Deep-neck space infections – a diagnostic dilemma!

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Abstract Deep Neck Space Infections (DNI) are a potentially life threatening condition. This paper highlights the importance of their early diagnosis and early intervention. The deep-neck space infections may be odontogenic in origin. The severe airway compromise caused by them may make diagnosis difficult. Suspicion of simultaneous occurrence of tetanus and retropharyngeal space infection in a child can further increase the dilemma.

Keywords Retropharyngeal abscess · Tetanus · Child · Preschool · Adult.

Introduction

Deep Neck Space infections (DNI) are still a potentially life-threatening condition in this era of modern medicine. This is attributable to the delayed presentation of the patient to a tertiary centre and diagnostic dilemma posed in certain cases. These infections are frequently accompanied with systemic toxicity and localized aero- digestive tract compromise and sometimes by life- threatening sequelae like severe airway obstruction, mediastinitis, pericarditis, Internal Jugular Vein thrombosis, epidural abscess and carotid artery erosion. To corroborate this, we present 2 case reports of patients with deep neck space infections.

Case report

Case 1

A 2-yr-old baby presented to emergency services of our hospital with difficulty in swallowing, fever, swelling in neck, noisy breathing, inability to open mouth, tightness in neck & involuntary movements of the body of 4 days duration. Baby was accepting breast feed but not able to swallow solid food. There was no h/o of preceding URI, trauma, dog bite or ear-discharge. Baby received primary immunization, but didn't receive DPT booster at 18 months.

On examination, baby was conscious but irritable. He had tachycardia and respiratory rate 36/m with inspiratory stridor having spO₂ 93%. The child had episodes of involuntary muscle spasms which were generalized, tonic with fist clenching, flexion and adduction of arms and hyperextension of legs. These spasms were precipitated by external stimulus. Neck movements were not possible due to torticollis. He also had trismus and risus sardonicus with opisthotonus posture. Spatula test was positive. There was diffuse swelling in sub mandibular region. Oropharynx could not be visualized due to trismus.

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His total leucocyte count was 12,200/cmm. Other investigation like Chest x-ray, electrolytes, CSF Studies and renal function tests were normal. X-ray neck lateral view showed widening of pre-vertebral soft tissue shadow at C-2 >7 mm and at C-6 >14 mm, with loss of cervical lordosis (straightening of cervical spine) (Fig. 1). CT scan could not be under taken due to falling O₂ saturation & respiratory distress.

We treated the baby with Injection penicillin, hydrocortisone, tetanus toxoid and tetanus immunoglobulin. Due to falling saturation and difficult intubation, tracheostomy was done. Under short GA with relaxant oropharyngeal examination was done which revealed slight bulge over left side of posterior pharyngeal wall. Needle aspiration revealed no pus. After tracheostomy, the noisy breathing disappeared and patient appeared more comfortable. Repeat x-ray after one day of antibiotic and steroid treatment revealed reduction in pre-vertebral space widening (Fig. 2). But his O₂ saturation kept falling due to respiratory paralysis. Ventilatory support was given but patient expired next day.

Case 2

A 32-years-old male patient presented in medicine emergency, with laboured breathing and restlessness. Endotracheal intubation was carried out in medicine ICU to secure the airway. Since ICU personnel faced difficulty in intubation due to restricted mouth opening, they referred the patient for Otolaryngology opinion. History as given by relatives revealed mild to moderate and intermittent fever since 15 days, pain while swallowing since 2 days. There

was no history suggestive of TB, DM, HT, bronchial asthma or cardiac disease in the past. There was no history of FB ingestion or inhalation, neither any history of any poisoning. Patient was non smoker and had no addictions. He had only taken some t/t for fever.

On examination, he was febrile, drowsy and restless. There was trismus so oropharynx couldn't be visualized. Flexible fiber-optic laryngoscopy was done. The entire posterior pharyngeal mucosa was grossly edematous compromising the laryngeal lumen. There was bulge on lateral pharyngeal wall behind posterior tonsillar pillar on right side and tonsil was pushed medially. Multiple carious teeth were present in the lower jaw. Patient developed swelling on right side of neck extending from behind angle of mandible to midline. The swelling was tense, tender and local temperature over swelling was raised. X-ray neck- lateral view showed loss of cervical lordosis without widening of the retropharyngeal space. USG neck was normal. CTscan neck was not done due to severe respiratory compromise. His total leucocyte count was 16000 / cmm. Chest x-ray, KFT, USG abdomen and other parameters were normal. He was negative for HIV. The patient was put on IV antibiotics, steroids, keeping the clinical diagnosis of right parapharyngeal space infection.

Urgent surgical exploration was decided as patient had severe respiratory compromise and no improvement by medical management. By that time, patient started complaining of pus filling in the oral cavity. Elective tracheostomy was done. Right horizontal incision (Batson submaxillary approach) was given 3–4 finger width below

Fig. 1 Showing loss of cervical lordosis.

Fig. 2 Repeat X-ray after treatment showing reduction in pre-vertebral space widening.

the auricle along the anterior border of SCM to the level of the mid-portion of the sub-mandibular gland, platysma was opened, right parapharyngeal space was entered, and dissection was carried upto pre-vertebral space. There was frank pus in that space, which was drained out. Pus and blood culture were positive for staphylococcus aureus sensitive to cephalosporins. Patient was given IV Cefuroxime, Gentamycin and Metronidazole. On subsequent days patient developed aspiration pneumonitis. His O₂ saturation was compromised further; patient was put on ventilator but he expired after two days.

