

Management of breast abscesses by ultrasound-guided needle aspiration and continuation of breastfeeding: a pilot study.ⁱ

Management of breast abscesses by ultrasound-guided needle aspiration and breastfeeding

V Rigourd^{1,2}, L Benoit³, C Paugam², M Driessen³, C Charlier³, E Bille⁴, B Pommeret⁵, E Leroy⁶, MS Murmu¹, A Guyonnet¹, N Baumot², JY Seror⁷

1 - Regional lactarium, Necker – Hôpital Enfants malades, Paris, France.

2 - Réseau de Santé Périnatal Parisien, Paris, France

3 - Department of Obstetrics and Gynecology, Necker – Hôpital Enfants malades, Paris, France.

4 - Department of Microbiology, Necker – Hôpital Enfants malades, Paris, France.

5 - Department of Obstetrics and Gynecology, Lille, France.

6 - Department of Neonatology, Necker – Hôpital Enfants malades, Paris, France.

7 - Department of Radiology, Duroc Breast Imaging Department, Paris, France

Corresponding author

Virginie Rigourd, Lactarium Régional d'Ile-de-France

Hôpital Necker-Enfants malades, 149 rue de Sèvres, 75015 Paris, France

Tel : Mail: virginie.rigourd@nck.aphp.fr

ABSTRACT

Objective– We reviewed our experience of treatment of lactating breast abscesses by ultrasound-guided aspiration and suggest an algorithm of their management. We also analyzed the continuation of breastfeeding of these patients after advices from trained teams.

Design: Needle aspiration of breast abscesses during lactation are currently recommended as an alternative to surgery only for moderate forms. **Setting:** In case of breast abscess, many patients stop breastfeeding on the advice of a health professional.

Population and samples – We conducted a retrospective study from April 2016 to April 2017, including 34 patients referred for a breast abscess during lactation at the Duroc Breast Imaging Center. **Method:** We collected data about the breastfeeding between October 2018 and January 2019.

Results – A single aspiration was sufficient in 64.3% of cases. The delay between the occurrence of the abscess and the indication for drainage was significantly higher for patients who have needed finally surgical drainage ($p = 0,0031$). There were no difference of size of abscesses between patients receiving needle aspiration alone and those who have undergone

surgery ($p = 0,97$). All patients who had been managed by needle aspiration continued breastfeeding after the treatment and 40% of the patients were still breastfeeding at 6 months.

Conclusion - The management of lactating breast abscess by ultrasound-guided needle aspiration is an effective alternative to surgery. It appears to be effective regardless of the size of the abscess and is compatible with the continuation of breastfeeding. Our study has indeed shown that if they are well advised, the majority of patients continue breastfeeding so that it is essential that health professionals be better trained regarding the management of breastfeeding complications.

Keywords Breast abscess / ultrasound-guided needle aspiration / breastfeeding

INTRODUCTION

Breastfeeding is the reference for infant feeding during the first months of life, with its short and long-term benefits unquestionable in terms of health and the ecological and economic impact for the family and the planet. The World Health Organization recommends an exclusively breastfeeding for the first six months of life, and continued breastfeeding until the age of 2 years [1]. In France, the prevalence of maternal breastfeeding, already lower compared to its European neighbors [2], dropped further in 2016, from 62% to 50% [3]. The decline is even more spectacular in terms of its extension given that the median duration of breastfeeding is 7 weeks with only 19% of French children breastfed until 6 month, and if we consider exclusively breastfed infants then it concerns only 3% [4-5]. Perceived insufficiencies to milk (cited by 51.3% of women) is the predominant factor among the causes for early weaning before one month of infancy, followed by breast diseases (36.6%), and problems related to breastfeeding (34.2%) [6-7]. Several breast diseases can complicate breastfeeding: 4% of women develop mastitis and 1% develops an abscess [8-9]. National recommendations propose professionals to perform surgery (if necessary); however, surgery might complicate breastfeeding continuation, which might have already been contraindicated at the time of mastitis diagnosis. From 34 cases of breast abscess that were managed in a multidisciplinary manner by a team trained in breastfeeding and ultrasonographers who followed a definite protocol, we will first define risk factors for breast abscess occurrence, then evaluate indications and methods for abscess management by ultrasound-guided puncture, and at last provide arguments motivating continuation of breastfeeding.

