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Predictors of intratonsillar abscess versus peritonsillar abscess in the pediatric patient

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ABSTRACT

Objective: To determine the incidence of intratonsillar abscess (ITA) patients within the population of patients diagnosed with peritonsillar abscess (PTA) and to further characterize the differences in symptomatology and successful treatment strategies between the two groups.

Methods: This study is a retrospective chart review of patients diagnosed with PTA or ITA at our institution from 2000 to 2017. Descriptive and inferential statistics are reported, including univariate and multivariate analyses.

Results: A total of 335 pediatric (< 18 years) patients presenting with a PTA or ITA were identified, 31 (9%) of whom were diagnosed with ITA. Patients with ITAs had significantly lower proportions of trismus, otalgia, and dysphagia and were less likely to experience acute progression from their initial symptoms. The ITA group had fewer attempted aspiration and drainage attempts, with those attempts significantly less successful than for the PTA group. Recurrence was uncommon in ITA patients in comparison to PTA patients.

Conclusions: Intratonsillar abscess should be considered in the differential diagnosis for patients presenting with sore throat and concern for a pharyngeal infection or abscess. These patients have a significantly lower proportion of otalgia, trismus, vocal changes, and dysphagia. Given the low success rate of drainage attempts and lower recurrence rate, diagnosing physicians should consider medical management rather than procedural drainage in this patient population.

1. Introduction

Peritonsillar abscess (PTA) is the most commonly occurring abscess in the head and neck region. The incidence in children is approximately 14–30 cases per 100,000 children per year, which mirrors the rates of the overall population [1]. 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 can differ between adult patients and pediatric patients. For adult patients, management typically involves antibiotics and bedside expression of purulent fluid with needle aspiration and/or formal incision and drainage [2]. In the pediatric population, bedside drainage can be more difficult due to higher variability in patient cooperation and is often not possible. Acute surgical drainage (i.e Quinsy tonsillectomy) carries additional risks of bleeding and anesthesia, and rates of this procedure are higher in the pediatric population, reported in the range from 10% to 68% [3,4,5].

The delineation between deep neck space cellulitis and frank abscess is more difficult to characterize in the pediatric population secondary to patient tolerance of thorough bedside examination, challenges in performing bedside procedures, and limited tendency to utilize contrast-based imaging. Furthermore, with younger children, it can be difficult to ascertain their true constellation of symptoms. These factors, coupled with inadequate true characterization, results in an unknown incidence of the phenomenon of ITA. The ITA is a coalescence of necrotic debris within the parenchyma of the palatine tonsil. The pathogenesis of the ITA has also yet to be fully elucidated. One proposed mechanism involves direct extension of obstruction of tonsillar crypts with subsequent enlargement and containment of the ITA. Other theories hypothesize that ITA arises from bacterial seeding via either the bloodstream or the lymphatic system [6].

PTA and ITA are similar entities, though with distinct clinical features. The differential incidence, presenting symptoms, risk factors, natural history, treatment and outcomes for PTA and ITA are

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incompletely characterized. The aim of this study was to establish these measures for ITA relative to the population of pediatric patients presenting for PTA.

2. Methods and material

We performed an IRB-approved single-institution retrospective case series of pediatric patients who presented to our emergency department or clinic with suspicion for a deep neck space infection. Patients who were diagnosed with a peritonsillar or intratonsillar infection from 2000 to 2017 were included. Patients who did not have a diagnosis of peritonsillar infection or intratonsillar abscess were excluded from the study, as were patients who had infections present within additional spaces of the neck (such as concomitant parapharyngeal or retropharyngeal abscesses). We excluded patients with diagnoses of viral pharyngitis or tonsillitis based on clinical reports. Pediatric patients were classified as patients < 19 years of age. Demographics, clinical symptomatology, primary treatment modality, imaging characteristics, and follow-up data were tabulated. Data were collected using clinical notes and imaging available in our electronic medical records system.

2.1. 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. First, all demographic, basic clinical factors and symptomology (listed in Tables 1 and 2) were considered as potential predictors of ITA vs PTA in multivariable logistic regression models. Backward selection, with alpha criteria of 0.10, was performed. Second, additional factors for which we had subsets of patient information such as WBC count, rapid mononucleosis and strep tests were tested for significance individually in addition to the parsimonious clinical model. Alpha of 0.05 was considered significant and all analyses were performed in SAS v9.4.

