

Original Research Article

Single layer versus double layer closure of enteric perforation- a comparative study

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ABSTRACT

Background: Small intestine perforation and gastrointestinal haemorrhage are the most common and dreadful complications of enteric fever. There are different operative procedures available for enteric perforation repair. In the present study attempts should be made to find out which operative procedure (either single layer or double layer closure) should be planned in enteric perforation by comparing these, in terms of morbidity, mortality and cost effectiveness.

Methods: This study was carried out on 50 patients of either sex. They were divided in two groups Group- A (conventional double layer repair in 25 patients) and Group- B (single layer interrupted sutures in 25 patients). After analysing the result of this study, it can be concluded that single layer repair for enteric perforation can be constructed in less time and with less complication rate compared with the conventional two layer repair technique, it also recovers the patient early and causing earlier bowel activity than two layer repair.

Results: 50 patients were studied in the present study and results were in favour of single layer group as time taken for perforation repair and overall surgical time was less in this group. Moreover, single layer repair also helps early bowel activity and early recovery to the patient than double layer technique.

Conclusions: Double layer closure of enteric perforation offers no definitive advantage over single layer repair in terms of faecal fistula formation, operative time, returns of bowel movements and other complications like wound abscess formation, wound dehiscence, respiratory complications etc. Less operative time and other factors in favour of single layer repair makes it the choice of procedure for most of the surgeons.

Keywords: Acute abdomen, Faecal fistula, Peritonitis, Perforation repair

INTRODUCTION

Enteric fever is an endemic disease in India and some other tropical countries. Salmonella typhi is the major cause of enteric fever and human are the only reservoir of the organism. Ileal perforation occurs in about 1 to 3% of treated patients of typhoid fever and it is the most common cause of death.

In addition to toxemia, mixed bacterial peritonitis is responsible for morbidity and mortality in most of the cases of enteric perforation. In the past enteric perforation was considered almost fatal and surgeons were in favour of conservative management (Huckstep).¹

For last 3-4 decades, surgical intervention is established as the choice of treatment for enteric perforation but still

there is no uniformity of opinion about the extent of surgery and numerous operative procedures such as, simple closure of perforation (Bhansali), repair of perforation with ileo-transverse bypass (Prasad et al), primary ileostomy (BK Kaul), single layer repair with omental patch (purohit) and resection and anastomosis (athie, guizar alcantara) have been tried.²⁻⁶

The aim of the present study was to evaluate the outcome of single layer versus double layer repair of enteric perforation in each group in terms of time taken for repair of perforation and overall surgical time, leakage and formation of faecal fistula, return of bowel movements, formation of wound infection and dehiscence, mortality etc.

METHODS

This comparative study was conducted over a period of 12 months from January 2005 to December 2005 in the department of general surgery JLN medical college, Ajmer Rajasthan. Fifty patients of either sex were taken for the study and divided equally in two groups. Group-A (n- 25) comprises, conventional double layer closure and Group-B (n- 25) comprises single layer repair of enteric perforation.

All cases were performed by experienced surgeons. In Group -A closure of perforation was carried out in two layers, inner transmural layer with continuous 2-0 absorbable polyglactin suture and the outer neuromuscular layer with silk 2-0 interrupted suture. In Group -B perforation was closed in single layer with interrupted non absorbable 2-0 silk suture. Operative and post-operative outcomes in terms of operative time, time taken for perforation repair, wound infection, formation of faecal fistula, duration of hospitalization, and death were analysed.

Table 1: Age and sex incidence.

Age groups (Years)	Male	Female	Total	%
1-10	2	0	2	4
11-20	12	4	16	32
21-30	10	4	14	28
31-40	6	1	7	14
41-50	3	2	5	10
51-60	2	1	3	6
61-onwards	3	0	3	6
Total	38	12	50	100

RESULTS

During this 12 months period of study enteric perforations was observed in 2nd and 3rd decades of life which comprises 32% and 28% respectively and M:F ratio was 3.16:1.

There was a seasonal variation of presentation as maximum no. of cases i.e.18% were presented in month of August followed by 16% in September. In Group-B time taken for perforation repair was less than Group-A and same was observed in overall surgical time that adversely affect post-operative recovery in Group-A. The range of duration of hospital stay was between 8-45 days and 7-35 days in group-A and group-B respectively.

