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Predictors of Intratonsillar versus Peritonsillar Abscess – A Case-Control Series

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Abstract

Introduction: An uncommon phenomenon in relation to the peritonsillar abscess (PTA) is the intratonsillar abscess (ITA) or formation of an abscess within tonsillar parenchyma. This study sought to characterize our experience with diagnosis and management of ITAs in the context of the PTA patient population.

Methods: This is a single institution retrospective review of patients treated at the University of Michigan between 2000 and 2017.

Results: 655 adult patients were identified. The incidence of ITA within the PTA population was 7% (n = 43). Patients with ITA had lower mean WBC count (p = 0.03), lower proportion of trismus (p < 0.0001), otalgia (p = 0.007), vocal changes (p < 0.0001), and fewer incidences of acute progression of symptoms (p = 0.0007). On multivariable analysis, ITA patients were noted to be older, present with a longer duration of symptoms, and have greater incidence of neck pain and lymphadenopathy. Drainage was attempted in fewer ITA patients and was rarely successful (15%) in comparison to successful drainage for PTA patients (69%) (p < 0.0001).

Conclusion: Symptomatology differs for ITA, as fewer present with the classic PTA symptoms of otalgia, trismus, and voice alterations. The lack of classic symptoms likely leads to delayed presentation. A greater number of ITA patients presented with neck pain and lymphadenopathy. In the ITA population, aspiration attempts were more infrequent and less successful in yielding purulence. Given infrequent yield of pus and low overall recurrence rate, the diagnosing clinician should consider medical management in this distinct patient population.

Keywords

Peritonsillar abscess; Intratonsillar abscess; Otolaryngology; IV; case series

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Introduction

Peritonsillar abscess (PTA) is the most commonly occurring abscess in the head and neck region. There is an annual incidence of 30 cases per 100,000 inhabitants in the United States, or a total of approximately 45,000 cases per year¹. Anatomically, PTAs are characterized by purulent pockets located between the palatine tonsil capsule and the pharyngeal constrictor muscles. The symptomatology of PTAs has been well-defined, and includes progressive odynophagia, unilateral otalgia, trismus, voice changes and malodorous breath. Management typically involves antibiotics and evacuation of purulent fluid with needle aspiration and/or formal incision and drainage of the peritonsillar space². On occasion though, there is coalescence of abscessed material within the parenchyma of the tonsil itself; this uncommon phenomenon is known as the intratonsillar abscess (ITA).

The pathogenesis of the ITA has yet to be fully elucidated. One proposed mechanism involves direct extension of obstructed tonsillar crypts with subsequent enlargement and containment of the ITA. Another theory hypothesizes that ITA arises from bacterial seeding via either the bloodstream or the lymphatic system^{3,4}. PTA and ITA are similar entities, though with distinct clinical features. The importance of distinguishing these two diseases processes lies in the possibility of differential management. Whereas aspiration and drainage is the well-studied gold standard in management of the PTA, there is little consensus regarding optimal management of the ITA⁵. Previous case series have demonstrated treatment success without utilizing formal aspiration or incision and drainage⁶. The lack of consensus is further compounded by few published studies on incidence of the ITA, likely resulting in poor provider recognition of this disease process. This diminished awareness could result in providers managing the ITA as they would the PTA, that is with drainage of the peritonsillar space. Given the anatomic differences in these abscesses, this practice may contribute to a proportion of failed PTA drainage attempts. Separate studies have demonstrated specificity ranging from 50%–70% when attempting to aspirate purulence in PTA patients^{7–9}. Thus, it is the authors' hypothesis that the ITA is a clinically distinguishable entity from the PTA with a treatment paradigm that should differ in regards to aspiration and drainage of the peritonsillar space. This study aims to prove this hypothesis via establishing the measures of differential incidence, presenting symptoms, risk factors, natural history, and treatment course and outcomes for ITA relative to the population of patients presenting for PTA.