3. Results

Our study initially identified 1335 patients with a diagnosis of PTA or ITA. Patients with diagnoses of viral pharyngitis or tonsillitis, or other concomitant deep neck space infections, were excluded. Among the 997 patients remaining, 335 patients were identified as pediatric (age < 19). Out of this group of 335 patients, 304 (91%) were diagnosed with PTA and 31 (9%) with ITA. Diagnostic criteria for ITA and PTA are outlined in Table 1. ITA diagnosis was confirmed radiographically for 20 patients and procedurally for 11 patients. A total of 107 patients (32%) underwent CT imaging as part of their work-up. Demographics and clinical data are displayed in Table 2. The majority of patients were in the adolescent age range (76%). Only one patient in our cohort was less than 2 years of age. The mean age of PTA patients was 14.6 years in comparison to 11.9 years for ITA patients (p = 0.01). Following treatment, a greater proportion of PTA patients had scheduled follow-up than ITA patients (55% vs 29%).

Symptomatology data is available **in** Table 3. The PTA and ITA groups had similar durations of symptoms, with the majority of patients in both groups experiencing symptoms for 4–7 days (mean 6.9 days, PTA; 6.6 days, ITA). The presence of fever was not significantly different between the two groups. On univariate analysis, a significantly greater proportion of PTA patients (76%) experienced acute progression of symptoms resulting in hospital visitation than ITA patients (58%) (p = 0.03). Likewise, a significantly greater proportion of PTA patients experienced otalgia (60% vs 26%, p = 0.0003), trismus (61% vs 16%, p < 0.0001), and vocal changes (61% vs 42%, p = 0.04). Presence of dysphagia was not statistically significant on univariate analysis (60% vs 45%, p = 0.11). The only symptom found to be significantly more prevalent in ITA patients was neck pain (61% vs 42%, p = 0.04). The proportion of patients presenting with cough, dyspnea, anorexia or lymphadenopathy was not significantly different between the cohorts.

Objective laboratory data obtained included white blood cell count, rapid strep testing and rapid EBV testing as noted in Table 4. ITA and PTA patients had similar rates of elevated WBC count (82% vs 78%) (p = 0.58). Positive rapid EBV testing (22% for PTA, 24% for ITA) and positive rapid strep testing (19% for PTA and 33% for ITA) were similar for both groups as well. Bedside aspiration was attempted in a far greater proportion of PTA patients (80%) than ITA patients (48%). When attempted, drainage was successful in a significantly greater proportion of PTA patients (68% vs 20%) than ITA patients (p = 0.0001). Patient inclusions flowsheet and outcomes are outlined in Fig. 1.

As seen in Table 5, multivariable results indicate that presence of otalgia (odds radio 0.29), trismus (OR 0.14), and dysphagia (OR 0.50) favored higher likelihood of PTA over ITA. Neck pain was associated with a higher likelihood of ITA (OR 3.37).

4. Discussion

The pathophysiologic mechanism of propagation of the ITA has been previously theorized. Prevailing theories discuss ITA formation in the context of acute follicular tonsillitis and extension of infection from within tonsillar crypts; alternatively, parenchymal infection could occur in the setting of seeding of bacteria throughout the tonsil via the bloodstream or lymphatics [7]. One of the first studies to reference the intratonsillar abscess was published in 1991 by Childs et al.; it discussed diagnosis of ITA following quinsy tonsillectomy via post-surgical analysis [7]. The authors noted that 7 (16%) of 43 patients who had underwent tonsillectomy had evidence of tonsillar abscess formation, characterized by presence of crypt abscesses. This is the first study to our knowledge to attempt to quantify the incidence of ITA within the PTA population, although they are limited by number of patients and method of diagnosis. Their incidence of 16% is slightly higher than our incidence of 9% from a population of 335 pediatric patients. Our incidence likely represents the minimal value within the PTA population, given that our diagnostic criteria were based off radiographic evidence or, rarely, clinical or procedural acumen. That only 107 patients (32%) received CT imaging means that some portion of ITAs went undiagnosed or unrecognized. From these 107 patients, radiologist interpretation yielded diagnosis of 20 ITAs (19%). Procedural or clinical results determined presence of ITA in 11 patients from the remaining

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	