Breast abscess

Inappropriate antibiotics continue to be prescribed for breast infection. Optimal management of breast abscesses consists of repeated aspiration or mini incision and drainage combined with appropriate antibiotic therapy.

Breast abscess can affect the parenchyma or the skin of the breast. Infections in the skin of the breast are usually secondary to a lesion within the skin such as a sebaceous cyst or skin conditions such as hidradenitis suppurativa. Management of breast abscesses has changed dramatically over the past two decades.

A survey of abscess management in the UK demonstrated that many units have no clear protocol (Thrush and Dixon, 2006). Some surgeons aspirate breast abscesses whereas others do not. There is no consistent policy on re-aspiration and older surgeons are more likely to perform incision and drainage rather than aspiration. Ultrasound is becoming increasingly used but there are still many units that do not have access to ultrasound. The Edinburgh Breast Unit deals with over 250 breast abscesses a year and has been at the forefront of optimizing breast abscess management.

The guiding principles in treating breast infection are:

- Prescribe appropriate antibiotics early to reduce the rate of abscess development
- In infection associated with breast feeding, promote milk drainage; this is usually best achieved by continuing to breast feed
- Refer urgently to a specialist breast surgeon if infection does not settle after one course of appropriate antibiotics
- Ensure that a patient with suspected infection does not have an inflammatory cancer by using appropriate imaging combined with image-guided needle core biopsy if a localized suspicious abnormality is detected.

Bacteriology of breast infection

Most lactating infection is caused by *Staphylococcus aureus* and can include methicillin-resistant *S. aureus* (MRSA) if the infection is hospital acquired. Other organisms responsible for breast-feeding infection include streptococci and *Staphylococcus epidermidis*. The organisms responsible for non-lactating infection, including skin-associated infections, often include anaerobic bacteria such as *Bacteroides* spp. and anaerobic streptococci (Bundred et al, 1985) (*Table 1*).

Antibiotic treatment of breast infection

Lactating infection can be treated by flucloxacillin or co-amoxyclav or, if there is a pencillin allergy, clarithromycin. Non-lactating and skin-associated infection is best treated by co-amoxyclav or if there is a penicillin allergy a combination of erythromycin and metronidazole (*Table 2*).

Inappropriate antibiotics continue to be prescribed by doctors in primary and secondary care. Antibiotics which should not be used in lactating infection include ciprofloxacin, chloramphenicol and tetracycline as they may enter the breast milk and can harm the baby.

It is convenient to separate true breast infection into lactating and non-lactating infection and separate non-lactating infection into central and peripheral infections as they have different aetiologies and treatments.

Lactating breast infection

Early treatment of infection associated with breast-feeding with appropriate antibiotics and promotion of breast-feeding reduces abscess formation. Women who develop breast-feeding infection usually have a history of problems with breast-feeding with engorgement, poor milk drainage and commonly have an excoriated nipple. Symptoms include erythema, localized tenderness, localized engorgement and systemic features of infection including pyrexia, generally feeling unwell and sometimes rigors.

Increasingly patients are being referred late to hospital with established and significant volume abscesses either as a result of failure to refer if infection does not settle

Table 1. Organisms responsible for breast infection

Type of breast infection	Organism
Neonatal	*Staphylococcus aureus* (rarely *Escherichia coli*)
Lactating	*Staphylococcus aureus* (rarely *S. epidermidis* and streptococci)
Non-lactating	*Staphylococcus aureus*, enterococci, anaerobic streptococci, *Bacteroides* spp
Skin associated	*Staphylococcus aureus*, less commonly *Bacteroides* spp

Table 2. Antibiotics most appropriate for treating breast infection*

Type of infection	No allergy to penicillin	Allergy to penicillin
Neonatal, lactating and skin associated	Flucloxacillin (500 mg four times daily)	Erythromycin (500 mg twice daily)†
Non-lactating	Co-amoxyclav (375 mg three times daily)	Combination of erythromycin (500 mg twice daily)† with metronidazole (200 mg three times daily)

*Doses are for adults. † Clarithromycin is also an option

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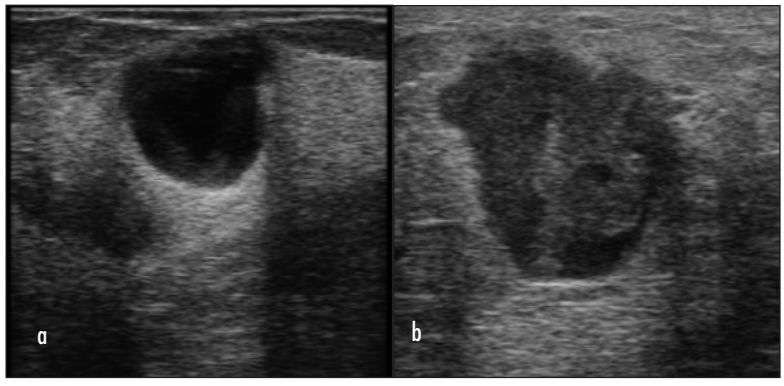


