

Outcome of primary closure of abdominal wounds following laparotomy for peritonitis in children

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ABSTRACT

Background: Primary wound closure following laparotomy for peritonitis is generally believed to be associated with wound complications and long hospital stay. Open wound management has long been the most common practice after laparotomy for peritonitis. Primary closure (PC), however, has recently been advocated to reduce cost and morbidity. This study determined the incidence and severity of wound complications and their impact on hospital stay and overall outcome when PC of abdominal wounds is done following laparotomy for peritonitis. **Patients and Methods:** A prospective review of patients who had PC of abdominal wounds following laparotomy for peritonitis over a 6-year period. **Results:** Fifty-six children were analysed (35 boys and 21 girls), aged 11 months to 13 years (median: 8 years). The indication for laparotomy was typhoid intestinal perforation 47 (83.9%), perforated appendicitis 4 (7.1%), complicated cholecystitis 3 (5.3%) and penetrating abdominal injury with bowel perforation and intestinal obstruction with bowel perforation, 1 (1.8%) each, respectively. Postoperatively, 34 patients had wound complications. Nine patients (16.1%) had superficial wound infection alone, 12 (21.4%) had superficial wound infection with partial wound dehiscence, 6 (10.7%) had deep wound infection, 7 (12.5%) had deep wound infection with complete wound dehiscence, whereas 22 (39.3%) had no wound complication. Overall, wound complications in 13 (23.2%) patients were considered to be severe, but none resulted in mortality. Hospital stay in patients who developed wound complications was 8–37 days (median:

25 days) and 6–22 days (median: 10 days) in patients who had no wound complications ($P = 0.02$). **Conclusion:** The rate of wound complications following PC of dirty abdominal wounds remain but PC is safe and gives good healing outcomes.

Key words: Abdominal, peritonitis, post-operative complication, surgical site infection

INTRODUCTION

Dirty surgical wounds are associated with a high rate of wound infection.^[1-3] Post-operative wound infections have a significant impact on health resources and costs, and the sequelae of wound infections can result in significant long-term problems.^[4-7]

The method of skin closure has been implicated as an important risk factor.^[8]

Delayed primary closure (DPC) and PC are two commonly used methods, but there is no consensus as to the optimal method.

In our practice, previous (unpublished) experience showed that DPC was almost never achieved if the wound was left open and nearly all patients developed wound complications. This is a report of a prospective review of the PC of dirty abdominal wounds in children

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with the aim of determining the incidence and severity of wound complications and their impact on hospital stay and overall outcome.

PATIENTS AND METHODS

A total of 60 patients who had peritonitis irrespective of aetiology were enrolled into the study from January 2004 to December 2009.

All sixty patients had PC of their abdominal wounds, using a continuous non-absorbable suture to fascia and interrupted non-absorbable suture to skin.

Patients who died <72 h following surgery from the primary disease, and patients who were identified intraoperatively to have anterior abdominal wall oedema were excluded from the study.

Broad spectrum antibiotics were commenced in all patients on admission and were also administered at induction of anaesthesia and continued postoperatively for 48 h.

Following surgery, the surgical site was inspected daily; a wound infection was deemed to have occurred when there was cellulitis, purulent discharge or pus collection in a cavity.

Severe wound complication was said to have occurred if there was deep wound infection or complete wound dehiscence or both.

If any discharge, alternate stitches were removed to allow egress of pus and daily wound dressing done, a wound swab was also taken before the commencement of antibiotics based on sensitivity. Patients with wound dehiscence had secondary wound suturing.

Data were analysed using SPSS version 15.0 (SPSS inc 1989-2006, Chicago, Illinois) for windows evaluation copyright SPSS Inc. 1989 – 2006 and level of significance was set at 0.05.

RESULTS

There were sixty children, four children died <72 h following surgery and were excluded from further consideration. None had anterior abdominal wall oedema.

Fifty-six children (35 boys and 21 girls) aged 11 months to 13 years (median: 8 years) were analysed.

The main indication for laparotomy was typhoid intestinal perforation 47 (83.9%), perforated appendicitis 4 (7.1%), complicated cholecystitis 3 (5.4%) and other indications are listed in Table 1.

