Abstract:
This is a case of a 13-year-old boy with a 2 day history of right shoulder pain and fever, progressing to include neck pain and stiffness. The patient had soft tissue swelling and tenderness over his shoulder and sternoclavicular joint, and was admitted to the intensive care unit due to signs of sepsis. CT and MRI imaging demonstrated multiple nodular densities in the lungs, local cellulitis, myositis and osteomyelitis at the shoulder and clavicle, and a flow void in the right internal jugular vein, consistent with Lemierre syndrome. Blood cultures revealed MRSA as the causative organism.

Keywords:
Lemierre syndrome; MRSA; fever; sore throat; osteomyelitis; pneumonia; bacteremia

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Neck Pain, or Just a Pain in the Neck?

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A 13-year-old previously healthy boy presented to a community hospital emergency department (ED) complaining of 2 days of right shoulder pain and fever. His maximum oral temperature during this illness was 105°F. The patient described right shoulder "stiffness" that progressed to a feeling of stiffness of his entire body. On the day of presentation, the patient also complained of right neck pain and stiffness, in addition to a mild sore throat. His review of systems was significant for dizziness upon standing on the day of admission. The patient denied neck or shoulder trauma, symptoms of upper respiratory tract infection, cough, chest pain, shortness of breath, nausea, vomiting, diarrhea, rash, and weight loss. He had no prior hospitalizations or surgeries, and his immunizations were up-to-date. The patient's family history was significant for hypertension in both parents. His social history revealed no recent travel, animal exposures, drug use, or sexual activity.

On presentation to the initial ED, the patient's vital signs included temperature 105.6°F, heart rate 163, respiratory rate 28, blood pressure 151/70 mm Hg, and his oxygen saturation was 99% in room air. On physical examination, the patient was ill appearing but not in acute distress. There was no conjunctivitis, congestion, or rhinorrhea. The oropharynx was pink without erythema, exudate, or ulceration with dry mucous membranes. The patient had full range of motion of his neck. Neck examination revealed mild bilateral submandibular and submental fullness with diffuse small (subcentimeter) cervical lymphadenopathy. He was tender over his right sternocleidomastoid muscle, right clavicle, right sternoclavicular (SC) joint, and right shoulder. There was a discrete swelling around the right SC joint without erythema or warmth. His lungs were clear to auscultation

on the right with some faint crackles noted at the left base. The patient was tachycardic without murmurs, rubs, or gallops. His extremities were warm, with a capillary refill time of less than 2 seconds. His abdomen was soft and nontender. Extremity and neurologic examination results were normal. He had no rashes.

Initial laboratory examination at the referring institution demonstrated a white blood cell count of 15 300/μL with 91% segmented neutrophils, 1% band forms, 3% lymphocytes, and 5% monocytes; hemoglobin of 12.7 g/dL; and platelet count of 171 000/μL. The patient's serum electrolytes were notable for a sodium of 132 mEq/L, potassium of 3.8 mEq/L, and glucose of 143 mg/dL. The remaining electrolytes and renal function studies were normal. A urinalysis revealed a specific gravity of greater than 1.035, 2+ protein and no ketones, glucose, nitrites, or leukocyte esterase. The patient's C-reactive protein was 12.5 mg/dL. Blood cultures were obtained. A computed tomography (CT) scan of the chest was performed with contrast that was interpreted by the referring radiologist as having "soft-tissue swelling and ill-defined abnormal soft tissue at the right SC joint without a distinct ring-enhancing fluid collection, likely from phlegmon, and scattered small infiltrates in the lungs concerning for pneumonia." The patient received vancomycin, ceftriaxone, and 1 L of isotonic sodium chloride solution before being transferred by ground transport to a tertiary care pediatric ED.

In the tertiary ED, the patient remained tachycardic despite an additional 3 L of isotonic sodium chloride solution. A rapid streptococcal antigen test of a throat swab was positive for group A streptococcal antigen. Clindamycin was added to the antibiotic regimen that the patient had already received. The patient was admitted to the pediatric intensive care unit with the following vital signs: temperature 37.2°C, heart rate 134, respiratory rate 26, and blood pressure 131/79. At the time of admission, the patient was noted to appear slightly uncomfortable but was eating and drinking without drooling or difficulty and was talking in full sentences with a normal tone of voice. Additional diagnostic testing revealed the diagnosis.

DIFFERENTIAL DIAGNOSIS

This patient's most notable findings include fever, a swelling or mass over the right SC joint, and tenderness over the right neck, clavicle, and shoulder. The neck mass and tenderness at the SC junction was the most striking feature on this patient's examination. The differential diagnosis of a neck mass can be devised using 4 major categories: congenital, traumatic, neoplastic, and inflammatory/infectious (Table 1).[1,2]

The most common congenital masses of the neck are thyroglossal duct cysts. Appearing anywhere in the midline from the base of the tongue to the sternal notch, thyroglossal duct cysts are generally soft, nontender, smooth, and will move superiorly with swallowing or tongue protrusion. Unlike thyroglossal duct cysts, cystic hygromas appear in the posterior triangle of the neck. Almost all cystic hygromas will present before the age of 2 years and are soft, mobile, and nontender. Branchial cleft cysts arise from defects in the development of the branchial arches and can present along the anterior border of the sternocleidomastoid muscle near the angle of the mandible in the posterior triangle of the neck. These cysts are painless and may drain along the lower half of the sternocleidomastoid muscle. Infection of any of these congenital cysts can result in a painful and warm lesion. Other congenital neck masses include hemangiomas, squamous epithelial cysts, laryngoceles, dermoid cysts, and cervical ribs.

Traumatic causes of neck masses include hematomas, subcutaneous emphysema, arteriovenous fistulae, foreign bodies, and cervical spine fractures. Most traumatic neck masses are usually the result of a hematoma that may expand to cause life-threatening compression of vital structures in the neck.

Malignant neoplasms comprise approximately 10% of neck masses in children. These include leukemia, lymphoma, rhabdomyosarcoma, neuroblastoma, thyroid carcinoma, nasopharyngeal carcinoma, and teratomas. Generally, malignant lesions are painless, firm, and fixed, which helps to differentiate them from the congenital cystic lesions described above. Signs and symptoms suspicious for malignancy include supraclavicular lymphadenopathy, a single node larger than 2 cm in diameter, ulceration, systemic symptoms, failure to respond to antibiotics, firm or rubbery consistency, persistence of a node for more than 4 weeks, and enlargement of a node over 2 weeks.

Most of the of neck masses in children are caused by inflammation and/or infection. The most common cause for neck masses in children is cervical lymphadenopathy, due to a reaction to an infection in the head or neck region that is drained by the cervical lymph nodes, such as pharyngitis, otitis media, or conjunctivitis. Cervical lymphadenitis is defined by one or more tender, warm, erythematous, and/or enlarged lymph nodes, usually associated with other signs of infection. This is most commonly the result of bacterial infection by group A streptococci and *Staphylococcus aureus*, but other