ISSN 0972-4958

Journal of Medical Society

www.jmedsoc.org

Volume 26 / Issue 3 / Year 2012

A Publication of Regional Institute of Medical Sciences, Imphal

Wolters Kluwer Health | Medknow

Original Article

Negative pressure wound therapy for post-cesarean, post-hysterectomy dehisced abdominal wounds

Shuchi Jain, Madhu Jain, Shammi Purwar[1], Vaibhav Jain[2], Pradeep Jain[1]

Departments of Obstetrics and Gynaecology, [1]Plastic Surgery, and [2]General Surgery, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India

Abstract

Objectives: Abdominal wound dehiscence occurs in 0.5-3% of the patients following laparotomies. As the vacuum assisted closure technique is now well established to manage chronic wounds, we hereby describe an innovative approach to apply negative pressure to acute wounds. **Materials and Methods:** The innovative negative pressure device was applied in 5 patients, three with wound dehiscence after cesarean section and two after hysterectomy. A commercially available closed suction apparatus 14 gauge in size and 5 cm thick sponge were used. The sponge was covered with an adhesive transparent sheet. The dressing was changed every 48-72 hours depending on the amount of secretion present in the chamber. The suction device was charged as and when it got deflated. **Results:** All the wounds had gradually decreasing area of undermining and the discharge from the second dressing change onwards. Whereas three of them underwent a two-layered closure, the other two healed with 100% take of the skin graft. **Discussion:** Healing by secondary intention is a time consuming process that leads to prolonged hospital stay. The negative pressure wound therapy (NPWT) has been used to treat chronic wounds and pressure ulcers, It evacuates the drainage from the wounds and thereby decreases edema of wound margins and the adjacent areas. It also improves the blood flow to the wounds and decreases bacterial burden. The innovative device used by us is easily available, affordable, and simple to use with good outcome. **Conclusion:** NPWT is a valuable alternative in selected cases when a surgical closure is not indicated or not desired by the patient. The innovative device was well accepted by our patients as it did not add to their postpartum or post-operative stress. It can be used in any set-up in any patient, meeting the criteria of NPWT.

Key Words: Innovative negative pressure wound therapy device, Negative pressure wound therapy, Wound dehiscence

INTRODUCTION

Abdominal wound dehiscence has been reported in the literature to occur in 0.5-3% of the patients following laparotomies for various causes taken together. Although, there is no reported incidence follow hysterectomies and cesarean sections in particular, the management remains essentially the same. While there have been various causes for this to occur, malnutrition, and anemia have to be specially kept in mind for overall management particularly in the developing countries such as India and the third world. Secondary suturing of the dehisced abdominal wounds or leaving the wounds as such for secondary intention healing to occur have been the traditional methods of managing such a situation in the past. As the vacuum assisted closure technique is now well-established to manage chronic wounds, we hereby describe, our experience with an innovative way to apply negative pressure to acute wounds and achieve successful closure with simple maneuver.

Access this article online

Quick Response Code:

Website: www.jmedsoc.org

DOI: 10.4103/0972-4958.113241

MATERIALS AND METHODS

We applied the innovative negative pressure device to 5 patients, three after the cesarean section, and two after the hysterectomy for fibroid uterus with menorrhagia. Two of these, one following cesarean and another following hysterectomy were malnourished and anemic. The third one following cesarean section delivery was obese. They were all in 20-46 years age group.

Condition of the wound: The abdominal wound dehisced on 5-7th day in post-cesarean cases and between the 3rd day and the 5th day in post-hysterectomy wounds. There was small hematoma with fat necrosis in post-cesarean wounds, while it was only fat necrosis in the post-hysterectomy wound with lot of undermining as a

Address for correspondence: Dr. Pradeep Jain, G-11, Lal Bahadur Shastri Colony, Karaundi, Varanasi - 221 005, Uttar Pradesh, India.
E-mail: pradeep.plasticpj@gmail.com

common feature in all the five. There was discharge from the wound and it was sent for culture and sensitivity. The obese patients also had wide suture marks suggesting closure of wound under tension.

Innovative device

A simple, indigenous and innovative negative pressure device consisted of: (a) Commercially available closed negative suction apparatus 14 gauge in size, (b) 5 cm thick sponge, (c) adhesive transparent film, and (d) adhesive surgical paper tape (Micropore). How did we do it? All the wounds were inspected for wound discharge, necrotic debris and amount of undermining. Swabs were taken from two to three different places of the wound depending on their size and sent for culture and sensitivity. The obviously dead and necrotic tissue was debrided [Figure 1]. The wounds were dressed and re-inspected after 2 days for evidence of any necrosis or missed devitalized tissue. If found so, these areas were also dealt with as before.

