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Comparison of Medical Versus Surgical Management of Peritonsillar Abscess: A Retrospective Observational Study

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Objectives/Hypothesis: To compare clinical characteristics and outcomes in patients presenting with peritonsillar abscess (PTA) treated with either initial medical or surgical management.

Study Design: Retrospective observational cohort.

Methods: A consecutive cohort of patients presenting between 2010 and 2014 with the final diagnosis of PTA (*International Classification of Diseases, Ninth Revision* code 475) were included. Comparisons between groups were evaluated using two-sample t, Wilcoxon rank sum, χ^2, and Fisher exact tests.

Results: Among 297 patients who presented with PTA during the 5-year period, 97 (33%) underwent primary medical management, and 200 (67%) received surgical treatment. Patients who received initial surgical management had larger abscess size (2.6 vs. 1.3 cm, $P < .001$) and were and more likely to have muffled voice (79% vs. 47%, $P < .001$), drooling (29% vs. 17%, $P = .03$), peritonsillar bulge (91% vs. 66%, $P < .001$), trismus (65% vs. 22%, $P < .001$), and dysphagia (86% vs. 73%, $P = .008$). There was no difference in the rates of imaging (55% vs. 59%) or antibiotic administration (100% in both groups), length of hospital stay (median 2 vs. 1 day, $P = .27$) or complications (1% vs. 2%, $P = .6$). Patients treated medically were more likely to be admitted to the hospital (22% vs. 11%, $P = .014$) and less likely to receive steroids (78% vs. 95%, $P < .001$). There was no difference in return visits (20% medical vs. 14% surgical, $P = .17$) or failure rates (5% medical vs. 3% surgical, $P = .30$).

Conclusions: Initial medical management can be considered in patients with less advanced symptoms or smaller abscess size without compromising outcome. Those with more advanced symptoms may benefit from surgical drainage.

Key Words: Peritonsillar abscess, neck space infection, pharyngitis, tonsillitis.

Level of Evidence: 4.

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INTRODUCTION

Peritonsillar abscess (PTA) is defined as a collection of purulent fluid between the capsule of the palatine tonsil and the pharyngeal muscles.[1,2] It is the most common deep neck space infection, both in children (49%)[3] and adults (30%),[4] and is the most frequent indication for nonelective otolaryngological hospital admissions.[5] According to the Agency of Healthcare Research and Quality, the estimated annual incidence in 2013 was 19.07 per 100,000, accounting for approximately 60,000 visits to the emergency department from which 22% were admitted to the hospital.[6] PTA is a potentially life-threatening condition when complicated by sepsis or airway compromise.[1,2]

Despite being relatively common and having the potential for severe morbidity and rare mortality, there is a wide practice variation among physicians and geographical locations.[6–9] For example, a national survey in the United Kingdom regarding PTA management found that 60% of providers preferred needle aspiration as first-line treatment, 25% incision and drainage, 1% quinsy tonsillectomy (i.e., tonsillectomy at time of PTA), and 5% intravenous antibiotic alone.[8]

The current literature commonly recommends surgical intervention, including aspiration or incision and drainage, for PTAs with success rates near 90%[10,11]; however, some small studies have demonstrated that medical treatment could offer similar success rates and may be an alternative to invasive management in patients with mild to moderate symptoms in limited-resource settings.[10,12] The aims of this study are to compare patient characteristics and outcomes of medical management versus surgical intervention for initial treatment of PTA.

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MATERIALS AND METHODS

Study Design and Population

Following institutional review board approval, medical records of a consecutive cohort of patients with PTA were reviewed. Patients were identified through *International Classification of Diseases, Ninth Revision* (ICD-9) code for PTA (ICD-9 475) at the Mayo Clinic, Rochester, MN, from January 2010 to December 2014. Patients included those evaluated in the emergency department (ED) as well as those in primary care clinics and referred to the Department of Otorhinolaryngology at our institution. Subjects who presented for follow-up of a previously diagnosed PTA elsewhere and those without PTA, such as those diagnosed with peritonsillar cellulitis, were excluded. There was no age restriction. The current study adheres to the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) guidelines for reporting observational studies.[13]

