KRASUSKA, Martyna, NOWAK, Karolina, OLEJARZ, Zuzanna, DRYGAŁA, Zuzanna, WYRWAŁ, Julia, ZIELIŃSKA, Zuzanna, SŁOWIK, Magdalena, NOWAK, Karolina, NIEĆ, Maria and GIERLACH, Katarzyna. Diagnostic possibilities in peritonsillar abscess and the significance of transcutaneous ultrasound - Systematic Review of the Literature. Journal of Education, Health and Sport. 2024;57:169-179. eISSN 2391-8306. https://dx.doi.org/10.12775/JEHS.2024.57.012
https://apcz.umk.pl/JEHS/article/view/48006
https://zenodo.org/records/10629583

The journal has had 40 points in Minister of Science and Higher Education of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of 05.01.2024 No. 32318. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical culture sciences (Field of medical and health sciences); Health Sciences (Field of medical and health sciences).
Punkty Ministerialne 40 punktów. Załącznik do komunikatu Ministra Nauki i Szkolnictwa Wyższego z dnia 05.01.2024 Lp. 32318. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).© The Authors 2024;
This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 12.01.2024. Revised: 06.02.2024. Accepted: 07.02.2024. Published: 07.02.2024.

Diagnostic possibilities in peritonsillar abscess and the significance of transcutaneous ultrasound - Systematic Review of the Literature

Martyna Krasuska
Mikulicz-Radecki University Clinical Hospital in Wrocław
Borowska 213 Street, 50-556 Wrocław
martynakrasuska102@gmail.com
ORCID ID: 0009-0005-1210-3511

Karolina Nowak
karolinanowakmd@gmail.com
ORCID ID: 0009-0000-2719-8326
Rear Admiral Professor Wiesław Łasiński 7th Military Navy Hospital with Outpatient Clinic in Gdańsk, Polanki 117 Street, 80-305 Gdańsk

Zuzanna Olejarz
olejarz.zuzanna@gmail.com
ORCID ID: 0009-0009-3750-7124
Rear Admiral Professor Wiesław Łasiński 7th Military Navy Hospital with Outpatient Clinic in Gdańsk, Polanki 117 Street, 80-305 Gdańsk

Zuzanna Drygała

zuzadrygala@gmail.com
ORCID ID: 0009-0000-1484-2696
4th Military Hospital, Weigla Street 5 Street, 53-114 Wrocław

Julia Wyrwał
julia.wyrwal@wp.pl
ORCID ID: 0009-0003-2566-3353
4th Military Hospital, Weigla Street 5 Street, 53-114 Wrocław

Zuzanna Zielińska
z.zielinska@icloud.com
ORCID ID: 0009-0007-1417-0106
St. Alexander Hospital, Kościuszki 25 Street, 25-316 Kielce

Magdalena Słowik
97magda@gmail.com
ORCID ID: 0009-0006-4337-5277

St. Barbara Specialist Hospital No. 5 in Sosnowiec, Medyków Square 1, 41-200 Sosnowiec

Karolina Nowak
knowak19988@gmail.com
ORCID ID: 0009-0007-4885-9622
Rear Admiral Professor Wiesław Łasiński 7th Military Navy Hospital with Outpatient Clinic named after in Gdańsk, Polanki 117 Street, 80-305 Gdańsk

Maria Nieć
mniec97@gmail.com
ORCID ID: 009-0006-7569-9137
Ludwik Rydygier Specialist Hospital, Złota Jesień 1 Street, 31-826 Kraków

Katarzyna Olga Gierlach
kaasia.gierlach@gmail.com
ORCID ID: 0009-0004-6767-4875
District Railway Hospital in Katowice, Panewnicka 65 Street, 40-760 Katowice.

Abstract:

Introduction and purpose:

A peritonsillar abscess is one of the most common complications of tonsillitis, especially among adolescents and young adults. Its diagnosis can pose a challenge, and overlooking it may pose a life-threatening risk. Various diagnostic methods have their advantages and disadvantages.

The aim of this publication is to compare and identify the best diagnostic approach currently described in the literature, contributing to improved clinical decision-making and patient outcomes with particular attention to the significance of transcutaneous ultrasound as a diagnostic method.

A brief description of state of knowledge:

Beyond clinical symptoms imaging options include transcutaneous and oral ultrasound, computed tomography, and magnetic resonance imaging. Ultrasound has been gaining importance in the diagnosis of PTA for an extended period due to its easy accessibility, cost-effectiveness, non-invasiveness and a relatively high anticipated specificity and sensitivity. Simultaneously, the use of CT as a tool in primary diagnosis is being called into question and new proposals for the use of MRI are emerging.

