



Factors affecting post-operative laparotomy wound complications

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Abstract

Despite the advances made in asepsis, antimicrobial drugs, sterilization and operative technique, post-operative wound problems continue to be a major threat. Clean sound healing of laparotomy wound after any intra-abdominal procedure is a cardinal index of good surgical repair. Post-operative wound problems delays recovery and often increases stay and may produce lasting sequel and require extra resources for investigations, management and nursing care, therefore its prevention is relevant to quality patient care. Post-operative wound problems seldom causes death, yet it does prove to be an economic burden on patient and on health system and induce psychological trauma to the surgeon as it robs his hours of dedicated work on operating table and good carrier. Considering wound problems is quite common in developing countries like India the present study was taken up to find out the incidence of post-operative wound problems and factors that influence its occurrence. Present study aimed to discover the sound, ideal method for the abdominal wound closure with regard to the problems associated with laparotomy wound.

Key words

Laparotomy, Wound infection, Burst abdomen, Incisional hernia.

Introduction

An abdominal wound may occur due to disruption in the anterior abdominal wall caused by either trauma [1] or any surgical intervention in order to gain access to the underlying

pathology [2]. In the latter scenario, incision thus made passes through various layers of the anterior abdominal wall from skin, subcutaneous tissue, linea alba and peritoneum. This incision when made initiates a cascade of mechanisms at cellular level, which aims at achieving healing at incision site [3]. This healing



may occur by primary intention (wounds with opposed edges) or by secondary intention (wounds with separated edges). Healing by secondary intention occurs whenever there is extensive loss of cells and tissue as occurs in infarction, inflammatory ulceration, abscess formation etc.

Factors affecting wound healing in abdominal wall and those leading to complication have been discussed by various previous reports but no clear consensus could be made. General patients profile like age, sex, nutritional status, pre-operative medical condition like anemia, diabetes, jaundice, renal failure, bad ASA (American Society of Anesthesiologists) scoring, intra-operative knot breakage, suture material rupture or suture cut through, emergency or elective surgery, type and duration of surgery and Post-operative wound infection or increase in intra abdominal pressure are the various factors leading to post-laparotomy complication.

Material and methods

The present study was a prospective study done during the period of July 2006 to September 2008 at a tertiary care centre. A total number of 100 cases were studied and followed up for a period of 6 months. All patients with indication for laparotomy (emergency and elective) with complete 6 month follow up included, while pediatric patients were excluded. Ryle's tube insertion for naso-gastric decompression and urinary catheterization was done all cases. Pre-operative antibiotics were given and anti-diabetic and antihypertensive precautions were taken as per medical advice. Preoperative shaving and local skin care with beta-scrub was done. In elective cases, when indicated bowel preparation was done either by stomach wash, total gut irrigation, or simple enema while in emergency cases no bowel preparation possible.

All patients were operated under general anesthesia through midline incision. Saline and beta dine peritoneal wash was given in all cases. Drainage was done through separate stab incision as per selection by operating surgeon. Mass or layered closure of abdomen was done with absorbable or non absorbable material. Skin was opposed with nylon intermittent stitches.

Post-operatively patient was given antibiotic according to need and early ambulation encouraged. Abdominal wound was examined on 3rd, 7th and 10th post-operative day and suture was removed. All patients were followed up for a period of 6 months.

Results

Total 100 cases were taken for study. Out of which, 76 were emergency cases and 24 were elective cases. Out of emergency surgery, 42 (55%) developed complication while 11 (45%) among elective surgery. 40% patients in the age group 21-40 years developed wound complication, 23% in age <20 year whereas 37% in >40 year age group. 66 patients were male of which 33 (50%), while 34 were female of which 16 (47%) developed complication. The rate shown in present study was higher in males than females explained by higher incidence of smoking, alcoholism, malnutrition and associated medical illnesses. All 24 patients in poor nutritional status developed complication, while 9 (20%) out of 44 with good nutrition had complications. 12 (92%) obese patients while 6 (32%) average patients had complications. Total 19 (59%) patients with hospital stay of <10 days, 25 (54%) patients with hospital stay 10-15 days and 9 (41%) patients with hospital stay >15 days had complications. There was significant rise in the post-operative wound infection with prolonged post-operative hospitalization because colonization of patients with hospital

acquired microorganisms. These organisms are frequently antibiotic resistance and gram negative bacteria. For emergency surgery, longer the duration of hospital stay increased wound problems. It was associated with more disturbances in internal milieu of patients. Total 8 (36%) patients with incision length of <10 cm, 36 (50%) patients with incision length 10-15 cm and 6 (100%) patients with incision length >15 cm had complications. Abdominal drains were kept in 86 patients of which 54%, whereas in 14 drain was not kept of which 2 (14%) developed complication. 60% of laparotomies with clean cases which showed only 25% wound problem rate while contaminated cases showed 62% of problem rate while in dirty cases it was 100%.

Discussion

Abdominal wound complications after laparotomy is a surgical emergency with high morbidity and mortality leading to escalation in hospital costs and prolonged illness. The reported incidence of major abdominal wound complication is 15-25% and is associated with mortality rate of 15-20% [4]. Although several systemic factors, local mechanical factors and post-operative events have been blamed for abdominal wound complication, yet there is no clarity on the importance of each of these factors.

