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Original article:

A comparative study of conventional incision and drainage versus incision and drainage with primary closure of the wound in acute abscesses

[1]Dr Mirza Faraz Beg , [2]Prof. Dr. Sunil Kumar Agarwal*

[1]PG Resident Surgery, [2]Unit Head and Professor
Department of General Surgery
National Institute of Medical Sciences and Research, Jaipur, Rajasthan
Corresponding author*

Abstract:

Background: The established principle of surgical management of abscesses has been incision and free drainage; this permits healing by secondary intention or treatment by secondary closure. This modality of treatment has been challenged with the introduction of antibiotics. We compared the outcome of standard incision and drainage of acute abscesses versus incision ad drainage with primary closure of wound in acute abscesses.

Material & methods: A Comparative study done on 100 patients diagnosed with acute superficial abscess in Surgery Department, National Institute of Medical Sciences & Research, Jaipur during January 2017-June 2018.Ethical Committee Clearance was prevail form hospital authority and written consent was documented before selecting for surgery. A total of 100 cases were taken. The study population was selected into two groups, namely, open and closed groups. Comparison will be done on the basis of wound healing time, duration of hospitalization, post operative pain & post operative scars and any severe sequel, which included recurrence and gaping of wounds.

Results: Our study showed that the majority of patients were seen in 21 to 30 years of age group (42% in group A & 36% in group B). Overall male to female ratio was 3:2. Hospital stay in group A was 15.28 days as compared to group B was 9.74 days, which was statistical significant (P<0.0001***). Wound healing days in group A was 14.46 days as compared to group B was 9.20 days, which was statistical significant (P<0.0001***). Our study showed that the VAS score in day 1, day 3, day 5 & day 7 was 7.280±1.126, 6.520±0.8142, 4.760±0.7709 & 1.700±0.8391 respectively in group A and 5.720±1.485, 5.140±1.178, 3.340±0.9172 & 1.060±0.9127 respectively in group B. The comparison of mean in different time duration was statistically significant (P<0.0001*** each).

Conclusion: We concluded that the reduction of hospital stay lengths and subsequent hospital visits for dressing changes reduces the work load of hospital staff and is more economical for both patients and hospitals. This method also allows patients to return to work more quickly and has more satisfactory cosmetic results. Future studies with larger sample sizes, and including larger abscesses, may better help define which closure method is superior.

Keywords: Incision & drainage, Wound healing, Hospital stay, VAS score, Recurrence

Introduction:

Surgical incision and drainage with or without antibiotics is the treatment of choice for skin and soft tissue abscesses[1,2] Acute soft tissue abscesses are common conditions in our environment.[3] For the treatment of skin and soft tissue abscesses, options include repeated aspiration, incision and drainage, incision and drainage with primary closure and conservatively treated by giving antibiotics. Abscesses may be infectious because of certain bacteria; mostly it has seen in different studies that Staphylococcus aureus *and* Streptococcus pyogenes are very common.[4] In case of infections the cavity of the abscess becomes larger while pus cells not get out. In many studies stated that the main cause of abscess is an infection with bacteria. These bacteria produced pus which causes cellular toxicity that can damage the body tissues. However serious medical complications may develop in case of untreated an abscess even it may be life-threatening.[5]

Father of Indian Surgery, Sushrutha[6] followed incision and drainage for such abscess which remains common method of treatment. This conventional method has disadvantages such as periodic painful dressing changes and delayed healing with prolonged hospitalization. This old method of treatment was first challenged by Ellis[7] in 1951, who described primary closure of incised and drained abscess in 30 patients with an anorectal abscess. The mostly of this type of patients healed unchanging within 2 weeks with fewer complications. Since then various studies have illustrated that primary closure is not only safe following I&D of abscesses, but also results in faster healing than secondary closure. This study compared Sushrutha's method and modified Elli's method using closed suction drain.

Ellis taught that the abscess wall prevented access of blood-borne antibiotics to the abscess cavity and that if this wall was curetted away the cavity could fill with antibiotic-laden blood clot, permitting safe primary closure. The primary closure technique is supported by many surgeons who showed its effectiveness in the treatment of breast, anorectal, axillary abscesses.[8] Advantages of primary closure technique are faster healing rate, less hospital stay and early return to work, no greater recurrence than the conventional method, better scar formation and finally reduced cost of labor and material and may be recommended as an alternative treatment that is superior to the orthodox technique.[9] On the other hand some complications have reported in some studies by different scientists in primary closure option after incision and drainage.

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While number of studies claims that secondary closure is a best way of treatment but it is prolonged.

In our study, we compared the outcome of standard incision and drainage of acute abscesses versus incision ad drainage with primary closure of wound in acute abscesses.

Material & Methods:

A Comparative study done on 100 patients diagnosed with acute superficial abscess in Surgery Department, National Institute of Medical Sciences & Research, Jaipur during January 2017-June 2018.Ethical Committee Clearance was prevail form hospital authority and written consent was documented before selecting for surgery.