Figure 1. a. Ultrasound of a lactating breast abscess. The abscess can be seen to be very close to the skin and so this abscess is probably best treated by mini incision and drainage. b. Ultrasound of a lactating breast abscess. The overlying skin is not involved and this abscess can be treated by aspiration.

rapidly after one course of antibiotics or as a result of infection with pathogenic organisms.

All patients with suspected infection associated with breast-feeding should have a breast ultrasound (Dixon, 2006) (*Figures 1a* and *b*). Management is then based on the state of the overlying skin (*Figure 2*). If the overlying skin is normal then aspiration of the abscess under ultrasound guidance using copious amounts of local anaesthesia is preferred (*Figure 3a*). The needle is introduced through the normal skin some distance from the abscess and 1% lignocaine with 1:200 000 adrenaline is infiltrated up to the abscess with a 21-gauge needle. Having entered the abscess, if the visible pus is not particularly thick then this can be aspirated with the same needle. Having aspirated the pus, the syringe is changed and the abscess cavity is irrigated with 1% lignocaine with 1:200 000 adrenaline solution. Up to 50 ml of local anaesthetic can be used safely in any patient and larger volumes are safe providing the local anaesthetic washed into the abscess cavity is aspirated later.

If the pus is very thick and will not aspirate through a 21-gauge needle, then having waited for the local anaesthetic and adrenaline to take effect (at least 7–8 minutes) a 19- or 17-gauge needle is advanced into the cavity washing the abscess cavity with local anaesthetic with adrenaline to dilute the pus which reduces the pain and reduces bleeding and subsequent bruising. Irrigation with local anaesthetic is continued until all pus is aspirated and the local anaesthetic irrigated into the cavity comes back clear. The net effect of this procedure is to control pain by a combination of local anaesthesia and reducing pressure within the abscess by aspirating all pus.

The patient should then be reviewed every 2–3 days and the abscess cavity imaged with ultrasound and aspiration repeated in a similar manner until either there is no further fluid visible in the abscess cavity or no further pus is aspirated (Dixon, 2006) (*Figure 3b*). The usual sequence is that at the second aspiration the pus is thinner and subsequently it then turns to serous fluid. The majority of lactating abscesses can be successfully managed in this manner. Repeated aspiration should be combined with continued appropriate oral antibiotics until the abscess resolves.

If the skin overlying the abscess is very thin (*Figure 4a*) and shiny or it is evident the abscess is about to burst through the skin then 1% lignocaine with 1:200 000 adrenaline is infiltrated into the thinned overlying skin and a small stab incision made into the abscess using a 15-blade (*Figures 4b* and *c*). The abscess is then irrigated with local anaesthetic and adrenaline solution and further irrigated every 2–3 days until the wound closes and no further pus is visible on ultrasound. Large incisions are not necessary to drain breast abscesses (Dixon, 1988). Such incisions do not need to be dependent (they are in the lower part of the breast so the abscess drains by gravity) and neither drains nor packing have any role in the modern day management of breast abscesses. Almost all patients with abscesses that require incision and drainage can have this performed under local anaesthesia. Few, if

Figure 2. Breast abscess protocol. Perform ultrasound (USS) to assess whether pus present. *=incision with a small 15 blade.

