ACUTE ABSCESS MANAGEMENT – A PROSPECTIVE 1-YEAR SINGLE-CENTRIC RANDOMIZED CONTROL TRIAL FOR COMPARISON BETWEEN PRIMARY CLOSURE OF SUPERFICIAL ABSCESS VERSUS HEALING OF ABSCESS BY SECONDARY INTENTION

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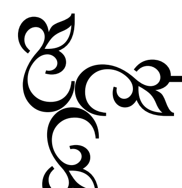

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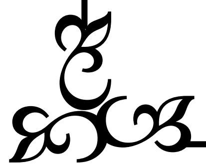
Dr. A.S.GOGATE M.S.
Professor and Head,
Department of General Surgery,
J. N. Medical College,
Nehru Nagar, Belagavi
Date:
Place: Belagavi

Dr. N.S. MAHANTASHETTI. MD(PAED)
Principal,
J. N. Medical College,
Nehru Nagar, Belagavi
Date:
Place: Belagavi



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(A constituent unit of KLE Academy of Higher Education & Research Deemed-to-be University)

Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category "A" by MHRD (GoI)

Nehru Nagar, Belagavi-590 010, Karnataka-India

Website : http/www.jnmc.edu
E-Mail : Principal@jnmc.edu

Office : +91-(0)831 2471350
FAX : +91 (0)831-2470759

Ref. No. MDC/PG/2278 Date : 17/9/2017

To,

REG NO. BH0117005

Postgraduate Student,
Department of General Surgery,
2017-18 Batch,
J. N. Medical College,
Belagavi.

Sub: Acceptance Letter

Sir/Madam,

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ABSTRACT

Background and objectives:

Acute abscess is amongst the common conditions to occur in the field of surgery. The conventional method of abscess management i.e. healing of abscess by secondary intention has disadvantages such as periodic dressing changes, painful dressings, delayed wound healing, prolonged hospitalization. However, closure of abscess cavity can also be achieved via suturing the skin and placing a negative pressure drain in the abscess cavity to promote obliteration of the cavity and wound healing i.e. healing by primary closure. This method of closure does not have the above mentioned disadvantages

Materials and methods

This one year randomized controlled trail was done in Department of General Surgery, KLES Dr.Prabhakar Kore hospital, Belagavi from January 2018 to December 2018. A total of 60 patients with an acute superficial abscess were included in this study. These patients were divided into two groups of 30 each that is Group A (Abscess closure by Healing with Secondary Intention) and Group B (Abscess closure by Primary Intention and placing a negative pressure drain).

Results

Amongst the 60 cases studied, the patients were evenly distributed amongst all age groups with a mean age of 47 years. Majority of the abscesses were gluteal abscesses in the study (18) followed by breast abscesses (10). The mean duration of hospital stay was 8 days in primary closure whereas it was 10 days in secondary healing group with a p-value of 0.256(not significant). The number of dressings required in primary closure group was found to be significantly less, with a mean of

5-6 dressings as compared to 16 dressings in secondary healing with a p-value of 0.0001 (statistically significant). The mean wound healing time was about 11 days in primary closure group as compared to 15 in secondary healing group with a p-value of 0.0001 (statistically significant)

Conclusion

Primary closure is suitable for all superficial abscesses under antibiotic cover, and the results were excellent when it came to mean healing time and the number of dressings required between the two groups. Hence, the method of primary closure of an abscess may be considered as an acceptable method when it comes to superficial abscesses

Key words

Abscess, primary closure, secondary healing

LIST OF ABBREVIATIONS

A	:	Wound healing by secondary intention
B	:	Wound healing by primary closure
COMP.	:	Complications
DOHS	:	Duration of Hospital Stay
DOS	:	Date of Surgery
I & D	:	Incision and Drainage
IP NO	:	In-Patient Number
NO.	:	Number of Dressings
OPD F/U	:	Outpatient Department Follow-Up
PROC.	:	Procedure
REC.	:	Recurrence
WHT	:	Wound Healing Time

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INTRODUCTION

A pyogenic abscess is a common condition affecting all age groups.

The age-old method of treatment for any abscessof incision followed by ensuring free drainage of the resulting cavity has good results by and large; however the technique has its drawbacks such as long periods of painful dressings, prolonged hospital stay and thus economic stress to the patients. Since 1951, when Ellis challenged this method of drainage of the abscess, curettage and primary closure of the abscess have demonstrated goodresults (Ellis – 1951, 1953, 1970; Jones and Wilson – 1976). This has been advocated in all superficial abscesses with rapid healing with a good scar, less hospitalization and fewer painful dressings.(1)

The role of antibiotic cover was first expounded by Ellis (1951) stating that significant level of antibiotics in the blood at the time of incision and curettage ensured sterilization of the abscess cavity.(2) He showed that the wall of the abscess cavity or “pyogenic membrane” is relatively impermeable to antibiotics circulating in the blood. Once the wall is breached, the blood with the antibiotic will be able to stop the bacterial growth which will render the cavity sterile for primary closure.(3)

This technique of the abscess cavity preventing infection from getting out and antibiotic from getting in was confirmed bacteriologically by Benson and Goodman(1970).(4)

In this study, a comparison has been done between incision, drainage and primary closure of a superficial abscess and age-old method of incision and drainage followed by healing of the abscess cavity by secondary intention. A totalof 60 patients have been included in thestudy, 30 patients treated by primary closure of the abscess and the other 30 by healing with secondary intention.

OBJECTIVES

The objective of this study is to compare the short term outcomes of patients with primary closure of abscess versus healingof abscess by secondary intention

REVIEW OF LITERATURE

A marked progress has been made since the era of Lister in the field of surgery as well as microbiology; and yet infections continue to be a major challenge n current surgical practice. The preceding century saw unbelievable mortality and morbidity rates caused by surgical infections.

The concepts of Lister's antisepsis along with Bergmann's concept of asepsis have contributed significantly in the control of infections in surgery via the development of modern chemotherapy. The discovery of penicillin by Fleming in 1928 was the trigger for further advent of antibiotic agents which have also been of great use in mitigating surgical infections. It is essential to understand the body's defense mechanism against infection to apply surgical and therapeutic modalities I the control of these infections.(5)

An acute abscess by definition is "The outcome of acute suppurative inflammation" when this process is sharply localized in the depths of an organ or tissue by a cellular reaction; a zone of granulation tissue prevents the free diffusion of the purulent exudate.(6)

Until 1951 and later to, the standard and conventional method of abscess management practiced for many years, given by Sushruta, has been incision and drainage (I&D) followed by secondary healing in which the open wound is allowed to heal by granulation tissue formation and re-epithelialization. This method has been challenged by Ellis in 1951, wherein he promoted the closure of abscess by suturing.(3)

Another study was performed in 1976 by Jones and Wilson which used the similar technique of primary closure for 150 acute abscesses with antibiotic cover by lincomycin and clindamycin. The results were mostly positive in the study with comparison of healing time between abscesses at different sites.(1)

A study published in British Journal of Surgery in the year 1985 by Stewart, Laing and Krukowski compared the two methods of primary closure of abscess v/s the healing by secondary intention with a focus on the bacteriology of pus along with other common parameter.(7)

Another detailed study was performed comparing the two methods in the Australia and New Zealand Journal of Surgery in 1997 by Abraham, Doudle and Phil Carson wherein postoperative analgesia was one of the important parameters measured along with others.(8)

Singer et al performed two separate studies in 2011 and 2013, one considering a systematic review of primary closure and the other mentioning a difference between the above two methods.(9)

In 2013, Dubey et al also performed a comparative study wherein they found postoperative complications to be lesser in the group with closure of abscess by primary intention than with healing by secondary intention.(10)

Thus, based on the recommendations from all above studies, incision of the abscess cavity followed by drainage of the pus and curettage of the wall of the cavity was effective in transporting blood laden with antibiotic into the cavity and then, closure of the cavity obliterating any space and preventing entry of any further infection.

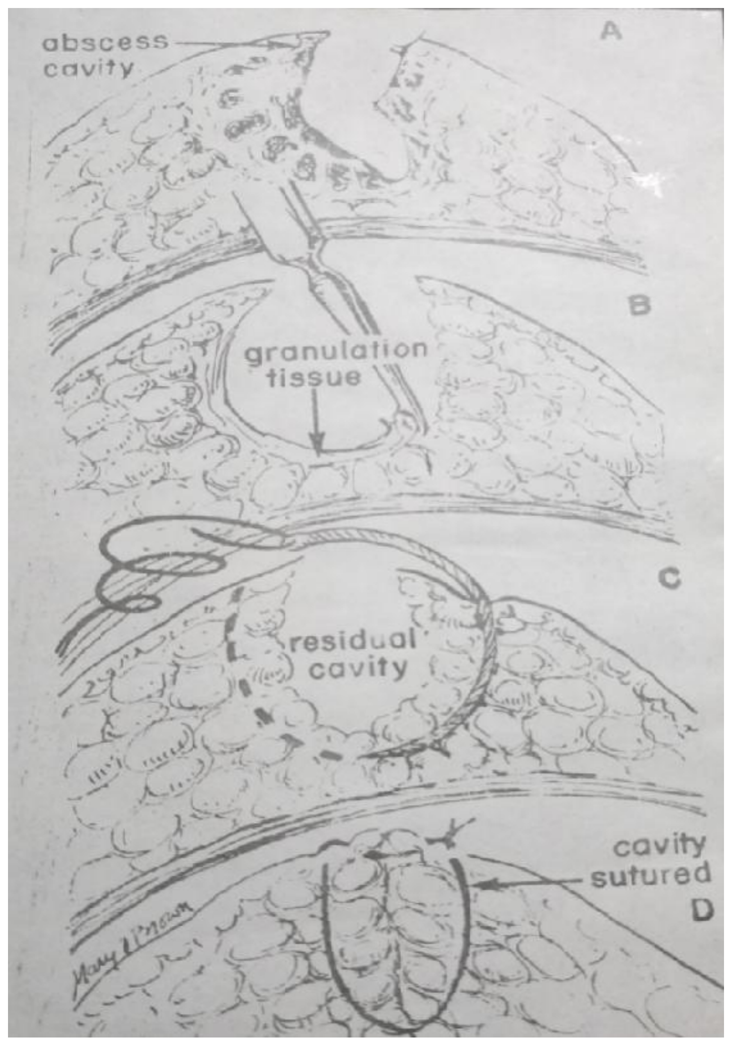


Fig.1. Pictorial demonstration of suturing of an abscess cavity.

AETIOLOGY AND ROUTES OF INFECTION

As a dictum, an acute abscess is the result of suppuration following bacterial infection, for which a large number of bacteria may be responsible. An abscess can also be made to occur experimentally in absence of bacteria by powerfully irritant substances such as turpentine. An occurrence of an abscess is usually associated with a large number of infective bacteria, or may be associated with a comparatively low resistant host which helps in augmentation of the bacterial load.

