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HEAD AND NECK

Comparison of needle aspiration versus incision and drainage under local anaesthesia for the initial treatment of peritonsillar abscess

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Abstract

Purpose The treatment of peritonsillar abscess (PTA) is still controversial regarding the best method of drainage to perform. This study aims to compare effectiveness and safety of needle aspiration versus incision and drainage under local anaesthesia for the initial treatment of PTA.

Methods A retrospective review of patients (age > 15 years) admitted in two tertiary medical centres for a PTA between November 2010 and October 2016 was performed. Patients were divided into two groups according to the type of drainage: needle aspiration or incision and drainage, under local anaesthesia. The primary outcome was the length of hospital stay; the need to repeat the procedure or to go to the operating room was also assessed. Complications or adverse events were listed in each group to assess safety.

Results Over a 6-year period, 182 patients were admitted for a PTA and included in the analysis, with 82 patients in the aspiration group and 100 patients in the incision group. Mean age was 36.3 years, with a sex ratio of 1.33. The length of hospital stay ranged from 1 to 7 days (mean 2.7 days, median 2 days) with a median length of stay of 3.0 days (interquartile range 2–4) in the aspiration group versus 2.0 days (IQR 2–3) in patients who underwent incision and drainage ($p = 0.009$). A repetition of the needle aspiration was made for 46.3% of patients versus 10% of repetition of the procedure in the incision group ($p = 0.0001$). 12 patients (14%) of the aspiration group and 4 patients (4%) of the incision group required an additional drainage under general anaesthesia ($p < 0.001$). We found no differences regarding safety in both groups.

Conclusion Our study showed a significant decrease in the length of hospital stay in patients admitted for a PTA who underwent an initial incision and drainage under local anaesthesia, compared to needle aspiration, as well as a lower risk of repeating the procedure. A well-designed prospective and randomized study on a larger sample of patients is required to support these findings.

Keywords Peritonsillar abscess · Quinsy · Needle aspiration · Incision and drainage · Local anaesthesia

Introduction

Peritonsillar abscess (PTA) or quinsy is one of the most common deep head and neck infections, representing 30% of soft tissue head and neck abscesses in adults [1, 2]. It is defined as a collection of pus between the capsule of the palatine tonsil and the superior pharyngeal constrictor muscle. It is generally considered to be the main complication of acute tonsillitis, but other mechanisms have been suggested such as an obstruction of accessory salivary Weber's glands [2]. Being a very common purpose of consultation in day-to-day practice of otolaryngologists, it is also a frequent reason for hospital admissions. Without an effective treatment, severe and life-threatening complications may

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occur including extension of the abscess to deeper neck spaces, cervico-mediastinitis, airway obstruction, vascular complications.

Despite numerous publications on the subject, some aspects of the clinical management of peritonsillar abscess remain controversial. The treatment classically includes antibiotics and a drainage of the collection [3], but significant debates exist among specialists with respect to the best method of drainage and, at this time, no superiority of one technique over another has been established [3-7]: needle aspiration, incision and drainage (realized under local or general anaesthesia), or in some cases immediate tonsillectomy (quinsy tonsillectomy). In France, needle aspiration and incision and drainage under general anaesthesia are the most common techniques, though it is important to keep in mind the potential risks of general anaesthesia and difficulties of intubation in those patients. Incision and drainage under local anaesthesia is believed to be more painful and technical than needle aspiration, and may be reserved to the failure of needle aspiration for some authors.

The objective of our study was to compare effectiveness and safety of needle aspiration versus incision and drainage under local anaesthesia for the initial treatment of peritonsillar abscess in adults.

Material and methods

An observational retrospective review was performed on every patient hospitalized for a peritonsillar abscess in two tertiary medical care centres between November 2010 and October 2016. Cases were extracted from the French hospital discharge database (PMSI).

Patients were aged 15 or more at the time of inclusion, presenting a peritonsillar abscess with a need for hospital admission, most of the time because an oral treatment was not possible. The evolution time of symptoms was not considered. Some patients had already been given antibiotics prior to their admission in hospital. We also listed prior treatment with non-steroid anti-inflammatory drugs (NSAID) or corticosteroids (CS), as many authors and recent publications [8-10] have suggested their role in the development of tonsillitis complications. Trismus at the entrance, and biological markers of inflammation such as leukocytes count (G/L) and CRP (mg/L) were also listed, as well as the main epidemiological data (gender, age, date of entrance and discharge), past medical history of peritonsillar abscess or immunosuppression conditions such as diabetes mellitus.

