SCIENTIFIC ARTICLE

Pilot study to assess the role of minimal access surgery in the management of superficial surgical infections

Ritesh Goel, Yashwant Singh Rathore , Sunil Chumber, Vitish Singla, Moin Baig
Department of Surgical disciplines, All India Institute of Medical Sciences, New Delhi, India

Keywords: Abscess; endoscopic drainage; superficial surgical infections

Abstract

Introduction

The standard treatment for an abscess since time immemorial has been Incision and Drainage [I&D] without primary closure at most sites. Post-I&D, pain and ugly scar are the most common complaints in these patients. In this study, we have evaluated the role of minimal access surgery [MAS] in the management of superficial surgical infections.

Materials and methods

This was a prospective study, comparing the clinical and cosmetic outcomes of patients undergoing conventional I&D of superficial abscesses and those undergoing MAS [5mm incision for a port of 5mm diameter] drainage.

Results

A total of 50 patients were recruited, out of which 2 patients had a spontaneous rupture. 25 patients underwent I&D and 23 underwent MAS drainage. The mean age was 35.8 ±13.5 years, mean size of the abscess was 6 ± 1.9 cm. Baseline characteristics like age, sex distribution, duration of symptoms, size of the abscess and volume of the pus drained were comparable between the two groups. Resolution of pain and redness was achieved earlier in MAS drainage compared to conventional I&D. Resolution of induration was statistically insignificant. Duration of the need for dressing and duration of return to daily activity was less with MAS drainage. Scar size was significantly less in the MAS drainage group. Staphylococcus aureus was the most common organism isolated, and both groups had comparable rates of complications and recurrences.

Conclusion

Our study has shown that MAS drainage offers earlier recovery along with better cosmetic outcomes.

Correspondence: Yashwant Singh Rathore
E-mail: dryashvant.r@gmail.com
https://orcid.org/0000-0002-0229-452X
Received: 31-07-2021 Accepted: 07-11-2021
DOI: http://doi.org/10.4038/sljs.v39i3.8871

Introduction

Wounds and abscesses have been recognized even in ancient history; the earliest recorded evidence being found in historic Greco-Roman texts [1]. Incision and drainage [I&D] with or without antibiotics have generally been considered an adequate treatment modality for abscesses. This is however associated with postoperative morbidity like requiring repeated dressings and scar related problems. Ultrasound-guided aspiration is another frequently used modality that offers several advantages like cosmesis, and a less morbid postoperative course. However, patients may require multiple sessions for complete resolution of the abscess. Minimally access surgery [MAS] drainage marks a paradigm shift in the treatment of superficial surgical infections.

In this study, we have evaluated the role of minimal access drainage in breast, perianal and gluteal and other superficial abscesses and found that MAS drainage offers added advantage of direct visualization of the abscess cavity, the walls of the cavity [diagnostic], thereby aiding in the scraping of the walls [therapeutic] of the abscess cavity. There is little documented literature available for MAS drainage of superficial infections. This is the first pilot study to assess the role of MAS drainage in the management of superficial infections.

Materials and methods

This study was a single centre, in hospital, prospective, clinical interventional, comparative, cohort study. A formal ethical clearance was taken before the conduct of the study. All the patients visiting the surgery outpatient department/casualty at our tertiary care academic institute were recruited under the study protocol. A total of 50 patients were recruited in the study, out of which 2 patients had spontaneous rupture of the abscess and were thus excluded. Patients aged 18 – 65 years, with superficial abscesses of >3 cm size, were included. Pregnant, hemodynamically unstable patients were excluded from the study. All the patients underwent routine blood investigations, pre-anaesthetic check-ups, ultrasonography of the abscess. All procedures were performed under general anaesthesia. The patients were divided into two groups: group A: conventional I&D and group B: MAS drainage. Their distribution was done based on chits kept inside sequentially numbered opaque envelopes

bearing either of the names [following the allocation concealment procedure] [2].

Patients were divided into two groups:
Group A: conventional I&D – 25 cases
Group A1: breast abscess – 10 cases
Group A2: anorectal abscess – 12 cases
Group A3: others – 3 cases – one case each of inguinal, back, and anterior abdominal wall abscess.

Group B: MAS drainage – 23 cases
Group B1: breast abscess – 14 cases
Group B2: anorectal abscess – 9 cases
Group B3: others – no cases were present in this group.

Perioperatively all the patients were empirically given amoxicillin + clavulanic acid, 1.2 G IV or 625 mg oral TDS and metronidazole 400 mg IV or 500 mg oral TDS, and antibiotics were changed according to the culture report, once available.[3]

Patients in group A: Under General anaesthesia, with aseptic precautions, the abscess was examined, and the most fluctuant point was marked with a sterile marker. The adequately sized incision was made over the point of maximum fluctuation. All the pus contained in the abscess cavity was drained out and sent for microbiological study [gram stain and culture]. Septations were broken down using blunt dissection using finger or sinus forceps. Thorough wash was given using warm Normal saline. The cavity was packed with betadine-soaked gauze with no drains. The wound was left open for continuous drainage and healing by secondary intention.