The wounds were measured for their dimensions and a sponge 2 inch thick was cut according to the wound size with 1 cm overlapping margin so as to snuggly fit into the wound when applying the negative suction. The cut piece of sponge was autoclaved and was ready for use.

After thorough washing of the wound with normal saline, a piece of autoclaved sponge selected for the particular wound was taken and the perforator of the closed suction drain was inserted through to come out from the other end. The sponge was put over the wound, and the perforator was finally taken out of the wound at a distance leaving the suction tube within the sponge. The piece of sponge was held in position with an adhesive transparent sheet and further secured with the adhesive paper tape. The tape was also used to further secure the exit tube of the drain so as to achieve a totally closed airtight compartment for negative suction to be effective. The drainage tube was connected to the suction device and the apparatus was charged. An effective suction system would show a collapsed bellow (drainage chamber), and depression into the sponge [Figure 2]. The system was charged as and when the bellow got deflated and the patient or the attendant was trained to do so. The dressing was changed every 48-72 h depending on the amount of secretion present in the chamber and the fluid collected was sent for culture and sensitivity. The antibiotics were started as per the sensitivity report and other supportive measures were also enforced.

RESULTS

All the wounds showed gradually decreasing area of undermining and the discharge from the the 2nd dressing change onwards. It required 4-5 dressing changes to completely obliterate the dead space with healthy granulation tissue [Figure 3a]. A two-layer closure was achieveeasily in all the three post-caesarean wounds after minimal freshening and mobilization of the wound margins and the sutures were removed after 2 weeks. All the wounds healed uneventfully. The two post-hysterectomy wounds were allowed to develop healthy granulation tissue and skin grafted by 4 weeks (25 days in the 1st and 27 days in the 2nd). The ultimate outcome was aesthetically pleasing [Figure 3b].

DISCUSSION

The abdominal wound dehiscence after caesarean section or hysterectomy in malnourished and anemic patients in the third world countries is not uncommon. A separation of the wound edges by more than a centimeter in width and/or the development of a hematoma/seroma, in the tissue between the rectus sheath and the skin may be defined as a wound dehiscence.[1] A hematoma or seroma may be treated conservatively as long as it is small and remains

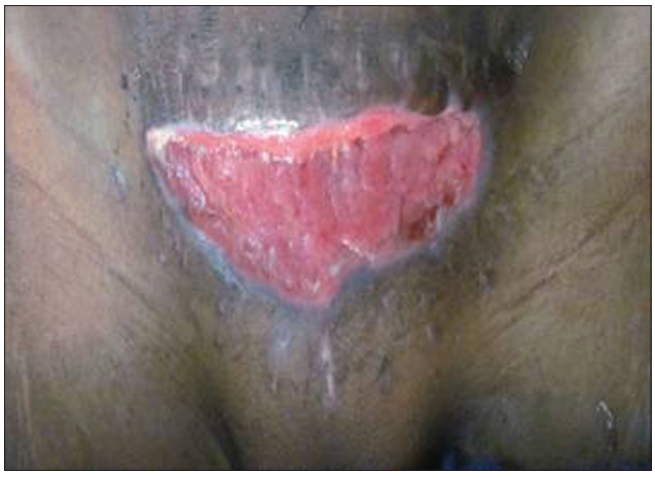

Figure 1: Post-caesarean section wound dehiscence after debridement with undermined edges

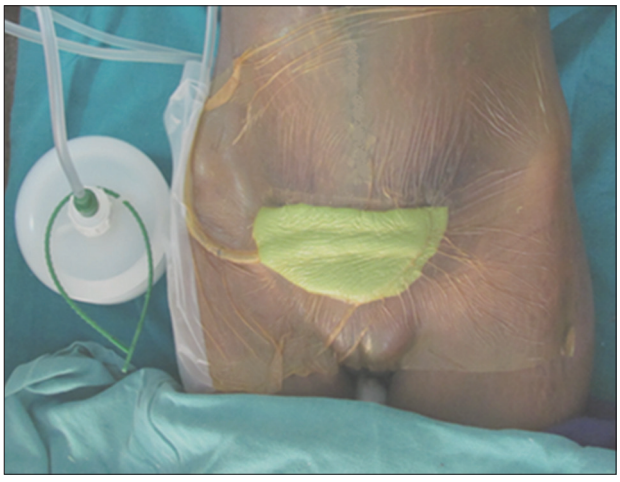

Figure 2: Indigenous device in use, showing retraction of the foam into the wound