Inflammation is caused as a result of virulent organisms infecting the ost, most notably among them being cocci which are gram positive and pyogenic in nature. Staphylococcus pyogenes characteristically produces such a response. Some strains of staphylococcus albus may also present with such features. It should always be remembered that the micro-organism causing formation of an acute abscess anywhere in the body can produce suppurative inflammation with/without abscess formation irrespective of in vitro bacteriological cultures.

Common routes of access for formation of an abscess can be by the following methods:

i) Breach caused of the tissue surface:

   Breach caused in mucous membrane and skin which may be pathological / traumatic.

ii) Extending into a duct system / duct:

   It is due to an entry in a contaminated tube or contaminated duct or hollow viscus and when associated with obstruction of duct and the secretions which are retained get infected such as a staphylococcal abscess affecting the dermis, lung abscess due to a stenosed bronchus, breast abscess.

iii) Rupture of tube or viscus:

It is due to distension of inflammatory exudate or infected material; due to perforation of appendix, ruptured pyosalpinx, peptic ulcer perforation or subphrenic abscess.

iv) Lymphatic extension:

An acute suppurative lymphadenitis causing an acute abscess may occur due to an extension through any of the above mentioned foci(11).

v) Due to venous involvement:

It starts as an acute thrombophebilitis and produces venous dissemination or an acute local abscess by means of septic infarction or a septic embolus, also infected emboli may reach the lungs causing venous pyaemia; or portal pyaemia caused by infected emboli formed in the portal system; puerperal endometritis, acute staphylococcal osteomyelitis or acute mastoiditis formed in a similar manner.

vi) By bacteremia :

The abscesses formed due to bacteremia may be larger, few, and localization to a tissue. Those due to septicaemia and arterial pyaemia may be many and small size. They may also be fewer and larger in acute endocarditis, brain abscess caused secondary to bronchiectasis, staphylococcal osteomyelitis.(5)

PATHOLOGY

- General sequence of events:

The sequence of events leading to formation of an acute abscess can be enlisted as below:

1. Growth, proliferation and bacterial dissemination
2. Inflammation caused due to dilatation of the capillaries, plasma exudation and edema caused by inflammation and tissue damage leading to release of toxic substances.
3. Polymorph nuclear leucocytes infiltrating and causing a transformation of the lesion.
4. Localization of the lesion early by formation of a temporary defense barrier.
5. Phagocytosis of bacteria by the leucocytes causing a leukocytosis in blood.
6. Autolysis of the leucocytes in the process liberating enzymes.
7. Proteolysis and lipolysis of the tissue constituents leading to liquefaction and pus formation.
8. Granulation tissue formation and its consolidation.

- Chemo taxis:

The proliferating bacteria probably produce diffusible and soluble toxins such as the alpha toxin of staphylococci, which cause tissue damage further leading to suppuration. The alpha toxin causes quick and acute necrosis of tissues. Such toxins and other products produced by bacteria may cause acute inflammation, and this leads to formation of breakdown products from the tissues which cause positive chemo taxis at following stage.

There is little available knowledge on the mechanism regarding chemo taxis; it is the attractive force of neutrophils towards bacteria which invade. Usually protein breakdown products form chemotactic agents which may be present in damaged cells and tissues including muscle and skin.(12)

Menkin in 1940 claimed that emigration of leucocytes which is found due to inflammation caused by bacteria and also in areas of scalding which have occurred due to turpentine oil application; is due to a breakdown product found at site of inflammation, leukotaxine. He had isolated this powerfully chemotactic substance. This was confirmed by Duthie and Chain. The leucocyte chemotactic response is not altered by acquiring immunity. It is not specific, as is an immune response, and it is more primitive compared to an antibody response. The duration of this response is not affected by the individual’s immune status per se.(5)

- Source of leucocytes :

The circulating blood alone will not be able to be the source of granulocytes in the earlier stages of abscess formation; these may be provided by the circulating leucocytes attracted by the breakdown products of proteins. It takes about 36 hours for the leucoblastic reaction formed by the maturing myelocytes and while this process is ongoing, there has to be a supply of mature granulocytes attached to the marrow as an emergency store. The protein breakdown products which act as an attracting force to the leucocytes to an inflamed area may be the ones which are transported to the bone marrow and may help in exerting a similar effect on the mature leucocytes.

Thus, the vascular response causes an increase in flow of blood through the marrow and cause leucocyte emigration. This emigration and suppuration will not occur if this response is not present. Hence, it is integral to the suppuration process.

- Localization of infection:

The localization of inflammation is an integral part of formation of an abscess and it is dependent on a variety of factors, including the micro-organism and its nature including an inability to spread through normal tissues or through a cellular or fibrinous layer which is made by the reacting tissues. Also, the tissue response may cause the formation of a mechanical barrier around micro-organisms or immobilize the micro-organisms by producing antibodies and causing agglutination leading to phagocytosis, bacterio-stasis or bacterio-lysis.(13)

- Fibrin barrier agglutination:

Localization is most vital in the early hours of infection before tissue defenses are mobilized.Localization early on following infection occurs by a barrier formation composed of fibrin occurring between normal tissue and the focus of inflammation. The effectiveness of the barrier is based on the speed at which fibrin is formed, and this in turn is decided by the degree of tissue injury occurring locally, as proposed by Menkin.

However, these views may not hold true in case of certain specific and highly soluble bacterial products which may play a large in the production or disruption of the fibrin barrier in pyogenic inflammation.

Streptococci causing diffuse inflammation produce a powerful fibrinolysin and this aid in their diffusion. Staphylococci do not produce fibrinolysin and this may partly explain their tendency to remain localized. Pathogenic staphylococci on the other hand excrete coagulase which rapidly coagulates plasma and may assist the rapid formation of an efficient defense barrier in the early hours of an acute abscess formation.

Another opinion by Rich considers that localization is largely conditioned by immobilization of the bacteria brought about by specific agglutination, this process progressing until the masses of clumped bacteria become fixed in the tissue, largely by virtue of their size.(13)

- Leucoblastic reaction of marrow :

The excessive demand for granular leucocytes during the evolution of any large or medium sized acute abscess is met in the first place by a discharge from the marrow of its emergency stock of mature white cells and by the accelerated ripening of partly differentiated myelocytes. This process may well be stimulated by protein breakdown products occurring in the inflamed tissue and Menkin has isolated a pseudo globin from inflammatory exudates which has this action. The maintenance of the sustained leukocytosis of acute suppuration is however a totally different process. This involves the proliferation by mitosis of primitive undifferentiated cells. It is a clear example of hyperplasia and judging from other hyperplastic processes, the stimulus producing it is probably a chemical one and is likely to have a physiological basis. There are several good reasons for supposing that nucleic acid or a closely allied substance provides this stimulus to mitosis. Substances of this group produce a marked leucoblastic reaction in normal animals. They must be constantly produced under physiological conditions as the nuclei of senile leucocytes disintegrate in the tissue and are almost certainly produced in excessive amounts by the action of the nuclease liberated from autolysing leucocytes during the process of suppuration.(12)

- Leucocytic destruction:

Process of acute abscess formation has been described as far as the local accumulation of a large number of emigrated leucocytes in the depths of a tissue. The next essential step is the rapid and wholesale killing of these cells. A

polymorphonuclear leucocyte which has emigrated into a normal tissue, must have a life span of few hours at the most and the majority of those which crowd into focus of suppuration must die rapidly, partly because of their unsuitable chemical and physical environment and partly from attack by toxic bacterial products, one such substance, staphylococci leucocidin is known to have a specific lethal effect on leucocytes and is apparently quite distinct from the toxin produced by the same micro-organism. It may well be that the capacity to produce a specific leucocidin explains in part the strong tendency of the coagulase positive staphylococci to produce localized suppuration. The scale on which leucocytes are destroyed obviously depends upon the speed at which the bacteria are proliferating in the lesion, altering the physical and chemical conditions within the lesion and liberating toxic metabolites.(14)

- Liquefaction – pus formation:

The death of leucocytes is followed by rapid autolysis of their cytoplasm and a complex mixture of cytoplasmic enzymes previously locked up in these cells, is liberated into the inflamed tissue. The fact that polymorphonuclear leucocytes can actually digest bacteria strongly suggest that they contain proteolytic enzymes and there are a fair number of observations which show that polymorphonuclear leucocytes contain considerable quantities of trypsin, nuclease, amylase, lipase and cathepsin. All the tissue elements lying within the focus are rapidly liquefied and the soluble end products, peptones and polypeptides, are added to the inflammatory exudate. The opaque fluid or pus which now entirely replaces the infected tissue is thus composed of living, dying or dead and autolysing leucocytes lying in inflammatory exudate composed of blood plasma diluted with tissue fluid and containing the end products of liquefaction of the tissue together with the living and

dead bacteria lying either free in the exudate or inside the bodies of the leucocytes.(12)

- Granulation tissue barrier:

At a relatively early stage in the evolution of an acute abscess and before central liquefaction is complete, the fibrin barrier becomes autolysed and is replaced by a living, growing and organized tissue composed of angioblastic mesenchyme containing myriads of primitive capillary blood vessels and proliferating fibroblasts which is granulation tissue. Solid buds composed of vasoformative endothelial cells (angioblasts) sprout from the walls of the tissue capillaries and push forwards to the extreme edge of the area of leucocytic infiltration and softening. They join to produce loops which become canalized by vacuolation of their central cells. These primitive capillaries lie at first in gel like matrix probably derived from plasma proteins, rapidly proliferating fibroblasts lie in close opposition with their walls.

The granulation tissue barrier develops and increases in thickness with the process of liquefaction in abscess. It may be regarded fertile formative tissue solely concerned with healing or as a living barrier forming an integral part of the defense process but eventually providing an undifferentiated tissue which lays the foundation for repair. Whatever its true significance may be, there is little doubt that the granulation tissue barrier around an acute abscess limits the spread of infection, is often called upon to resist actual bacterial invasion and frequently repels it.(3)

CLINICAL FEATURES

The local features of pyogenic abscess are a feature of common in surgical practice, but the distinction between organisms which produce local necrosis (typically those of staphylococcus) and those which result in a spreading of infection is worth noting, particularly there is a need to stress that the former group is associated with rapid rise in tissue tension often in the fascial compartments which contain fat i.e. the lobules of the breast, the pulp spaces of fingers and toes, the buttock and ischio-rectal fossae and fascial spaces of neck, palm and sole. The result is severe local and sometimes general symptoms and early necrosis with slough formation, the tempo of surgical management must take this into account and, in particular, the temptation must be resisted to prolong antimicrobial treatment when what is needed is decompression. By contrast, in the group, where the infection spreads rapidly, the urgent need is for chemotherapy, and surgery is likely to be unnecessary or at least unproductive until late in the disease when localization has taken place either at the site of infection or in the regional nodes.(6)

- Symptoms:

The patient feels ill, the degree depending upon the size of the abscess, the virulence of the organism and the tension within the cavity. Throbbing pain is characteristic of suppuration, the pain becoming more severe if the affected part is dependent.

- Signs:

These may be general or local.