MATERIALS AND METHODS

Study design and population

We conducted a descriptive monocentric retrospective study from April 2016 to April 2017. Patients' consent letters for care were obtained. A declaration was made at CNIL (Commission Nationale de l'Informatique et des Libertés) in order to collect participant data. We also obtained ethical committee (Comité de Protection des Personnes Necker Enfants

Malades) favorable opinion. The data were collected using a questionnaire sent by e-mail and reminders by e-mail between October 2018 and January 2019, then anonymized before statistical analysis. Patients were contacted again (at 3 months on average) to assess the impact of management on the continuation of breastfeeding in the medium term.

The patients included were all patients referred to the Duroc Breast Imaging Center for lactating breast abscess, with ultrasound confirmation of diagnosis. Three radiologists welcomed the patients within a short times. An examination of both breasts and axillary was systematically performed. The criteria for non-inclusion were refusal to participate in the study. The exclusion criteria were minor patients, those who did not have a good understanding of the French language or who were not affiliated to the general social security system (or similar).

Regarding the characteristics of patients and breastfeeding, we collected age, parity, breastfeeding history, term of delivery, type of breastfeeding, possible breastfeeding difficulties and the use of a breast pump. We also collected the following data on the occurrence of an abscess: the type of lesion, the time of occurrence, the initial management, the fate of breastfeeding and the reasons for stopping in case of interruption, the time before the first ultrasound-guided puncture. In the case of continued breastfeeding, we collected the following criteria: breastfeeding support, difficulties encountered, total duration of breastfeeding and reasons for subsequent weaning. When surgery was necessary, we studied the length of hospitalization, mother-child separation, continuation of breastfeeding and use of a breast pump, reasons for stopping breastfeeding in case of interruption, total duration of breastfeeding and reasons for subsequent weaning. Finally, the questionnaire focused on feelings about breastfeeding and the management of breast abscess.

Ultrasound-guided needle aspiration process

Ultrasound-guided needle aspiration was performed by three trained ultrasonographers according to the protocol described in Table 1. After local anesthesia with xylocaine and under ultrasound tracking, the abscess was punctured using 13 gauge needles. The drained fluid was analyzed in bacteriology on Champman's medium by enumeration and identification of germs and by performing an antibiogram. The patients were reevaluated clinically at H24 and H48, and an ultrasound check was systematically programmed at day 2-3 and then at day 7-8. According to the flowchart, two further aspirations can be considered and surgery should be referred if the abscess is not resolved after a maximum of 4 to 5 needle aspirations or the treatment becomes worse.

An associated medical treatment was systematically proposed that included: prescribe or pursue antibiotic (Pristinamycine 1g x 3/d) at the time of clinical diagnosis of the mastitis and abscess, prescription of anti-inflammatory analgesics (Paracetamol 1g x 4/d associated or not to ibuprofen 200 - 400 mg x 3/d).

The fate of breastfeeding was systematically evaluated at the end of care by a healthcare professional from the Parisian Perinatal Health Network (RSPP) trained in breastfeeding.

Statistical analysis

To analyse statistical differences between the punctured and the surgical drainage groups, a parametric test, Student's t-Test was used.

RESULTS

Population

34 patients were referred for breast abscess and included during the study period among which 18% (n = 6) did not have abscess but mastitis, and 82% (n=28) had one or several abscesses confirmed by ultrasound testing.