Inclusion criteria

1. Acute superficial abscesses of any age.
2. Clinically and investigationally proved diagnosis of superficial abscess.

Exclusion criteria

1. Patients suffering from systemic diseases like diabetes mellitus, immunodeficiency, anemia, healing disorder, etc.
2. Patients on steroids, deep seated abscesses (e.g., intra-abdominal abscess, pelvic, thoracic, intracranial abscess).

TECHNIQUE

Superficial abscesses in back, trunk, breast, and extremities and size of upto 10 centimetre were taken. A total of 100 cases were taken. The study population was selected into two groups, namely, open and closed groups. Both group of patients received Tetanus immunization at the time of procedures.

• In open group, I&D of the abscess done and packed with Povidone iodine-soaked gauze. Dressing changed appropriately depending on the soakage.

• In closed group, abscess incised and pus drained, and wall of abscess cavity curetted until fresh bleeding occured. A closed suction drain was kept in the cavity and closed with interrupted sutures and compression bandage applied. Negative pressure reapplied appropriately. Suction drain removed when the discharge was <2 mililitres. Follow-up visits were on 7th, 14th, and 30th post procedure days.

Procedure

First case was allotted, by lottery method and patients were assigned into one group and subsequent patients into alternate groups. Patients were prepared before surgical procedure and

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anesthesia was given. Before recovery of anaesthesia, IV antibiotics were given in both groups for 2 days postoperatively and then regular with tablet for next 3 day, when culture report was not available. Antibiotics were changed accordingly as per culture sensitivity report.

Suction drain was separated after discharge from abscess cavity was minimal (<5 milliliters) and the sutures were removed between 7th and14th day. The average duration of drain removal was 7 days.

Postoperatively evaluate the healing in Group A: Healing was calculated from beginning of incision to complete removal of abscess. In Group B: Healing time was recorded from period of incision to removal of suture promising that edges of skin were properly approximated. Pain assessment was done by visual analog score (VAS).

Comparison will be done on the basis of

• Wound healing time (number of days from the time of incision up to complete epithelialization in open group and up to skin suture removal in closed group).

• Duration of hospitalization (number of days from time of incision to till discharge).

• Post operative pain.

• Post operative scars and any severe sequel, which included recurrence and gaping of wounds.

Results:

Our study showed that the majority of patients was seen in 21 to 30 years of age group (42% in group A & 36% in group B). Overall male to female ratio was 3:2 (table 1 &2).

In our study showed that the hospital stay in group A was 15.28 days as compared to group B was 9.74 days, which was statistical significant (P<0.0001***) (table 3). Wound healing days in group A was 14.46 days as compared to group B was 9.20 days, which was statistical significant (P<0.0001***) (table 4).

Our study showed that the VAS score in day 1, day 3, day 5 & day 7 was 7.280±1.126, 6.520±0.8142, 4.760±0.7709 & 1.700±0.8391 respectively in group A and 5.720±1.485, 5.140±1.178, 3.340±0.9172 & 1.060±0.9127 respectively in group B. The comparison of mean in different time duration was statistically significant (P<0.0001*** each) (table 5).

The distribution of abscess site according to overall culture report. Staph. Aureus mostly present in lower limb abscess (19 cases), E.coli in gluteal abscess (19 cases), sterile abscess mostly in breast (10 cases) and pseudomonas maximum in lower limb abscess (3 cases) (table 6).

Discussion:

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Primary closure following I&D was first advocated in 1951.[10] Many British trials have evaluated primary suture of the cavity following I&D (level I and II evidence).[11-14] The primary closure technique is supported by many surgeons who showed its effectiveness in the treatment of breast, anorectal, axillary abscesses.[8] Advantages of primary closure technique are faster healing rate, less hospital stay and early return to work, no greater recurrence than the conventional method, better scar formation and finally reduced cost of labor and material and may be recommended as an alternative treatment that is superior to the orthodox technique.[9]

Aniruddha Kale, et al (2018)[15] found that the maximum number of patients in Groups A and B were in the age group 21-30 years. In Group A, of 50 cases, 27 were males and 23 were females. In Group B, 31 were males and 19 were females. In our series showed that the male to female ratio in group A was 1.27:1 and male to female ratio in group B was 1.77:1 in our study. Overall male to female ratio was 3:2. Majority of patients was seen in 21 to 30 years of age group (42% in group A & 36% in group B). Dubey et al (2013)[16] found male to female ratio was 1:1.2.

Hospital stay in group A was 15.28 days as compared to group B was 9.74 days, which was statistical significant (P<0.0001***) in present series. Similar finding was observed in a study conducted by Abraham et al. they found that hospitalization was reduced by 40-60% in group with closure of superficial abscess.[9] **Aniruddha Kale et al (2018)[15] found** Hospital stay was less in Group B (11.98±1.82) than in Group A (17.46±2.57), which was statistical significant (P<0.0001***). **M R Madan Karthik Raj, Akmal Aareb (2016)[17] found** mean number of days of hospitalization was significantly less in closed group as compared to open group.

