Intraoral Ultrasound in the Diagnosis and Treatment of Suspected Peritonsillar Abscess in the Emergency Department

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Abstract

Peritonsillar abscess (PTA) can be a life-threatening disease and may lead to significant complications without drainage. **Objectives:** To describe the utility of ultrasound (US) in the evaluation of potential PTA and US-guided PTA drainage. **Methods:** The authors performed a retrospective US quality assurance review of all patients over 18 years of age scanned by emergency physicians for possible PTA. All patients presenting with PTA signs and symptoms including erythema and swelling of the tonsillar pillar and uvular deviation were eligible to be scanned. Patients confirmed to have an abscess on US had US-guided drainage followed by intravenous antibiotics in the emergency department and discharge home on oral antibiotics. Scans were performed by credentialed attending emergency physicians and residents. Researchers recorded patient symptoms, US findings, results of abscess drainage if performed, and any complications of drainage. All US examinations were performed with sheathed endocavity broadband US transducers on minimum depth and maximum resolution settings. Statistical analysis included descriptive statistics. **Results:** Forty-three patients received intraoral US examinations for suspected PTA. Thirty-five (81%) were diagnosed as having abscess on US. All abscesses were drained with an 18- or 14-gauge needle under US guidance. There were no drainage complications. There was one false positive with a focal area of edema yielding no pus on needle aspiration under direct US visualization. No patient returned unexpectedly after drainage. **Conclusions:** These data suggest that intraoral US of suspected PTA allows for reliable diagnosis and safe and accurate abscess drainage. **Key words:** peritonsillar abscess; peritonsillar abscess drainage; peritonsillar ultrasound; emergency ultrasound; intraoral ultrasound; ultrasound-guided procedure. ACADEMIC EMERGENCY MEDICINE 2005; 12:85–88.

Peritonsillar abscess (PTA), the most common deep infection of the head and neck, consists of suppuration outside the tonsillar capsule as a consequence of acute tonsillitis.[1] Often presenting in the emergency department (ED) setting with the clinical picture of trismus, odynophagia, ''hot potato'' voice, edema and erythema of the superior peritonsillar tissue, and soft palate deviation away from the infected side,[2] PTA can be a life-threatening disease that must be drained in order to resolve.[2] Death can occur through rupture into the airway, dissection into the carotid artery, or regional spread of infection leading to sepsis. In most ED settings, diagnosis and subsequent drainage are accomplished using blind needle aspiration of the suspected abscess.[2] However, blind needle aspiration is an invasive, painful procedure that has a reported false-negative rate of 10–24%.[3–5] In addition, a serious complication of blind needle aspiration of the suspected abscess is laceration of the carotid artery.[2]

Due to the recent increased availability of ultrasound (US) equipment in the ED, it is now possible for suspected PTA to be imaged in real time by the emergency physician. Several reports have suggested the use of intraoral sonography as well as its safety for diagnosing and draining PTA. Our purpose is to further describe the utility of US in the evaluation of potential PTA and treatment of PTA in the ED setting.

METHODS

Study Design. This was an institutional review board–approved, retrospective US review of all patients over 18 years of age scanned by emergency physicians for possible PTA.

Study Setting and Population. This study took place at an academic Level I ED with approximately 75,000 visits per year. The facility has an emergency medicine (EM) residency and active emergency US education program. Hospital credentialing is available for emergency US. All patients presenting with PTA signs and symptoms including erythema, swelling of the tonsillar pillar, and uvular deviation were eligible to be scanned based on availability of personnel.

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Study Protocol. The US examinations for the evaluation of PTA were performed using an ATL HDI 4000 system (Philips Medical Systems, Bothell, WA) with a sheathed-endocavity 4–8-MHz broadband US transducer on minimum depth and maximum resolution settings. The probe was placed in the patient's mouth after preparation with three 1-second intraoral sprays of topical benzocaine and tetracaine hydrochloride combination and 30 mg of intramuscular ketorolac to overcome trismus (Figure 1A). Cellulitis was diagnosed when a homogeneous or striated area with no distinct fluid collection was noted. An abscess is typically cystic or heterogeneous in appearance with a poorly defined, irregular border (Figure 1C). If a fluid collection was localized, an 18-gauge, 2-inch needle was inserted and aspirated under US guidance (Figure 1B). A 14-gauge, 6-inch needle was utilized if pus was too thick or if the abscess was too deep, as determined on initial aspiration attempt. Patients were then given intravenous antibiotics prior to aspiration attempt and were sent home on oral antibiotics. All patients were asked to return in two days for follow-up to be rechecked. If there were any concerns about resolution of abscess, the patients were rescanned to evaluate for buildup of fluid.

Measures. Researchers recorded patient symptoms, US findings, results of abscess drainage if performed, and any complications of drainage.