The response rate to the questionnaire was 71% with missing data for 8 patients. Among the 20 analyzed patients, the average age was 33,7 years \pm 4,5 with 85% of patients over 30 years old. The average term of parturition was 39,6 SA \pm 1,35. 70% of the patients were primipara and for 85% of them this was the first breastfeeding experience. The abscess occurred at more than one month postpartum in three quarters of the patients and 55% of them were exclusively breastfeeding.

Difficulties encountered before the discovery of the breast abscess

95 % of patients presented breastfeeding difficulties before the abscess occurred among which the main causes cited were engorgement (70%), mastitis (60%), pain (55%) or nipple cracks (50%). In the majority of cases several causes were associated.

Abscesses characteristics and management

Among these 28 patients, all except one benefitted from first needle aspiration: 18 were punctured once (64.3%), 8 were punctured twice (28.6%) and 1 was punctured three times (3.6%). From a total of 28 cases, 25% (n=7) were then referred for surgical drainage while 75% (n= 21) were managed only by needle aspirations (Fig. 1).

The mean delay between the indication of aspiration of the abscess and the beginning of disease was 12.2 ± 6 days for the group managed by needle aspiration and 24 ± 4 days for patients whose abscesses were surgically drained ($p = 0.0031$).

The mean size of abscess for the group that was only punctured was 40.18 ± 13 mm whereas the group that underwent surgical drainage had a mean abscess size of 39 ± 21 mm ($p = 0.97$) (Table 2).

The percentage of patients who were not under antibiotic treatment at the time they were managed was 42.8% for the aspiration group compared to 28% for those requiring surgical drainage. The type of antibiotic taken was clavulanic acid and amoxicillin, pristinamycin or cefoxitin. The results of bacteriological analysis of the drainage fluid indicated *Staphylococcus aureus* in 100% of the cases with a resistance to first-generation cephalosporin in 10.5% of the cases according to the antibiogram against 100% sensitivity to pristinamycin.

Continuation of breastfeeding

Immediately after the needle aspiration, all patients for whom the needle aspiration was effective continued breastfeeding against no patients for the group that ultimately required surgery, as it was suggested by medical staff ($p < 0,005$) (Table 2).

60% of patients ($n = 12$) stopped breastfeeding when they were diagnosed with breast abscess, of which 35% on both breasts and 25% on the abscessed breast only (Fig. 2). Reason mentioned by patients was in 25 % of cases after consulting a health professional. For 30% of patients, the interruption of breastfeeding was temporary.

After management by needle aspiration, 30% of patients took up breastfeeding again, giving with those who had not interrupted a total of 70% of patients who continued breastfeeding after management of the abscess by ultrasound-guided needle aspiration. Among them, 95% continued to breastfeed on both breasts, including the one that had been punctured. All of them received support from a midwife or a lactation consultant. At 5 months postpartum, half of the patients were still breastfeeding. For the others, the main reason for the arrest mentioned was the return to work. The 30% of patients who stopped breastfeeding within the first two months did so before the abscess was managed at the Duroc center.

The patients who required surgical management required hospitalization in 100% of cases with mother-child separation and permanent discontinuation of breastfeeding. In more than a third of cases (37.5%), stopping breastfeeding was recommended by the health care team.

Finally, 70 % of the patients pursued their breastfeeding after the abscess in the group with needle aspiration only, against no one in the surgical group ($p < 0,005$).

For 60% of the patients, the breastfeeding project was modified by the management of the abscess. Despite this, 95% of patients reported being satisfied with their management.

DISCUSSION

Avoid the occurrence of a breast abscess

The main risk factor for an abscess is mastitis, especially when it is complicated by a failure or delay in treatment. The modalities of mastitis prevention are relatively well codified now that causal factors are better known but their management is not well known to caregivers. It is therefore important to establish protocols to improve the management of mastitis and avoid the occurrence of abscesses (fig 3).