Summary:

Currently, the use of both intraoral and transcutaneous ultrasound represents the optimal first-line solution in diagnosing peritonsillar abscess. In cases of uncertainty, a more specific diagnostic tool would be MRI, although for various reasons, CT is more commonly chosen.

Keyswords: Peritonsillar abscess; Ultrasonography; Diagnostic imaging;

Introduction

A peritonsillar abscess, commonly referred to as quinsy, occurs when pus accumulates in the peritonsillar space, situated between the tonsillar capsule and the superior constrictor muscle.[1] Typically, the diagnosis is established through clinical presentation and examination. Common symptoms and observed findings encompass fever, a painful throat, difficulty swallowing and restricted mouth opening (trismus).[2] Differentiating between peritonsillar abscess (PTA) and peritonsillar cellulitis through clinical assessment is a complex task due to the considerable overlap in features for both conditions. Physical examination alone demonstrates approximately 75% sensitivity and 50% specificity in diagnosing PTA, underscoring the challenges in precisely distinguishing between the two. [3] Therefore, the use of additional diagnostic methods could be the only way to accurately identify the condition. Among the most common additional methods are various forms of ultrasound (USG), computed tomography (CT), and magnetic resonance imaging (MRI).

Epidemiology

Peritonsillar abscess is most common in persons 20 to 40 years of age[4]. Most cases of peritonsillar abscess (PTA) are a complication of tonsillitis; however, non-inflammatory causes may also contribute.[5] Individuals, particularly males and those aged over 40, appear

to face an elevated risk of developing complicated disease. [6] Complications of peritonsillar abscess (PTA) can be dangerous, with one of the most severe being Lemierre's syndrome. Accurate diagnosis and timely treatment of PTA are crucial to prevent potential complications, including the spread to adjacent deep neck spaces, the mediastinum, and the skull base.[7] The culture results frequently reveal a polymicrobial infection, with primary causative organisms including Streptococcus pyogenes, Fusobacterium necrophorum, and Streptococcus milleri. [8] Approximately 50% of individuals diagnosed with peritonsillar abscess fulfill the criteria for sepsis.[9]

Clinical symptoms

Individuals with peritonsillar abscess (PTA) exhibited a higher likelihood of experiencing trismus, uvular deviation, and palatal edema compared to those without PTA.[10] A nd even though COVID-19 introduced significant disruptions to the diagnosis of respiratory system diseases, the clinical presentation of peritonsillar abscess (PTA) seems unaffected by the pandemic.[11] Relying solely on physical examination yields a sensitivity of around 75% and a specificity of 50% in the diagnosis of peritonsillar abscess (PTA). [12] The utilization of artificial intelligence has the potential to enhance their usefulness, as demonstrated by the top-performing algorithm, the artificial neural network, which achieved an accuracy of 72.3%. Artificial neural networks can leverage patient symptoms to surpass human capability in predicting peritonsillar abscess (PTA) among patients with clinical suspicion for PTA.[13]

Ultrasonography

In recent years, ultrasound (USG) has gained increasing prominence. This is not without reason. It is an easily accessible, quick, and cost-effective examination.[14] It can be particularly significant among the pediatric population due to the elimination of harmful radiation.[15] In the diagnosis of peritonsillar abscess, we currently utilize both transcutaneous and transoral ultrasound (TUS). Transcutaneous ultrasound holds an advantage over transoral ultrasound due to its capability to be used even in cases of trismus, which can be a symptom in individuals with peritonsillar abscess.[16][17] The experience of the operator is also significant. Ultrasounds performed by a radiologist have a sensitivity of 89% and specificity of 71%, whereas those conducted in point-of-care settings exhibit a

sensitivity of 74% and specificity of 79%.[3] Studies confirm its significance even in the case of an inexperienced operator.[18] The results obtained from a subsequent point-of-care transcutaneous ultrasound conducted by a emergency physician may directly influence and prompt the decision to proceed with needle aspiration.[19] The utilization of ultrasound in emergency medicine for diagnostic purposes has the potential to decrease hospital admissions.[20] However, it is essential to highlight the limitations of ultrasound, which may require the use of secondary imaging and potentially extend hospital stays.[21] In response to this challenge, the introduction of Contrast-Enhanced Ultrasound (CEUS) proves beneficial by not only diminishing the reliance on secondary imaging by enhancing the sensitivity of ultrasound.[22] However, it involves the administration of contrast, excluding a small fraction of patients.