Methods

Study Population

We performed an IRB-approved single-institution retrospective case series of patients who presented to our emergency department or clinic with suspicion for a deep neck space infection. Patient list was compiled via a medical records search for peritonsillar abscesses and tonsillar abscesses via ICD-9 and ICD-10 coding. Patients who were diagnosed with a peritonsillar or intratonsillar infection from 2000–2017 were included. Diagnostic criteria for diagnosing ITA included: radiologist confirmation of debris or abscess within tonsillar parenchyma or body, or evacuation of purulence from intratonsillar parenchyma or evacuation of purulence from intratonsillar parenchyma as noted in operative note for quinsy

tonsillectomy. Patients who did not have a diagnosis of peritonsillar or intratonsillar abscess, most commonly those diagnosed with pharyngitis or tonsillitis, were excluded from the study. Patients who had infections present within additional spaces of the neck, such as concomitant parapharyngeal or retropharyngeal abscesses, were also excluded. We collected the following data from the medical record: age, patient gender, vital signs, date of treatment, presenting symptoms, record of previous treatment, laboratory data, type and outcome of intervention performed, imaging characteristics, record of recurrence of PTA or ITA, culture data, and any follow-up visitation in clinic. Data were collected using clinical notes and imaging available in our electronic medical records system.

Statistical Analysis

Standard descriptive statistics were tabulated and bivariate associations with ITA vs PTA were tested with chi-square tests and t-tests where appropriate. Multivariable modeling was performed in two stages. For the initial stage, all demographic, basic clinical factors and symptomatology related data points that were completely represented within our patient cohort were considered as potential predictors for the presence of ITA or PTA. Thereafter, each significant variable as determined by our selection criteria ($\alpha = 0.10$) remained in the model, whereas non-significant variables were removed one-by-one. After the removal of each non-significant variable, new estimates with remaining variables were evaluated at each step. Following generation of our base model, we tested whether the model improved with introduction of treatment and test characteristics that were available for a select number of patients. Given that these additional variables were not completely represented within our sample size, their inclusion in generation of our base model would potentially allow the missing data pattern of one variable to negatively impact evaluation of the other variables. All analyses were performed in SAS v9.4.

Results:

Our study identified 655 adult patients (age > 18) with confirmed diagnosis of PTA or ITA. Of these, 612 (93%) were diagnosed with PTA and 43 (7%) with ITA. Diagnostic criteria for ITA and PTA are outlined in Table 1. ITA diagnosis was confirmed radiographically for all 43 patients. Demographics and basic clinical data are displayed in Table 2. The vast majority of patients in either group were in the 19–30 age range. The ITA population demonstrated a greater mean age, with an average mean of 32.3 years in comparison to 29.2 years for PTA patients ($p = 0.09$). There was a significantly greater proportion of patients in the 19–30 cohort for PTA patients ($p = 0.03$). There was no appreciable difference in gender breakdown between the two groups.

A significant proportion of patients in either group (49% for PTA, 40% for ITA) were treated prior to their evaluation for a PTA or ITA; previous treatment attempts were quantified as prior antibiotic administration, steroid administration, or prior drainage attempt at a separate facility. A greater number of PTA patients were seen for scheduled follow-up in Otolaryngology clinic (49% for PTA, 35% for ITA). Recurrence data was calculated based off any charted incidences of return to the emergency department for repeat drainage attempt

or quinsy tonsillectomy in a future encounter; 7% of ITA patients experienced documented recurrent abscess, in comparison to 15% of PTA patients.

Symptomatology data is displayed in Table 3. PTA patients experienced symptoms at a mean of 6.4 days in comparison to 7.5 days for ITA patients ($p = 0.16$). A significantly greater proportion of PTA patients (71%) experienced acute progression of symptoms resulting in hospital visitation than ITA patients (49%) ($p < 0.001$). Likewise, a significantly greater proportion of PTA patients experienced otalgia (61% vs 40%, $p = 0.007$), trismus (59% vs 21%, $p < 0.001$), and vocal changes (59% vs 28%, $p < 0.001$). The only symptom found to be significantly more prevalent in ITA patients was neck pain (35% vs 16%, $p = 0.002$).