Data Analysis. Statistical analysis included descriptive statistics, utilizing StatsDirect (StatsDirect Software, Ashwell, UK).

RESULTS

From August 2002 to January 2004, a total of 43 patients received intraoral US examinations for suspected PTA from emergency sonologists. Thirty-five (81%) were diagnosed as having an abscess on US. Mean (±SD) age was 23 (±5.4) years, with a mean duration of reported symptoms of 3 (±1.7) days; none of the patients had any significant past medical history. There was no difference between the groups who had cellulitis and abscess in age, symptom duration, or past medical history. Typically, the abscesses were drained with an 18-gauge needle under US guidance; there were no drainage complications. The amount of material aspirated ranged from 2 to 22 mL. The mean amount of fluid drained per patient was 6 mL of pus. The largest abscess (22 mL) required a 14-gauge, 6-inch needle and three passes to complete drainage of the large amount of pus. Further, this large abscess was noted to be deeper than most of the other ones, thus also necessitating a longer needle. Abscess depth from the skin surface of the posterior pharynx ranged from 5 mm to more than 30 mm.

Cellulitis was diagnosed in eight of the 43 cases (19%). There was one false-positive diagnosis of a PTA

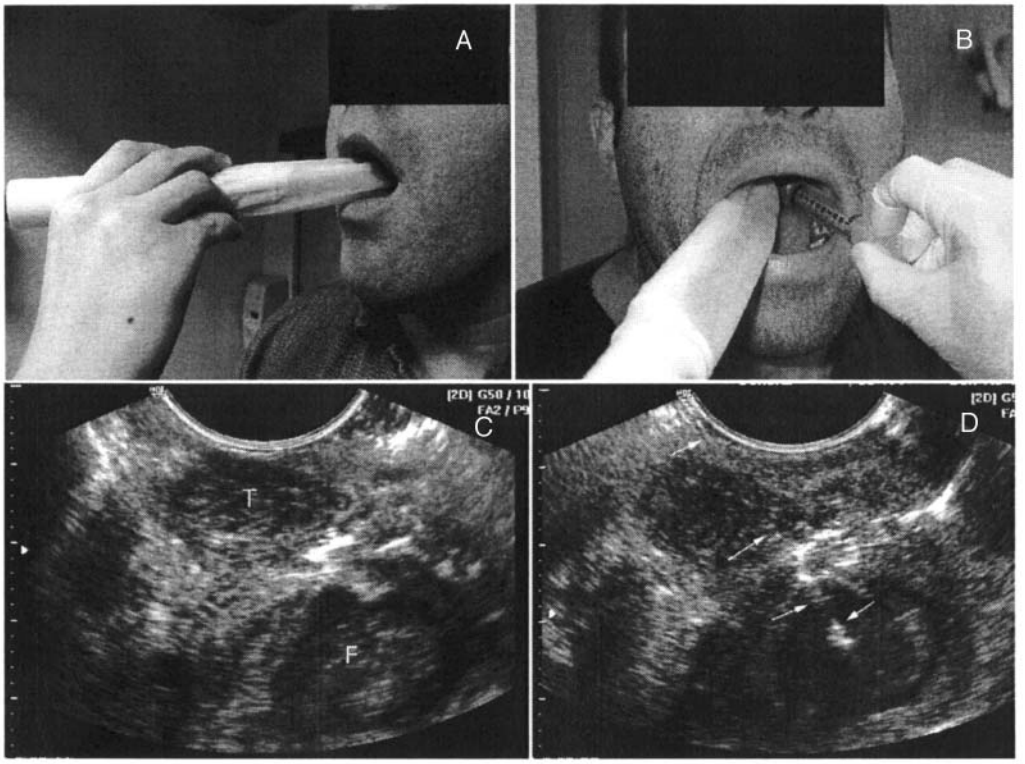

Figure 1. An endocavity transducer is inserted into the mouth to scan the peritonsillar region, **A**. A syringe with an 18-gauge needle is inserted next to the transducer to allow ultrasound-guided abscess aspiration, **B**. An abscess is shown on intraoral ultrasound (f: fluid) that is deep to the tonsil (t), **C**. A needle (*arrows*) is seen inserting into the abscess for drainage, **D**.

on US. It was a focal area of edema that appeared fairly well circumscribed and defined to the scanning physician. However, it yielded no pus on needle aspiration under direct US visualization. Upon review by the quality assurance committee, it was determined that this area was most consistent with peritonsillar cellulitis with focal edema and, hence, drainage was unnecessary. In another such area, correctly identified as lacking an actual abscess on US, needle drainage was attempted without success at the insistence of the treating physician.

No patient returned unexpectedly after drainage, and in those patients scheduled for recheck in 48 hours, there was no evidence of persistent or recurrent PTA or cellulitis on subsequent US examination.