In our series showed that the wound healing days in group A was 14.46 days as compared to group B was 9.20 days, which was statistical significant (P<0.0001***). **Aniruddha Kale et al (2018)[15] found** wound healing was respectively faster in Group B as compared with Group A (<0.0015). Another study done by Dubey and Choudhary found that wound healing was faster in acute abscesses treated with primary closure than in regular incision and drainage.[16] **M R Madan Karthik Raj, Akmal Aareb (2016)[17] found** wound healing time in closed group (12.30±0.80) was faster than in open group (19.63±1.43), which was statistically highly significant ($P < 0.001$). **Singer AJ et al (2011)**[18] stated that the time to healing after primary closure (7.8 days, 95% CI = 7.3 to 8.3 days) was significantly shorter than after secondary closure (15.0 days, 95% CI = 14.3 to 15.7 days; absolute difference 7.3 days, 95% CI = 6.9 to 7.6 days).

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In this series the VAS score in day 1, day 3, day 5 & day 7 was 7.280±1.126, 6.520±0.8142, 4.760±0.7709 & 1.700±0.8391 respectively in group A and 5.720±1.485, 5.140±1.178, 3.340±0.9172 & 1.060±0.9127 respectively in group B. The comparison of mean in different time duration was statistically significant (P<0.0001*** each). Similar findings done with **Aniruddha Kale et al (2018)**[15] found that there was a significant difference in both groups, which is statistically highly significant (P < 0.0001). Similar finding was observed in a study conducted by Abraham et al.[9] **M R Madan Karthik Raj, Akmal Aareb (2016)**[17] **found** the difference in pain scores was statistically significant on day 7 in closed group indicating decreased intensity of pain than open group.

The size of abscess less than 5cm was present in 48% cases, above 5 cm size was present in 44% cases in our study. Similar findings consisted with **M R Madan Karthik Raj, Akmal Aareb (2016)**[17] **Ngo QD, Lam, VWT, Deane, SA (2004)**[19] stated that most of the trials included abscess of <5 cm in size, many of them were not site-specific and culture was not known in all cases.

Staph. Aureus was present in 40% cases followed by E.coli 30% cases, Sterile abscess 25% cases and Pseudomonas present only 5% cases in culture report in our study. Staph. Aureus mostly present in lower limb abscess (19 cases), E.coli in gluteal abscess (19 cases), sterile abscess mostly in breast (10 cases) and pseudomonas maximum in lower limb abscess (3 cases). Abscesses may be infectious because of certain bacteria; mostly it has seen in different studies that Staphylococcus aureus *and* Streptococcus pyogenes are very common.[4] In case of infections the cavity of the abscess becomes larger while pus cells not get out.

Conclusion

In the current study, the healing time was shorter for patients in Group A, possibly because of better access of antibiotics in the abscess cavity due to the curettage of pyogenic membrane and use of closed suction drains. The reduction of hospital stay lengths and subsequent hospital visits for dressing changes reduces the work load of hospital staff and is more economical for both patients and hospitals. This method also allows patients to return to work more quickly and has more satisfactory cosmetic results. Primary closure with negative suction drain is a better alternative technique over the conventional incision and drainage method of acute abscesses. Future studies with larger sample sizes, and including larger abscesses, may better help define which closure method is superior.

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Table 1: Gender wise distribution of cases in Group A & Group B

Sex	Group A	Group B	Total
Male	28	32	60
Female	22	18	40
Total	50	50	100

Table 2: Age wise distribution of cases in Group A & Group Be-wise distribution of cases in Groups A and B

Age (yrs)	Group A	Group B	Total
11-20 yrs	4	5	9
21-30 yrs	21	18	39
31-40 yrs	6	8	14
41-50 yrs	8	10	18
51-60 yrs	5	5	10
61-70 yrs	6	4	10
Total	50	50	100

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Table 3: Comparison of Hospital stay in groups A & B

Hospital stay	Group A	Group B	Z-value	p-value
Days	15.28±2.232	9.740±1.724	13.89	<0.0001***

Table 4: Comparison of wound healing in groups A & B

Wound	Group A	Group B	Z-value	p-value
Healing (Days)	14.46±2.233	9.200±1.414	14.07	<0.0001***

Table 5: Day- wise comparison of VAS in groups A & B

VAS	Group A	Group B	Z-value	p-value
Day 1	7.280±1.126	5.720±1.485	5.919	<0.0001***
Day 3	6.520±0.8142	5.140±1.178	6.814	<0.0001***
Day 5	4.760±0.7709	3.340±0.9172	8.381	<0.0001***
Day 7	1.700±0.8391	1.060±0.9127	3.650	0.0004***

Table 6: Distribution of abscess site according to overall culture report

Culture	Gluteal abscess	Lower limb abscess	Breast abscess	Axillary abscess	Others
Sterile	6	4	10	4	1
Staph. Aureus	8	19	3	9	1
Pseudomonas	1	3	0	1	0
E.coli	19	10	0	0	1
Total	34	36	13	14	3

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