In this study, the highest incidence of wound complication (40%) was recorded in the age group of 21-40 years, probably because of higher incidence of acute abdomen in this decade. Our study showed no correlation of the increased incidence with the increasing age as was showed by Halasz, et al. [5]. Our study showed male predominance (66/100) as was also recorded by studies of Keill, et al. [6] and Penninckx, et al. [7]. Out of the total of 100 patients, 13 were found to be obese (BMI>35).

In a similar study conducted by Cruse and Foord, et al. [8] on 18090 patients, it was found that obese patients have 13.5% wound infection rate. Obesity is associated with other co morbid conditions like diabetes, hypertension, herniation etc., which can all, contribute to poor wound strength and healing. Keill, et al. [6] and Whipple, et al. [9] depicted that anemic people have poor wound healing and tend to have wound gaping. Hypoproteinemia contributes to prolonged inflammatory phase and impairs fibroplasia, proliferation, proteoglycan and collagen synthesis, neoangiogenesis and wound remodeling [10]. In a series of studies of collagen formation in diabetes, Goodson and Hunt [11] have shown that obesity, insulin resistance, hyperglycemia and depressed leukocyte function interfere with collagen synthesis and thus impair wound healing. Pre-existing systemic illness contributes to higher ASA score and higher wound dehiscence rates because of increase wound infection [12].

One of the significant finding was that 76 of the 100 patients who had developed wound complication had undergone laparotomy on emergency basis, 5% patient had wound dehiscence. Similar observation has been made by Penninckx, et al. [7], where wound dehiscence rate was found to 6.7% in emergency laparotomy and 1.5% in elective cases. This fact may be attributed to poor patient preparation, complicated inflammatory disease, premorbid factors and operating at odd hours. Another characteristic feature of our study was that these laparotomy wounds were either contaminated in 62% or dirty in 100% of patients. Similar results were found in a study by Haley, et al. [13], in which they showed contaminated/ dirty wounds to be an important predictor for wound infection. Haley, et al. demonstrated that the duration of surgery more than 2 hours was second greatest independent predictor of risk after a multivariate analysis.

The increase in intra abdominal pressure because of nausea, vomiting or cough results in breakage of suture, undoing of knots or pulling through the tissue. Jenkin, et al. [14] proved in his study that facial layers tend to lengthen as the wound distends where as suture length remains the same leading to breakage of suture, undoing of knot or pulling through tissue. Post-operative wound infection was found to be single most common factor observed in 90% of our patients as a cause of abdominal wound complication. It has been shown by various other studies [15] that tensile strength of staphylococcus aureus contaminated wounds in rat on 6th post-operative day was much decreased. These infected wounds slowly break down and then heal by granulation tissue. All our patients had multiple risk factors contributing wound complication. The least number of risk factors recorded were 3 and maximum number was 11, the same was also interpreted by Riou, et al. [16].

Conclusion

It is necessary to mention that wound healing is a multi factorial problem, influenced by a variety of factors not included in the present study, even though the surgical art of monolayer closure technique proved its superiority in terms of wound healing, strength and security.

References

1. Thomas CL. Taber's Cyclopedic Medical Dictionary. 17th edition. Philadelphia: F.A. Davis Company; 1993, p. 2165.
2. Coleman DJ. In. Russel RCG, Williams NS and Bulstrode CJK (eds), Bailey and Love's: Short Practice of Surgery. 23rd edition. Vol. 29. London: Arnold Publisher London; 2000.
3. Cotran Ramzi S, Kumar Vinay, Collins Tucker. Robin's Pathologic Basis of Disease. 6th edition. USA: W.B. Saunders Co; 2001, p. 89.
4. Poole GV. Mechanical factors in abdominal wound closure. The prevention of fascial dehiscence. Surg., 1985; 97: 631–9.
5. Halasz NA. Dehiscence of laparotomy wounds. Amer J Surg., 1968; 116: 210–4.
6. Keill RH, Keitzer WF, Nichols WK. Abdominal wound dehiscence. Arch Surg., 1973; 106: 573–7.
7. Penninckx FM, Poelmans SV, Kerremans RP. Abdominal wound dehiscence in gastro- enterological surgery. Ann Surg., 1979; 189: 345–52.
8. Cruse PJE, Foord R. The epidemiology of wound infection: A 10 year prospective study of 62939 wounds. SurgClin North Am., 1980; 60: 27.
9. Whipple AO. The critical latent or lag period in the healing of wounds. Ann Surg., 1940; 112: 481.
10. Pollack SV. Wound healing: A review III. Nutritional factors affecting wound healing. J Dermatology Surg Oncol., 1979; 5: 615.
11. Goodson WH III, Hunt TK. Wound healing and diabetic patient. Surg Gynecol Obstet., 1979; 149: 600–8.
12. Sawyer GS, Pruett LP. Wound infection. Surgical clinics of North America, 1984; 74(3): 523.
13. Haley Rw, Culver DH, Morgan WM. Identifying patients at high risk of surgical wound infection. Am J Epidemiol., 1985; 121: 206.
14. Jenkins TPN. The burst abdominal wound: A mechanical approach. Br J Surg., 1976; 63: 873–6.
15. Smith M, Enquist IF. A quantitative study of the impaired healing resulting from



infection. *Surggynecol Obstet.*, 1967;
125: 965–73.

16. Riou JP, Cohen JR, Johnson H. Factors influencing wound dehiscence. *Am J Surg.*, 1992; 163: 324–30.

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