Data Collection, Measurements, and Outcomes

All cases classified as ICD-9 code 475 from electronic medical records and administrative databases within the institutional health records system for the specified time frame were identified, and data were abstracted. Records were independently reviewed by two previously trained investigators (D.L.S.S. and W.G.), and data were extracted in duplicate for a sample of the cohort to ensure quality and consistency and to reduce bias. A calibration of the abstractors was performed after the duplicate abstraction. Abstractors and principal investigator (PI) met frequently to review and discuss coding rules, and the abstraction process was monitored by the PI. The following data points were collected: demographic variables, clinical presentation, vital signs, presence of an immunocompromised state, previous episodes of PTA, imaging reports, laboratory findings, blood and throat culture results, management, and clinical outcomes. Immunocompromised status was defined based on clinical conditions such as acquired immunodeficiency syndrome, active cancer, metastasis, and chemotherapy or use of immunosuppressive drugs including chronic high-dose corticosteroids. Outcomes measurements included failure of initial treatment, hospital admission, hospital length of stay, number of hospital revisits, and mortality. Failure of initial treatment was defined as a suspected or confirmed PTA that required subsequent surgical treatment within 14 days of index diagnosis. Hospital revisit was defined as new self-referred medical evaluation concerning nonimproved or worsened symptoms.[14]

If the variable of interest was not mentioned in the records, including emergency physician, otolaryngology consult, or nursing note, it was left as missing value and the results were adjusted based on the number of observations in the denominator. Follow-up was determined through medical record review for up to 30 days after initial treatment. A total of 16 patients of the 297 included (5.4%) had less than 30 days follow-up, and there was no information regarding their status after the index visit. Study data were recorded and managed using REDCap (Research Electronic Data Capture) tools hosted at an institutional data server. REDCap is a secure web-based application designed to support data capture for research studies.[15]

Data Analysis

Continuous features were summarized with medians and interquartile ranges (IQRs), because most of the continuous features were not approximately normally distributed; categorical features were summarized with frequency counts and percentages. Comparisons between groups of interest were evaluated using two-sample t, Wilcoxon rank sum, χ^2, and Fisher exact tests depending on the type and distribution of the feature. All tests were two-sided, and P values $<.05$ were considered statistically significant. Statistical analyses were performed using version 9.3 of the SAS software package (SAS Institute, Cary, NC).

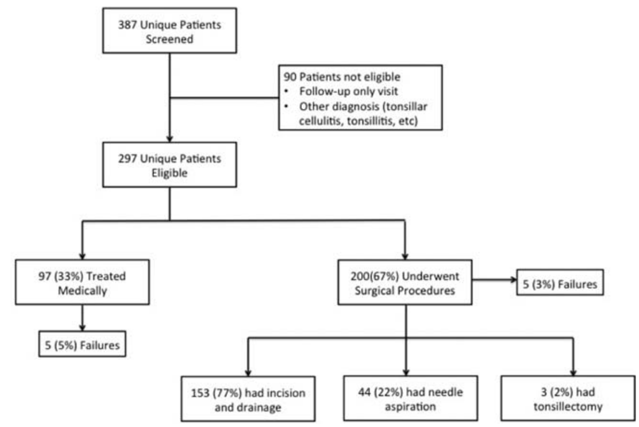

Fig. 1. Flow diagram of patient selection and management.

RESULTS

A total of 387 patients were screened, and 297 (77%) met study inclusion criteria. Regarding primary management, 97 (33%) underwent initial medical treatment, and 200 (67%) received surgical treatment. The decision to pursue laboratory testing and imaging was at the discretion of the presiding physician and was not different between medical and surgical groups. Similarly, initial treatment was based on physician clinical judgment after reviewing the clinical presentation, vital signs, physical examination, laboratory workup, and imaging results. All patients receiving surgical management also had medical treatment including antibiotics. Among those who underwent initial surgical treatment, 153 (77%) had incision and drainage, 44 (22%) had needle aspiration, and three (2%) had tonsillectomy (Fig. 1).