CT

Computed tomography (CT) holds significant importance in emergency medicine due to its speed and objective outcome. There is a suggested relatively high positive predictive value, reaching around 80%.[23] However, studies also report instances of overuse, leading to overdiagnosis of abscesses.[24] The study observed that CT has nearly 100% sensitivity and around 75% specificity in detecting peritonsillar abscess (PTA). This implies that a negative CT result is valuable for excluding PTA due to its high sensitivity. However, a positive CT may not be as useful in detecting PTA since it is more likely to produce a false positive result given its lower specificity.[25]

MR

Due to the length of the MRI examination, it is not commonly utilized in emergency medicine on a daily basis, particularly in the diagnosis of peritonsillar abscess. Additionally, factors such as costs and limited availability contribute to its reduced usage.

However, it has its application, especially in complicated abscess cases. Reports have emerged regarding the possibility of utilizing a 5-minute non-contrast MRI sequence as an equivalent to a full protocol (30 min), which could enhance the utility of MRI in diagnosing abscesses. A short MRI protocol demonstrated a high level of accuracy, ranging from good to excellent, in the diagnosis of tonsillar abscesses.[26] Furthermore, studies have emerged

emphasizing the superiority of MRI over CT in accurately diagnosing abscesses.[27] These reports lead to great optimism and a positive outlook for the future use of MRI.

Conclusion

Despite the extensive capabilities of imaging diagnostics, the diagnosis of peritonsillar abscess (PTA) primarily relies on symptoms in the first instance. Nevertheless, the fact remains that in many cases, symptoms alone may be insufficient. The incorporation of imaging methods can prove to be crucial. Currently, we place great hope in ultrasound as a non-invasive and readily accessible method. Based on the current results, transcutaneous sonography holds substantial potential for enhancing the diagnosis of peritonsillar abscess and facilitating a reliable distinction from peritonsillar cellulitis.[28] The use of ultrasound may prevent the need for further investigations such as CT scans. [29] At present, there is a preference for intraoral examination, with transcutaneous ultrasound being recommended in cases where intraoral examination is not feasible.[30] For a long time, CT has been considered the gold standard; however, its increasing scrutiny stems from radiation concerns and the delay in abscess drainage during the procedure. Nevertheless, it continues to be widely utilized, especially in the emergency room. Research suggests that 30% or more of imaging tests could be avoidable, resulting in an annual cost of around $30 billion in the United States.[31]. MRI demonstrates higher specificity for peritonsillar abscess, but it should be primarily utilized in cases of suspected extensive complications.

Author's contribution:

Conceptualization, supervision and project administration: Martyna Krasuska, Julia Wyrwał, Zuzanna Drygała, Maria Nieć

Methodology: Zuzanna Olejarz, Karolina Nowak, Magdalena Słowik

Software, validation, formal analysis, investigation, resources, writing original draft preparation: Katarzyna Gierlach, Martyna Krasuska,

Writing review editing and visualisation: Karolina Nowak, Zuzanna Zielińska

All authors have read and agreed with the published version of the manuscript.

Funding: This research received no external funding.
Institutional Review Board Statement: Not applicable.
Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References:

1. Gupta G, McDowell RH. Peritonsillar Abscess. 2023 Jul 17. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 30137805.
2. Galioto NJ. Peritonsillar Abscess. Am Fam Physician. 2017 Apr 15;95(8):501-506. PMID: 28409615.
3. Kim DJ, Burton JE, Hammad A, Sabhaney V, Freder J, Bone JN, Ahn JS. Test characteristics of ultrasound for the diagnosis of peritonsillar abscess: A systematic review and meta-analysis. Acad Emerg Med. 2023 Aug;30(8):859-869. doi: 10.1111/acem.14660. Epub 2023 Jan 30. PMID: 36625850.
4. Steyer TE. Peritonsillar abscess: diagnosis and treatment. Am Fam Physician. 2002 Jan 1;65(1):93-6. Erratum in: Am Fam Physician 2002 Jul 1;66(1):30. PMID: 11804446.
5. Sanmark E, Wikstén J, Välimaa H, Aaltonen LM, Ilmarinen T, Blomgren K. Peritonsillar abscess may not always be a complication of acute tonsillitis: A prospective cohort study. PLoS One. 2020 Apr 3;15(4):e0228122. doi: 10.1371/journal.pone.0228122. PMID: 32243441; PMCID: PMC7122714
6. Klug TE, Greve T, Hentze M. Complications of peritonsillar abscess. Ann Clin Microbiol Antimicrob. 2020 Jul 30;19(1):32. doi: 10.1186/s12941-020-00375-x. PMID: 32731900; PMCID: PMC7391705.
7. Scott PM, Loftus WK, Kew J, Ahuja A, Yue V, van Hasselt CA. Diagnosis of peritonsillar infections: a prospective study of ultrasound, computerized tomography and clinical diagnosis. J Laryngol Otol. 1999 Mar;113(3):229-32. doi: 10.1017/s0022215100143634. PMID: 10435129.