Objective laboratory data obtained included white blood cell count, rapid strep testing, rapid EBV testing, and culture data when collected and tabulated in Table 4. PTA patients had significantly higher mean white blood cell count than ITA patients, 13.7 in comparison to 12.1 ($p = 0.03$). ITA patients were more likely to demonstrate normal WBC count (45% vs 25%) ($p = 0.008$). Rapid EBV testing was positive in 16% in both groups when performed, and rapid strep testing positivity was low in both groups as well (16% for PTA, 6% for ITA). Bedside aspiration was attempted in a far greater proportion of PTA patients (92%) than ITA patients (63%). When attempted, drainage was successful in a significantly greater proportion of PTA patients (69% vs 15%) than ITA patients ($p < 0.001$). Patient inclusions flowsheet and outcomes are outlined in Figure 1.

Multivariable analysis indicates that progression of symptoms, trismus, and voice changes are associated with a higher likelihood of PTA (Table 5). Older age, longer duration of symptoms, neck pain, and presence of lymphadenopathy were associated with a higher likelihood of ITA.

Discussion

In this case-control study of ITA, we found these patients were less likely to present with otalgia, trismus, and vocal changes; these symptoms can be predictive of the ITA disease process and harbor important connotations for appropriate management. The study further aimed to discern the true incidence of ITAs within the PTA population. From the 655 adult patients with diagnosed PTA from this retrospective case series, 43 (7%) had radiographically diagnosed ITA. An example of a patient with radiographically diagnosed ITA is presented in Figure 2. This is an important contribution to the literature, as current studies describing ITAs are largely case report or series driven. Due to a multitude of factors – lack of established distinguishing characteristics, low clinical suspicion in managing physicians, lack of imaging on all potential patients - the true incidence of the ITA has been thus far difficult to ascertain. In a retrospective study of 52 patients who underwent tonsillectomy for PTA, the authors identified evidence of areas of neutrophils or necrotic debris in 7 patients, lending evidence toward the presence of an ITA¹⁰. Even in this large retrospective review, our incidence of 7% likely represents the minimum value. Given that our diagnostic criteria were based off radiographic evidence, that only 32% of patients received CT imaging means that some portion of ITAs went undiagnosed.

The intersection between tonsillitis, ITA, PTAs and combined abscesses can be discussed in relation to the symptomatology of these infections. While not compared to a baseline PTA population, previous case series have demonstrated that ITA patients presented with lower-than-expected rates of muffled voice and trismus, in addition to high rates of sore throat, fever, and odynophagia^{6,11,12}. These findings were confirmed in our study as ITA patients had significantly lower rates of trismus, otalgia, and vocal changes (Table 3). A distinct finding in this study was that fewer ITA patients experienced progression of symptoms, defined in this study as acute worsening of symptomatology following initial onset of sore throat. Assuming the infection is isolated within the parenchyma of the tonsil, it stands to reason that it would not involve the masseteric space and result in trismus or involve the glossopharyngeal nerve and invoke otalgia. The ITA cases where patients did have trismus (21%) or otalgia (40%), could potentially be part of the continuum of PTA and ITA, where neutrophilic or necrotic debris penetrated the capsule and began involving the peritonsillar space proper. A distinguishing symptom for ITA appeared to be increased patient awareness and reporting of neck pain, which was distinguished from throat pain (35% versus 16% for PTA). This may be related to patient identification of this symptom in the absence of other symptoms to focus on, such as vocal changes, otalgia, or trismus. Other distinguishing characteristics for the ITA, developed through multivariable analyses, included older patient age and lymphadenopathy. The greater prevalence of lymphadenopathy may be related to the finding of neck pain, as patients are aware of the presence of tender cervical lymph nodes. It stands to reason that the development of lymphadenopathy, and potentially associated neck pain, could be secondary to longer duration of symptoms prior to eventual presentation in ITA patients (7.5 days versus 6.4 days).

