection was suspected, and therefore a CT scan of the neck with contrast was performed on admission. Examination showed multiloculated abscess in right retropharyngeal space (fig. 3-6), what confirmed our suspicions. Our patient was qualified for the surgical procedure – drainage of the abscess under general anaesthesia together with wide spectrum antibiotic therapy in a form of cefuroxime and clindamycin. During procedure a large amount of pus was evacuated, and a sample was sent for microbiological results. It showed growth of *Staphylococcus hominis*, probably multiplication of local physiological colonization. She also received intravenous steroids, anti-inflammatory drugs and has had physiotherapy throughout the hospitalization period to prevent torticollis. We observed gradual local and general improvement, together with normalization of the inflammatory markers. She was discharged from the hospital after 7 days of intravenous treatment.

DISCUSSION

Deep neck infections are a possible complication of pharyngitis that occur mostly in children under 5 years old, what relates to the anatomy and physiology of their lymphoid tissue. In a group of older children and adults, they usually occur as complications of dental infections or injuries to the pharynx or oesophagus (1, 2, 5, 6). According to the literature, there is a slightly higher incidence of deep neck infections in male patients (2). The most common among deep neck infections are parapharyngeal and retropharyngeal abscesses (7).

Patients with deep neck infections most frequently report symptoms such as fever (27-70%) and pain or swelling of the neck (24.62-82.70%). Other symptoms as severe sore throat, trismus, dysphagia or respiratory disorders are also notified. Physical examination usually reveals typical abnormalities, in a form of cervical lymphadenopathy (77%), restricted neck movements (64%), torticollis (54%), tonsillitis (49%) and tonsil displacement (33%) (2, 6).

Radiological imaging is crucial in the diagnostic process of the deep neck infections. When suspected, a CT scan with contrast is a preferable diagnostic tool. According to the literature it shows abscesses with 92-95% sensitivity and about 53% specificity (2, 7). To early diagnose or when CT scan is not available the ultrasound imaging is advised. It can thoroughly show size and location of the abscess, as well as potential surgical access (5). Due to new technologies, there is an increasing efficacy with percutaneous or intraoral ultrasound examination (7, 8). Ultrasound is also

useful during drainage procedure as a guiding tool or when assessing the recovery process. X-ray imaging is inadvisable because of its low accuracy, missing a lot of changes in the affected region.

As far as microbiological factors are concerned, most of deep neck infections are caused by *Streptococcus* B-haemolysed species and *Staphylococcus aureus*. Some of the cases are proved to be coinfections of pathogens like *Haemophilus influenza*, *Escherichia coli* and *Moraxella catarrhalis* (1). Especially retropharyngeal abscesses are diagnosed with mixed flora (5).

Due to the pathogenesis of the infections of the deep neck tissue, understood as complications of previous local infections they require a wide-ranged intravenous antibiotic therapy. Recommended antibiotics are amoxicillin, cefuroxime or ceftriaxone combined with metronidazole or clindamycin (2, 7). The parenteral therapy can be changed into oral with the same or similar spectrum of activity drugs after patient's improvement (7). It's worth to point out the fact that most patients had already been during antibiotic therapy with amoxicillin before admission to the hospital. Failure of this treatment might be caused by the emergence of drug-resistant bacterial strains, including methicillin resistant *Streptococcus aureus* (MRSA) (7). Moreover, patients who has already taken antibiotics in the previous 6 months, independently of the reason, are more susceptible to be infected by mixed flora and drug resistant bacteria (9).

In some cases, non-operative treatment is satisfactory (this applies mostly to the inflammatory infiltrate without an organized abscess or smaller abscesses), but most patients need operative procedures in a form of drainage, preferably performed using intraoral access (also due to cosmetic reasons). Final decision concerning the most proper treatment is undertaken after CT scan with contrast findings, but sometimes false positive abscess assumptions are observed, what is usually proved during procedure (10). It's also worth mentioning that anti-oedematous therapy is essential in the treatment protocol in such severe deep neck infection. Dexamethasone is advisable during abscess's drainage in order to decrease the oedema of pharynx and to prevent from some serious respiratory disorders. According to some studies, there are presumptions that giving dexamethasone can decrease the number of necessary drainages, also as a repeated procedure, and lessen duration of hospitality (7, 11).

CONCLUSIONS

Accurate diagnosis and immediate proper treatment of deep neck infections are essential in prevention of further local (to the surrounding regions) and general expansion (like thrombosis, sepsis, meningitis) of the inflammatory process and of persistent changes (like stenosis of the respiratory tract). Fortunately, in the post-antibiotic era most patients are fully healed, further complications are almost unseen and mortality rates are low (7).

CONFLICT OF INTEREST
KONFLIKT INTERESÓW

None
Brak konfliktu interesów

CORRESPONDENCE
ADRES DO KORESPONDENCJI

*Lidia Zawadzka-Głós
Klinika Otolaryngologii Dziecięcej
Warszawski Uniwersytet Medyczny
ul. Żwirki i Wigury 63A, 02-091 Warszawa
tel.: +48 (22) 317-97-21
laryngologia.dsk@uckwum.pl

submitted/nadesłano:

9.05.2022

accepted/zaakceptowano do druku:

30.05.2022

REFERENCES/PIŚMIENNICTWO

1. Gryczyńska D: Otorynolaryngologia dziecięca. Alfa Medica Press, Bielsko-Biała 2007.
2. Grisarú-Soen G, Komisar O, Aizenstein O et al.: Retropharyngeal and parapharyngeal abscess in children – epidemiology, clinical features and treatment. *Int J Pediatr Otorhinolaryngol* 2010; 74(9): 1016-1020.
3. Hasegawa J, Hidaka H, Tateda M et al.: An analysis of clinical risk factors of deep neck infection. *Auris Nasus Larynx* 2011; 38(1): 101-107.
4. <https://radiopaedia.org/articles/abscess>.
5. Jain H, Knorr TL, Sinha V: Retropharyngeal Abscess. 2022 Nov 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. PMID: 28722903.
6. Huang CM, Huang FL, Chien YL, Chen PY: Deep neck infections in children. *J Microbiol Immunol Infect* 2017; 50(5): 627-633.
7. Esposito S, De Guido C, Pappalardo M et al.: Retropharyngeal, Parapharyngeal and Peritonsillar Abscesses. *Children (Basel)* 2022; 9(5): 618.
8. Malia L, Sivitz A, Chicaiza H: A novel approach: Point-of-care ultrasound for the diagnosis of retropharyngeal abscess. *Am J Emerg Med* 2021; 46: 271-275.
9. Farkaš M, Čulina T, Sišul J et al.: Impact of antibiotic consumption on the carriage of antibiotic-resistant bacteria by school children. *Eur J Public Health* 2020; 30(2): 265-269.
10. Martin CA, Gabrillargues J, Louvrier C et al.: Contribution of CT scan and CT-guided aspiration in the management of retropharyngeal abscess in children based on a series of 18 cases. *Eur Ann Otorhinolaryngol Head Neck Dis* 2014; 131(5): 277-282.
11. Tansey JB, Hamblin J, Mamidala M et al.: Dexamethasone Use in the Treatment of Pediatric Deep Neck Space Infections. *Ann Otol Rhinol Laryngol* 2020; 129(4): 376-379.