For each case of peritonsillar abscess, a needle aspiration was conducted initially according to French guidelines [3], to confirm the diagnosis if purulent secretions were found, and to locate the abscess cavity.

A medical treatment was introduced directly after admission, including pain killers and intravenous antibiotic, which was in first line a broad-spectrum penicillin (amoxicillin–clavulanate 1 g × 3/24 h) except in case of allergy.

If the needle aspiration remained negative after one or two repetitions, the diagnosis of peritonsillar abscess was not confirmed and patients were not included in the study.

Patients who had been treated with exclusive medical treatment were excluded, as well as those who initially needed drainage of the abscess under general anaesthesia (in case of deep localization of the abscess, excessive trismus or if the patient did not agree with a procedure under local anaesthesia).

The drainage of the abscess was made in the first hours of the management, under local anaesthesia made with a 10% lidocaine spray and patients were divided into two groups according to the type of procedure: needle aspiration (aspiration group) or incision and drainage (incision group).

Needle aspiration was defined by the insertion of a large bone needle connected to a 10 or 20 cc syringe through the palatoglossus muscle, lateral to the superior tonsillar pole, directly in the suspected collection. Several insertions of the needle in different locations may be performed in a single treatment procedure.

Incision and drainage were only conducted if the "confirmation" needle aspiration was positive. A curvilinear scalpel incision was made lateral to the superior tonsillar pole to enter directly the abscess cavity. Then, a dissection movement was made with a haemostat to create a wide open pathway to the oral cavity and help clearing pus from the entire abscess.

Patients were discharged by their referent physician after sufficient clinical improvement, including: lack of fever, resumption to a semisolid diet and capability of taking the treatment orally, significant pain improvement and decrease of local swelling. Outpatients' clinical follow-up consisted of a medical visit within 7 days after discharge.

We chose the length of hospital stay as a primary outcome, because it was one of the best global indicators of clinical recovery and success of the treatment.

Secondary outcomes included the need to repeat the procedure (re-aspiration or incision and drainage) during the stay, which was decided in case of evident recollection or lack of clinical improvement, and the need to go to the operating room and proceed to drainage under general anaesthesia.

To compare the safety of both procedures, we listed complications or adverse effects of each intervention.

All the necessary data were collected retrospectively for the analysis from the numeric patients' files and hospital reports by a same observer.

For statistical analysis, patient data were described globally and in both groups using appropriate indicators:

frequency and percentage for categorical variables, means, standard deviations, median and interquartile ranges for continuous variables. Patient data was compared between the aspiration group and the incision group using Chi-square or Fisher's exact test (if expected numbers were lower than 5) for categorical variables and Mann–Whitney–Wilcoxon or Student's *t* tests (in case of normal distribution and homogeneity of variances) for continuous variables. All tests were two tailed, and the alpha risk was set at 5%.

Results

A total of 215 patients were admitted in the hospital for a suspected peritonsillar abscess from November 2010 to October 2016. Among those patients, 33 were excluded, including 8 because the initial needle aspiration remained negative, 10 who had only been treated medically, 12 patients who initially required a drainage of the abscess under general anaesthesia and an additional 3 patients because the exact procedure of drainage was unknown. Overall, 182 patients were included in the analysis, with 82 patients in the aspiration group and 100 in the incision group (Flow chart—Fig. 1).

Patient age ranged from 15 to 81 years (mean 36.3) in the aspiration group and from 18 to 82 years (mean 35.2) in the incision group, and the global sex ratio was 1.33. Two patients had a past medical history of diabetes in each group and one patient from the aspiration group suffered from sickle cell disease, who was identified as an immunosuppression factor. The characteristics of patients in the two groups are listed in Table 1.

46 patients received NSAIDs, 15 received corticosteroids prior to hospital admission, and 56 were already treated with antibiotics on the day of admission, which was mostly amoxicillin. Distribution of those treatments and other patient characteristics were comparable between the two groups, except for C-reactive protein (CRP) value at hospital admission which was significantly higher in the aspiration group (mean 124.6 mg/L versus 102.2 mg/L; $p = 0.034$).

All patients received the intravenous antibiotic treatment during their hospital stay, mainly amoxicillin–clavulanate (91% in aspiration group, 88% in incision group).

The length of hospital stay ranged from 1 to 7 days (mean 2.7 days, median 2 days). Among the patients treated by needle aspiration, the median length of stay was 3.0 days (interquartile range—IQR 2–4), whereas it was 2.0 days (IQR 2–3) in patients who underwent incision and drainage ($p = 0.009$; Table 2). The distribution of the length of hospital stay in each group is presented in Fig. 2.

