Diagnosis of a Peritonsillar Abscess by Transcutaneous Point-of-Care Ultrasound in the Pediatric Emergency Department

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Abstract: We report a case of a pediatric patient with an initial diagnosis of peritonsillar cellulitis made by otolaryngology. The findings from a subsequent transcutaneous point-of-care ultrasound by a pediatric emergency physician directly affected the decision to perform needle aspiration. Sonographic characteristics of a peritonsillar abscess may be helpful in the prompt diagnosis of peritonsillar abscess.

Key Words: bedside ultrasound, peritonsillar abscess, emergency medicine (Pediatr Emer Care 2016;32: 489–492)

CASE

An 18-year-old previously healthy male patient presented to the pediatric emergency department (ED) with the chief complaint of odynophagia, dysphagia, and referred right otalgia for 5 days. Four days before this visit, he was evaluated by a school-based nurse practitioner and had a negative result of rapid streptococcal A test. Owing to worsening symptoms, the patient began taking ibuprofen for pain and also medicated himself with ampicillin 500 mg that he brought with him from the Dominican Republic. He experienced no relief from the pain, and due to worsening symptoms, he presented to the ED for further care.

The patient had decreased oral intake due to odynophagia. However, he was handling his secretions and had no drooling. He had no fevers, vomiting, diarrhea, abdominal pain, or upper respiratory tract symptoms. On examination, he was alert and interactive. He was hesitant to speak but was able to with a normal voice. He had mild trismus, and his oropharynx was erythematous. He also had an enlarged erythematous right tonsil with overlying exudates and mild bulging of the right peritonsillar region (Fig. 1). No uvalar deviation was appreciated. The external auditory canals were clear, and his tympanic membranes were translucent with normal landmarks. His remaining examination results were within normal limits. Based on the mild erythema and only slight edema around the right peritonsillar area without uvalar deviation, findings were more consistent with peritonsillar cellulitis (PTC) rather than peritonsillar abscess (PTA). The pediatric emergency medicine attending physician performed a transcutaneous point-of-care ultrasound (US) of the left tonsil which appeared normal (Fig. 2). The US of the right tonsil suggested a small PTA (Fig. 3). Therefore, the decision was made to proceed with needle aspiration of the right superior peritonsillar region. The otolaryngology resident aspirated approximately 0.5 mL purulent fluid from the superior peritonsillar region, and it was sent for culture. After the procedure was concluded, a repeat transcutaneous US showed resolution of the abscess (Fig. 4).

The patient was discharged on clindamycin, and a follow-up call 1 week later revealed that the patient's throat pain had resolved and he was back to baseline. A Gram stain of the aspirated purulent material showed moderate polymorphonuclear leukocytes and few gram-negative rods on Gram stain; however, final culture results showed no growth.

ULTRASOUND FINDINGS

A 5- to 10-MHz linear array probe (M-Turbo L38x transducer; SonoSite, Inc, Bothell, Wash) on small parts setting was used to evaluate the external neck. The probe was placed parallel to and under the mandible with the probe marker directed posterior.1 The peritonsillar area was evaluated by slowly angling the transducer cephalad and caudal. Both the unaffected (Fig. 2) and affected (Fig. 3) sides were evaluated. After identifying the pharyngeal tonsils, a distinct hypoechoic structure suspicious for an abscess was identified in the superior pole of the right tonsil measuring 1 x 1 cm in one view and not extending outside the tonsil when fanning through the area (Fig. 3). No increased color flow was detected to suggest a vascular structure within the tonsil.

TECHNIQUE

When performing transcutaneous US for the detection of PTA, it is important to use a high-frequency probe. The patient's head should be slightly reclined and tilted to the opposite side.1 To obtain a transverse view of the submandibular region, the transducer is placed parallel and just below the posterior third of the mandible and angled 45 degrees cranially with the indicator point directed posterior.2 While fanning through the area, the buccal muscles are visible near the skin. Lymph nodes will be encountered as well as the tonsil with several hyperechoic echo dots corresponding to the tonsils crypts (Fig. 2). A normal tonsil has an oval structure with a homogeneous low-level echo texture, whereas enlarged tonsils with a heterogeneous or cystic appearance are suggestive of a PTA.3 With progression from PTC to PTA, the hyperechoic structures with indistinct borders develop into an anechoic structure with a distinct border.4 Although structures should be scanned in 2 orthogonal planes, this was not possible with our transducer because of the anatomic location of the tonsil immediately behind the mandible and the neck preventing sliding of the transducer medially.

REVIEW OF THE LITERATURE

Peritonsillar abscess is the most common deep space infection of the head and neck with an incidence of 1 in 6000 to 10,000 per year.5 It presents frequently in the ED and most often occurs in children older than 10 years and in young adults.6 Traditionally, the diagnosis of PTA has been clinical and based on the...
FIGURE 1. Photo of the patient’s oropharynx before aspiration of the peritonsillar abscess. Based on the mild erythema and only slight edema around the right peritonsillar area, findings were more consistent with peritonsillar cellulitis rather than peritonsillar abscess.

