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Case Report

CT-guided transcutaneous drainage of peritonsillar abscess after failed ultrasound-guided drainage: A case report [☆]

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ABSTRACT

Peritonsillar abscess (PTA) is the most common deep neck infection in the United States. Timely treatment of PTA with antibiotics and aspiration or drainage is paramount, as delay in management may lead to further complications. The oral approach is the preferred route of drainage however may not always be accessible, warranting consideration of other routes of drainage. To the best of our knowledge, CT guidance for aspiration or drainage of a PTA has not been previously described. We present a 50-year-old patient with a PTA who initially presented with throat pain and dysphagia, rapidly developed upper airway obstruction, and required intubation. After the failure of clinical improvement and unsuccessful PTA aspiration via the conventional oral route, successful CT-guided percutaneous needle aspiration was performed by neuroradiology. Shortly thereafter, the patient clinically improved and was discharged with an oral course of antibiotics and follow-up on an as-needed basis. Total hospital length of stay was seven days. The complex patient may not allow for simple incision and drainage or needle aspiration of a suspected PTA. Assistance with ultrasound guidance is often utilized, however, challenges may persist depending on the anatomical location of the PTA and patient comorbidities. In cases where external drainage is considered and conventional ultrasound imaging is particularly challenging, CT-guided percutaneous aspiration may provide a useful alternative. PTAs are common with the possibility of complication. Although the usual route of drainage is oral, there are instances in which this cannot

Abbreviations: PTA, peritonsillar abscess; CT, Computed tomography.

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be performed. This case exhibits an uncommon approach to PTA aspiration via an external CT-guided percutaneous approach with rapid subsequent clinical improvement, exhibiting the utility of CT guidance.

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Introduction

Peritonsillar abscess (PTA) is the most common deep neck infection with an incidence of 30 cases per 100,000 people in the United States and a peak incidence from ages 20–40 and usually presents with fever, dysphagia, muffled voice, and sore throat [1–3]. Once there is high clinical suspicion concerning PTA, timely treatment with antibiotics and drainage of the abscess is crucial as delay in management may have potentially fatal sequelae such as involvement of the carotid sheath, airway obstruction, and suppuration into adjacent spaces including retropharyngeal, skull base, and mediastinal [1–5]. Incision and drainage and needle aspiration using an oral approach are the 2 methods commonly used for drainage. Ultrasound is commonly used as an adjunct with needle aspiration to detect the abscess perioperatively [6,7]. Occasionally, this method is ineffective in visualizing the abscess collection and tonsillectomy versus external cervical drainage may be considered. Here we present a patient with a PTA and upper airway obstruction managed with successful CT-guided needle aspiration by Neuroradiology status post failed ultrasound-guided needle aspiration. To the best of our knowledge, the discrete utilization of CT guidance for aspiration or drainage of a PTA has not been previously described.

Case presentation

A 50-year-old man presented from an outside hospital with throat pain and dysphagia for 2 days. Prior to arrival, an outside computed tomography (CT) scan (Figs. 1–3) was obtained which was concerning for PTA with epiglottic edema. The patient was transferred with IV ampicillin/sulbactam. On arrival at our emergency department, the patient was found to have a WBC count of 21.4 and was febrile up to 38.6°C with continued throat pain, difficulty speaking, pooling of oral secretions, and neck swelling. The patient rapidly decompensated in the emergency department requiring increased oxygen and subsequent rapid sequence intubation. The patient began a course of intravenous dexamethasone and continued ampicillin/sulbactam.

The CT scan obtained previously showed marked edema and thickening of the epiglottis and right aryepiglottic folds along with an ill-defined area of hypoattenuation of the right lateral oropharyngeal wall extending from the posterior, inferior margin of the right palatine tonsil at the tongue base anteriorly, and posteriorly along the lateral margin of the right aryepiglottic fold measuring 2.7 × 1.3 × 2.5 cm (anterior-posterior, transverse, craniocaudal). Mild narrowing of the inferior oropharyngeal/hypopharyngeal airway was also ob-



Fig. 1. – Axial CT of head and neck with IV contrast, hospital day 1 (May 31, 2023). Showing abscess/phlegmon at posterior, inferior aspect of right palatine tonsil at the tongue base anteriorly, extending posteriorly along the lateral margin of right aryepiglottic fold. Measurements present on margins of collection.

served. The hypoattenuation was consistent with a small abscess or phlegmon.