General signs are characterized by an elevated temperature, in severe cases rigors may be present.

Local signs are the five classical local signs of inflammation due to hyperemia and inflammatory exudate.

1. Heat: inflamed area feels warmer than the surrounding tissues.
2. Redness of the skin over the inflamed area. Both heat and redness are due to hyperemia
3. Tenderness: Due to pressure of the exudate on the surrounding nerves, if the exudate is under tension in a furuncle(boil) of the ear, pain is severe whereas lax tissues (i.e. scrotum) may swell enormously with little discomfort.
4. Swelling
5. Loss of function: An inflamed tissue does not perform its physiological function.(6)

The degree, to which these signs are evident, depends on extent of the inflammation and its proximity to the surface, the surface the swelling is at first edematous, later softening and fluctuation occurs, in some cases increasing edema is characteristic of deep pus, as in acute mastitis. If untreated, an abscess tends to point the skin or membrane covering it gives way and the contents are discharged usually with relief.

COMPLICATIONS & SEQUELAE

1. Resolution:

A naked eye examination of the inner wall of the abscess cavity often shows it to be lined with a friable, shaggy, grey membrane (pyogenic membrane) composed of necrotic tissue not yet completely liquefied and not infrequently heavily infected by the bacteria. In some instances, the amount of undigested necrotic slough lying adherent to the wall of the abscess or free in the cavity is considerable. This material, out of reach of the circulation and heavily infected, cannot be reached by the antibiotic and bacteriostatic agents and suppuration continues unless it is to be completely removed, outside this zone, the signs of inflammation become less conspicuous and in the outermost zone are often absent.(15)

2. Invasion of the granulation tissue:

If the granulation tissue fails to resist invasion and this usually takes place before an efficient barrier is laid down and when bacteria are freely multiplying, the whole thickness of the granulation tissue becomes pierced at many places by finger like processes composed of closed packed leucocytes. As these push forward into the tissue, they are in turn held by a barrier, at first composed of fibrin, coagulated plasma and reacting tissue mesenchyme, and later by a granulation tissue envelope. In this way, an acute abscess increases in size and may considerably alter its shape by the development of extensions and loculations.

3. Loculations:

Loculation is often an obstacle to successful treatment of acute abscess by penicillin and bacteriostatic drugs. It is prone to occur in glandular tissues such as the breast

where it is complicated by the occurrence of multiple ruptures into the duct system with extensive spread and burrowing.

4. Diffusion of infection:

If the penetration of granulation tissue is not localized, there is a risk of free dissemination of infected purulent exudate into the tissue. The acute abscess then becomes the centerof an area of diffuse suppurative inflammation. This complication is liable in any situation to give rise to free dissemination of bacteria by lymphatics with the possibility of acute suppurative lymphadenitis with or without acute abscess formation in the regional lymph nodes.

a) Rupture:

The granulation tissue which encloses an acute abscess is called upon to withstand another force which tends to destroy its continuity. This is the considerable and increasing hydrostatic tension exerted in all directions by the contents of the abscess when total liquefaction has transformed this into a sphere of fluid of constantly increasing volume imprisoned in solid tissue. This internal tension alone may lead to rupture which may be precipitated by pressure, trauma or violent muscular contraction.

b) Tracking pus:

Rupture into the tissue itself will disseminate infective exudate and considerable force along the line of least resistance and the tracking pus will travel considerable distance until it is discharged to the exterior or ruptures into a duct, space, sac, hollow viscus, cavity or blood vessel. Rupture of an abscess may lead to spontaneous cure provided the pus is discharged to the exterior and the point of rupture, is favorable situated for the free discharge of all contaminated material.

Failing this, suppuration will continue. The track to the surface is then enclosed in a sleeve of granulation tissue and often becomes secondarily infected. It is often tortuous and liable to become intermittently obstructed with the risk of the formation once more of pus under tension and the danger of rupture at another and perhaps more dangerous point.

Rupture into a space or tube may cause innumerable complications, some of the serious being a general peritonitis, acute meningitis, acute arthritis and acute osteomyelitis. These complications are determined by the situation of the primary lesion.

5. Thrombophlebitis:

It must be constantly born in mind that any acute abscess in any situation, may involve the wall of a nearby vein with the production of acute thrombophlebitis and the grave risk of venous pyaemia. This risk is obviously greater in organs such as the uterus and prostate which contain venous plexuses, the vessels of which are tortuous and thin walled and which not infrequently become varicose and have a pronounced tendency to undergo thrombosis.(5)

6. Application to treatment:

In the majority of instances, bacteria can be seen in films made from the pus of an acute abscess. They can be cultivated from it in the large majority of the cases even when the results of film examination are doubtful. Enriched nutrient media may be needed and is sometimes necessary to incubate cultures anaerobically or in an atmosphere containing 5% carbon dioxide.

It must therefore be assumed that the pus of an acute abscess is a highly infective fluid and always contains living and viable bacteria. For this reason an acute

abscess must be considered as an surgical emergency and in spite of the brilliant results obtained by the use of antibiotics and bacteriostatic drugs, every well established and deep seated abscess containing pus under tension and liable for spontaneous rupture requires incision and adequate drainage.

This is all the more necessary when the cavity is loculated or the pus is burrowing and when there is any likelihood that the cavity may contain infected slough which is out of reach of the circulating blood. It is however possible to arrest the further development of an acute abscess at an early stage, if the patient is given adequate systemic appropriate antibiotics, even then an incision must be made in the lesion to relieve the tension and it must be borne in mind that free drainage is urgently called for unless there are clear indications of rapid and satisfactory resolution.

In view of the enormous help to be expected from treatment with antibiotics, a full bacteriological examination of the pus from all acute abscesses unless small and superficial should be carried out as soon as possible. This examination must, of course, include tests to determine the sensitivity of the cultivated micro-organisms to antibiotics and the appreciate supplement of the antibiotics should be done at the earliest.(14)

TREATMENT

In a situation of any severity, every attempt should be made to put both the patient and the affected area at rest.

- Antibiotics:

In the early stage of an acute local infection, so sited that it is of potential seriousness and showing obvious signs of spread, widening erythema lymphangitis or lymphadenitis, antibiotics must be administered on a best guess basis taking into consideration the known sensitivities of the organisms in a population, the characteristics of the infection and for the choice of route of administration, the urgency of the situation.

The following general rules are also important:

1. A history of antibiotics may be sought and sensitivity from every patient may be noted.
2. In severe infections, a blood culture should be taken and repeated daily, it may be the only way in which the organisms can be identified.
3. The clinical features should be reviewed and the antibiotic therapy needs to be reviewed accordingly in the scenario of persisting or worsening local and/or general signs after 24-48 hours. In case there is need for drainage or decompression and reassessment of the antibiotic if indicated.

  - The drainage should be carried out at a point of maximum tenderness.(16)

  - Wound healing:

Healing of a wound occurs by either secondary healing or by primary intention when the wound edges have been approximated. The first tissue to bridge the incisional gap is the squamous epithelium of the epidermis within 24 hours and extending from 3-4 mm around the wound edge there is enlargement and flattening of the basal cells and loss of prominent rete ridges; proliferation also occurs, mainly among basal cells in the epidermis and pilosebaceous follicles adjacent to the wound. The cell which produce proteolytic enzymes, grow beneath the surface clot and also down the cut edges into the dermis. Within 48 hours and before there is any consecutive tissue regeneration, the wound may be bridged by epithelium which rapidly becomes stratified and any epithelium which has grown down the dermis is later resorbed.

The dermis and subcutaneous tissue heal by proliferation of new blood vessels and fibroblasts to form the granulation tissue. From about the third day, vascular proliferation is seen as capillary sprouts which grow from blood vessels at the wound margins and advance up to 2 mm per day into the wound. The capillary sprouts are produced partly by rearrangement and migration of pre-existing endothelial cells and partly by proliferation just behind the advancing tip; sprouts are first solid and then gel canalizes and circulation is restored. Lymphatic vessels are also restored in the same manner as the blood vessels.(11)

Fibrous tissue proliferation occurs in the following manner. After the removal of blood, fibrin and the dead cells from the wound and simultaneously with the development of new blood vessels, long, spindle shaped fibroblasts in the adjacent tissue begin to proliferate and to move into the incisional area. Within 4-5 days, fibroblasts mingle in the incision and produce randomly arranged reticulin fibers

which are soon converted into the mature collagen which gives scar tissue its original strength.

- <u>Events following primary wound healing:</u>

Once the wound is healed, the young scar is raised above the surface due to the underlying proliferative processes and is red as a result of increased vascularity, the blood vessels gradually decrease in number and excess fibrous tissue may slowly disappear. Elastic fibers are formed much later than collagen. Sensory nerves may reach the scar in about three weeks but specialized nerve findings such as pacinian corpuscles do not reform, the end result of healing by first intention should be a pale linear scar level with the adjacent skin surface but sometimes a hypertrophic scar or keloid may form.(12)

MATERIALS AND METHODS

The material for the clinical study and comparisons of primary closure versus open drainage in superficial abscess has been taken from all the patients admitted to Kle'sDr. Prabhakar Kore Hospital and MRC, Belagavi. The cases have been taken in the study period from January 2018 to December 2018. A total of 60 cases have been selected of which 30 cases were treated with open drainage and the remaining 30 cases were treated with primary closure of the abscess. Superficial abscesses i.e. those lying in the superficial plane including skin and superficial fascia were considered for this study. Deep abscesses, perineal and perianal abscesses were excluded from the study.

- History

All patients in the study have been interviewed in detail and the necessary history, investigations, treatment and follow up have been recorded in accordance with the proforma specially prepared for the same.

Each patient was asked about his complaints with reference to any comorbidity (e.g.: diabetes mellitus) that may have been associated with the patient. Regarding the abscess, the duration of abscess, associated symptoms, the site was noted.

- Examination:

All patients were examined for the state of nourishment, degree of anemia, presence of edema. A systemic examination of all vital systems including cardiovascular, gastrointestinal, respiratory and neurological systems was done.

The site, size of abscess, condition of the overlying skin, presence of erythema, tenderness, local rise of temperature and such other findings were noted.

- Investigations:

Routine investigations such as hemoglobin percentage, random blood sugar, and other blood investigations required for fitness for surgery were done in all cases.

- Diagnosis:

A diagnosis was made on clinical basis including history, physical examination and following the investigations, patients were prepared for surgery after taking written informed consent. Patients were kept nil by mouth for a period of 6 hours and all patients received a dose of injection tetanus toxoid and lignocaine sensitivity testing. Affected parts were prepared for surgery. Patients were allotted into two operative groups based on Sequentially Numbered Opaque Sealed Envelopes (SNOSE)

- Surgery/ intervention:

Every patient planned for surgery was given a single dose of systemic antibiotics pre-operatively in all cases and post-operatively, the antibiotics was continued for all patients. A course of amoxicillin with clavulanic acid as per culture reports noted in previous cases of abscesses over a period of one year; following which antibiotics were started as per the culture reports and antibiotic sensitivity. The parts were painted and draped after giving appropriate position to the patient along with anesthesia.