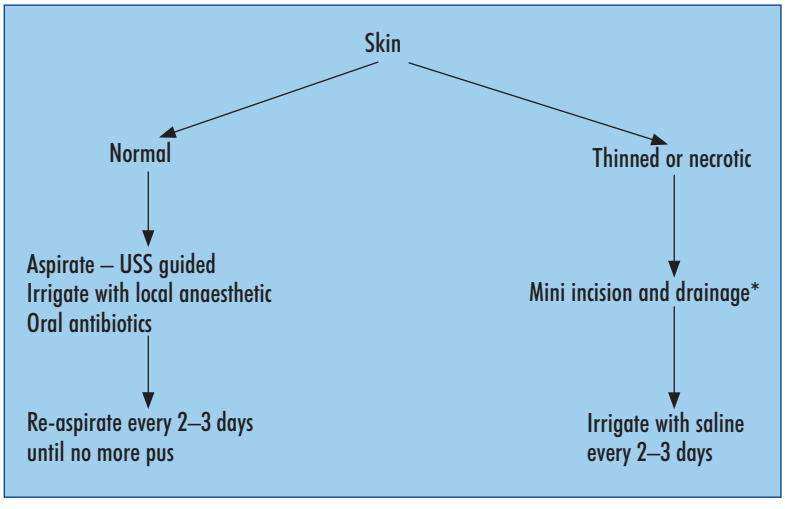


Figure 3. a. Lactating breast abscess. The skin is red but normal. This abscess was treated by repeated aspiration with resolution of the abscess. b. Abscess as in* Figure 3a *following aspiration.

Figure 4. a. Lactating breast abscess with very thin and discoloured overlying skin best treated by mini incision and drainage. b. Following mini incision and drainage. c. Result 1 week later.

any, patients with breast abscesses require drainage under general anaesthetic.

Some women persist with breast-feeding despite widespread nipple excoriation and obvious pain and are at the end of their tether by the time they come to hospital. Although advised by breast-feeding counsellors that they need to persist with breast-feeding, such women are best advised to stop breast-feeding so their breasts can heal. This comes as a relief to almost all such women. In these women, it may be advantageous to suppress lactation using cabergoline 250 mg given twice a day for 2 days.

Where the skin overlying the abscess is obviously necrotic it should be excised and the abscess cavity irrigated with local anaesthetic and adrenaline solution, which allows all pus to be drained and provides local analgesia.

A summary of the management of breast abscesses is shown in *Figure 2*.

Non-lactating infection

Central infection

This usually develops secondary to periductal mastitis which is a condition where the subareolar ducts become damaged and subsequently become infected often by anaerobic bacteria. This condition affects young women, the average age being 32 years, and the major causative factor appears to be smoking (Dixon, 1998). It is known that the breast concentrates substances in cigarette smoke for instance cotinine, a nicotine derivative is found in subareolar ducts in a much higher concentration than in plasma. Either the toxic substances in cigarette smoke damage the ducts directly or there is a local hypoxic effect, the consequence being subareolar duct damage and subsequent infection (Dixon, 1998). Periductal mastitis and its complications of abscess and mammary duct fistula result in recurrent episodes of infection and discharge through the fistula exit site which often require duct excision to stop this cycle of recurrent infection (Dixon and Thompson, 1991).

Abscesses when they develop are managed in a similar way to lactating abscesses by aspiration (*Figures 5a* and *b*) or incision and drainage (*Figures 6a* and *b*) combined with appropriate oral antibiotic therapy. If the skin is necrotic (*Figure 7*) it is excised to allow the abscess to drain. The problem in periductal mastitis is that following apparent resolution of the abscess, recurrence is frequent because the underlying abnormality in the central ducts persists. Patients who develop recurrence or develop a mammary duct fistula, which is a connection between the subareolar duct and the skin usually in the

Figure 5. a. Ultrasound of a subareolar abscess (arrow). b. Same abscess with needle visible in abscess before aspiration.

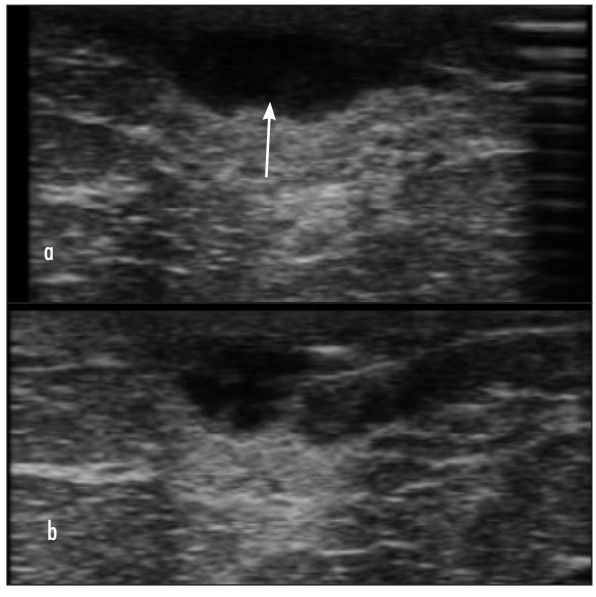
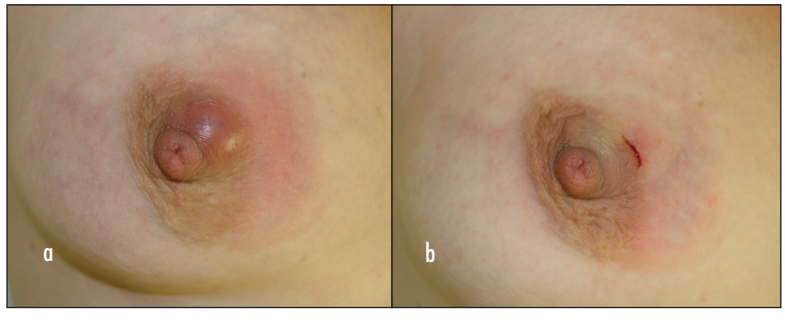