Postoperatively, 34 patients had wound complications. Nine patients (16.1%) had superficial wound infection alone, 12 (21.4%) had superficial wound infection with partial wound dehiscence, six (10.7%) had deep wound infection alone, 7 (12.5%) had deep wound infection with complete wound dehiscence, whereas 22 (39.3%) had no wound complication.

Fifty-three (94.6%) had generalised peritonitis, whereas three (5.4%) had localised peritonitis.

Of the 53 patients who had generalised peritonitis, 8 (15.1%) had superficial wound infection alone, 12 (22.6%) had superficial wound infection with partial wound dehiscence, five (9.4%) had deep wound infection alone, 7 (13.2%) had deep wound infection with complete wound dehiscence and 21 (39.6%) had no wound complication [Table 2].

Three patients with partial wound dehiscence and all the patients with complete wound dehiscence had secondary wound suturing done after sepsis was controlled.

Overall, 13 (23.2%) patients had severe wound complications, but none resulted in mortality [Table 2].

Table 1: Indications for laparotomy

Indication	Frequency	Percentage
Typhoid intestinal perforation	47	83.9
Perforated appendicitis	4	7.1
Complicated cholecystitis	3	5.4
Penetrating abdominal injury with bowel perforation	1	1.8
Intestinal obstruction with bowel perforation	1	1.8
Total	56	100

Table 2: Post-operative wound complications

Complications	Generalised Peritonitis	Localised peritonitis	Total
Superficial wound infection alone	8	1	9
Superficial wound infection with partial wound dehiscence	12	-	12
Deep wound infection alone	5	1	6
Deep wound infection with complete wound dehiscence	7	-	7
None	21	1	22
Total	53	3	56

Hospital stay in patients who developed wound complications was 8–37 days (median: 25 days) compared to 6–22 days (median: 10 days) in patients who had no wound complications ($P = 0.02$).

DISCUSSION

DPC of dirty wounds, which has over time become a generally accepted practice, is thought to reduce the risk of bacterial colonisation and subsequent wound infection.^[9-11]

However, DPC, especially in children is associated with anxiety for both the parents and the child, and the frequent wound dressings are associated with pain. This has led to a recent clamour for PC of dirty wounds.^[12-14]

Our study showed a surgical site infection (SSI) rate of 60.7% (34/56). Most of the infections, 61.8% (21/34) were not severe, were easily controlled and none resulted in a mortality, this is similar to the findings by Usang *et al.* practicing in Ile-Ife who found a wound infection rate of 59.4% following PC among 32 patients with typhoid ileal perforation, with a primary wound healing rate of 18.8%.^[2]

The SSI rate in this report though similar to that of Usang *et al.* is lower than the rates reported in other series in our environment, especially when typhoid ileal perforation was the primary pathology.^[2,15,16]

We also found that about one-third of our patients had primary wound healing without complications, a finding which is a slight improvement when compared to one-fifth primary wound healing rate reported by other authors.^[2,3]

SSI in this report resulted in prolonged hospital stay, which by inference may mean more cost as reported by several other authors.^[4-7]

In view of the physical and psychological effects of DPC on patients and caregivers, our findings may make primary wound closure an attractive alternative to DPC, especially in children, this should be understood vis-a-vis several recent studies that show no added benefit of DPC over PC.^[3,17-20]

Other post-operative wound complications in our study include partial and complete wound dehiscence with some of the patients requiring secondary wound closure after sepsis was controlled. This pattern is similar to other reports.^[2,3,15,16]

A limitation, however, of the present report is the fact that PC and DPC were not compared, and this should be the basis for future studies.