Hilton's method of abscess drainage for incision was chosen in all cases, wherein the incision was made on the most prominent part of the abscess to facilitate easy drainage of pus. The skin and subcutaneous tissue were incised and a pair of

sinus forceps or artery forceps was inserted to widen the abscess cavity, after opening the blades. Pus coming out was collected and sent for culture and antibiotic sensitivity.

A finger was introduced in the abscess cavity and the cavity was explored. Any loculi found were broken and one single abscess cavity was created. The wall of the cavity was thoroughly curetted. All pus in the cavity was liberally drained. A thorough povidone iodine and hydrogen peroxide wash was given into the cavity, followed by normal saline wash till clear fluid drained out of the cavity.

In the first group (Group A), the abscess was incised and after drainage of pus, the wound was packed with roller gauze soaked in povidone iodine and hydrogen peroxide and dressing was done. The wound was reviewed after 24 hours and any residual pus was removed. Daily dressing was done for the patient and gradually, the size of the pack placed inside was decreased as the cavity started filling up.

In the second group (Group B), after incision of the abscess and adequate drainage and wash, a negative-suction drain was placed in the cavity after inserting it out through the most dependent part of the abscess and the abscess cavity was closed with ethilon sutures taken on a large curved cutting needle which was passed through the cavity to obliterate the cavity and act as an adjuvant in drainage of the pus along with the drain. The skin was cleaned with spirit and a firm compression dressing was applied. The dressing was reviewed on post-operative day 3 and alternate day thereafter. Drain was removed when it did not show any collection in all cases. Sutures were removed on post-operative day 10 in almost all cases.

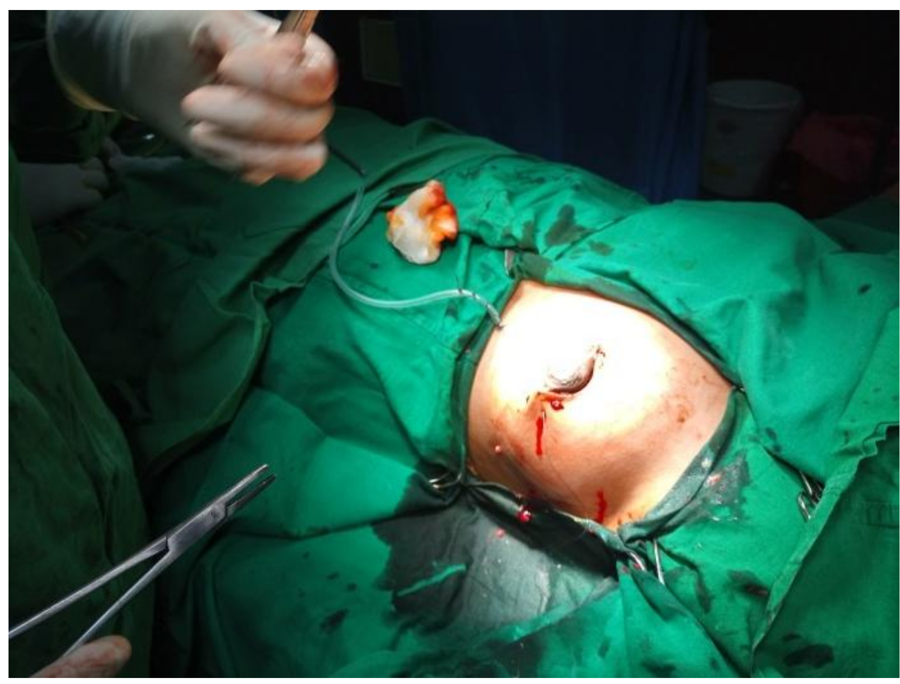


Fig.2. Breast Abscess I & D.

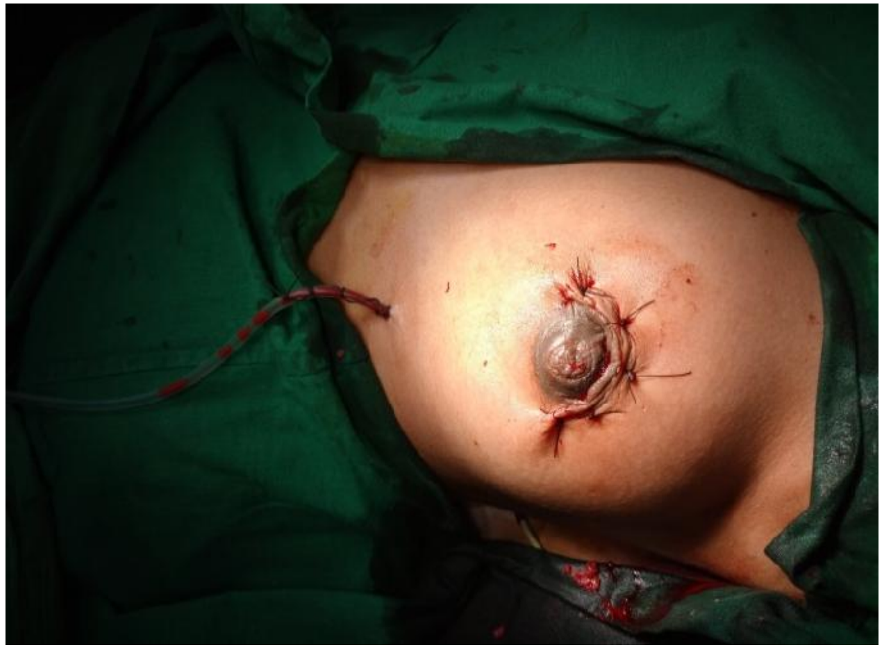


Fig.3. Primary closure following I& D with placement of drain.

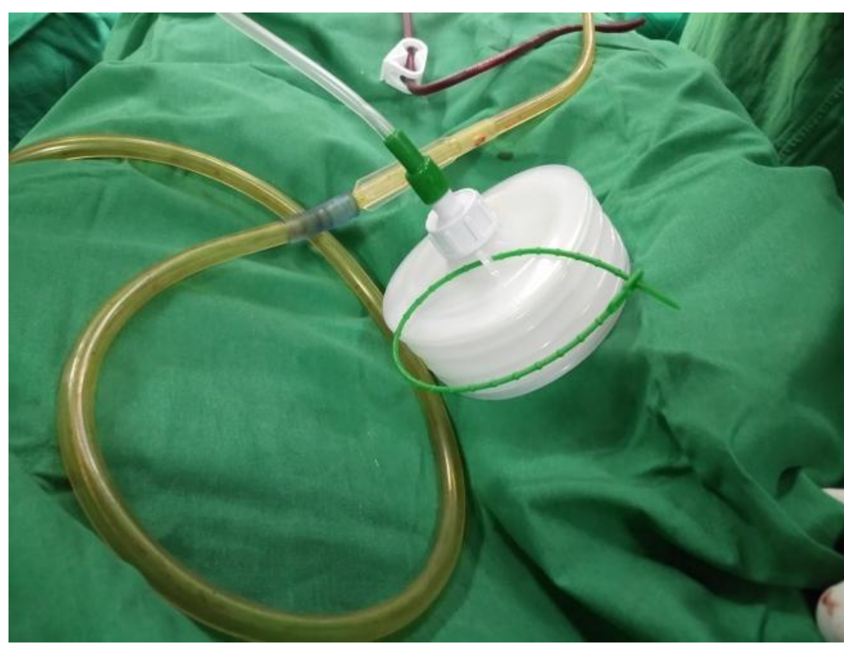


Fig.4. Dressing done post-procedure.

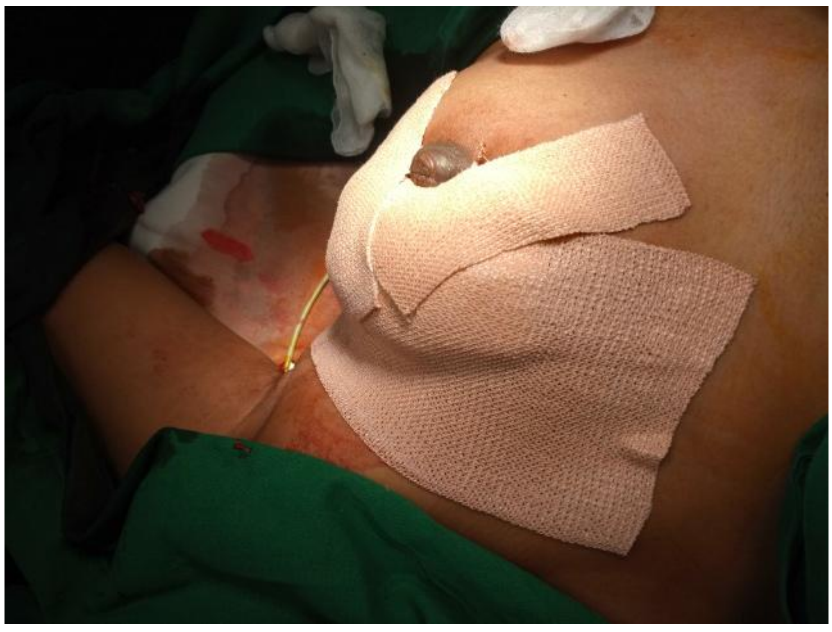


Fig.5. Placement of a negative-suction drain.

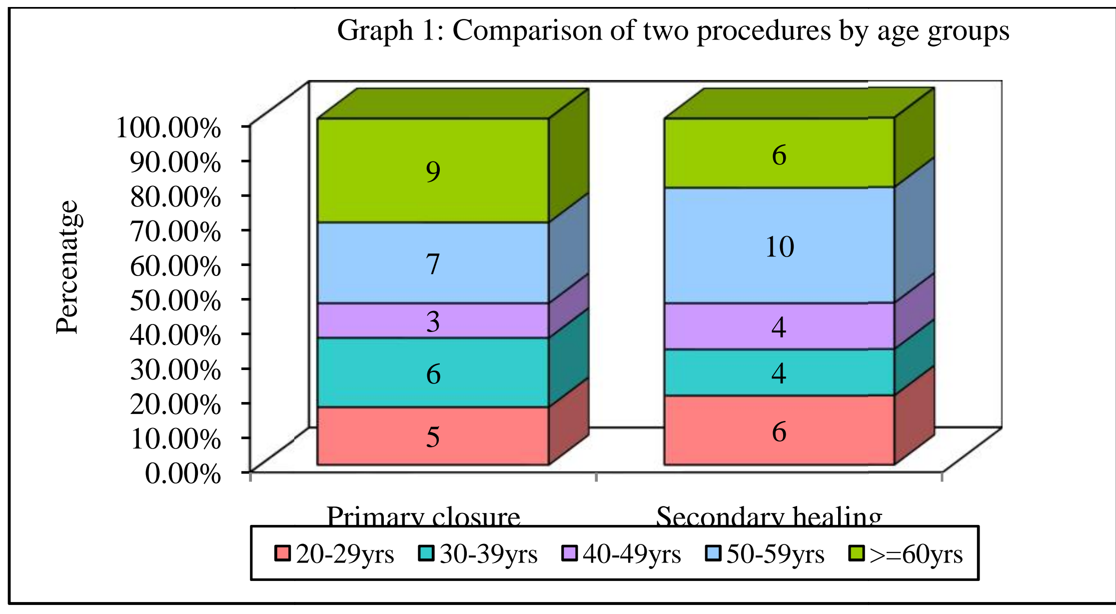
The wounds were noted for time required for wound healing as a primary objective, along with the total number of dressings required for the patient along with the mean duration of hospital stay required for the patient. Some patients were discharged early on and follow up dressings were carried out on an outpatient basis.