Patients in group B: Under general anaesthesia, with aseptic precautions, the abscess was examined, and the most fluctuant point was marked with a sterile marker. A 5mm small stab incision was made at the point of maximum fluctuation. Now, a single 5 mm port was inserted [figure 1] and egress of the pus was aspirated [figure 2] and collected for pus culture and sensitivity. The abscess cavity was visualized using a 5 mm 0°-degree telescope [figure 3]. A suction cannula was inserted through the 5-mm port and any remaining pus was aspirated. The abscess cavity was washed with normal saline repeatedly until there was a clear return.

CO2 insufflation was performed at low pressure of 5mm of Hg, to expand the cavity for better visualization. When all the pus had been drained, septations were broken down Maryland forceps blindly. The abscess cavity was visualized again for any remaining septations for confirmation of completion of the procedure. A repeat normal saline wash was given in the end. A 14 fr closed suction drain was inserted through the same incision site and CO2 gas was allowed to escape. The incision site was closed over the drain using 2-0 silk sutures.
Post-procedure the wound was examined for resolution of redness and induration. Drain output [if present] was monitored. It was decided that in case of failure of resolution of the abscess after primary operation, the second operation if needed would be I&D. Patient satisfaction was analyzed concerning the size of the scar, and duration of time to resume normal activity. These patients were followed up for 90 days postoperatively. Scars after both the procedures are shown in figures 4 and 5.

Results
The mean age in group A was 36.2 ± 13.6 years group B was 34.4 ± 11.4 years. Group A had 56% female patients and Group B had 74% female patients.

1. Resolution of pain:
The duration to the resolution of pain in both the groups remained around 6 days with no statistically significant difference, as shown in table 1.

2. Resolution of redness:
Redness resolved earlier in the MAS group as compared to the I&D group. Sub-group analysis revealed significant differences amongst patients with breast abscesses. However, no such difference was observed in patients with another abscess group as shown in table 2.

3. Resolution of induration:
There was no statistical difference concerning the resolution of induration in both groups as depicted in table 3.

4. Duration of dressing:
Patients in the MAS drainage group required dressing for a shorter duration of time [7.7 days v/s 8.7 days, p = 0.007] as compared to the I& D group. A significant difference was noticed in the breast abscess group but not in the anorectal abscess group. [Table 4.]

5. Duration of hospital stay:
Both groups of patients required hospital care for about 2 days which was statistically insignificant, as shown in table 5.

6. Return to daily activities:
There was no significant difference in the time taken to return to daily activities, about 7 days in each group as shown in table 6.

7. Size of scar:
The size of the scar was significantly smaller in the MAS group against the conventional I&D group, as shown in table 7.

Table 1. Resolution of pain in days

Site	Group A: Conventional I&D (days)	Group B: MAS drainage (days)	P value
Overall	6.8 ± 2	5.8 ± 1.5	0.15
Breast abscess	6.7 ± 1	5.6 ± 1.6	0.68
Anorectal abscess and others	7.4 ± 2.5	6.2 ± 1.5	0.50

Table 2. Resolution of redness in days

Site	Group A: Conventional I&D (days)	Group B: MAS drainage (days)	P value
Overall	5.8 ± 1.5	4.5 ± 1	0.004
Breast abscess	6.6 ± 1.6	4.4 ± 1	0.002
Anorectal abscess and others	5.4 ± 1.3	4.6 ± 1.1	0.19

Table 3. Resolution of induration

Site	Group A: Conventional I&D	Group B: MAS drainage	P value
Overall	6 ± 1.6	6.7 ± 1.1	0.10
Breast abscess	6.7 ± 1.1	6.6 ± 1.5	0.92
Anorectal abscess	5.9 ± 2	6.9 ± 0.6	0.14

Table 4. Duration of dressing in days

Site	Group A: Conventional I&D	Group B: MAS drainage	P value
Overall	8.7 ± 2.1	7.7 ± 1.5	0.007
Breast abscess	8.3 ± 2	6.9 ± 1	0.04
Anorectal abscess and others	8.9 ± 2.3	7.7 ± 1.9	0.36

Table 5. Duration of hospital stay in days

Site	Group A: Conventional I&D	Group B: MAS drainage	P value
Overall	2.8 ± 1.2	2.5 ± 1	0.37
Breast abscess	2.1 ± 0.7	2.1 ± 1	1
Anorectal abscess	3.6 ± 1	3.1 ± 0.78	0.25