All patients received antibiotic therapy (100% in each group), and 266 patients (90%) received corticosteroids. In the authors' practice, the most common intravenous antibiotic used for PTA is ampicillin/sulbactam, and the most common oral antibiotic is amoxicillin/clavulanic acid. For those with penicillin allergy, clindamycin is the most frequent second-line agent. Patients in the surgical management group were more likely to receive steroids (95% vs. 78%, P < .001). Among those who underwent medical treatment, five (5%) failed and 92 (95%) were successful. In the surgical group, five (3%) patients failed surgical management and required a second surgical procedure, including three with initial incision and drainage and two with needle aspiration (Fig. 1). There was no significant difference in failure rates between patients with initial medical management versus initial surgical management (5% vs. 3%, P = .30).

Clinical characteristics of the two groups of patients are outlined in Table I. Patients in the surgical group

TABLE I.
Clinical Characteristics of the Study Subjects.

Feature	Medical, n = 97	Surgical, n = 200	*P* Value
Age, yr	22 (17–31)	23.5 (19–37)	.033
Sex			.42
Female	45 (46)	83 (42)	
Male	52 (54)	117 (58)	
Signs and symptoms			
Fever, n = 292	60 (63)	100 (51)	.046
Stridor, n = 294	0	0	NA
Sore throat, n = 297	97 (100)	198 (99)	1.0
Throat swelling, n = 297	92 (95)	191 (96)	.78
Muffled voice, n = 275	41 (47)	147 (79)	<.001
Drooling, n = 263	14 (17)	52 (29)	.031
Peritonsillar bulge, n = 282	61 (66)	173 (91)	<.001
Type of peritonsillar bulge, n = 234			.11
Unilateral	48 (79)	151 (87)	
Bilateral	13 (21)	22 (13)	
Trismus, n = 281	19 (22)	125 (65)	<.001
Uvular deviation, n = 279	25 (29)	134 (70)	<.001
Neck swelling, n = 278	23 (26)	61 (32)	.24
Neck pain, n = 280	42 (47)	96 (51)	.55
Dysphagia, n = 289	69 (73)	168 (86)	.008
Referred pain to ear, n = 252	35 (40)	81 (49)	.14
Vital signs			
Heart rate, n = 280	95.5 (84–107)	91 (79–104)	.18
Systolic blood pressure, n = 273	125 (112–138.5)	131 (118–143)	.005
Diastolic blood pressure, n = 273	72 (64–83.5)	77 (68–83)	.29
Respiratory rate, n = 265	16.5 (16–20)	16 (16–18)	.41
Oxygen saturation, n = 267	98 (97–99)	98 (97–99)	.21
History			
Previous episodes, n = 282	13 (14)	26 (14)	.84
No. of previous episodes, n = 38			1.0
1	11 (85)	22 (88)	
2	2 (15)	3 (12)	
Immunosuppression, n = 292	8 (8)	11 (6)	.36

NA = not applicable.

were slightly older (mean age 23.5 vs. 22 years, $P = .03$), and there was no difference by gender ($P = .42$). Regarding presenting symptoms, patients who received initial surgical therapy were more likely to have muffled voice (79% vs. 47%, $P < .001$), drooling (29% vs. 17%, $P = .03$), peritonsillar bulge (91% vs. 66%, $P < .001$), trismus (65% vs. 22%, $P < .001$), uvular deviation (70% vs. 29%, $P < .001$), and dysphagia (86% vs. 73%, $P = .008$), and less likely to have fever (51% vs. 63%, $O = .046$). There was no significant difference in sore throat ($P = 1.0$), throat swelling ($P = .78$), neck swelling ($P = .24$), neck pain ($P = .55$), referred otalgia ($P = .14$), PTA-related complications including one episode of airway obstruction in the surgical group with incision and drainage, and one case with internal jugular vein thrombosis in the medical group ($P = .60$), immunocompromised status ($P = .36$), or previous episodes ($P = .84$) between groups.