RESULTS

• Age distribution:

Table 1: Comparison of two procedures by age groups

Age groups	Primary closure	%	Secondary healing	%	Total	%
20-29yrs	5	16.67	6	20.00	11	18.33
30-39yrs	6	20.00	4	13.33	10	16.67
40-49yrs	3	10.00	4	13.33	7	11.67
50-59yrs	7	23.33	10	33.33	17	28.33
>=60yrs	9	30.00	6	20.00	15	25.00
Total	30	100.00	30	100.00	60	100.00
Mean	47.70		46.80		47.25	
SD	17.22		14.85		15.95	
Chi-square=1.3141 P = 0.5182						

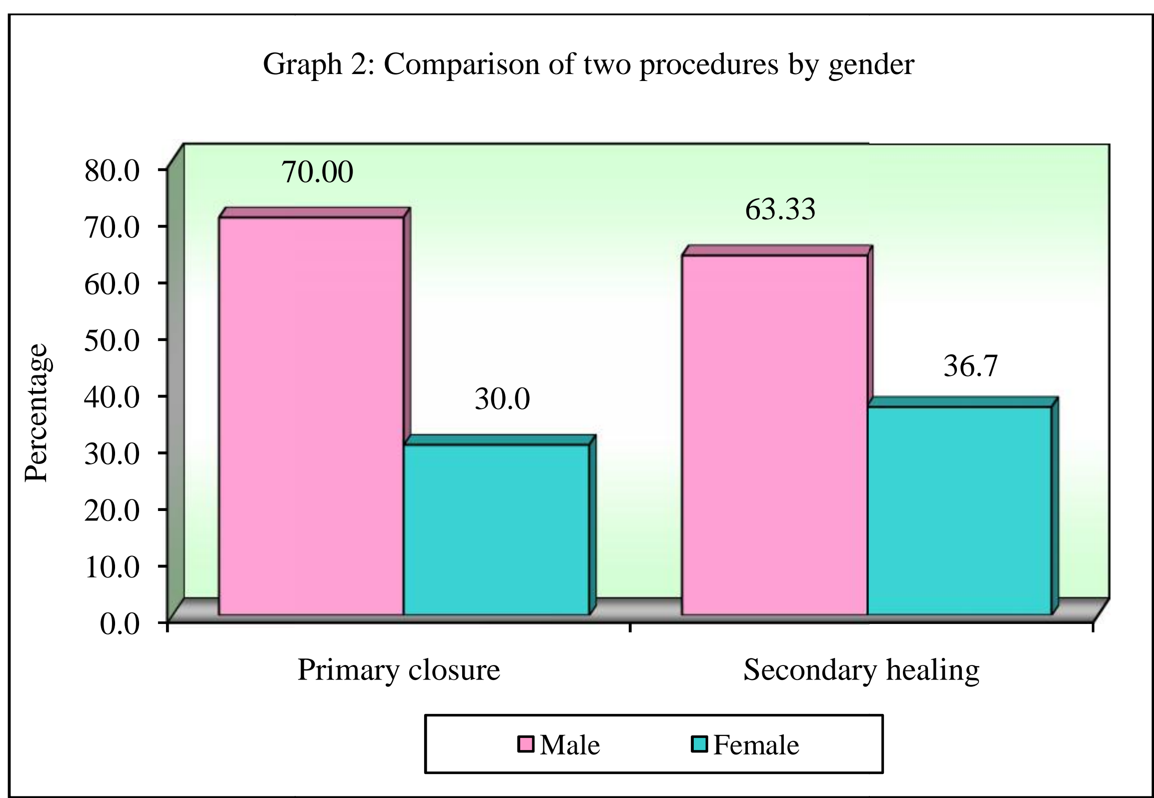


Amongst the 60 cases studied, the patients were evenly distributed amongst all age groups with a mean age of 47 years.

- **Sex distribution:**

Table 2: Comparison of two procedures by gender

Gender	Primary closure	%	Secondary healing	%	Total	%
Male	21	70.00	19	63.33	40	66.67
Female	9	30.00	11	36.67	20	33.33
Total	30	100.00	30	100.00	60	100.00
Chi-square=0.3000 P = 0.5840						



The gender distribution showed a male preponderance in both groups of abscess drainage with 70% in primary closure group and 66% in secondary healing group.

- **Site of the abscess:**

Table 3: Comparison of two procedures by Site of abscess

Site of abscess	Primary closure	%	Secondary healing	%	Total	%
Back	1	3.33	1	3.33	2	3.33
Bilateral gluteal region	0	0.00	1	3.33	1	1.67
Chest wall	2	6.67	0	0.00	2	3.33
Forehead	0	0.00	1	3.33	1	1.67
Left arm	0	0.00	1	3.33	1	1.67
Left breast	1	3.33	3	10.00	4	6.67
Left cervical region	1	3.33	0	0.00	1	1.67
Left foot	0	0.00	2	6.67	2	3.33
Left gluteal region	6	20.00	5	16.67	11	18.33
Left ischiorectal region	0	0.00	1	3.33	1	1.67
Left leg	1	3.33	1	3.33	2	3.33
Left lumbar region	1	3.33	0	0.00	1	1.67
Left scrotum	1	3.33	0	0.00	1	1.67
Left submandibular region	0	0.00	1	3.33	1	1.67
Left thigh	3	10.00	0	0.00	3	5.00
Neck	2	6.67	0	0.00	2	3.33
Right axillary region	1	3.33	1	3.33	2	3.33
Right breast	2	6.67	4	13.33	6	10.00
Right cervical region	0	0.00	1	3.33	1	1.67
Right foot	2	6.67	1	3.33	3	5.00
Right gluteal region	2	6.67	4	13.33	6	10.00
Right heel	1	3.33	1	3.33	2	3.33
Right inguinal region	1	3.33	0	0.00	1	1.67
Right leg	1	3.33	0	0.00	1	1.67
Right sole	1	3.33	0	0.00	1	1.67
Right submandibular region	0	0.00	1	3.33	1	1.67
Total	30	100.0	30	100.00	60	100.00

Majority of the abscesses were gluteal abscesses in the study (18) followed by breast abscesses (10)

- **Duration of hospital stay:**

Table 4: Comparison of two procedures by duration of hospital stay

Duration of hospital stay	Primary closure	%	Secondary healing	%	Total	%
1-7 days	17	56.67	12	40.00	29	48.33
8-14 days	9	30.00	11	36.67	20	33.33
>=15 days	4	13.33	7	23.33	11	18.33
Total	30	100.00	30	100.00	60	100.00
Chi-square=1.8800 P = 0.3910						

Graph 3: Comparison of two procedures by duration of hospital stay

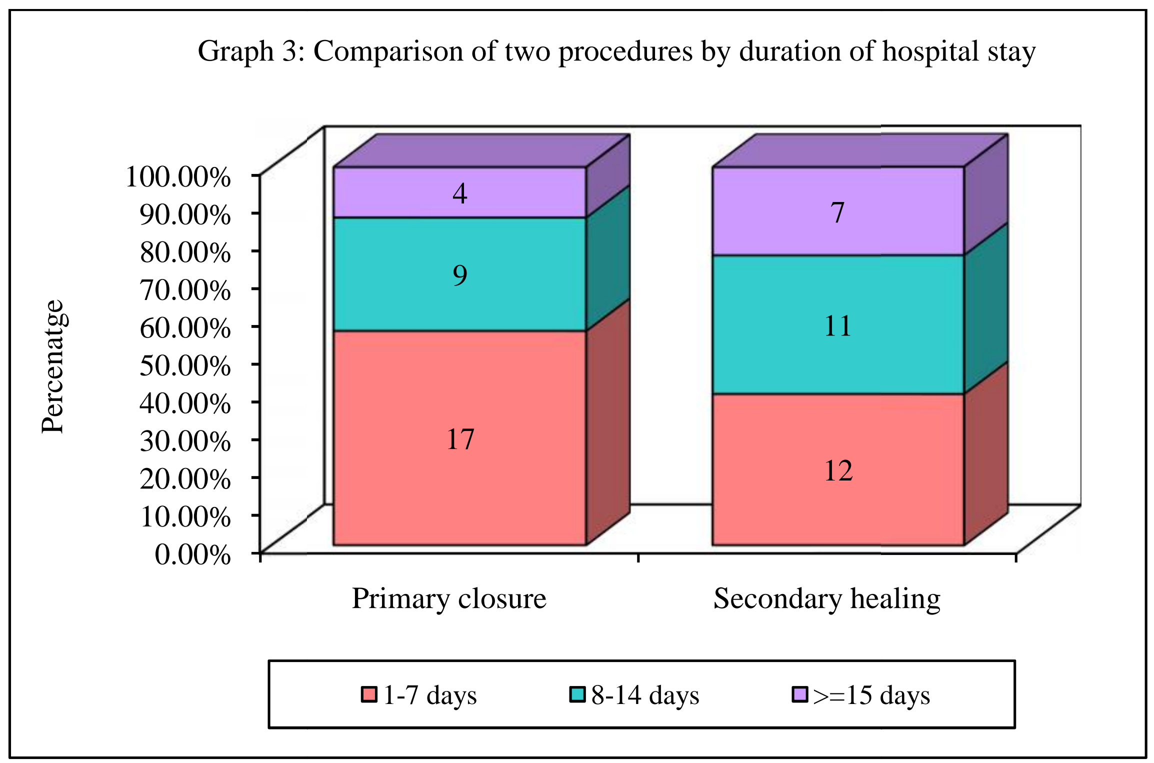
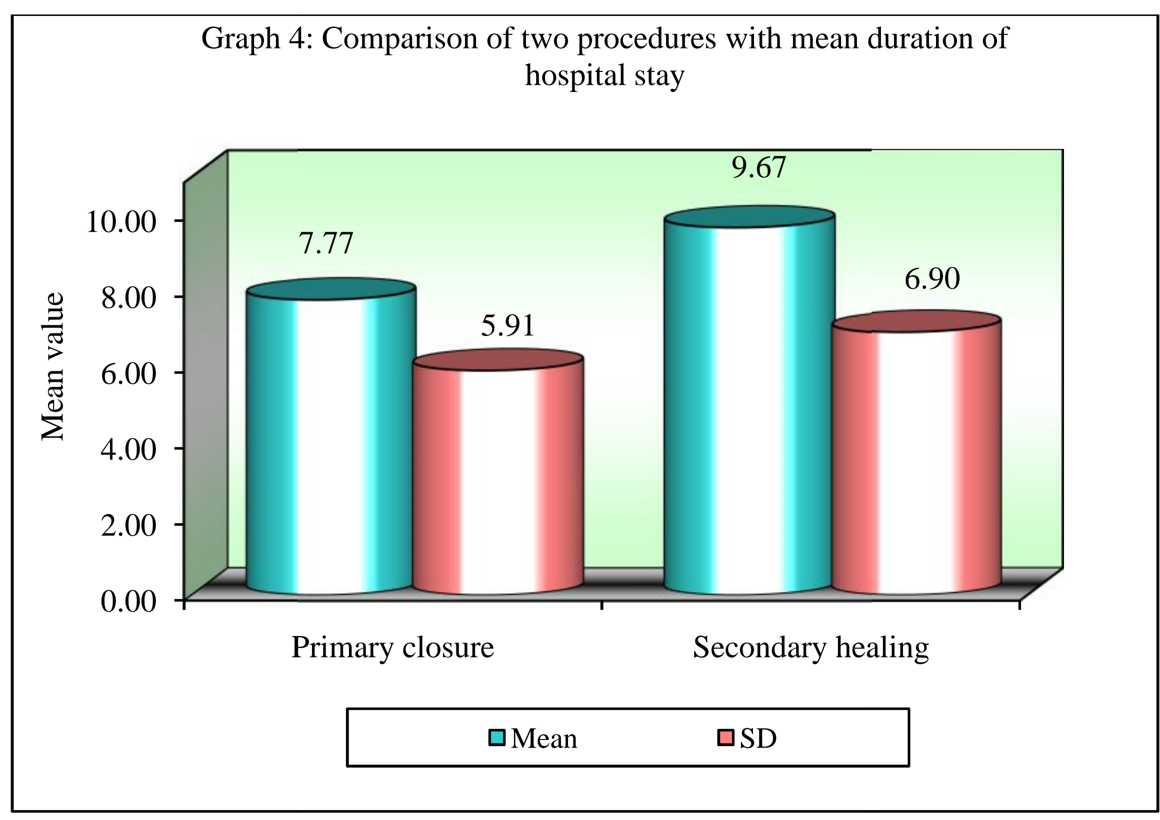