Figure 6. a. Periareolar abscess. The overlying skin is very thin. Retraction of a central breast duct is easily visible. b. Following incision and drainage of the same abscess under local anaesthesia.



region of the areolar (*Figure 8*), require definitive surgery to excise the diseased ducts. The surgery is not straightforward (Dixon and Thompson, 1991; Dixon et al, 1998). It is essential to excise all the ducts right up to the back of the nipple, leaving only nipple skin, to reduce the risk of recurrence which occurs in a significant percentage of women who have an incomplete total duct excision. Where a fistula is present excision of the fistula combined with a total duct excision is usually effective (Dixon and Thompson, 1991).

Providing the size of the incision is kept to a minimum complications of total duct excision are rare (Dixon et al, 1998). The complication of nipple necrosis is now very rare but patients should be warned of a potential reduction or a loss of nipple sensation following this procedure. It is important when excising the diseased ducts to evert the nipple at the end of the procedure. This is achieved by excising all the scar tissue at the back of the nipple. If the procedure is performed correctly, a suture is not required to keep the nipple everted. The problem with placing such sutures is that the nipple is permanently everted and looks unnatural. Furthermore, sutures will not keep a nipple which wishes to invert everted.

Patients with periductal mastitis often have bilateral disease (*Figure 8*) and some women present with bilateral fistulae and nipple changes on both sides. Once the nipple on the affected side has been everted then this can produce asymmetry, the everted nipple looking better and more natural than the non-operated side. For this reason consideration should be given at a later date to performing a total duct excision on the other side to achieve symmetry. All patients who smoke should be advised of the risks of continued smoking and its association with recurrent breast infection.

Figure 7. Non-lactating central breast abscess with overlying skin necrosis. This abscess should be treated by excision of the necrotic skin.

Nipple piercing

Serious infection after nipple piercing is rare but does occur particularly in smokers. Damage from smoking combined with damage caused by piercing can result in persistent and troublesome infection (*Figure 9*). Removal of the ring combined with total duct excision may be required for recurrent infection. Rarely this fails because of the extent of damage and removal of the nipple areolar complex is necessary. Subsequent nipple reconstruction is then possible at a later date.

Peripheral non-lactating infection

This is less common than central infection. It is described as being associated with diabetes, rheumatoid arthritis and granulomatous lobular mastitis but the majority of people with this condition have no underlying abnormality (*Figure 10*). Very occasionally comedo ductal carcinoma in situ can become infected and present with inflammation or an abscess, for this reason patients over the age of 35 years should have bilateral mammography once peripheral infection has resolved. Peripheral infection is treated with antibiotics and if an abscess is present repeated aspiration or incision and drainage under local anaesthesia.

Figure 8. Bilateral mammary duct fistula secondary to bilateral periductal mastitis.

Figure 9. Central recurrent breast infection in a patient with periductal mastitis who also had a nipple ring.

Figure 10. Peripheral breast abscess. The overlying skin is abnormal and this abscess was treated by mini incision and drainage under local anaesthesia.

Granulomatous lobular mastitis is a condition of unknown aetiology. It can present as peripheral inflammatory masses, which masquerade as cancer (*Figure 11a*) or as an area of ulceration (*Figure 11b*). Almost all women described to date have been parous and many of them develop abscesses which can be multiple and recurrent. Although one study (Paviour et al, 2002) isolated corynebacteria organisms including *Corynebacterium kroppenstedtii*, *Corynebacterium amycolatum* and *Corynebacterium tuberculostearicum* from lesions of granulomatous lobular mastitis, antibiotics that are effective against these organisms are rarely effective and it is thought that these organisms are unlikely to have a major aetiological role in this condition. Treatment of abscesses is with aspiration or incision and drainage if the skin overlying the abscess is thinned, combined with appropriate antibiotics. Although steroids have been tried this condition eventually resolves without active intervention other than managing abscesses appropriately.