A re-aspiration of the collection was necessary during the stay for 22 patients (26.8%) of the aspiration group, and 16 patients (19.5%) had to undergo at least 3 repetitions of the aspiration.

In the incision group, a re-opening of the incision was necessary for 9 patients (9%), while 1 patient underwent

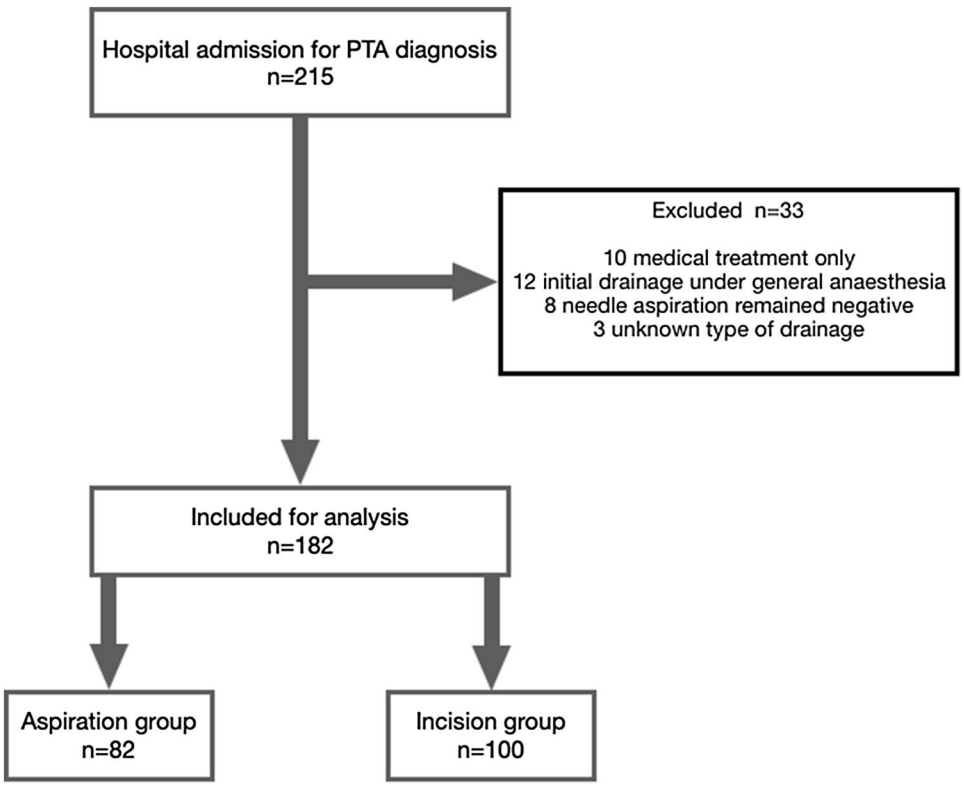

Fig. 1 Flow chart illustrating the selection of the population. PTA: peritonsillar abscess. Cf. attached file "Fig. 1"

Table 1 Clinical and biological characteristics of the population in both groups

	Aspiration group ($n=82$)	Incision group ($n=100$)	Total ($n=182$)	p
Men, $n=(\%)$	46 (56%)	58 (58%)	104 (57%)	0.796
Sex ratio	1.27	1.38	1.33	
Mean age (SD)	36.3 (15.0)	35.2 (12.0)	35.7 (13 .4)	0.950
Past medical history of peritonsillar abscess	10 (12%)	15 (15%)	25 (14%)	0.584
Past medical history of diabetes mellitus	2 (2.5%)	2 (2%)	4 (2.2%)	0.612
Other immunodepression risk factor	1 (1.2%)	0 (0%)	1 (0.5%)	
Pre-hospital NSAIDs (%)	18 (22%)	28 (28%)	46 (25%)	0.350
Pre-hospital corticosteroids (%)	5 (6%)	10 (10%)	15 (8%)	0.422
Pre-hospital ATB	29 (35%)	27 (27%)	56 (31%)	0.224
Penicillin allergy	4 (5%)	8 (8%)	12 (6.6%)	0.551
Trismus at the admission (missing data $n=17$)	50 (66%)	52 (59%)	102 (62%)	0.378
Mean CRP admission count (mg/L) (SD)	124.6 (79.8)	102.2 (75.92)	112.2 (78.3)	0.034
Leukocytes admission count (G/L) (SD)	14.3 (4.0)	14.3 (4.3)	14.3 (4.1)	0.857

SD standard deviation, *NSAIDs* non-steroidal anti-inflammatory drugs, *ATB* antibiotics