Table 5: Comparison of two procedures with mean duration of hospital stay by independent t test

Procedures	Mean	SD	SE	t-value	P-value
Primary closure	7.77	5.91	1.08	-1.1459	0.2566
Secondary healing	9.67	6.90	1.26		



The mean duration of hospital stay was 8 days in primary closure whereas it was 10 days in secondary healing group with a p value of 0.256(not significant).

- **Number of dressings:**

Table 6: Comparison of two procedures by number of dressings

Number of dressings	Primary closure	%	Secondary healing	%	Total	%
1 -- 5	16	53.33	0	0.00	16	26.67
6 -- 10	14	46.67	6	20.00	20	33.33
>= 11	0	0.00	24	80.00	24	40.00
Total	30	100.00	30	100.00	60	100.00
Chi-square=43.2001 P = 0.0001*						

*p<0.05

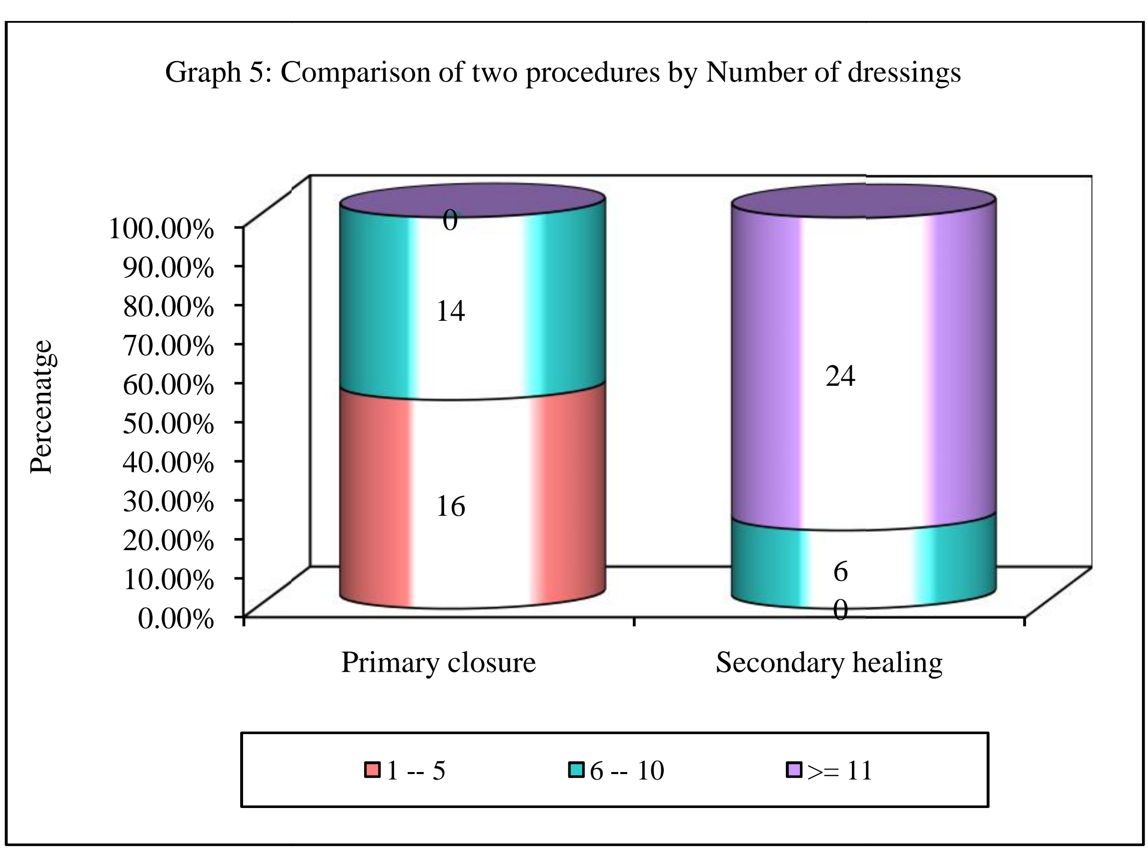
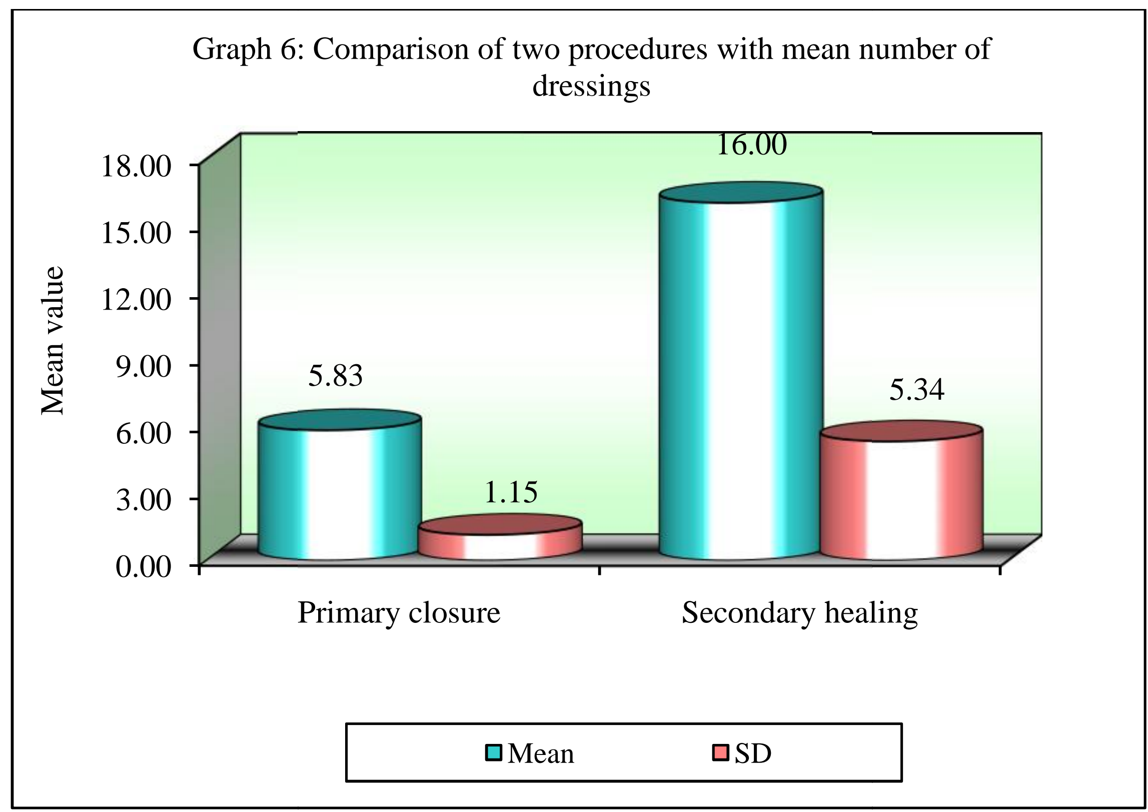


Table 7: Comparison of two procedures with mean number of dressings by independent t test

Procedures	Mean	SD	SE	t-value	P-value
Primary closure	5.83	1.15	0.21	-10.1891	0.0001*
Secondary healing	16.00	5.34	0.98		

*p<0.05



The number of dressings required in primary closure group was found to be significantly less, with a mean of 5-6 dressings as compared to 16 dressings in secondary healing with a p value of 0.0001 (statistically significant)

- **Wound healing time:**

Table 8: Comparison of two procedures by wound healing time

Wound healing time	Primary closure	%	Secondary healing	%	Total	%
1-7 days	2	6.67	0	0.00	2	3.33
8-14 days	28	93.33	18	60.00	46	76.67
15-21 days	0	0.00	10	33.33	10	16.67
>=22 days	0	0.00	2	6.67	2	3.33
Total	30	100.00	30	100.00	60	100.00
Chi-square=15.0001 P = 0.0001*						