Table 6. Return to daily activities in days

Site	Group A: Conventional I&D	Group B: MAS drainage	P value
Overall	7.8 ± 3.2	6 ± 2.3	0.08
Breast abscess	5.6 ± 1.2	5.1 ± 1.5	0.43
Anorectal abscess	9.7 ± 3.1	7.6 ± 2.7	0.12

Table 7. Size of scar

Site	Group A: Conventional I&D	Group B: MAS drainage	P value
Overall	3.4 ± 0.6	0.7 ± 0.2	<0.05
Breast abscess	3.7 ± 0.8	0.75 ± 0.2	<0.05
Anorectal abscess	3.4 ± 0.6	0.6 ± 0.2	<0.05

Discussion

An abscess is a localised collection of pus or fluid that is walled off due to local tissue reaction. It is a part of the defence mechanism of the body against infective organisms wherein, the body walls off a local inflammatory reaction. This does not allow infection to spread elsewhere. However, it hinders the action of antibiotics.

Breast abscess

The incidence of lactational breast abscess is approximately 0.4 to 11 % [4]. They develop following mastitis in 5%–11% of the patients [8]. Non-lactational abscesses are more common in obese and smokers because of periductal mastitis [5]. The usual signs of a breast abscess include redness, warmth, tenderness and swelling. [6]

Ultrasonography has been described as a primary investigation of choice in patients having an abscess or signs of acute inflammation. The presence of interstitial fluid and hypoechoic wall of abscess cavity is diagnostic of breast abscess. Patients without such signs can be managed with antibiotics alone. The presence of abscess mandates the need for surgical intervention [9].

The commonest organisms found in mastitis and breast abscess are coagulase-positive Staphylococcus i.e, Staphylococcus aureus and Staph. Albus [7]

A study by Chandika et al [2012] randomized patients into 2 groups: USG guided aspiration with 16G needle v/s I&D under general anaesthesia. All patients received tablet

Cloxacillin 500mg TID for 10 days. 65 patients over 14 years of age and with abscess size > 5cm were recruited, 93.1% were cured with a single aspiration while 6.9% required re-aspiration. There was no conversion to I&D, with the mean duration of healing of 24 days in each group [10].

Naeem et al randomized patients into Aspiration v/s I&D. All patients received amoxicillin + clavulanic acid 625mg TID and metronidazole 400mg twice daily until culture reports were available. Pregnant patients and abscesses >5cm were excluded from the study. With 32 patients in each group, 18.8% in the aspiration group required 2 aspirations and 34.4% required multiple aspirations. Mean healing time was 45 days in the I&D group against 19 days in the aspiration group. [11]

We could not find any studies related to minimal access drainage for the treatment of breast abscess. Our study is a pilot study to assess the role of minimal access drainage of breast abscesses.

Perianal abscess

Among all anorectal pathologies, abscesses account for 0.4%, and fistulas account for 0.8% [12]. Perianal abscess like other abscesses requires surgical drainage for adequate drainage and faster recovery. Superficial abscesses can be drained in the emergency room, but higher and deeper abscess requires regional or general anaesthesia for proper examination and drainage. There is no role of 'antibiotic alone' therapy as part of conservative management and all abscesses must be drained either by I&D or other means.

Wright [13] et al compared the minimally invasive technique to open incision and drainage. In their study, I&D was performed on 329 children. 60.2% of the abscess occurred in the groin/ perineal region. 202 patients underwent conventional I&D and packing and 127 [38.6%] underwent minimally invasive drainage. Median length of hospital stay decreased from 2 days [IQR 1-2] in conventional group to 1 day [IQR 1-2] in the MAS group [$p < 0.001$]. there was also a decrease in the total hospital costs with the use of the MAS technique [$p < 0.001$].

Safety et al [14], used a MAS approach in pediatric patients for perianal abscesses. They found lesser pain postoperatively and similar efficacy to conventional I&D. The authors excluded patients less than 18 years of age, those suffering from inflammatory bowel and fistulae. There was no difference between both groups as far as the rate of recurrence, readmission, hospital stay, or total cost were concerned. The traditional group [46 patients] had more postoperative complications. [$p < 0.01$]. The MAS group had 96 patients with lesser complications and better compliance.

Gaszynski et al [15] performed a study on 63 patients with subcutaneous abscesses. All 27 patients in the incision and drainage group required general anaesthesia and 10 were lost to follow up. MAS group had 36 patients and 27 required general anaesthesia. The rate of compliance was 100%.

Data regarding the comparison between minimal access surgery and incision and drainage in the Indian population is still lacking in number and quality.

