Case report

Bilateral deep neck space infection in the paediatric age group: a case report and review of the literature

Infezione bilaterale delle logge profonde del collo in età pediatrica: descrizione di un caso clinico e revisione della letteratura

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SUMMARY

Deep neck space infections can occur at any age but require more intimate management in the paediatric age group because of their rapidly progressive nature. Concurrent abscess in distinct neck spaces has rarely been reported in healthy children. Herewith, a rare case of bilateral neck abscess is reported in a 16-month-old female and the clinical presentation and management are discussed with a review of the literature.

KEY WORDS: Deep neck space infections • Paediatric neck abscess • Lymphadenitis • Cellulitis

RIASSUNTO

Le infezioni delle logge profonde del collo possono verificarsi a qualsiasi età ma richiedono particolare attenzione quando si manifestano in età pediatrica anche a causa della loro rapida evoluzione. Un ascesso bilaterale del collo è stato descritto raramente in un bambino. Questo articolo descrive il caso di un ascesso cervicale profondo bilaterale in una bambina di 16 mesi; la presentazione clinica ed il trattamento del caso vengono discussi e viene riportata una revisione della letteratura sull'argomento.

PAROLE CHIAVE: *Infezione delle logge profonde del collo • Età pediatrica • Linfoadenite • Cellulite*

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Introduction

Deep neck space infections (DNSIs) are known to spread along facial planes and potential spaces of the neck. They can occur at any age but the paediatric deep neck infections require more intimate management because of their rapidly progressive nature [1]. Delays in diagnosis and treatment may lead to life-threatening complications. When the diagnosis of abscess is confirmed clinically or radiologically, prompt surgical drainage can prevent morbidity and mortality. Concurrent abscess in distinct neck spaces has rarely been reported in healthy children. Here a rare case of bilateral neck abscess, in a 16-month-old female, is reported and the clinical presentation and the management are discussed with a review of the literature.

Case report

A 16-month-old female presented with a 2-day history of fever, progressive left and right sided neck swelling. Physical examination showed a non-toxic appearance with low grade fever. There were bilateral firm, tender swellings located in the right parotid region and the left submandibular region measuring 3×2 cm and 5×5 cm, respectively. Limited mouth opening was inspected. Chest radiography revealed no abnormality, but the laboratory studies showed a leukocyte count of 24190/μl with neutrophil dominance and haemoglobin level of 9.7 g/dl. The sedimentation rate and C-Reactive protein (CRP) were 90 mm/h and 4.19 mg/dl, respectively. Neck ultrasound (US) identified bilateral abscess formation. In addition to adequate hydration, intravenous Ceftriaxone and Metranidazole were started immediately. There was no adequate clinical improvement under medical management within the first 48 hours. To identify the extent of the disease a contrast enhanced magnetic resonance imaging (MRI) was obtained which demonstrated a pre-auricular mass adjacent to the parotid measuring 35 × 29 mm on the right side and a submandibular mass measuring 54 × 30 mm

on the left side. Both masses were enhanced with contrast peripherally which led to suspected abscess formation. Subsequently, the patient underwent external drainage of the abscess. Bilateral pus was encountered and the abscess diagnosis was confirmed. Fever and mass subsided after surgery and treatment with antibiotics. Methicillin-sensitive *Staphylococcus aureus* was isolated from the pus culture. Pathologic examination was concordant with abscess. Bilateral course of the disease led us to search for an underlying aetiology. The parents of patient denied any systemic disease. Peripheral blood lymphocyte subtypes and Ig A, Ig M, Ig G, Ig E levels were within normal limits. Serologic studies for TORCH, EBV, hepatitis and HIV were negative. Evaluation for tuberculosis did not show any abnormality. No clinical evidence of an underlying immunocompromisation was detected and the patient was discharged from the hospital with complete recovery after 2 weeks.