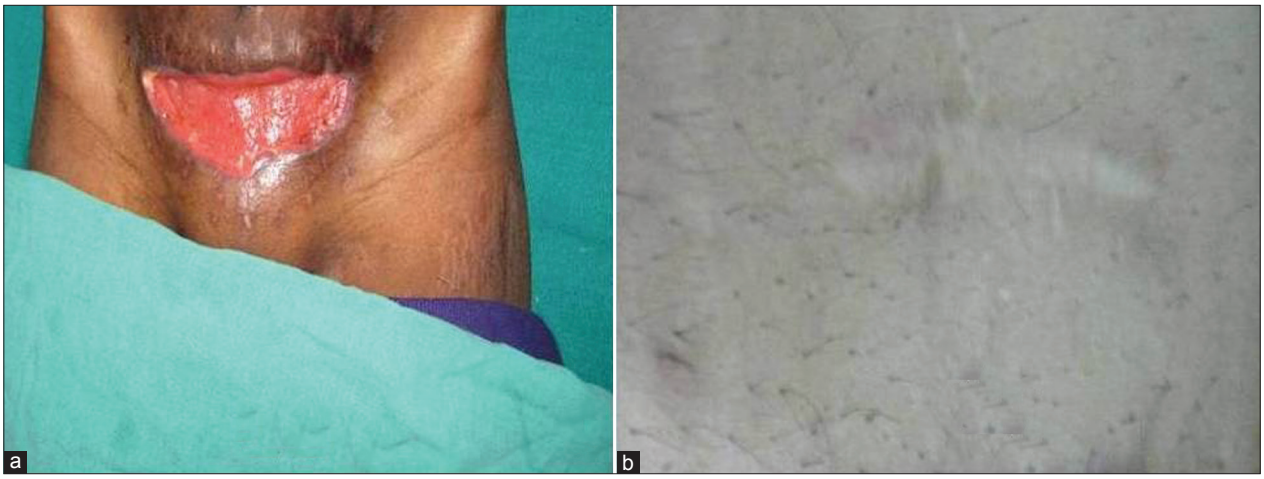

Figure 3: (a) Healthy granulation with no undermining of edges on 8th day, (b) Faint scar at 6 months follow-up

uninfected. However, the separation of wound edges with undermining calls for immediate intervention. In majority of patients, the wound dehiscence is associated with wound infection as well. In very few instances, a wound dehiscence may not be associated with infection (1.7%).[2] The overall incidence rate of wound dehiscence has been variously reported as 1.6-16%.[3]

Treatment options for post-cesarean superficial wound disruption include, healing by secondary intention and superficial wound closure. The former method considers modern wound care factors, such as the phase of healing, volume of the exudate, and presence of necrotic tissue. A wide range of wound care products is available to maintain an optimal physiological environment for the wound to heal. Such products include non-toxic solutions for cleansing, enzymatic debriding agents like collagenase and papain for removing necrotic tissue, and highly absorbent dressing materials for controlling drainage.[4]

Healing by secondary intention is a time consuming process that leads to prolonged hospital stay and additional cost, even in an out-patient setting.[5] In 2 studies, the mean time required for healing by secondary intention was 61-71 days, and for secondary closure, the mean was 15.8-17 days.[5,6] With the latter option, the wound is surgically closed as soon as there is no sign of exudate or necrotic debris and granulation tissue is forming. The waiting time varies from 2 days to 4 days.[5,6] The main problem is the potential for reinfection, which leads to re-opening and usually to healing by secondary intention. The incidence rate of reinfection after secondary closure in post-cesarean wound disruption is poorly documented; a rate of 14% is reported in a mixed group of obstetrical and gynecological patients.[5]

Besides the above mentioned conventional measures, negative pressure wound therapy (NPWT) has come in a big way for the wound management. The first commercial NPWT device was introduced in the year 1996 by KCI (Kinetic Concepts Inc., San Antonio, Tx, USA) under the brand name VAC® (Vacuum Assisted Closure) for use in acute, subacute, and chronic wounds. This alternative therapeutic option has been used in surgery to treat chronic (e.g., diabetic, dysvascular) and pressure ulcers; traumatic, and dehisced wounds; meshed skin grafted wounds; fresh and compromised flaps; or burns. The five vacuum assisted closure of the wounds differs from the previously mentioned conventional methods in many ways. It not only evacuates the drainage from the wounds and thereby decreases the edema of the wound margins and adjacent areas (that allows easy holding of the sutures at the margin without fear of cutting through), it also improves the blood-flow to the wounds, delivering more oxygen, growth factors, and blood cells like polymorphonuclear leukocytes and macrophages. The increased delivery of the cells helps in decreasing the bacterial burden in the wounds, decreasing the chance of reinfection of the wound following its closure. The increased delivery of the growth factors enhances angiogenesis, which also helps in overall increase in the blood-flow to the wound with rapid formation of healthy granulation tissue suitable for grafting and if not too wide, for healing by secondary intention.