FIGURE 2. Transverse view of the submandibular area. Normal appearing tonsil. BM, buccal muscle; light grey arrow, lymphnode; dark grey arrow, submandibular gland; black arrow, base of tongue; white arrow, tonsillar crypt. Orientation in white italic letters.


FIGURE 4. POC US image: Transverse view of the submandibular area. Resolution of abscess after needle aspiration. White arrow, area where the fluid collection was located prior to aspiration; grey arrow, submandibular gland. Orientation in white italic letters.
distorted anatomy of the uvula and peritonsillar area. However, the diagnosis of a PTA can be difficult to distinguish from PTC based on a physical examination alone.\(^5\)\(^6\) In addition, if a PTA occurs bilaterally, the typical features such as uvular and palate deviation are absent.\(^7\) A case series by experienced specialists showed that physical examination is unreliable with poor sensitivity and specificity of 78% and 50%, respectively.\(^8\) If missed, PTA can lead to spontaneous rupture with risk of aspiration or progression to a parapharyngeal space infection, which, in turn, may result in sepsis or even death.\(^9\)

The differentiation of a PTA from a PTC is important to determine the appropriate treatment. Whereas a PTC can be treated with antibiotics alone, a PTA needs to be drained. A recent case report described the use of transcutaneous US to diagnose a very large PTA in an adult with uvular deviation and peritonsillar bulging with subsequent aspiration of 5 mL purulent fluid.\(^10\) To date, there are no reported cases detailing transcutaneous US for the diagnosis of PTA by pediatric emergency medicine physicians.

Transcutaneous US has been used since the late 1980s, and many studies suggest it is valuable as a diagnostic tool for PTA. Boesen et al enrolled 27 consecutive patients between 1988 and 1989 who were scheduled for tonsillectomy for suspected PTA. All underwent an ultrasound examination before surgery; and in 92% of patients enrolled in the study, it was possible to verify the presence of an abscess.\(^11\) In 2 patients, the US examination was falsely negative; and one of these patients had a heavy head that interfered with the US transducer's skin contact. A prospective study of 36 patients in the 1980s found the sensitivity of US for diagnosing PTA to be 82%, with 4 false-positive examination results. Sensitivity of US was 82% in diagnosing PTA.

On the other hand, Kueppers et al were able to detect only 2 of 15 PTAs using transcutaneous US.\(^12\) Otolaryngologists performing the USs were not able to distinguish a PTA from a PTC in most cases and found that hypoechogenic structures with indistinct borders were noted in both disease entities. In 2006, Filho et al compared radiologist-performed intraoral and transcutaneous US for the diagnosis of PTC and PTA and used blind needle aspiration as the criterion standard. The overall sensitivity was 80%, and specificity was 92.8% for transcutaneous US; and there was no statistical difference in the accuracy of transcutaneous versus intraoral US. However, in patients with trismus, transcutaneous US was able to identify all cases of PTA.\(^13\)

Transcutaneous US, as with all US procedures, is operator dependent. Ultrasound can be used to monitor a patient’s response to antibiotic treatment, US can easily be used to evaluate whether the PTC has developed into a PTA. Intraoral ultrasound has been recognized as a technique in diagnosing PTA and used blind needle aspiration as the criterion standard. A prospective study of 36 patients in the 1980s found the sensitivity of US for diagnosing PTA to be 82%, with 4 false-positive examination results. Sensitivity of US was 82% in diagnosing PTA.

Furthermore, it is an invasive, painful procedure with potential risks of bleeding and injury to the carotid artery.\(^15\) Additional risks exist with the use of cetacaine topical anesthesia, which can induce methemoglobinemia as described in Costantino et al.\(^8\) In younger children, sedation may be necessary and includes the associated risks as well as an increase in ED length of stay.\(^16\) Neck CT exposes patients to ionizing radiation, which increases the risk of future cancer.\(^19\)\(^20\) Specifically, the pediatric thyroid gland is one of the most radiosensitive organs,\(^21\) and the concentrated radiation exposure to this area should be considered when ordering this test. Although in this case needle aspiration did reveal fluid, it is possible that the lesion would have responded to antibiotic therapy alone. Studies are needed to determine which peritonsillar fluid collections are amenable to conservative management.

**CONCLUSIONS**

We present a case of a patient with a clinical diagnosis of PTC in which transcutaneous point-of-care US was used to diagnose a PTA, which was drained. Future research is needed to evaluate if transcutaneous US is an accurate and reliable method to diagnose a drainable fluid collection in patients with peritonsillar infections.

**REFERENCES**