The management of ITAs remains a subject of controversy and debate. Some studies advocate for simple needle aspiration without formal incision of the tonsillar parenchyma^{11,12}. A larger case series of 11 pediatric patients with ITA advocated for IV antibiotic therapy for those with isolated ITA, and procedural or surgical intervention for those with combination ITA and PTA infections^{6,13}. Determining appropriate management of these patients is challenging for numerous reasons. Given signs and symptoms concerning for an abscess, the majority of ITA patients (63%) did receive needle aspiration, although a small proportion of the attempts were successful in evacuating purulence (15%). It is difficult to determine if the act of dissection of the peritonsillar space had any therapeutic effect, either for potentially allowing for a drainage pathway for the coalesced intratonsillar bacteria or for possibly preventing peritonsillar spread of infection. Furthermore, follow-up information is not reliable; recurrence data was calculated based off any charted incidences of either return to the emergency department or telephone calls denoting persistent symptoms. With this information in mind, only 7% of ITA patients experienced documented recurrent abscess, in comparison to 15% of PTA patients. This may speak to the disease process responding well to medical therapy in the absence of evacuation of pus, although it is difficult to determine a conclusion with retrospective information. Only 35% of ITA patients had scheduled follow-up to ensure resolution of infectious symptoms.

The limitations of this study are related to its retrospective nature. The diagnosis of ITA was based off radiographic documentation of coalesced abscess or debris within the tonsillar parenchyma. The diagnosis of PTA was based of radiographic confirmation or direct

evacuation of purulence from the peritonsillar space; the remaining patients who had negative aspiration attempts and no imaging (n = 196) were classified as PTA based off clinic report and documentation. It is possible that a subset of these patients – had they received imaging- would have been determined to have an ITA. Despite this potential underreporting of ITA prevalence, the difference in symptomatology between the compared cohorts is large enough to demonstrate statistical significance.

Conclusion

Unlike the peritonsillar abscess, the symptomatology, examination findings, and treatment strategies for intratonsillar abscess are not well elucidated. This unique process that sits at the crossroads between tonsillitis and PTA typically presents later than PTAs. It is identifiable via an overall clinical picture concerning for an abscessed infection, however with lack of the traditional otalgia, vocal changes, progressive symptoms and trismus that affect patients with PTA as determined by multivariable analysis. Upon recognition of the intratonsillar abscess, the diagnosing physician should consider medical management as attempted needle aspiration and/or incision drainage does not typically result in evacuation of purulence. Future prospective studies could further characterize optimal management in a randomized fashion.

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Abbreviations

ITA	Intratonsillar abscess
PTA	Peritonsillar abscess

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Figure 1.

Exclusions flowsheet and outcomes with aspiration and drainage. ITA = intratonsillar abscess; PTA = peritonsillar abscess; I&D = Incision and drainage.

Figure 2.
Computed tomography scan of the neck with contrast demonstrating presence of Hypodensity within the inferior pole of the left tonsil with surrounding rim enhancement (arrow).

Table 1.

Diagnostic criteria for peritonsillar abscess and intratonsillar abscess.

Diagnostic Criteria for PTA	Diagnostic Criteria for ITA
Evacuation of purulence from peritonsillar space via bedside procedure; OR	Radiologist confirmation of debris or abscess material within tonsillar parenchyma or body; OR
Evacuation of purulence from peritonsillar space as noted in operative note for quinsy tonsillectomy; OR	Evacuation of purulence from intratonsillar parenchyma via bedside procedure; OR
Radiologist confirmation of debris or abscess material in the peritonsillar space; OR	Evacuation of purulence from intratonsillar parenchyma as noted in operative note for quinsy tonsillectomy
Clinical diagnosis of early peritonsillar abscess after failed evacuation attempt	

- PTA (peritonsillar abscess), ITA (intratonsillar abscess)

Table 2.

Demographics and clinical data.