DISCUSSION

The differentiation between the distinct clinical entities on the spectrum from pharyngitis to tonsillitis to cellulitis and, finally, to PTA is difficult based solely on clinical examination. The usual markers of PTA—trismus, odynophagia, ''hot potato'' voice, edema and erythema of the superior peritonsillar tissue, and soft palate deviation away from the infected side—are often present with the precursor to PTA, cellulitis.[2] The resultant sensitivity and specificity of clinical diagnosis of PTA are 78% and 50%, respectively.[6] The decision to drain or not to drain a potential abscess on such level of accuracy can dissuade clinicians from evaluating such patients themselves, preferring instead to refer them to subspecialists.

Diagnostic drainage, aspiration, or incision and drainage, often supplements the clinical diagnosis of PTA.[6] In fact, aspiration and incision and drainage continues to be the criterion standard for the diagnosis of PTA.[3] However, there are several locations near each tonsil to which the abscess may localize and, in addition, cellulitis often has an appearance similar to that of PTA.[2] Consequently, aspiration may be falsely negative if the wrong location is aspirated or if the abscess is multiloculated.[3,7] Therefore, blind needle aspiration is also unreliable for the diagnosis of PTA, with a reported false-negative rate of 10–24%.[3–5]

First reported in the otolaryngology literature, intraoral sonography for the diagnosis of PTA is now described in several reports in the EM literature.[8–10] The reported sensitivity for intraoral sonography varies from 90% to 100%, depending on the training of the sonographer as well as the field of training. Typically, the sonographic appearance of a normal tonsil is defined as a small (10–20 mm), oval structure with a homogeneous low-level echo texture. Enlarged tonsils (>20 mm) with a homogeneous or striated appearance are usually considered peritonsillar cellulitis. Enlarged tonsils with a heterogeneous or cystic appearance, in contrast, are typically considered to be PTA.[3]

Our rate of clinical diagnosis of PTA versus cellulitis was similar to those in prior reports,[8–10] i.e., 81% of suspected abscesses were confirmed by ultrasound. Several of the cases of cellulitis diagnosed in this study were followed to resolution using serial sonographic examinations. These cases were treated only with intramuscular dexamethasone and oral antibiotics. Although these cases were not subjected to the criterion standard of incision and drainage or aspiration for confirmation of the cellulitis, all resolved completely, both sonographically and clinically, within 48 hours, without recurrence.

As demonstrated in our series, intraoral sonography is a noninvasive method of safely differentiating PTA from peritonsillar cellulitis. The ability to simultaneously image and introduce the needle allows the emergency physician to track the entire course of the needle and ensure that sensitive tissues such as the carotid artery are not touched (Figure 1C and D). In addition, sonography is well tolerated with the use of a benzocaine and tetracaine hydrochloride combination as the only anesthetic for the initial imaging as well as the aspiration. As in our experience, a 2-inch, 18-gauge needle is typically required for the needle aspiration. However, the use of a 6-inch, 14-gauge needle was used in some cases due to the increased viscosity encountered in the minority of PTAs. The sole false-positive diagnosis with no pus on drainage attempt occurred early in the physician's learning curve. However, despite the negative results, dynamic US visualization allowed for needle placement away from any vital structure such as the carotid artery.

The manual dexterity required to manipulate the endocavity transducer and syringe can take some practice (Figure 1B). Ideally, this would be a one-handed procedure and require minimal dexterity. This can be achieved through the use of a fixed needle guide attached to the transducer that allows one hand to hold the probe, advance the syringe and needle, and aspirate. Although a needle guide is available for the endocavity probe, in our practice it is not used. The needle guide adds considerably to the cost of this procedure and can be easily lost. However, the major disadvantage is that unless a costly biopsy needle is used, which requires sterilization or replacement, the guide limits the distance to which the needle can penetrate the oropharynx. In our series, we found that the location of the abscess can be variable and the distance from the surface of the oropharynx can range from 5 mm to more than 30 mm.

LIMITATIONS

There are several limitations to this study. Physicians scanned only those patients with a clinical examination causing suspicion for PTA. Therefore, some PTAs could have been mistaken for cellulitis and not considered for scanning. In addition, scans were performed by

a limited number of credentialed providers in the ED with experience in emergency US. When one of the US-credentialed faculty members was not available, blind drainage had to be performed. As suggested earlier, some practice and hand–eye coordination are required for the procedure, and results may vary for different physicians. In the cases of cellulitis diagnosed by intraoral US, there was no criterion standard confirmation, i.e., incision and drainage or aspiration, except for one case. However, there was no known occurrence of PTA subsequent to treatment with only steroids and oral antibiotic therapy.

CONCLUSIONS

Our data suggest that intraoral US of suspected PTA helps differentiate peritonsillar cellulitis from abscess. Intraoral US of suspected PTA may facilitate or assist safe and accurate abscess drainage.

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