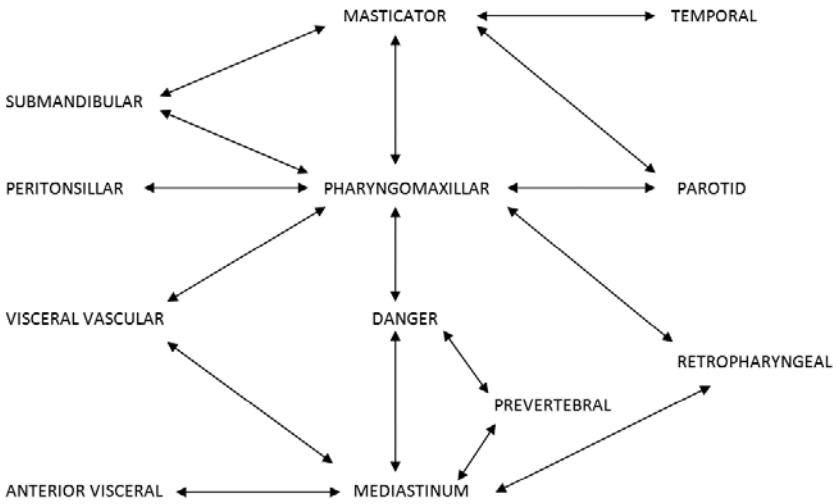

Fig. 1. Network of patterns of infectious extension within the potential spaces of the neck (from Gadre et al. 2006 [15], mod.).

Discussion

DNSIs are infections in the potential spaces and facial planes of the neck which could be lymphadenitis, cellulitis, necrotic node or abscess in nature [1 2]. Although the increased use of antibiotics has reduced the incidence of DNSIs, they still remain an important clinical entity with serious potential complications, such as airway obstruction, jugular vein thrombosis, carotid artery aneurysm or rupture, mediastinitis and sepsis [3]. Infection of the ears, nose, or throat may spread to deep neck spaces by direct continuity or by lymphatic drainage to lymph nodes in these spaces [4]. The facial layers of the neck and natural defense mechanisms help to prevent spread of these infections [5]. However, if the infection is not adequately treated, a severe lymphadenitis in the lymph nodes draining the primary infection site or cellulitis in the soft tissues may progress to a purulent fluid collection called abscess [2 6 7]. Abscesses of the neck may involve many spaces simultaneously through the potential pathways of extension illustrated in Figure 1. In the pre-antibiotic era, pharyngo-tonsillitis was the most common cause of deep neck abscesses whereas dental infection was the second factor. With the wide-spread use of antibiotics, the role of pharyngo-tonsillitis has declined [7 8]. Among infants and children, upper respiratory tract infections are still a primary cause of deeper infections [7].

While adults often have numerous localizing signs and symptoms, children with DNSIs tend to have a more subtle presentation in that they are seldom able to verbalize their symptoms or cooperate with the physical examination [4]. The most common signs and symptoms are a neck mass or swelling, fever, poor oral intake and prior symptoms of an upper respiratory infection such as rhinorrhoea or cough. Other symptoms include: neck pain, irritability, decreased neck mobility, sore throat, upper airway obstructive symptoms and febrile seizures [4 9]. In our case, the patient presented with bilateral soft swelling and low grade fever but no history of preceding upper respiratory infection.

Computerized tomography (CT) scanning is the most widely used modality for diagnosing deep space neck infections because it is less expensive and readily available [10]. Although CT is helpful both in determining the presence and location of neck infections in children, it is less helpful in differentiating abscess from lymphadenitis and cellulitis [11]. On the other hand, use of MRI gives improved soft tissue definition without the use of radiation but its use is limited due to the lack of availability and cost [10 11]. US also seems more effective than CT in identifying abscess versus cellulitis and can be helpful to avoid incision and drainage in cellulitis [10]. We preferred MRI as a diagnostic tool because of its superiority in determining the type of soft-tissue infection.