This study has shown that MAS drainage offers a good cosmetic outcome and earlier resolution of symptoms in the breast abscess group though no significant difference was observed in the anorectal abscess group. The wound size is smaller and dressing time is lesser after MAS drainage. In MAS drainage we can directly visualise the abscess cavity via a telescope and ensure that all loculi are broken. This might result in faster healing and recovery. The loculi are broken via a trocar and with a scope using blunt dissection similar to that in conventional I&D. Visualisation with the scope is necessary to ensure that all loculi are addressed to prevent recurrence and early recovery. In our study, the difference in the period of dressing is around 1-2 days. The size of the scar differs from about 2.5 cm between the two groups. A smaller wound should heal faster which was consistent with our results. The difference in the period was 1-2 days which is not too high. A wound of 3-5 cm is itself a small wound, which might have resulted in a lesser difference in the period between a 0.7cm wound and a 3.4cm wound to heal. Although it was a randomised study, there are confounding factors including patient factors and environmental factors which play a role and is a limitation of this study. MAS drainage should be considered as a treatment option for breast abscesses and non-inferior to conventional I&D for treatment of anorectal and other superficial subcutaneous abscesses. Although we did not evaluate the cost difference among the two procedures, the MAS drainage is likely to be costly as compared to conventional I&D. However, some patients might prefer MAS drainage if given the option of both MAS and conventional I&D. Further, over time MAS drainage might become the standard of care resulting in its incorporation in government hospitals where the cost might not be an issue at least for the patient.

Conflict of interest statement: The authors declare that they have no conflicts of interests or financial ties to expose. Written informed consent was taken from each patient before the procedure. The study was performed with prior ethical approval from the institute ethics committee.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. G majnotime. The healing hand: man and wound in the ancient world. Harv univ press. 1975 (37-38,56-59,90-104, 183-185.).
2. Clark l, fairhurst c, torgerson dj. Allocation concealment in randomised controlled trials: are we getting better? Bmj 2016;355: i5663. https://doi.org/10.1136/bmj.i5663
3. Antibiotic Expert Group. Therapeutic Guidelines: Antibiotic. Peter Leggat Version 14. Melbourne: 2010 Therapeutic Guidelines Ltd.
4. Dener c, inan a. Breast abscesses in lactating women. World j surg. 2003 27(2):130-3. https://doi.org/10.1007/s00268-002-6563-6
5. Dixon jm. Breast infection. Bmj 2003.16;347: f3291. https://doi.org/10.1136/bmj.f3291
6. Abdelhadi MSA, Bukharie HA. Breast infections in non-lactating women. J Fam Community Med 2005. 12(3):133-7
7. Matheson I, Aursnes I, Horgen M, Aabø O, Melby K. Bacteriological findings and clinical symptoms in relation to clinical outcome in puerperal mastitis. Acta Obstet Gynecol Scand 1998. ;67(8):723-6. https://doi.org/10.3109/00016349809004296
8. Bharat a, gao f, aft rl, gillanders we, eberlein tj, margenthaler ja. Predictors of primary breast abscesses and recurrence. World j surg 2009.;33(12):2582-6. https://doi.org/10.1007/s00268-009-0170-8
9. Hayes r. michell m, nunnerly hb; Acute inflammation of the breast-the role of breast ultrasound in diagnosis and management. Clin. Radiology 1991: 44(4): 253-6 https://doi.org/10.1016/S0009-9260(05)80190-4
10. Chandika a, gakwaya am, kiguli-malwadde e, chalya, pl. Ultrasound guided needle aspiration versus surgical drainage in the management of breast abscesses: bmc res notes 2012512.
11. Naeem m, rahimnajjad mk, rahimnajjad na, ahmed qj, fazel pa, owais m. Comparison of incision and drainage against needle aspiration for the treatment of breast abscess. Am surg 2012;78(11):1224-7. https://doi.org/10.1177/000313481207801129
12. Shrum rc. Anorectal pathology in 1000 consecutive patients with suspected surgical disorders. Discolon rectum 1959; 2:469-72. https://doi.org/10.1007/BF02616939
13. Wright tn, gilligan l, zhurbich o, davenport dl, draus jm. Minimally invasive drainage of subcutaneous abscesses reduces hospital cost and length of stay. South med j 2013. ;106(12):689-92. https://doi.org/10.1097/SMJ.0000000000000032
14. Salfity hv, valsangkar n, schultz m, salfity j, stanton-maxey kj, zarzaur b, et al. Minimally invasive incision and drainage technique in the treatment of simple subcutaneous abscess in adults. Am surg 2017.1;83(7):699-703. https://doi.org/10.1177/000313481708300724
15. Gaszynski r, punch g, verschuer k. Loop and drain technique for subcutaneous abscess: a safe minimally invasive procedure in an adult population. Anz j surg 2016. https://doi.org/10.1111/ans.13709