Due to airway compromise and subsequent intubation, the patient was admitted to the intensive care unit. Otolaryngology attempted a traditional ultrasound-guided needle decompression of the peritonsillar abscess on day 2 of hospitalization which was unsuccessful due to patient's body habitus and the abscess location. Neuroradiology was then consulted for evaluation of CT-guided needle aspiration.

Neuroradiology performed a CT-guided percutaneous needle aspiration of the peritonsillar collection on hospital day 3 due to persistent poor clinical status after 3 days of IV antibiotics and steroids. The patient was placed supine and positioned for the procedure. The patient was given a dose of contrast and a planning image was obtained with CT immediately prior to the procedure (Fig. 4). The previously identified collection measured 2.2 × 1.3 cm (anterior-posterior, transverse). Once the lingual artery was identified, a line to the target for needle insertion was planned. A small skin incision was made and a 15-gauge coaxial needle was advanced to the target site (Fig. 5). Approximately 1 mL of purulent material was obtained from the collection and was sent for cultures. Postneedle abscess decompression images were obtained using CT which



Fig. 2. – Coronal view of the same CT in Figure 1 demonstrating the craniocaudate height of the previously described abscess/phlegmon.

showed a decreased collection size measuring 1.6×1.0 cm (Fig. 6).

The patient returned to the ICU following the procedure and was extubated the following day on hospital day 4. Abscess cultures grew streptococcus constellatus, and the patient was continued on IV ampicillin/sulbactam. On hospital day 6, the patient was stable on supplemental oxygen via nasal cannula and was tolerating liquid diet with no trouble swallowing. He was transferred to the medical floor where he received one more day of IV dexamethasone. After speech therapy evaluation, it was determined that he could tolerate a full diet, and he was transitioned to oral amoxicillin/clavulanate. He was discharged on hospital day 7 in stable condition, after 7 days of antibiotics and steroids and 4 days postprocedure. He was prescribed 14 days of oral amoxicillin/clavulanate with follow-up as needed. No further imaging was indicated at the time of discharge.

Discussion

Current treatment strategies

The standard treatment for probable PTA is antibiotics and abscess drainage. Both incision and drainage and needle aspira-

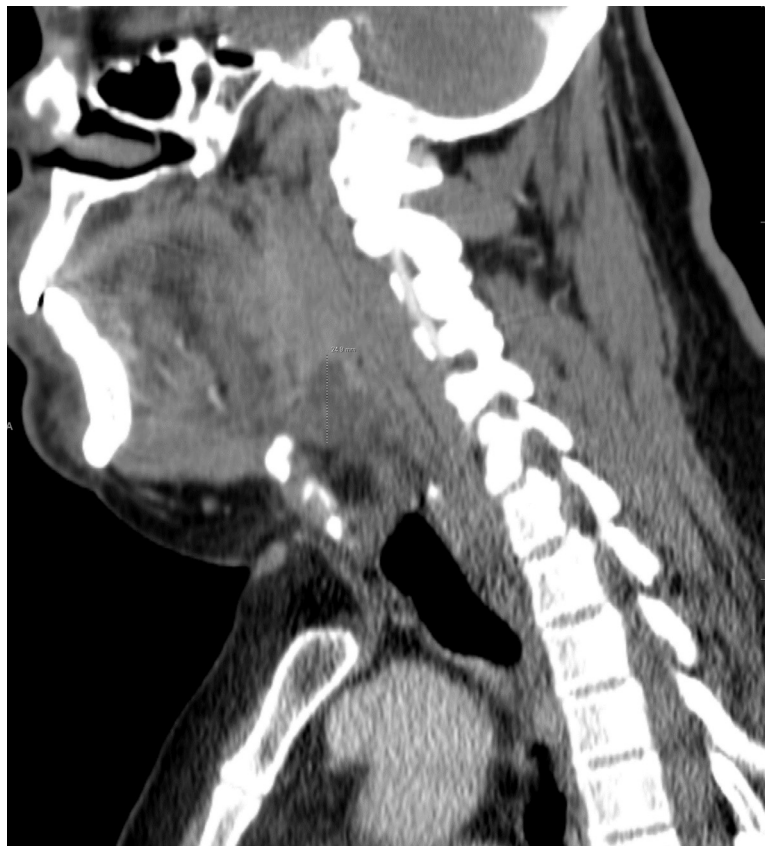


Fig. 3. – Sagittal view CT of head and neck with IV contrast, hospital day 1. Showing abscess/phlegmon at posterior, inferior aspect of right palatine tonsil at the tongue base anteriorly, extending posteriorly along the lateral margin of right aryepiglottic fold. Measurements present on margins of collection.