Discussion

Tetanus usually follows trauma. Rare causes include animal bites, abscesses (including dental abscesses), otogenic, burns, insect bites, etc [1]. Localized tetanus results in painful spasms of the muscles adjacent to the wound site and may precede generalized tetanus. Noisy breathing in a patient with tetanus can be due to laryngeal spasm. Deep neck space infections can cause airway compromise due to edema or abscess. Other symptoms include odynophagia, dysphagia, sore throat, neck stiffness, neck pain, trismus and voice changes. Signs include neck swelling, elevation of floor of mouth, drooling, elevated temperature, and bulging of the pharyngeal wall [2]. The various deep neck space infections may involve retropharyngeal space, pre-vertebral space, parapharyngeal space, submandibular space, etc.

Retro pharyngeal space infection is encountered most commonly in children, although it may also occur in adults. The mean age of the patients with retropharyngeal space infection is 4 yrs. in most series [3]. Cervical lymphadenopathy is the most common physical sign [3]. Limited neck movement & torticollis are common and important signs of retropharyngeal infection [4]. The typical sign of unilateral posterior pharyngeal wall swelling may be present in 30% cases [3]. Children with an infection in the retropharyngeal space are usually irritable and have fever, dysphagia and muffled speech or cry, noisy breathing, a stiff neck and cervical lymphadenopathy. As the infection progresses, stridor and drooling develops [5].

Thus deep neck space infections have some clinical features in common with tetanus. Case 1 presented with neck swelling, torticollis, drooling, dysphagia, difficulty in breathing, and unilateral posterior pharyngeal wall bulge which was negative for pus on needle aspiration. In addition, he had features of generalized tetanus, which included opisthotonus posture and seizures.

Retropharyngeal space infection frequently originates from an infection in the nose, para nasal sinuses or nasopharynx. Penetrating and blunt trauma to neck and pharynx can also provide a portal of entry for infection of the retro pharyngeal and lateral pharyngeal spaces [2, 3, 5]. Tubercular infection of the vertebral bodies (Potts abscess) as well as non- tubercular infection can lead to pre-vertebral (retro-

pharyngeal) space infection. Case-1 had no h/o URI, trauma or animal bite. In children, h/o trauma to pharynx may be missing, so this was kept as the possibility for co-existence of the retropharyngeal space infection with tetanus.

Diagnostic studies

The simplest and most readily available imaging study to evaluate deep neck space infection is the anteroposterior and lateral soft - tissue radiographs of the neck and pharynx, especially in which there is suspicion of retro pharyngeal or prevertebral space infection. These lateral cervical films are interpreted by measuring the distance from the anterior aspect of the vertebral body to the air column of the posterior pharyngeal wall. At the level of C-2, the normal distance may be as wide as 7mm in both adults and children. At the level of C-6, the normal distance may be as much as 22 mm in adults and 14mm in children [2]. Values more than these are indicative of infection in the retro pharyngeal space.

A chest x-ray may identify complication of deep neck infection like mediastinal extension, lung abscess, pyopneumothorax. The presence of an infiltrate on chest X-ray can suggest aspiration and necessitates aggressive management of patient. Case 2 developed extensive chest infiltrates.

Ultra sound has been recommended to differentiate between cellulitis, abscess and adenopathy in head and neck infection. Physical examinations have sensitivity and specificity of 33 % and 81% respectively in detecting presence of an abscess. USG has a sensitivity of 95% and specificity of 75% [5]. In recent years, CT is the most widely used imaging procedure [5]. Intra-venous contrast may help identify an abscess as a “rim –enhancing lesion” with a low-density center [3, 5]. Cellulitis is defined as soft-tissue swelling with obliteration of regional fat planes. CT has been reported to have sensitivity of 91% and specificity of 60% for detection of head and neck space abscess [3, 5]. The appropriate care of patients with DNI requires an accurate determination of cellulitis vs abscess formation [3]. CT is the most preferred radiological investigation for making this differentiation but is not totally flawless. Hence surgical intervention is based on combination of clinical manifestation and radiological findings. The use of CT or MRI is not done in an acute situation in which there is potential respiratory complication of deep neck infection. This complication mandates immediate surgical attention and should not wait for imaging [2].

Indications of surgery

When patients have a compromised airway or fail to rapidly improve after antimicrobial therapy, incision and drainage is indicated, despite the lack of evidence from imaging that an abscess is present [3]. If there is no improvement even after 24–72 hours of medical therapy without surgical in-

tervention, severe complications can occur such as carotid artery erosion, internal jugular venous thrombosis [5]. For case 1, we had only x-ray of neck. CT was not undertaken as child was in respiratory distress with recurrent spasms induced by stimulus. It was important to exclude and manage suspected retropharyngeal abscess in the child. So child was taken to O.T. for examination and needle aspiration. For case-2, USG was negative for abscess but patient had external neck swelling and lateral pharyngeal bulge. CT was deferred again due to severe airway compromise. USG finding suggested it to be parapharyngeal space infection in the stage of cellulitis. The dilemma was when to operate. Respiratory compromise is an indication for surgical exploration in spite of no abscess on imaging. So urgent surgical exploration was done but rupture of abscess in the oral cavity complicated the situation. The patient developed septicemia with aspiration pneumonitis and he succumbed.

Conclusion

Deep- neck space infections still are a cause of high mortality in rural areas of developing countries. Delayed presentation with respiratory and other complications, lack of

vaccination and ignorance among patients that a toothache may cost them their lives are factors for high mortality. The patients may present to medicine or pediatric emergency wards with respiratory distress. So the attending doctors should have high index of suspicion and consult the otolaryngologist without delay to rule out deep-neck space infections, if the history and symptoms are suggestive, as the only positive history may be a toothache.

High index of suspicion and decision making between medical management vs surgery are very important in the management of deep-neck space infections.

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