There are state of the art vacuum assisted wound closure systems available commercially. Some of them use reticulated open cell foam as the interface between the wound bed and negative pressure source.[7] However, they are very costly and are beyond the reach of the poor patients in the developing third world countries. The innovative device used by us can easily be assembled at every wound care facility and can be managed by the motivated patient himself or by trained medical personnel. It is also not mandatory to institute any enzymatic debriding agent or growth factor extraneously. This innovative device has been used by the authors[3] in the management of moderate sized pressure ulcers with negative pressure of-80 mm Hg at the start of the

therapy (unpublished). However, as the edema fluid from the wound keeps on collecting in the chamber, the negative pressure within the chamber also keeps on decreasing with the passage of time. Therefore, it is mandatory to charge the device as soon as it gets inflated or gets filled with fluid. This recharging of the device may initially be required more frequently 3-4 times a day but after 3-4 days, as the edema fluid gets less and less, recharging may also be required only 1-2 times a day. This is where the commercially available devices outscore the indigenous one due to incorporation of a valve in the suction device, which maintains constant negative pressure in the wound but the cost factor, easy availability, and simple handling make the latter a good alternative. Moreover, the indigenous device has been able to achieve same clinical goals as with other sophisticated commercial devices, including the reduction in the wound surface area.

The three cases of post-cesarean wound disruption treated by vacuum assisted wound closure method were subjected to secondary suturing of superficial layers without much mobilizing the wound margins after about a week of applying the device. The sutures were removed after 2 weeks thus achieving successful closure of dehisced abdominal wound by around 3 weeks. This was little faster than in those post-hysterectomy dehisced wounds, which were skin grafted (25 days and 27 days). A layered closure of the dehisced wounds is preferred in women with cesarean section because of their future obstetric prospects.

To the authors' knowledge, this is the first report on the specific use of NPWT in superficial wound disruptions after cesarean sections. In an already stressful post-partum period with recovery from delivery, caring for a newborn, and hormonal fluctuations, a wound disruption further complicates the difficult setting for the patient and her care providers. In all 5 cases, the incision disrupted a length of 10 cm or more and reached the rectus fascia. All wounds were successfully closed without complications or adverse effects, such as pain, bleeding, or infection. Both the course of treatment and the aesthetic results were well-accepted by the patients without adding to post-partum or post-operative stress. Problems with breastfeeding or caring for their newborns during treatment with NPWT were not reported.

CONCLUSION

NPWT is a valuable alternative in selected cases when a surgical closure is not indicated, or not desired by the patient. It was well-accepted by the patients as it did not add to their post-partum or post-operative stress. It also saved them from the mental agony of "re-operation." The device described here can be used in any set-up in any patient, meeting the criteria of NPWT. The indigenous device is simple, safe, affordable, and effective alternative tool in the third world countries with universal application.

REFERENCES

1. Naumann RW, Hauth JC, Owen J, Hodgkins PM, Lincoln T. Subcutaneous tissue approximation in relation to wound disruption after cesarean delivery in obese women. Obstet Gynecol 1995;85:412-6.
2. Martens MG, Kolrud BL, Faro S, Maccato M, Hammill H. Development of wound infection or separation after cesarean delivery. Prospective evaluation of 2,431 cases. J Reprod Med 1995;40:171-5.
3. Chelmow D, Rodriguez EJ, Sabatini MM. Suture closure of subcutaneous fat and wound disruption after cesarean delivery: A meta-analysis. Obstet Gynecol 2004;103:974-80.
4. Sarsam SE, Elliott JP, Lam GK. Management of wound complications from cesarean delivery. Obstet Gynecol Surg 2005;60:462-73.
5. Walters MD, Dombroski RA, Davidson SA, Mandel PC, Gibbs RS. Reclosure of disrupted abdominal incisions. Obstet Gynecol 1990;76:597-602.
6. Dodson MK, Magann EF, Meeks GR. A randomized comparison of secondary closure and secondary intention in patients with superficial wound dehiscence. Obstet Gynecol 1992;80:321-4.
7. Morykwas MJ, Argenta LC, Shelton-Brown EI, McGuirt W. Vacuum-assisted closure: A new method for wound control and treatment: Animal studies and basic foundation. Ann Plast Surg 1997;38:553-62.

How to cite this article: Jain S, Jain M, Purwar S, Jain V, Jain P. Negative pressure wound therapy for post-cesarean, post-hysterectomy dehisced abdominal wounds. J Med Soc 2012;26:171-4.

Source of Support: Nil, **Conflict of Interest:** None declared.