Healthcare utilization including laboratory tests, imaging, returned visits to the ED, and clinical outcomes are outlined in Table II. A total of 114 patients had a throat culture performed, and the culture returned positive in 45 patients (39.5%); 11 patients had blood cultures performed in the ED, and of these only one patient had a positive result (9.1%). A total of 43 patients had a mononucleosis test performed, and 14% of these tests were positive.

There was no difference in the rate of imaging between groups (59% medical vs. 55% surgical, $P = .49$). The most common type of imaging modality used was computed tomography of the neck with intravenous contrast. Among patients who underwent imaging, those with initial surgical management were more likely to have larger abscesses (2.6 cm [IQR 1.8–3.0] vs. 1.3 cm [IQR 1.0–2.0], $P < .001$). Of the 36 patients with location

TABLE II.
Medical Evaluation, Management, and Outcomes.

Feature	Medical, n = 97	Surgical, n = 200	*P* Value
Laboratories			
Red blood cell count, n = 158	4.6 (4.4–4.9)	4.8 (4.4–5.1)	.16
White blood cell count, n = 158	13.2 (9.9–15.2)	14.4 (11.9–16.7)	.085
Sodium, n = 138	137 (136–138.5)	137 (135–139)	.68
Potassium, n = 138	4.1 (3.8–4.5)	4.1 (3.8–4.4)	.80
Creatinine, n = 144	0.7 (0.6–0.9)	0.8 (0.7–1.0)	.24
Throat culture, n = 114	39 (40)	75 (38)	.65
Positive	11 (28)	34 (45)	.076
Negative	28 (72)	41 (55)	
Blood culture	5 (5)	6 (3)	.35
Result of blood culture, n = 11			
Positive	0	1 (17)	1.0
Negative	5 (100)	5 (83)	
Mononucleosis test	13 (13)	30 (15)	.71
Result of mononucleosis test, n = 43			
Positive	4 (31)	2 (7)	.058
Negative	9 (69)	28 (93)	
Imaging	57 (59)	109 (55)	.49
Type of imaging, n = 166			
CT with IV contrast	53 (93)	103 (95)	.87
Ultrasound	1 (2)	3 (3)	
MRI	1 (2)	1 (1)	
Other	2 (4)	2 (2)	
Maximum dimension, n = 113	1.3 (1.0–2.0)	2.6 (1.8–3.0)	<.001
Antibiotics	97 (100)	200 (100)	NA
Antibiotics orally in ED	6 (6)	5 (3)	.19
Antibiotics intravenous in ED	53 (55)	158 (79)	<.001
Antibiotics as outpatient	95 (98)	200 (100)	.11
Steroids	76 (78)	190 (95)	<.001
Steroids orally in ED, n = 266	14 (18)	13 (7)	.005
Steroids intravenous in ED, n = 266	50 (66)	159 (84)	.001
Steroids as outpatient, n = 266	48 (63)	127 (67)	.57
Outcome			
Admitted to hospital	21 (22)	22 (11)	.014
Length of hospital stay, d	2 (1–2)	1 (1–2)	.27
Returned to hospital	19 (20)	27 (14)	.17
No. of return visits, n = 46			
1	18 (95)	23 (85)	.31
2	1 (5)	3 (11)	
4	0	1 (4)	
Any complications, n = 295	2 (2)	2 (1)	.60
Failure of initial management	5(5)	5 (3)	.30

CT = computed tomography; ED = emergency department; IV = intravenous; MRI = magnetic resonance imaging; NA = not applicable.

of abscess specified, there were 22 with abscesses in multiple locations, seven in the midpoint of the tonsillar bed, six in the inferior pole, and one in the superior pole.

Overall, the rate of failures of initial treatment and complications were low. Complications were 1% in surgical group versus 2% in medical group ($P = .6$), and failure rates were 5% in the medical group versus 3% in the surgical group ($P = .30$).

In total, there were 43 (14.5%) patients admitted to the hospital. Patients in the medical management group were more likely to be admitted (22% vs. 11%, $P = .014$), although there was no difference in length of hospital stay (median 2 vs. 1 day, $P = .27$) or number of return visits (20% medical vs. 14% surgical, $P = .17$). There were no deaths attributable to PTA or its complications.