Diagnosis of breast abscess

Lactating breast abscess is a rare condition estimated to affect 0.1-0.4% of breastfeeding mothers. It is a well-defined collection of pus in the breast. Abscesses can either be warm with signs of inflammation or, more rarely, cold without any sign of inflammation and therefore more difficult to identify. Breast abscesses appears most often around six weeks of breastfeeding but could be observed at any time during lactation [10] and weaning. The

clinical situation includes a fluctuating, well-limited, painful inflammatory mass at the level of the breast, associated with fever. The diagnosis of abscesses behind areola is more difficult.

If an ultrasound is required to confirm the diagnosis, it must be performed by an experienced radiologist. Indeed, one of our patient for whom the diagnosis of a 20 mm breast abscess was made at the Duroc imaging center had an ultrasound reversing the diagnosis the day before, whereas the clinic hadn't change. The clinical diagnosis is sometimes difficult and excessively withheld in 18% of cases, so that it's better to perform a quality ultrasound which safety is known to confirm or invalidate the diagnosis. Lack of training of professionals in the ultrasound of lactating breast can however lead to miss the diagnosis and delay the treatment [11].

In ultrasound imaging, an abscess appears as a heterogeneous, mixed mass with irregular contours, often associated with axillary adenopathy's (Fig. 4). The differential diagnosis is that of cystic dilation of a terminal duct filled with milk accumulated and denatured by enzymes, which gives it an evolutionary appearance with a fluid center and a thick wall or that of a simple mastitis. In our study, 100% of patients had a prior clinical diagnosis of mastitis. It is the main risk factor for abscess, found in 91% of cases according to the literature [11]. However, ultrasound should not be systematic for the management of a mastitis but should become necessary if an abscess is clinically suspected or in case of mastitis not progressing favorably under antibiotic treatment. Ultrasound by an experienced person can also reveal malignant disease. Breast cancer is in fact the most frequent cause of cancer death in breastfeeding women and the second most frequent cause of death in the postpartum period.

Indication and methods of ultrasound-guided puncture

As we have seen previously, the delay in the management of abscess seems to be the main factor in failure of needle aspiration ($p = 0.0031$) (Table 2), as reported by Debord et al [11]. While the majority of teams indicate an aspiration for abscesses less than 30 mm and recommend surgical drainage beyond that, our study suggests that the size of the abscess is not a determining factor in the success or failure of puncture management (Fig. 4-5). In the group that required surgery the largest size was 85 mm and 80 % were over 30 mm. However, 85.7% of our aspiration's successes ($n = 18$) involved abscesses greater than 30 mm, whose largest measured 70 mm. Similarly, the size of the abscess is not predictive of the number of punctures required. Indeed, abscesses that evolved favorably after a single puncture had an average size of 50 mm compared to 37 mm for those who required two punctures. There was no significant difference concerning the diameter of the abscess between the group "successful puncture" and the "requiring surgery" group ($40,18 \pm 13$ mm vs 39 ± 21 mm ; $p = 0,97$) (Table 2).

Concerning the time required for complete resorption, studies report a time ranging from one to eight weeks [12] and some authors suggest a weekly monitoring [13]. Surgical treatment is not necessary in most cases, with less occurrence of skin fistulas [12]. A French team has shown the effectiveness of the ultrasound-guided puncture in a study of 34 patients, with a success rate of 91,2% [11]. The same team recently published a series of 92 patients

with 105 breast abscesses and showed that ultrasound-guided puncture was effective in 96% of cases regardless of the size of the abscess (95 CI 91-99%) [14]. 53% required more than one drainage with a median number of 2.6 and in 4 of the 105 cases surgeries was necessary. Our experience has shown similar results with patients recruited by the RSPP.

Based on these data, we propose a management protocol of breast abscesses which combines appropriate antibiotic therapy and analgesics for mastitis, and with ultrasound-guided needle aspiration at the radiology center Duroc with in case of evolution towards a breast abscess (Fig. 5). A film to facilitate the learning of the technique is available on the website of the RSPP. These needle aspirations are performed under local anesthesia, which allows ambulatory care of patients and avoids mother-child separation and can be performed on both breasts. In case of drainage difficulties, a macrobiopsy aspiration may be used.