Table 2 Comparison of the length of hospital stay between the two groups

Length of hospital stay								
	$n=$	Mean	Standard deviation	Median p50	Min	Max	First quartile p25	Third quartile p75
Aspiration group	82	3	1.247219	**3**	1	7	2	4
Incision group	100	2.42	0.9865766	**2**	1	6	2	3
Total	182	2.681319	1.145533	**2**	1	7	2	3
p value				**0.0009**				

Significative results and p value for the primary outcome are presented in bold

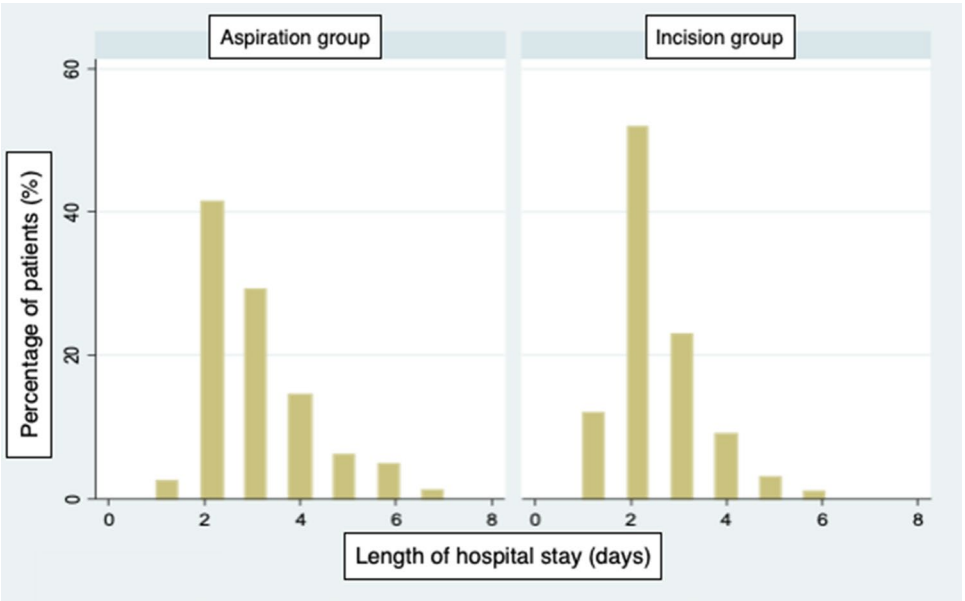

Fig. 2 Bar chart showing the distribution of the length of hospital stay in the two groups. Cf. attached file "Fig. 2"

more than two interventions under local anaesthesia (1%). The need to repeat the procedure of drainage was higher in the aspiration group ($p < 0.001$).

12 patients of the aspiration group (14%) finally required an additional drainage under general anaesthesia versus 4 patients (4%) in the incision group ($p < 0.001$).

Regarding adverse events, we found one patient in the aspiration group who presented a local hematoma after two needle aspirations repeated on subsequent days. It was a 33-year-old patient with no identified risk of bleeding. No other complication or adverse effect was found in both groups. The secondary outcomes are listed in Table 3.

Discussion

The mean length of hospital stay in our study was 2.7 days, which is similar to what is reported in the literature [11-13]. This study was about "simple" peritonsillar abscess, without any other complication on the day of admission. We found a significantly lower length of stay in the incision group compared to the aspiration group, suggesting that incision and drainage under local anaesthesia may be more effective than needle aspiration. According to the meta-analysis conducted by Johnson et al., incision and drainage are slightly more effective than needle aspiration with a success rate of 93.7% against 91.6%, meaning that 48 patients would need to undergo incision and drainage to save 1 patient an initial treatment failure using needle aspiration [1]. Comparative studies of Spires, Maharaj and Schechter et al. which are also referred to by Johnson's meta-analysis found no significant differences between aspiration and incision regarding different outcomes (resumption of normal diet, length of stay, recurrence rate, etc.), although in those studies groups of patients were relatively small (from 50 to 62 patients) suggesting a lack of statistical power [5, 6, 14]. Our study included 182 patients.