Fig. 4. - Axial CT of head and neck with contrast, prior to procedure on hospital day 3. Abscess phlegmon measuring 2.21 cm x 1.32 cm.

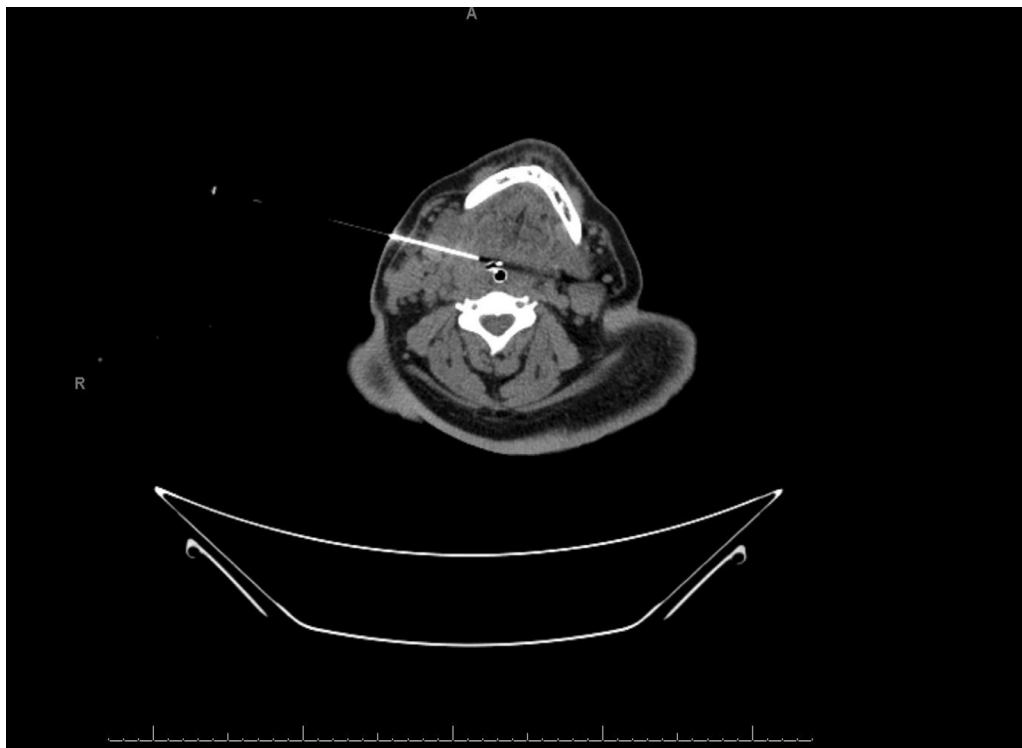


Fig. 5. - Axial CT of head and neck with contrast, hospital day 3 (June 2, 2023), intraprocedural image showing the needle in target collection.



Fig. 6. – Axial CT of head and neck with contrast, hospital day 3 (June 2, 2023), postprocedural image showing successful drainage of collection, now measuring 1.6 × 1.0 cm.

tion are techniques used to drain PTAs [1,5–7]. A systematic review of 11 studies determined that there were no statistically meaningful differences between needle aspiration and incision and drainage via the oral route [7]. Both procedures have high success rates with resolution of PTA near 90% [2,8,9]. There is weak evidence to suggest that incision and drainage may have lower recurrence, but higher rates of pain [7]. Oral approach is the preferred method for incision or needle aspiration, but when the abscess is not well visualized, an external cervical approach can be a more suitable option [2]. Ultrasound is the preferred method for visualizing PTAs prior to surgical intervention. It can be performed either orally or transcutaneously and is quick and cost-effective compared to CT. However, its use is limited to abscesses in deep neck spaces and is heavily influenced by user skill [2].