CONCLUSION

The rate of wound complications following PC of dirty abdominal wounds remain but PC is safe and gives good healing outcomes. In settings similar to ours, PC of abdominal wounds in patients with peritonitis should be done if there is no anterior abdominal wall oedema or abdominal wall cellulitis. The wound would need to be monitored closely post-operative to identify any SSI early for appropriate intervention

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Cruse PJ, Foord R. The epidemiology of wound infection. A 10-year prospective study of 62,939 wounds. *Surg Clin North Am* 1980;60:27-40.
2. Usang UE, Sowande OA, Ademuyiwa AO, Bakare TI, Adejuyigbe O. Outcome of primary closure of abdominal wounds following typhoid perforation in children in Ile-Ife, Nigeria. *Afr J Paediatr Surg* 2009;6:31-4.
3. Adesunkanmi AR, Ajao OG. Typhoid ileal perforation: The value of delayed primary closure of abdominal wounds. *Afr J Med Med Sci* 1996;25:311-5.
4. Davey PG, Nathwani D. What is the value of preventing postoperative infections? *New Horiz* 1998;6 (2 Suppl):S64-71.
5. Riou JP, Cohen JR, Johnson H Jr. Factors influencing wound dehiscence. *Am J Surg* 1992;163:324-30.
6. Shulkin DJ, Kinosian B, Glick H, Glen-Puschett C, Daly J, Eisenberg JM. The economic impact of infections. An analysis of hospital costs and charges in surgical patients with cancer. *Arch Surg* 1993;128:449-52.
7. Poulsen KB, Bremmelgaard A, Sørensen AI, Raahave D, Petersen JV. Estimated costs of postoperative wound infections. A case-control study of marginal hospital and social security costs. *Epidemiol Infect* 1994;113:283-95.
8. Cohn SM, Giannotti G, Ong AW, Varela JE, Shatz DV, McKenney MG, *et al.* Prospective randomized trial of two wound management strategies for dirty abdominal wounds. *Ann Surg* 2001;233:409-13.
9. Benard HR, Cole WR. Wound infection following partially contaminated wounds: Effects of delayed primary closure of skin and subcutaneous tissue. *J Am Med Assoc* 1963;184:290-2.
10. Coller FA, Valk WL. The delayed closure of contaminated wounds: A preliminary report. *Ann Surg* 1940;112:256-70.
11. Edlich RF, Rodeheaver GT, Thacker JC. Biology of wound repair and infection. In: Gillenwater JY, Grayhack JT, Howards SS, Duckett JW, editors. *Adult and Paediatric Urology*. 3rd ed. St. Louis: Mosby; 1996. p. 219-87.
12. Serour F, Efrati Y, Klin B, Barr J, Gorenstein A, Vinograd I. Subcuticular skin closure as a standard approach to emergency appendectomy in children: Prospective clinical trial. *World J Surg* 1996;20:38-42.

13. Rucinski J, Fabian T, Panagopoulos G, Schein M, Wise L. Gangrenous and perforated appendicitis: A meta-analytic study of 2532 patients indicates that the incision should be closed primarily. *Surgery* 2000;127:136-41.
14. Chiang RA, Chen SL, Tsai YC, Bair MJ. Comparison of primary wound closure versus open wound management in perforated appendicitis. *J Formos Med Assoc* 2006;105:791-5.
15. Irabor DO. Fifteen years of typhoid perforation in children in Ibadan: Still a milestone around the surgeon's neck. *Niger J Surg Res* 2003;5:92-9.
16. Rahman GA, Abubakar AM, Johnson AW, Adeniran JO. Typhoid ileal perforation in Nigerian children: An analysis of 106 operative cases. *Pediatr Surg Int* 2001;17:628-30.
17. Siribumrungwong B, Noorit P, Wilasrusmee C, Thakkinstian A. A systematic review and meta-analysis of randomised controlled trials of delayed primary wound closure in contaminated abdominal wounds. *World J Emerg Surg* 2014;9:49.
18. Tsang TM, Tam PK, Saing H. Delayed primary wound closure using skin tapes for advanced appendicitis in children. A prospective, controlled study. *Arch Surg* 1992;127:451-3.
19. Khan KI, Mahmood S, Akmal M, Waqas A. Comparison of rate of surgical wound infection, length of hospital stay and patient convenience in complicated appendicitis between primary closure and delayed primary closure. *J Pak Med Assoc* 2012;62:596-8.
20. Mehrabi Bahar M, Jangjoo A, Amouzeshi A, Kavianifar K. Wound infection incidence in patients with simple and gangrenous or perforated appendicitis. *Arch Iran Med* 2010;13:13-6.

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