Mammotome

The use of the mammotome has been described to allow aspiration of thick pus from some breast abscesses (Varey et al, 2005). Mammotome needles are not cheap and the majority of specialist surgeons who treat breast abscesses do not have access to a mammotome. Breast abscesses can be managed perfectly well without a mammotome and thick pus can be diluted and aspirated through a large needle inserted into the abscess cavity with local anaesthetic. The author has access to a mammotome and has used it for abscess drainage but is not convinced it offers any advantage over other available techniques.

Skin-associated infections and abscesses

Sebaceous cysts are common over the skin of the breast and these can become infected to form local abscesses

Figure 11. a. Breast mass secondary to granulomatous lobular mastitis. Ultrasound showed a number of small abscesses within this area which were treated by aspiration. b. Granulomatous lobular mastitis resulting in areas of overlying ulceration. This settled on conservative management.

(*Figure 12*). Incision under local anaesthesia with irrigation of the cavity and evacuation of the sebaceous material is effective at resolving the abscess. Following abscess resolution the sebaceous cyst is usually sufficiently scarred to not require formal excision.

Hidradenitis suppurativa can affect the lower half of the breast as well as the axilla and groin (*Figures 13a* and *b*) and result in infection and abscess formation affecting

Figure 12. Skin abscess in the lower part of the breast secondary to an inclusion epidermoid sebaceous cyst.

Figure 13. a. Abscess over lower part of breast in a patient with hidradenitis suppurativa. b. Axilla of the same patient showing scars of recurrent infections.

the skin of the lower half of the breast. Abscesses are treated by mini incision and drainage combined with appropriate antibiotics. Options for recurrent infection include treatment with retinoids with surgical excision of the affected area or skin grafting, usually resulting in long-term control in up to 50% of women (Dixon, 2006).

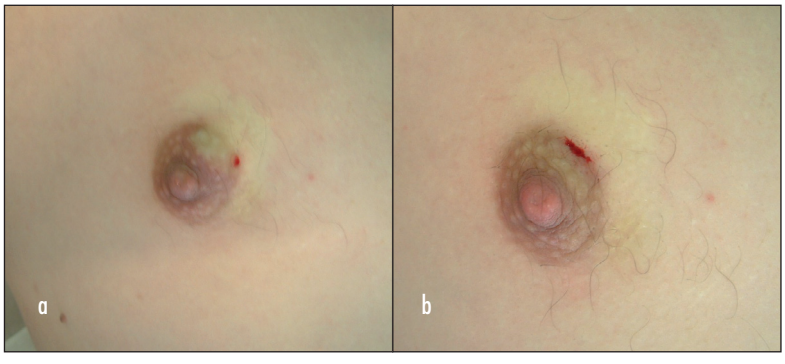
Other infection

Breast infection is more common after breast cancer treatment in breasts treated by breast-conserving surgery and radiotherapy. Not all swollen red breasts following this treatment are, however, infected and require antibiotics. Breast infection associated with implants is not uncommon in women following breast reconstruction or augmentation and if severe and pus is present requires implant removal.

Infection in males

Males get periductal mastitis and develop central infection (*Figures 14a* and *b*), subareolar abscesses and mammary duct fistulae. Treatment is as for women with a need for total duct excision in men whose infection is recurrent.

Figure 14. a. Periareolar abscess in male following injection of local anaesthesia. b. Same patient immediately following aspiration of the abscess.



KEY POINTS

- Early prescription of appropriate antibiotics reduces the rate of abscess development.
- Hospital referral is indicated in all patients where infection does not settle following one course of appropriate antibiotics.
- Ultrasound can detect whether pus is present in an area of infection.
- Breast abscesses can be treated almost exclusively in the outpatient department by repeated aspiration or incision and drainage through small incisions under local anaesthesia.
- Recurrent central infection is usually associated with periductal mastitis, which is almost exclusively a smoking-related disease. These patients often need the damaged ducts excised by total duct excision.

Delay

Delay either in referral or instituting appropriate treatment can have significant cosmetic penalties with loss of large volumes of breast tissue and substantial asymmetry (*Figures 15a* and *b*) and potential medicolegal consequences. BJHM

Conflict of interest: none.

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Figure 15. a. Right lactating breast abscess where there was significant delay in referral to hospital. The overlying skin shows significant areas of necrosis. This patients was treated by aspiration and intravenous antibiotics. b. The same patient 1 year later. The large abscess in the right breast had obviously damaged a significant amount of the breast tissue. Not only is the right breast smaller but there is evidence of significant scarring within the skin.