Among the 28 patients with a breast abscess, surgery was avoided in 75% of cases. These results are in line with those of literature [15 – 18]. In fact, in French recommendations, iterative needle aspiration is presented as an alternative to surgical drainage in moderate forms of lactating breast abscess [19]. Furthermore, a meta-analysis of 22 studies including a total of 975 patients evaluating the effectiveness of lactating breast abscess punctures, found that 52 to 97% of abscesses healed after one aspiration [20]. The overall success rate was 82 to 100% closely related to viscosity, multi-locularity, late management, pain, size and number of punctures. Our population is probably insufficient to confirm these last two data. However, our results suggest that needle aspiration is possible regardless of the size of the abscess and that close monitoring is important to repeat the procedure if necessary. The use of a vacuum biopsy device (Mammotome®) could be a technique in perspective [21 – 22].

Continuation of breastfeeding

The main strength of the study is to present the long-term future of breastfeeding after management by puncture of a lactating breast abscess.

In France, the gold standard for the treatment of lactating breast abscess is surgical management by incision and drainage as recommended by the CNGOF [19]. This technique is not without its disadvantages: it is performed under general anesthesia, resulting in hospitalization and mother/infant separation, most often accompanied by discontinuation of breastfeeding due to the drainage equipment (blade) and the risk of contamination of the milk by the drainage area [23]. There is no consensus on this last point, but it seems beneficial to continue breastfeeding and if the drainage area is close to the areola, the milk can be drawn and thrown until the banks stick together. The milk that may flow through the drainage area contributes to healing thanks to the biological factors it contains (resolvins, protectins, maresins, lipoxins) [24]. In addition, in the longer term, the less aesthetic result is often reported by patients [25].

With our protocol, patients are not hospitalized, which avoids the separation of mother and child. This technique has the additional advantage of being less painful than surgery. Local anesthesia (xylocain and adrenaline) and used analgesics (paracetamol and non-steroidal anti-inflammatory) do not contraindicate continuation of breastfeeding [26,27].

The latest French recommendations advocate stopping breastfeeding of infected breast [19]. However, more recent work has shown that an abscess is not an indication for weaning, even on the affected breast, as it is rarely connected to a lactiferous duct so that the newborn cannot ingest pus [28]. There is no greater risk of infection for the child if antibiotic therapy is appropriate [29]. In addition, abrupt cessation of breastfeeding increases milk stasis and can increase the size of the abscess or even promote its non-resorption despite adequate treatment [28]. After needle aspiration, continued breastfeeding reduces inflammation by promoting proper emptying of the breast, accelerating the healing of the abscess [30]. Non-surgical management allows the continuation of breastfeeding on both breasts, with a better prognosis compared to surgery [31]. The study conducted in Lyon showed a continuation of breastfeeding in 87.8% of cases, including 48.5% of cases on the abscessed breast [11]. Their more recent results were even better with continuation of breastfeeding in 91% of patients, excluding abscesses that occurred during the weaning phase [14]. In our study, 100% of patients who were still breastfeeding at the beginning of puncture management continued breastfeeding after. In total, 70% of mothers were breastfeeding after the immediate termination of the procedure, knowing that 30% of patients who stopped breastfeeding within the first two months did so before the abscess was managed at the Duroc center.

The continuation of breastfeeding is dependent on the prevention of the occurrence of breastfeeding complications but above all on better management [25]. Mastitis develops into breast abscess in 3 to 11% of cases depending on the publications [8]. The choice of antibiotic therapy initiated before or at the time of the puncture is based on the type of germ identified during bacteriological sampling. Our study shows in 100% of cases the presence of staphylococcus aureus, of which 100% were resistant to penicillin G and 10.5% to first generation cephalosporins. In our study the germ was sensitive to pristinamycin in 100% of cases. An unpublished French study found a quarter of cephalosporin-resistant staphylococci in 403 isolated aureus staphylococci. Our staff is probably not sufficient to highlight this trend. Pristinamycin is the first-line antibiotic. In fact it is available per os, it has a good tissue diffusion, a good oral absorption, a very good sensitivity of *Staphylococcus aureus*, and it is compatible with breastfeeding [32]. Despite the absence of published data on pristinamycin during lactation, no specific events have been reported to date in breastfed children of mothers treated with pristinamycin, and this antibiotic is used in paediatrics.