Literature review of PTA CT guided needle aspiration

Primary literature review for the use of CT guidance for peritonsillar abscess aspiration was reviewed by searching Medline (PubMed, National Center for Biotechnology Information, US National Library of Medicine, Bethesda, Maryland) and Science Direct (Elsevier B.V., Amsterdam) with (“peritonsillar abscess” or “deep neck infection”) and (“computed tomography” or “CT”) and “guided.” The abstracts of each article from all sources were reviewed for utilization of CT

guidance for aspiration of PTA. Relevant reference articles were also reviewed. Although multiple articles described CT guidance for drainage or aspiration of deep neck infections within the deep spaces of the neck including the pterygomandibular space, parapharyngeal space, submandibular space, and retropharyngeal space [10–17], none of the articles reviewed discretely described CT guidance for PTA needle aspiration.

Utility of CT guidance in this case

In our patient, CT had already been obtained which demonstrated a collection concerning abscess. Otolaryngology attempted to use ultrasound to locate the collection and guide needle aspiration or incision and drainage. Otolaryngology was unable to locate the collection using ultrasound. Difficulty in visualization may have been due to a decreased size of the collection as a result of 3 days of IV antibiotics and steroids. The patient’s body habitus and the location of the collection are also likely contributing factors. The patient had a large neck and the abscess was located inferior to the palatine tonsil and along the lateral aspect of the aryepiglottic folds. This inferior pharyngeal mucosal space location made it more difficult to visualize through the oral approach, and the patient’s body habitus made a transcutaneous view using ultrasound challenging as well.

Medical treatment without surgical intervention has been shown to have similar success rates and no significant difference in recurrence in management of PTA by Battaglia et al., but did not use imaging to evaluate presence or severity of abscess [2,18]. The recommendation peritonsillar abscess in the literature is drainage or aspiration. In this case, our patient experienced upper airway obstruction requiring intubation and hospitalization with high suspicions of abscess collection due to CT findings. As a result of his critical condition and imaging findings, it was determined that he still required aspiration. Otolaryngology consulted Neuroradiology to evaluate for a minimally invasive external cervical approach aspiration with CT guidance. The abscess was aspirated and able to be cultured to tailor antibiotic coverage.

Future considerations

The external cervical approach for PTA aspiration was chosen after a multidisciplinary collaboration between otolaryngology and Neuroradiology for a complex patient. CT guidance offers a reasonably low-invasive method, however only warrants consideration after well-established methods of drainage have failed, such as attempted aspiration via the oral route. Additionally, in this case the benefits of drainage were thought to outweigh the risks of ionizing radiation. Radiology studies and procedures should always be performed with the concept of keeping radiation dose as low as reasonably achievable. Our case presents CT guidance for an adult patient, however, the decision to utilize CT guidance would warrant special consideration if applied to the pediatric population. In keeping with the concept of limiting radiation, we believe the need for follow-up imaging should be determined based on clinical judgment. In our case, the patient's rapid postprocedure improvement did not necessitate a follow-up CT scan.

Conclusion

This case represents a nuanced clinical scenario that necessitated the use of an exceedingly uncommon procedure that can be used for PTA and other deep neck infections. In patients with difficult anatomy or body habitus, CT-guided procedures may prove as a useful alternative that provides minimally invasive access and visualization of infections. In the case of the PTA, this may allow for drainage of abscesses that otherwise would not be able to reach through the oral route.

Author contributions

Christopher Mejias leads in planning, writing, and revising the manuscript, and is the first author. Daniel Hubbard, and Eun Jeong contributed to the initial writing and revisions. Ambur Reddy supervised, advised, and made final revisions to the manuscript.

Patient consent

The authors declare that written and informed consent was obtained from the patient for the use of this case and its radiographic images.