*p<0.05

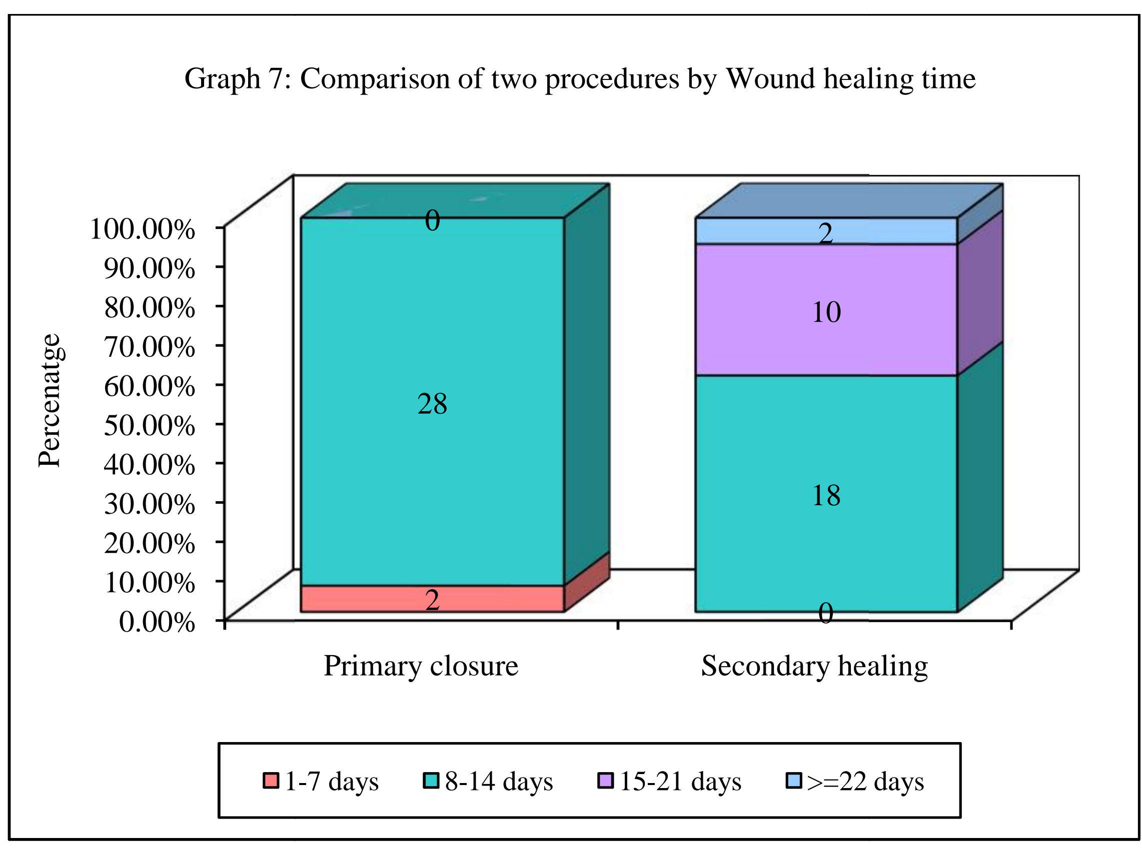
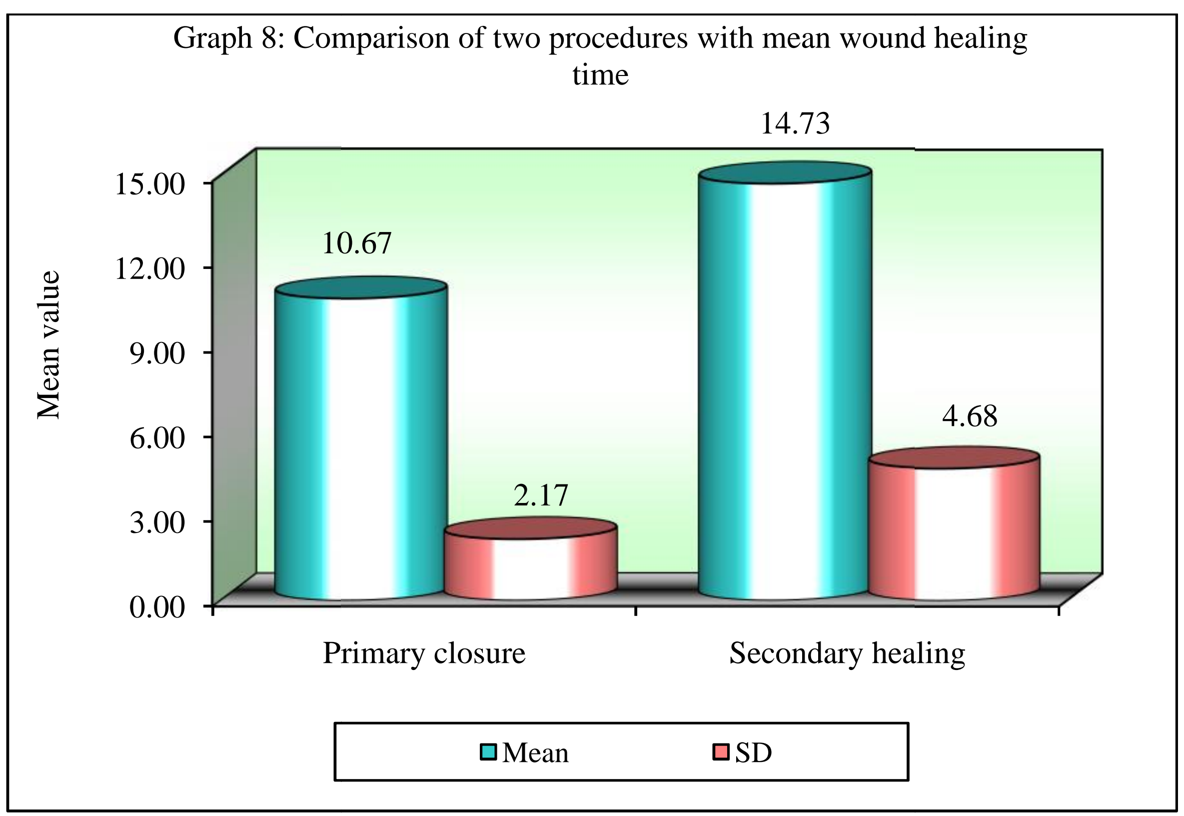


Table 9: Comparison of two procedures with mean wound healing time by independent t test

Procedures	Mean	SD	SE	t-value	P-value
Primary closure	10.67	2.17	0.40	-4.3212	0.0001*
Secondary healing	14.73	4.68	0.85		

*p<0.05



The mean wound healing time was about 11 days in primary closure group as compared to 15 in secondary healing group with a p value of 0.0001 (statistically significant)

DISCUSSION

The aim of this study was to find out an effective alternative to the routine practice of incision and drainage of abscesses. If an abscess is incised, drained and sutured primarily with a placement of a negative suction drain, by and large, very few alternate day dressings are required before the abscess has healed and it will leave a linear scar.

It is a less painful type of healing as it does not involve packing of the wound and hence, the patient is saved from a number of painful daily dressings. This method requires an average of 10-11 days as compared to 15-16 days in the conventional method with lesser number of dressings in the primary group.(17)

Ellis' had originally proposed the role of antibiotics in treatment of abscesses, prior to this, it was only possible to lay open the abscess cavity and let it heal by secondary intention. It was a slow process which required close supervision and resulting in an ugly scar. Ellis claimed satisfactorily that with a good antibiotic cover and closing the cavity with primary intention, a faster healing could be achieved.(2)

There were 3 important aspects to Ellis' technique; the patient required a good antibiotic cover, secondly this antibiotic loaded blood needed to be freely flowing into the abscess cavity which could be achieved with thorough exploration and curettage of the cavity. And thirdly, the cavity had to be completely obliterated by the suture. If all three measures were taken, Ellis claimed that the abscess would heal in five days; and the only management that the patient would require would be one visit for the removal of the suture. This was considerable in saving time and effort for the patient as well as the hospital staff.(3)

For this technique to form a mainstay of treatment, it is essential that it must supersede the age-old forms of treatment and gain general acceptance.

Since 1951, evidence has been submitted to show the efficacy of this treatment for ano-rectal abscesses (Wilson 1964)(18), breast abscesses (Benson and Goodman 1970) (4)and axillary abscesses (Page 1974) and its superiority to conventional methods of treatment for these lesions. (19)

Rapid healing with minimum of attendance for dressings has been achieved; the cosmetic results have been encouraging; also the method has been found to be both practical and acceptable to the patient in the post-operative period. The patient can wear a firm, small dressing under the clothing and attend as an outpatient.

Previous studies have showed encouraging results for breast abscesses as well as axillary abscesses. However earlier studies have shown that perianal abscess had a chance of cut through of the sutures and wounds have healed by secondary intention. Hence, in this study, perianal and perineal abscesses have been excluded.

The objection to Ellis' logic is that adequate drainage of pus may not be present in a wound which is sutured and the closed cavity may lead to formation of a blood clot which itself acts as a nidus for infection. Hence, in this study, a drain has been placed in most of the abscesses to facilitate sufficient drainage of the pus as well as any bleeding in the initial phases of healing. Also, the presence of a negative-pressure of the drain further helps in obliteration of the abscess cavity and promotes healing.

Previous studies have suggested that recurrence rates following primary suture are comparable to open drainage (Benson Goodman 1970, Wilson 1976). It may not

always be possible to curette an abscess such as an axillary abscess wherein, taking a deep suture may not be possible for reluctance on behalf of the surgeon due to presence of vital structures. In this study, a recurrence has been found in a single case of thigh abscess treated by primary suturing following incision and drainage. The wound then healed by secondary intention. However the wound still healed faster as compared to an abscess that would have healed by secondary intention alone, as proven by previous studies.

CONCLUSION

60 cases were selected at random for the study admitted to the hospital and amongst them, 30 cases were treated with primary closure and the rest 30 were treated by secondary healing.

Primary closure is suitable for all superficial abscesses under antibiotic cover, and the results were excellent when it came to mean healing time and the number of dressings required between the two groups. The advantages being:

1. Patient is spared of painful dressings
2. Patient need not stay admitted or come daily, hence economical and convenient.
3. It reduces the workload in the dressing room
4. Mean healing time is less
5. Cosmetically better and more acceptable results

Hence, considering all the above factors, the method of primary closure of an abscess may be considered as an acceptable method when it comes to superficial abscesses.

SUMMARY

The age-old method of treatment for any abscess of incision followed by ensuring free drainage of the resulting cavity has good results by and large; however the technique has its drawbacks such as long periods of painful dressings, prolonged hospital stay and thus economic stress to the patients.

An occurrence of an abscess is usually associated with a large number of infective bacteria, or may be associated with a comparatively low resistant host which helps in augmentation of the bacterial load. Various events can be attributed to the formation of an abscess. Local signs are the five classical local signs of inflammation due to hyperemia and inflammatory exudate.

In this study, a comparison has been done between incision, drainage and primary closure of a superficial abscess and age-old method of incision and drainage followed by healing of the abscess cavity by secondary intention. A total of 60 patients have been included in the study, 30 patients treated by primary closure of the abscess and the other 30 by healing with secondary intention.

Majority of the abscesses were gluteal abscesses in the study (18) followed by breast abscesses (10). The mean duration of hospital stay was 8 days in primary closure whereas it was 10 days in secondary healing group with a p value of 0.256(not significant). The number of dressings required in primary closure group was found to be significantly less, with a mean of 5-6 dressings as compared to 16 dressings in secondary healing with a p value of 0.0001 (statistically significant). The mean wound healing time was about 11 days in primary closure group as compared to 15 in secondary healing group with a p value of 0.0001 (statistically significant). The number of dressings required in primary closure group was found to be significantly

less, with a mean of 5-6 dressings as compared to 16 dressings in secondary healing with a p value of 0.0001 (statistically significant).