Contemporary reports from different countries or areas may reveal different common pathogens [1]. Most studies have determined the predominance of *streptococcus* and *Staphylococcus aureus* as a causative organism although often infections are polymicrobial. On the other hand, the presence of anaerobes may be underestimated because of the difficulty in culturing them [2]. *Streptococcus* and normal oropharyngeal flora were more common in retropharyngeal and parapharyngeal abscesses because these organisms are found in the oropharynx. Likewise, one would expect *Staphylococcus aureus* to be more common

Fig. 2. Bilateral neck abscess in right parotid and left submandibular region.

Fig. 3. Coronal magnetic resonance imaging demonstrated abscess in right parotid region.

in anterior and posterior triangle and submandibular and submental abscesses because this organism is a common skin contaminant and these regions are more distant from the oropharynx [4]. Consistent with the literature, culture of the obtained pus resulted methicillin-sensitive *Staphylococcus aureus*.

In a study reported by Coticchia et al., the most commonly encountered sites of abscesses in the head and neck region of paediatric patients were retropharyngeal or parapharyngeal spaces followed by anterior or posterior triangle and submandibular or submental regions, respectively. Parotid space abscess constituted only 1% of children. Retropharyngeal or parapharyngeal involvement was more common in one-year-old children, or older, whereas submandibular or submental involvement was more common in children younger than one year. However, there are different results, in different studies, in the literature regarding the distribution of abscesses among the spaces of the neck [4].

Multiple and recurrent abscesses are often seen in immuno-compromised and debilitated patients [12]. The ability of infections to spread from deep neck spaces is well known anatomically and clinically [13]. Since the spread of the infection from the parotid space to the contralateral submandibular space or vice versa is very unique, this unexpected directed led us to search for an underlying aetiology. But there was no clinical evidence of an underlying systemic disease or any immunocompromisation. According to us, subclinical extension of the infection through the retropharyngeal space to the contralateral side might have been the aetiology of this extraordinary condition. Prompt starting of treatment with broad-spectrum antibiotics might have masked the

Fig. 4. Coronal magnetic resonance imaging demonstrated abscess in left submandibular region.

retropharyngeal abscess formation but failed to prevent the spread of the infection. Likewise, a retropharyngeal infectious focus, which had been resolved at the time of presentation, might have resulted in an infection with a bilateral course.

Treatment with antibiotics and surgical drainage with securing the airway are the mainstays of treatment [1]. Although various studies have reported success in treating deep neck abscess medically with parenteral antibiotics, most still consider incision and drainage as the gold standard for the majority of paediatric deep neck abscesses [14]. Because of the different causative organisms, broad-spec-

trum antibiotics are advocated in treating deep neck infections [1]. Empirical parenteral antibiotics should be started before the culture results become available and then tailored to the culture results when available. Fortunately, most paediatric DNSIs are located either in the anterior or posterior triangle of the neck or in the retropharyngeal area. Surgical drainage of these abscesses is usually direct and effective [3]. Alternatively, needle aspiration can be another choice in the treatment of some abscesses. But it is less reliable and may require recurrent aspirations. Since there was no clinical improvement during intravenous antibiotic treatment, we decided to perform external incision and drainage and eventually confirmed the abscess diagnosis. The intra- and post-operative courses were uneventful.

Conclusions

Infections in the deep neck spaces may result in mortality if they are not diagnosed early and promptly. Since the recommended treatment for lymphadenitis and cellulitis is medical, differentiating this abscess from the other forms of DNSI avoids unnecessary surgical interventions. Clinical evidence with radiological evaluation provides precious information in determining the origin and extension of the disease and increases the accuracy of diagnosis. Although the anatomic relationships and pathways of extension of infections between the neck spaces are a well known entity, especially under broad-spectrum antibiotic treatment, subclinical retropharyngeal spread of the infections or retropharyngeal infectious foci which had been resolved at the time of presentation may result in unexpected involvement of distinct neck spaces.

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