DISCUSSION

In this observational study of a consecutive cohort of patients with PTA, we found that one-third were treated medically, with success rates similar to patients treated with initial surgical management, either aspiration or incision and drainage. The modality of management was based on physician discretion, and the overall failure rate was $\leq$5% in each group. Patients in the surgical group had more severe symptoms (trismus, uvula deviation, or muffled voice) and larger abscess sizes. There were no differences in vital signs, laboratory testing, or rate of imaging.

Medical interventions were provided for both groups, including antibiotics and corticosteroids. All patients received antibiotics, and those in the surgical group were more likely to receive intravenous antibiotics in the ED. The medical group received intravenous corticosteroids and antibiotics less frequently than the surgical cohort. Although this did not translate into different failure rates, is important to consider that the previous reported experience with medical management included strict intravenous steroids[12] and antibiotics,[14] and this is an area to consider when adopting a medical approach. In our cohort, there were more hospital admissions in the medical group.

Currently, the first-line treatment for PTA involves largely needle aspiration or incision and drainage, whereas data regarding the efficacy of initial noninvasive medical therapy are limited.[1,2,7] There is novel evidence that antibiotic administration associated with steroids, pain control, and hydration can be as effective as surgical management as first-line treatment in selected cases.[1,10,12] Recent literature suggests a high success rate for the noninvasive management of immunocompetent patients with PTA.[16,17] The efficacy of medical treatment alone in our study was consistent with a study by Lamkin and Portt,[12] who reported a 4.1% failure rate in 98 Native American patients initially treated with antibiotics and high-dose steroids, and Wang et al.[14] who analyzed a national dataset from Taiwan and reported a 4.5% failure rate within 30 days among more than 11,000 PTA patients with initial medical management. Previous studies have not directly compared side-to-side clinical presentation and outcomes of patients managed medical versus surgically; our study adds this comparison and is able to describe a cohort of patients who are likely to respond well to medical management.

The present study is consistent with Lamkin and Portt[12] and Wang et al.,[14] and suggests that is reasonable to consider initial medical management on patients presenting with mild to moderate symptoms and whose airway appears not to be threatened. Reserving surgical management as second-line treatment may reduce operative resources utilization and possibly decrease the risk of iatrogenic complications. The use of medical treatment as a first-line treatment in resource-limited or austere environments could serve as definitive treatment or as a temporizing measure, or as a final therapy in populations where surgical approach can be challenging or unfeasible, such as small children or when it is the patient's preference.

In closing, there are several limitations of study that deserve review. First, given the retrospective nature, the authors were reliant on the accuracy and availability of data in the medical record. Second, outcome measures and length of follow-up were variable. Third, the decision-making regarding diagnosis and management was left to the clinical team caring for the patients, with the intrinsic practice variation that this implies and the difficulty of capturing all the elements playing a role in decision making. The data suggest that there was a decision bias toward patients with less-severe infection to receive medical therapy. Fourth, we did not evaluate the cost of the interventions or ED length of stay in hours, however we were able to estimate return visits to the ED and hospitalizations as markers of healthcare utilization and indirectly of healthcare cost. Finally, the low rates of failure of initial treatment and complications limited the statistical power to detect associations with these outcomes. Our findings are the result of an observational study of patients presenting to an academic emergency department, and these findings may not be generalizable to other clinical settings. Future study is needed to validate these conclusions. Given the low failure rate between both treatment arms, ultimately, a large prospective study may be required.

CONCLUSION

One-third of the patients presenting with PTA were treated medically with success rates similar to patients managed with initial surgical intervention (95% vs. 97% success rate). Patients treated medically had less-severe symptoms and smaller abscesses. These findings suggest that initial medical management can be considered in patients with less-advanced symptoms or smaller abscesses without compromising outcome. Those with drooling, trismus, muffled voice, and uvular deviation or large abscess size may benefit from surgical drainage. These findings support the need for further research to compare medical versus surgical management and to identify which populations will benefit the most with either approach.

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