It should be noted that in our study, in more than a third of cases (37.5%), stopping breastfeeding was recommended by the health care team. With regard to all the data we mentioned above, the benefit/risk ratio seems to favor continued breastfeeding even in the event of breast abscess, with the exception of those located near the nipples and requiring surgical drainage. These data are still not well known to health professionals whose advice is most often inappropriate regarding the continuation of breastfeeding. This work therefore highlights the need to update the recommendations and train health professionals so that patients receive the best information and support.

Limits of the study

The main limit of this study is the small number of staff. Indeed, it corresponds to the number of patients treated over a one-year period in a single center, with a pathology that remains uncommon. We also deplore a number of missing data due to the lack of response to the questionnaire despite reminders. The monocentric nature may have induced a selection bias but allowed a uniformity of management. The retrospective nature and remote questionnaire data collection leads to a significant memorization bias. However, it was necessary to collect long-term data, particularly about the continuation of breastfeeding. Finally, most of the items in the questionnaire were open-ended and subjective questions, which makes it difficult to extrapolate the results.

CONCLUSION

Our work confirmed that the management of a lactating breast abscess by ultrasound-guided needle aspiration appears to be effective while promoting continued breastfeeding. Even if the most voluminous lesions especially after delayed treatment lead to more surgical treatment, the initial size of the abscess and the repetition of procedures should not lead to give up this management. Indeed, the technique itself is compatible with the continuation of breastfeeding as well as the associated treatments local anesthesia, analgesics, anti-inflammatory drugs and antibiotics. This message should be given to all health professionals and a guide care could be consultable on RSSP site.

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Contribution to authorship:

VR, JYS: has ensured conception, planning, carrying out, analyzing, and writing up of the work

LB: has writing up of the work

CP: has ensured the collection of data

MD, CC, EB, NB: have completed the protocol

BP, EL, AG: have corrected the manuscript

MM: has translate the manuscript in English

Conflicts of interest

Authors report no conflict of interest.

Ethics approval: A declaration was made at CNIL in order to collect participant data. We also obtained ethical committee favorable opinion. from CPP Ile de France n° 39931

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Table 1 Protocol for the management of lactating breast abscess by ultrasound-guided puncture

- Ultrasound confirmation of diagnosis by a trained ultrasonographer
- Antibiotic prophylaxis: pristinamycine 1 g x 3/d
- Analgesics: paracetamol 1 g x4/d ± ibuprofen 200-400 mg x3/d
- Local anaesthesia:
 - skin disinfection with biseptin
 - local anaesthesia with xylocaine
 - prick away from the nipple
- Technique :
 - ultrasound-guided
 - 13 gauge needle
 - deep-plane parallel needle
 - macrobiopsy with a 14 gauge needle if difficulty in drainage
 - bacteriological sampling
 - lavage of the cavity with physiological saline solution
 - skin cleaning and sterile skin suture dressing on the puncture site
- Report of the puncture sent to the patient and to the breastfeeding referent
- Monitoring:
 - clinical reevaluation at day 1 and day 2
 - ultrasound at day 4 to 5 / at day 2-3 then day 7-8

Table 2 Mains results of the study

	Needle aspiration(s) only	Resort to surgery	p value
Delay between diagnosis and first aspiration (days)	12,2 ± 6	24 ± 4	0,0031
Size of the abscess (mm)	40,18 ± 13	39 ± 21	0,97
Continuation of breastfeeding immediately after the first aspiration (%)	100	0	< 0,005