We chose the length of hospital stay as the primary outcome, because it represented a clinical and composite endpoint. Indeed, to get discharged, a significant clinical improvement including general (lack of fever), local (significant decrease of pharynx asymmetry and swelling), and functional (resumption of oral diet) aspects was necessary. However, the decision of discharge remained subjective, and in any medical care centre, it could have possibly been impacted by non-medical factors (availability of medical beds in the department for other patients and emergencies, transportation issues in case of discharge, etc.). The recurrence rate of the abscess has been used as a primary outcome in many studies, but the definition of the recurrence rate differs from one study to another. The meta-analysis of Chang et al. found ten articles reporting the recurrence rate as the primary endpoint to compare needle aspiration versus incision and drainage [15]. Only four of those ten studies provided a definition for "recurrence" which varied greatly from "persistent evidence of swelling" to "persistent pyrexia and trismus" or "reaccumulation of pus confirmed by aspiration", and the timing for assessment of the recurrence was not clearly stated. This lack of standardization makes the comparison of studies and findings difficult. However defined, the recurrence rate in those studies was lower after incision and drainage than needle aspiration.

The main limitation of this study is the decision to choose, for a particular patient, the type of drainage (needle aspiration or incision and drainage) to perform. Patients were not randomized to choose the type of treatment, which was decided by the specialist in charge of the admission of the patient, according to their own experience and habits, regardless of the severity and size of the abscess. As in many settings for tertiary care centres, quinsy patients, as other emergency patients admitted in departments of otorhinolaryngology are most of the time managed by junior doctors, especially residents. Regarding the duration of the study, there were many different operators, with different skills and experience, and this may have influenced the type and quality of the drainage. An American national survey published by Herzon revealed that there is a significant decrease in the use of needle aspiration to drain PTA associated with increasing years away from board certification ($p < 0.001$), in favour of incision and drainage [16].

A repetition of the needle aspiration was necessary in 46.3% of patients versus 10% of repetition of the

Table 3 Comparison of secondary outcomes between the two groups: number of aspirations/incisions, need for drainage under general anaesthesia and adverse effects

	Aspiration group	Incision group	*p* value
Number of aspirations/incisions			0.0001
1, *n* = (%)	44 (53.7%)	90 (90%)	
2, *n* = (%)	22 (26.8%)	9 (9%)	
3 or more, *n* = (%)	16 (19.5%)	1 (1%)	
Additional drainage under general anaesthesia			0.016
n = (%)	12 (14.6%)	4 (4%)	
Complications / adverse effects			
n = (%)	1 (1%)	0 (0%)	

procedure in patients who underwent an incision and drainage ($p=0.0001$). The need to perform several needle aspirations to get an effective drainage is common, suggesting that incision and drainage should be more effective.

Those results are supported by Wolf et al. [11], and more recently by the meta-analysis of Chang et al. who found a higher recurrence rate after needle aspiration (HR = 3.74; CI 95% 1.63–8.59) for a total of 612 patients [15].

In our study, the rate of patients requiring an additional drainage under general anaesthesia was also significantly higher in patients who were initially managed by needle aspiration (14% versus 4%; $p=0.016$).

Regarding the safety and adverse effects of each technique, we found no differences, as other reported studies in the literature [7, 12, 15].

Because of the limitation due to the retrospective design of the study, there are some missing data. We could not assess immediate postoperative pain in the two procedures, which would have been a good endpoint for safety assessment. Needle aspiration is considered to be the least painful procedure [3, 4, 15]. Many studies are supporting this evidence using subjective pain scores as in Chi or Khan et al.'s works, which found a significantly higher immediate post-operative pain in patients who underwent incision and drainage versus needle aspiration [17, 18].

However, Nwe et al. compared the short-term evolution of pain and trismus after needle aspiration or incision and drainage [19]. Results indicated a significant improvement in the distance between lower and upper incisor teeth 15 minutes after the drainage in 38% of patients who underwent needle aspiration versus 100% of patients after incision and drainage. Moreover, 2 hours after the drainage, 92% of patients in the incision group were able to swallow water without any discomfort. Such results must be managed carefully, as the data collected are very subjective, but seem to approve superiority of incision and drainage in terms of effectiveness and pain relief. The use of validated and objective pain intensity rating scales would be more appropriate.

Conclusion

Our study showed a significant decrease in the length of hospital stay in patients admitted for a peritonsillar abscess who underwent an initial incision and drainage under local anaesthesia, compared to needle aspiration. Our experience suggests that incision and drainage performed under local anaesthesia in adults may be more effective than needle aspiration, with no added risks or adverse effects. Moreover, in our study needle aspiration was associated with higher risks of repeating the procedure and of secondary interventions under general anaesthesia.

The achievement of a well-designed prospective and randomized study on a larger sample of patients is required to support these findings with a higher scientific level of evidence.

It is important to keep in mind that compliance and ability of patients to cooperate must be taken into account when choosing the surgical method, especially under local anaesthesia.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest and received no funding concerning this article.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent For this type of study with retrospective design, formal consent is not required.

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