8. Papacharalampous GX, Vlastarakos PV, Kotsis G, Davilis D, Manolopoulos L. Bilateral Peritonsillar Abscesses: A Case Presentation and Review of the Current Literature with regard to the Controversies in Diagnosis and Treatment. Case Rep Med. 2011;2011:981924. doi: 10.1155/2011/981924. Epub 2011 May 5. PMID: 21629820; PMCID: PMC3099234.
9. Vaikjärv R, Mändar R, Kasenõmm P. Peritonsillar abscess is frequently accompanied by sepsis symptoms. Eur Arch Otorhinolaryngol. 2019 Jun;276(6):1721-1725. doi: 10.1007/s00405-019-05424-6. Epub 2019 Apr 16. PMID: 30993467. German
10. Varelas AN, LoSavio PS, Misch E, Casey PE, Jeffe JS. Utilization of emergency department computed tomography and otolaryngology consultation in the diagnosis of pediatric peritonsillar abscess. Int J Pediatr Otorhinolaryngol. 2019 Feb;117:189-193. doi: 10.1016/j.ijporl.2018.11.034. Epub 2018 Nov 30. PMID: 30579080.
11. Heilig Y, Sapir A, Yafit D, Ben-Shimol S, Kaplan DM, Cohen O. Impact of the COVID-19 era on clinical presentation, management and microbiology in paediatric peritonsillar abscess: A case-control study. Clin Otolaryngol. 2023 Dec 15. doi: 10.1111/coa.14133. Epub ahead of print. PMID: 38100150.
12. Scott PM, Loftus WK, Kew J, Ahuja A, Yue V, van Hasselt CA. Diagnosis of peritonsillar infections: a prospective study of ultrasound, computerized tomography and clinical diagnosis. *J Laryngol Otol*. 1999; **113**(3): 229-232.
13. Wilson MB, Ali SA, Kovatch KJ, Smith JD, Hoff PT. Machine Learning Diagnosis of Peritonsillar Abscess. Otolaryngol Head Neck Surg. 2019 Nov;161(5):796-799. doi: 10.1177/0194599819868178. Epub 2019 Aug 20. PMID: 31426695.
14. Huang Z, Vintzileos W, Gordish-Dressman H, Bandarkar A, Reilly BK. Pediatric peritonsillar abscess: Outcomes and cost savings from using transcervical ultrasound. Laryngoscope. 2017 Aug;127(8):1924-1929. doi: 10.1002/lary.26470. Epub 2017 Jan 16. PMID: 28092120.
15. Fordham MT, Rock AN, Bandarkar A, Preciado D, Levy M, Cohen J, Safdar N, Reilly BK. Transcervical ultrasonography in the diagnosis of pediatric peritonsillar abscess. Laryngoscope. 2015 Dec;125(12):2799-804. doi: 10.1002/lary.25354. Epub 2015 May 6. PMID: 25945805.
16. Nogan S, Jandali D, Cipolla M, DeSilva B. The use of ultrasound imaging in evaluation of peritonsillar infections. Laryngoscope. 2015 Nov;125(11):2604-7. doi: 10.1002/lary.25313. Epub 2015 May 6. PMID: 25946659.