Thus it can be concluded that primary closure is suitable for all superficial abscesses under antibiotic cover, and the results were excellent when it came to mean healing time and the number of dressings required between the two groups.

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ANNEXURE I

CONSENT STATEMENT

I, Mr/Ms/Mrs. ________________________________ voluntarily agree for the participation as a subject of study titled ACUTE ABSCESS MANAGEMENT – A PROSPECTIVE 1-YEAR SINGLE-CENTRIC RANDOMIZED CONTROL TRIAL FOR COMPARISON BETWEEN PRIMARY CLOSURE OF SUPERFICIAL ABSCESS VERSUS HEALING OF ABSCESS BY SECONDARY INTENTION. By signing this consent form I am not giving up any of my legal rights, I may withdraw from the study anytime. I am signing the consent form after having read or been read for me in my vernacular language, including the risks and the benefits and having all my questions answered.

Subject Name : ____

Signature or the Left Thumb Print of Subject : ______________________

Witness Name: __________________ Signature: ___________________

Investigators Name: _________________ Signature: ______________________

Date: ________________

Place: ________________

CONSENT FOR PARTICIPATION IN RESEARCH STUDY

Mr/Mrs/Miss. ______________________________ we are requesting you to enroll yourself in the study titled "ACUTE ABSCESS MANAGEMENT – A PROSPECTIVE 1-YEAR SINGLE-CENTRIC RANDOMIZED CONTROL TRIAL FOR COMPARISON BETWEEN PRIMARY CLOSURE OF SUPERFICIAL ABSCESS VERSUS HEALING OF ABSCESS BY SECONDARY INTENTION." conducted by Dr. ______________, Post Graduate in M.S. General Surgery under the guidance of Dr. ___________, Professor, Department of General Surgery, J. N. MEDICAL COLLEGE,

BELAGAVI

Respected Sir/Madam,

We request you to participate in our study as you are eligible for participating in the study. Your participation in the research is absolutely voluntary. Your decision to participate in the study or otherwise will not affect the relationship with KLE hospital. If you decide not to participate, you are free to withdraw at any time. During the study your operative outcome will be accessed by some questions which will be answered by your operating surgeon.

Risks and Benefits:

There is no increased risk involved in becoming a part of this study and the complications are those which are normally anticipated. This study will help to estimate the incidence of postoperative pain in comparison with the two procedures involved. The results derived at the end of study will benefit all similar patients admitted in this hospital.

Withdrawing/removal from the study

The participant has freedom to withdraw from the study whenever he/she wishes and with any prior notice. Even if you decline to participate, there will not be any change in the line of your management or the relationship with your doctor. You will be told about all the new information that affects your decision to participate in the study. The investigator may also exclude a participant from the study at anytime.

Privacy and Confidentiality:

The only people to know that you are a research subject are members of the research team. No information about you or information provided by you during the research will be disclosed to other without your written permission except:

1. In emergency to protect your rights and welfare.

2. If required by law.

Institutional/sponsors policy:

If any unforeseen complications or injury occurs during the period of study the participant will be given treatment within the limitations of KLE's Prabhakar kore hospital general ward.

Financial Incentives for participation:

The participant neither gets any financial incentives during the period of study nor will be asked to pay for the purpose of this study.

Authorization to Publish Results:

When the results of the research are published or discussed, in a conference, no information will be displayed that would disclose your identity. Any information that is obtained in connection with this study and that can be identified with your identity remaining confidential.

ANNEXURE II.ETHICAL CLEARANCE.

K.L.E.UNIVERSITY'S
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)
(Accredited 'A' Grade by NAAC)

Website: http//www.jnmc.edu
E-Mail : domc@jnmc.edu

Phone: (+ 91-(0)831 Office : 2471350
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/ 11 **Date: 22/11/2017**

To,

PG student in Surgery,
J.N.Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"ACUTE ABSCESS MANAGEMENT – A PROSPECTIVE 1-YEAR SINGLE – CENTRIC RANDOMIZED CONTROL TRIAL FOR COMPARISON BETWEEN PRIMARY CLOSURE OF SUPREFICIAL ABSCESS VERSUS HEALING OF ABSCESS BY SECONDARY INTENTION"**, is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. Arathi Darshan)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Roopa M Bellad)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

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ANNEXURE III - PROFORMA

Name : Age :

Address : IP no.:

Sex : Religion:

Education: Date of admission:

Occupation: Date of discharge:

HISTORY

Clinical history (Site of Abscess):

Other associated illnesses:

GENERAL PHYSICAL EXAMINATION:

SYSTEMIC EXAMINATION:

LOCAL EXAMINATION:

PROCEDURE/OPERATION DETAILS:

POST-OPERATIVE FOLLOW-UP:

1) Number of days of hospital stay:

2) Number off dressings:

3) Wound healing time:

ANNEXURE IV - KEY TO MASTERCHART

A	:	Wound healing by secondary intention
B	:	Wound healing by primary closure
COMP.	:	Complications
DOHS	:	Duration of Hospital Stay
DOS	:	Date of Surgery
P NO	:	In-Patient Number
NO.	:	Number of Dressings
OPD F/U	:	Outpatient Department Follow-Up
PROC.	:	Procedure
REC.	:	Recurrence
WHT	:	Wound Healing Time

S.N.	IP NO.	SITE	SIZE	PROC.	DOS	DOHS	NO.	WHT	COMP.
1	850002	left breast	3*3	A	01/01/2018	1(opd f/u)	12	12	nil
2	852197	forehead	3*3	A	13/01/2018	6(opd f/u)	10	10	nil
3	853018	left gluteal region	5*6	A	19/01/2018	8(opd f/u)	12	12	nil
4	854567	left gluteal region	5*5	A	25/01/2018	14	16	16	nil
5	854720	right breast	15*10	A	25/01/2018	8(opd f/u)	18	16	nil
6	855428	right gluteal region	6*6	A	30/01/2018	13	16	16	nil
7	856746	right breast	4*4	A	06/02/2018	18	20	18	nil
8	857276	left thigh	7*5	B	09/02/2018	8	5	10	nil
9	857775	left breast	3*4	A	14/02/2018	5(opd f/u)	10	8	nil
10	858842	left gluteal region	5*4	A	20/02/2018	3(opd f/u)	22	20	nil
11	859239	left breast	3*3	B	20/02/2018	10	6	10	nil
12	860796	right gluteal region	4*5	A	01/03/2018	3(opd f/u)	12	10	nil
13	863218	right breast	na	A	13/03/2018	3(opd f/u)	15	12	nil
14	863721	right gluteal region	5*4	A	20/03/2018	18(opd f/u)	25	20	nil
15	864768	left gluteal region	3*3	B	20/03/2018	2(opd f/u)	5	10	nil
16	864958	right breast	3*4	A	21/03/2018	21	25	21	nil
17	866007	right heel	2*3	B	27/03/2018	4(opd f/u)	5	10	nil
18	865982	right heel	2*3	A	29/03/2018	5(opd f/u)	8	10	nil
19	866014	right cervical region	10*7	A	30/03/2018	9(opd f/u)	18	14	nil
20	866676	right gluteal region	3*3	A	30/03/2018	27	25	26	nil
21	867116	left gluteal region	10*8	A	04/04/2018	18	16	16	nil
22	867183	left lumbar region	5*4	B	04/04/2018	10(opd f/u)	7	14	nil
23	867923	neck	3*2	B	06/04/2018	1(opd f/u)	5	8	nil
24	867308	left arm	4*3	A	07/04/2018	2(opd f/u)	14	12	nil
25	869223	left gluteal region	5*5	B	13/04/2018	15	7	14	nil
26	871699	right foot	2*2	B	27/04/2018	3(opd f/u)	5	8	nil
27	871735	left submandibular region	6*5	A	28/04/2018	9(opd f/u)	15	14	nil
28	872088	right axillary region	3*3	A	28/04/2018	1(opd f/u)	15	12	nil
29	873067	right foot	3*2	A	06/05/2018	14	12	12	nil
30	873239	chest wall	6*8	B	08/05/2018	4(opd f/u)	5	8	nil
31	878848	right breast	2*2	B	01/06/2018	2(opd f/u)	5	7	nil
32	878990	right foot	3*2	B	04/06/2018	6	5	8	nil
33	880039	left foot	4*2	A	09/06/2018	14	14	12	nil
34	880225	right gluteal region	5*4	B	14/06/2018	14(opd f/u)	6	12	nil
35	882976	left foot	3*2	A	24/06/2018	18(opd f/u)	20	20	nil
36	881177	right breast	5*4	B	25/06/2018	10	7	10	nil
37	883202	right gluteal region	4*4	B	02/07/2018	14	8	10	nil
38	884867	right submandibular region	3*3	A	04/07/2018	5(opd f/u)	8	8	nil
39	889108	left gluteal region	10*10	A	27/07/2018	8(opd f/u)	12	14	nil
40	889523	left cervical region	2*2	B	31/07/2018	18	6	12	nil
41	890894	left gluteal region	2*2	B	03/08/2018	4(opd f/u)	5	10	nil

42	891772	left breast	3*4	A	07/08/2018	1(opd f/u)	12	10	nil
43	893639	left leg	15*5	B	16/08/2018	2(opd f/u)	8	14	nil
44	894975	back	5*5	A	25/08/2018	9(opd f/u)	25	24	nil
45	895098	left gluteal region	6*4	B	03/09/2018	22	8	14	nil
46	897318	right gluteal region	8*5	A	05/09/2018	2(opd f/u)	10	12	nil
47	894610	left gluteal region	10*5	B	08/09/2018	3(opd f/u)	7	12	nil
48	897764	right leg	6*3	B	08/09/2018	5(opd f/u)	5	10	nil
49	898549	left leg	10*6	A	14/09/2018	16	25	21	nil
50	899042	left thigh	7*6	B	15/09/2018	8	5	12	nil
51	899349	neck	2*2	B	17/09/2018	2(opd f/u)	5	8	nil
52	899636	chest wall	2*3	B	19/09/2018	3(opd f/u)	5	7	nil
53	904375	left gluteal region	5*3	B	11/10/2018	6(opd f/u)	5	10	nil
54	904928	left thigh	6*6	B	13/10/2018	21	8	14	rec.
55	904981	left ischiorectal region	6*6	A	14/10/2018	11	18	14	nil
56	905815	right sole	5*2	B	20/10/2018	3(opd f/u)	4	10	nil
57	905927	right axillary region	4*3	B	20/10/2018	12	6	12	nil
58	906250	left scrotum	2*2	B	21/10/2018	4(opd f/u)	6	12	nil
59	917784	back	5*2	B	18-Dec	5(opd f/u)	5	12	nil
60	918067	right inguinal region	5*5	B	21/12/2018	12	6	12	nil