CHARACTERISTIC	OVERALL N (%) = 655 (100)	PTA N (%) = 612 (93)	ITA N (%) = 43 (6.6)	P- VALUE
AGE IN YEARS, MEAN (SD)	29.4, 25 (12.1)	29.2, 25 (11.9)	32.3, 27 (13.9)	0.09
AGE GROUP 19–30, N(%)	432 (66)	406 (66)	26 (60)	0.03
AGE GROUP 31–50, N(%)	171 (26)	162 (26)	9 (21)	
AGE GROUP 51+, N(%)	52 (8)	44 (7)	8 (19)	
MALE, N(%)	344 (53)	324 (53)	20 (47)	0.41
DURATION SX (MEAN, MEDIAN, RANGE)	6.4, 5, 1–38	6.4, 5, 1–38	7.5, 5, 1–28	0.16
PREVIOUS TREATMENT, N(%)	316 (48)	299 (49)	17 (40)	0.24
FOLLOW-UP, N(%)	321 (49)	306 (50)	15 (35)	0.06
RECURRENCE, N(%)	92 (14)	89 (15)	3 (7)	0.17

PTA (peritonsillar abscess), ITA (intratonsillar abscess)

Table 3.

Symptomatology of intratonsillar abscess versus peritonsillar abscess

CHARACTERISTIC		OVERALL N (%) = 655 (100)	PTA N (%) = 612 (93)	ITA N (%) = 43 (6.6)	P-VALUE
DURATION OF SX, N(%)	3 days	197 (30)	185 (30)	12 (28)	0.17
	4–7 days	318 (49)	301 (49)	17 (40)	
	>7 days	140 (21)	126 (21)	14 (33)	
FEVER, N(%)		251 (38)	234 (38)	17 (40)	0.87
SORE THROAT, N(%)		655 (100)	612 (100)	43 (100)	
WORSENING OF SYMPTOMS, N(%)		468 (71)	447 (73)	21 (49)	0.0007
OTALGIA, N(%)		388 (59)	371 (61)	17 (40)	0.007
TRISMUS, N(%)		371 (57)	362 (59)	9 (21)	<0.0001
COUGH, N(%)		31 (5)	28 (5)	3 (7)	0.47
VOICE CHANGE, N(%)		375 (57)	363 (59)	12 (28)	<0.0001
DYSPHAGIA, N(%)		427 (65)	402 (66)	25 (58)	0.32
DYSPNEA, N(%)		31 (5)	30 (5)	1 (2)	0.44
ANOREXIA, N(%)		287 (44)	267 (44)	20 (47)	0.71
NECK PAIN, N(%)		115 (18)	100 (16)	15 (35)	0.002
LYMPHADENOPATHY, N(%)		369 (56)	340 (56)	29 (67)	0.13

- PTA (peritonsillar abscess), ITA (intratonsillar abscess), Sx (symptoms)

Table 4.

Lab and treatment data.

CHARACTERISTIC		OVERALL N (%) = 655 (100)	PTA N (%) = 612 (93)	ITA N (%) = 43 (6.6)	P-VALUE
WBC (MEAN, MEDIAN), N=497		13.7, 13.2	13.8, 13.2	12.1, 12.0	0.03
WBC, N=497, N(%)	Normal (<11.0)	132 (27)	115 (25)	17 (45)	0.008
	Elevated (11.0+)	365 (73)	344 (75)	21 (55)	
MONO, N=282, N(%)	Positive	46 (16)	43 (16)	3 (16)	0.95
STREP, N=451, N(%)	Positive	74 (16)	72 (17)	2 (6)	0.11
ATTEMPTED DRAINAGE , N(%)		593 (91)	566 (92)	27 (63)	<0.0001
SUCCESSFUL DRAINAGE, N=593, N(%)		397 (67)	393 (69)	4 (15)	<0.0001

PTA (peritonsillar abscess), ITA (intratonsillar abscess)

Table 5.

Multivariable model of probability for ITA vs PTA.

Effect	Point Estimate	95% Wald Confidence Limits
19–30 years vs 31–50 years	0.9	0.4 – 2.1
19–30 years vs 51+ years	3.51	1.2 – 104
3 days or less vs 4–7 days	1.3	0.6 – 3.1
3 days or less vs >7 days	3.4	1.3 – 8.6
Progression of symptoms	0.4	0.18 – 0.83
Trismus	0.2	0.09 – 0.45
Voice change	0.4	0.17 – 0.75
Neck pain	4.0	1.8 – 8.8
Lymphadenopathy	2.2	1.0 – 4.8

- PTA (peritonsillar abscess), ITA (intratonsillar abscess)