17. Araujo Filho BC, Sakae FA, Sennes LU, Imamura R, de Menezes MR. Intraoral and transcutaneous cervical ultrasound in the differential diagnosis of peritonsillar cellulitis and abscesses. Braz J Otorhinolaryngol. 2006 May-Jun;72(3):377-81. doi: 10.1016/s1808-8694(15)30972-1. PMID: 17119775; PMCID: PMC9443609.
18. von Beckerath M, Svensson J, Landström F. Feasibility of an inexperienced examiner using trans-cervical ultrasound in the diagnosis of peritonsillar abscesses. Acta Otolaryngol. 2021 Sep;141(9):847-850. doi: 10.1080/00016489.2021.1960421. Epub 2021 Aug 15. PMID: 34392793.
19. Halm BM, Ng C, Larrabee YC. Diagnosis of a Peritonsillar Abscess by Transcutaneous Point-of-Care Ultrasound in the Pediatric Emergency Department. Pediatr Emerg Care. 2016 Jul;32(7):489-92. doi: 10.1097/PEC.0000000000000843. PMID: 27380609.
20. Bryczkowski C, Haussner W, Rometti M, Wei G, Morrison D, Geria R, Mccoy JV. Impact of Bedside Ultrasound on Emergency Department Length of Stay and Admission in Patients With a Suspected Peritonsillar Abscess. Cureus. 2022 Dec 5;14(12):e32207. doi: 10.7759/cureus.32207. PMID: 36620852; PMCID: PMC9812542.
21. Orobello NC, Crowder HR, Riley PE, Michel M, Behzadpour HK, Rana MS, Sanchez-Jacob R, Reilly BK. Predicting failure of detection of peritonsillar abscess with ultrasound in pediatric populations. Am J Otolaryngol. 2024 Jan-Feb;45(1):104021. doi: 10.1016/j.amjoto.2023.104021. Epub 2023 Aug 15. PMID: 37625277.
22. Tüchert SE, Vollert K, Schuster T, Kröncke T. Use of CEUS for Imaging Evaluation of Pediatric Peritonsillar Abscess. Ultraschall Med. 2023 Dec;44(6):631-636. English. doi: 10.1055/a-2017-7172. Epub 2023 Jan 23. PMID: 36690031.
23. Freling N, Roele E, Schaefer-Prokop C, Fokkens W. Prediction of deep neck abscesses by contrast-enhanced computerized tomography in 76 clinically suspect consecutive patients. Laryngoscope. 2009 Sep;119(9):1745-52. doi: 10.1002/lary.20606. PMID: 19551850.
24. Eliason MJ, Wang AS, Lim J, Beegle RD, Seidman MD. Are Computed Tomography Scans Necessary for the Diagnosis of Peritonsillar Abscess? Cureus. 2023 Feb 9;15(2):e34820. doi: 10.7759/cureus.34820. PMID: 36919070; PMCID: PMC10008127.

25. Capps EF, Kinsella JJ, Gupta M, Bhatki AM, Opatowsky MJ. Emergency imaging assessment of acute, nontraumatic conditions of the head and neck. Radiographics. 2010 Sep;30(5):1335-52. doi: 10.1148/rg.305105040. Erratum in: Radiographics. 2011 Jan-Feb;31(1):316. PMID: 20833854.
26. Vierula JP, Nurminen J, Jussila V, Nyman M, Heikkinen J, Pape B, Sorvettula K, Mattila K, Hirvonen J. Diagnostic performance of short noncontrast biparametric 3-T MRI for tonsillar infections: comparison with a full protocol including contrast-enhanced sequences. Eur Radiol Exp. 2023 Oct 24;7(1):65. doi: 10.1186/s41747-023-00379-0. PMID: 37872406; PMCID: PMC10593634.
27. Nurminen J, Velhonoja J, Heikkinen J, Happonen T, Nyman M, Irjala H, Soukka T, Mattila K, Hirvonen J. Emergency neck MRI: feasibility and diagnostic accuracy in cases of neck infection. Acta Radiol. 2021 Jun;62(6):735-742. doi: 10.1177/0284185120940242. Epub 2020 Jul 13. PMID: 32660316; PMCID: PMC8167911.
28. Miksch M, Koch M, Mantsopoulos K, Gostian AO, Mueller SK, Rupp R, Iro H, Sievert M. Sonografische Diagnostik tonsillärer Abszesse: Eigene Erfahrungen und eine systematische Übersicht [Sonographic diagnosis of tonsillar abscesses: Our experience and a systematic review]. Laryngorhinootologie. 2022 Sep;101(9):706-712. German. doi: 10.1055/a-1744-6305. Epub 2022 Feb 2. PMID: 35108744.
29. Kohen B, Perez M, Mckay J, Zamora R, Xu C. The Use of Point of Care Ultrasound in Diagnosis of Peritonsillar Abscess. POCUS J. 2023 Nov 27;8(2):116-117. doi: 10.24908/pocus.v8i2.16568. PMID: 38099156; PMCID: PMC10721292.
30. Secko M, Sivitz A. Think ultrasound first for peritonsillar swelling. Am J Emerg Med. 2015 Apr;33(4):569-72. doi: 10.1016/j.ajem.2015.01.031. Epub 2015 Jan 23. PMID: 25737413.
31. Oren O, Kebebew E, Ioannidis JPA. Curbing Unnecessary and Wasted Diagnostic Imaging. JAMA. 2019 Jan 22;321(3):245-246. doi: 10.1001/jama.2018.20295. PMID: 30615023.