REFERENCES

- [1] Galioto NJ. Peritonsillar abscess. *Am Fam Physician* 2017;95(8):501–6.
- [2] Esposito S, De Guido C, Pappalardo M, Laudisio S, Meccariello G, Capoferri G, et al. Retropharyngeal, parapharyngeal and peritonsillar abscesses. *Children (Basel)* 2022;9(5):618. doi:10.3390/children9050618.
- [3] Klug TE. Peritonsillar abscess: clinical aspects of microbiology, risk factors, and the association with parapharyngeal abscess. *Dan Med J* 2017;64(3):B5333.
- [4] Klug TE, Greve T, Hentze M. Complications of peritonsillar abscess. *Ann Clin Microbiol Antimicrob* 2020;19(1):32. doi:10.1186/s12941-020-00375-x.
- [5] Martínez Pascual P, Pinacho Martínez P, Friedlander E, Martín Oviedo C, Scola Yurrita B. Peritonsillar and deep neck infections: a review of 330 cases. *Braz J Otorhinolaryngol* 2018;84(3):305–10. doi:10.1016/j.bjorl.2017.03.008.
- [6] Costantino TG, Satz WA, Dehnkamp W, Goett H. Randomized trial comparing intraoral ultrasound to landmark-based needle aspiration in patients with suspected peritonsillar abscess. *Acad Emerg Med* 2012;19(6):626–31. doi:10.1111/j.1553-2712.2012.01380.x.
- [7] Chang BA, Thamboo A, Burton MJ, Diamond C, Nunez DA. Needle aspiration versus incision and drainage for the treatment of peritonsillar abscess. *Cochrane Database Syst Rev* 2016;12(12):CD006287. doi:10.1002/14651858.CD006287.pub4.
- [8] Powell J, Wilson JA. An evidence-based review of peritonsillar abscess. *Clin Otolaryngol* 2012;37(2):136–45. doi:10.1111/j.1749-4486.2012.02452.x.
- [9] Johnson RF, Stewart MG, Wright CC. An evidence-based review of the treatment of peritonsillar abscess. *Otolaryngol Head Neck Surg* 2003;128(3):332–43. doi:10.1067/mhn.2003.93.
- [10] Han SM, Chae HS, Lee HN, Jeon HJ, Bong JP, Kim JH. Computed tomography-guided navigation assisted drainage for inaccessible deep neck abscess: a case report. *Medicine (Baltimore)* 2019;98(10):e14674. doi:10.1097/MD.00000000000014674.
- [11] Taub D, Yampolsky A, Diecidue R, Gold L. Controversies in the management of oral and maxillofacial infections. *Oral Maxillofac Surg Clin North Am* 2017;29(4):465–73. doi:10.1016/j.coms.2017.06.004.
- [12] Cheng Z, Tang X, Yu J. Effectiveness and therapeutic impact of CT-guided percutaneous drainage for deep neck abscesses. *Int J Otolaryngol Head Neck Surg* 2015;4:409–16.
- [13] Cole DR, Bankoff M, Carter BL. Percutaneous catheter drainage of deep neck infections guided by CT. *Radiology* 1984;152(1):224. doi:10.1148/radiology.152.1.6729120.
- [14] Thanos L, Mylona S, Kalioras V, Batakis N. Potentially life-threatening neck abscesses: therapeutic management under CT-guided drainage. *Cardiovasc Intervent Radiol* 2005;28:196–9. doi:10.1007/s00270-004-0003-y.
- [15] de Marie S, Tjon A Tham RT, van der Mey AG, Meerdink G, van Furth R, van der Meer JW. Clinical infections and nonsurgical treatment of parapharyngeal space infections complicating throat infection. *Rev Infect Dis* 1989;11(6):975–82. doi:10.1093/clinids/11.6.975.

- [16] Poe LB, Petro GR, Matta I. Percutaneous CT-guided aspiration of deep neck abscesses. *AJNR Am J Neuroradiol* 1996;17(7):1359–63.
- [17] Wang B, Gao BL, Xu GP, Xiang C. Images of deep neck space infection and the clinical significance. *Acta Radiol* 2014;55(8):945–51. doi:[10.1177/0284185113509093](https://doi.org/10.1177/0284185113509093).
- [18] Battaglia A, Burchette R, Hussman J, Silver MA, Martin P, Bernstein P. Comparison of medical therapy alone to medical therapy with surgical treatment of peritonsillar abscess. *Otolaryngol Head Neck Surg* 2018;158(2):280–6. doi:[10.1177/0194599817739277](https://doi.org/10.1177/0194599817739277).