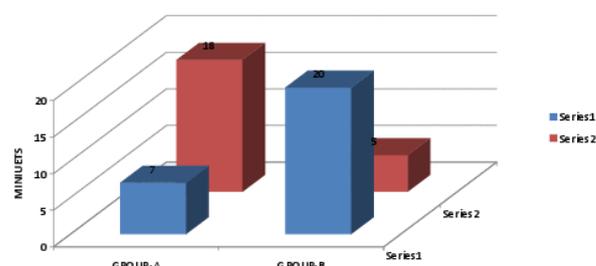


Figure 1: Time taken for repair.

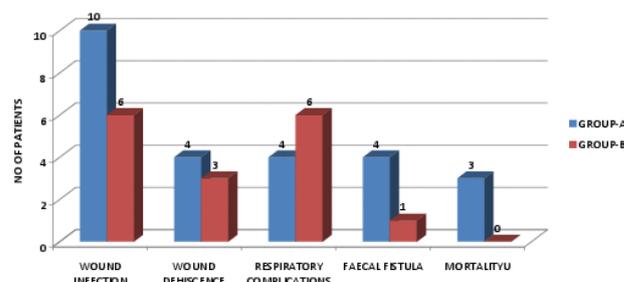


Figure 2: Incidence of complications.

DISCUSSION

Age (>40 years), sex (female), late presentation, multiple perforations and poor general condition (anaemia, severe peritoneal contamination, severe fluid and electrolyte imbalance etc.) of the patient had always been a cause for concern in patient undergoing enteric perforation repair as healing process is adversely affected by these factors and may result leakage and faecal fistula formation and sometime death may occur.

A careful physical examination with particular attention to the abdomen is certainly the most important and may be the only diagnostic procedure available to the physicians in certain part of the world.

Laboratory investigations in the series were used as a supportive role only. Widal's test was performed but was not helpful in the early diagnosis of acute enteric fever. An upright chest radiograph or FPA was done to look for free air beneath the diaphragm is a valuable adjuvant diagnostic tool. The ultimate diagnostic tool is the exploratory laprotomy. A delay of greater than 24 hours in diagnosis increases the mortality rate.

Olurin et al had pointed out that the proper treatment of perforated typhoid enteritis must deal with three process⁷

- General septicaemia
- Generalised peritonitis
- Dehydration and electrolyte imbalance

Egglestone et al observed that the mortality rate was adversely influenced by the duration of illness, duration of perforation, shock, uraemia, encephalopathy and faecal peritonitis.⁸ Ajao OG demonstrated the factors affecting the mortality and morbidity in typhoid perforation such as age of the patients, duration of perforation, presence of additional complications like massive rectal bleeding, the extent of the surgery and number of perforation.⁹

According to Nadkarni et al in a series of 32 cases, the ultimate results are not related to the cause but are directly proportional to the degree of the contamination of the peritoneal cavity, delay in manifestation, antibiotic resistance, and the method of the treatment of the perforation.¹⁰

Rathore AH treated 58 patients of typhoid perforation surgically and observed that the larger the time interval between perforation and surgery, the worse is the prognosis.¹¹ Kim JP et al also added that delay in operative intervention adversely affects the survival rate after surgery.¹² In this series patient received i.v. crystalloid solution in the quantity sufficient to normalise blood pressure and to restore urine output. Broad spectrum antibiotic coverage is recommended to treat generalised peritonitis and septicaemia.

Typhoid perforation is a surgical emergency. The treatment should be prompt and energetic. The role of conservative treatment is limited and the surgical procedure depends on the general health of the patient. There are so many options available to the surgeon in the management of the typhoid perforation like debridement and closure of perforation, simple ileal resection and anastomosis, closure of perforation and ileotransverse bypass, ileostomy etc. but simple debridement and meticulous bowel closure with peritoneal toileting with normal saline to be the safest and simplest way for a surgeon.

Kuruvilla MJ advised that resection is preferable but other procedures have their place in appropriate cases.¹³ Shah AA et al treated 81 cases by dividing them in four groups.¹⁴ Group A (resection and anastomosis), Group-B (debridements of margins of perforation/wedge excision and simple closure), Group-C (simple closure), Group-D (by ileostomy). The complication and mortality was 37.50% and 21.47% respectively in Group-A, very much less than that observed in the other groups.

Ameh EA treated 64 patients of typhoid perforation by three techniques (simple closure, wedge excision and anastomosis and segmental resection and anastomosis).¹⁵

The risk of reperforation and mortality rate were highest in patients who had wedge excision and were lowest in those who had segmental resection and anastomosis. The conclusion was that segmental resection seems to be the best treatment for typhoid perforation. Even in the best hands post-operative morbidity is extensive in majority of the cases probably due to endotoxin released by the organism. In present study in Group- A, the time taken for repair is <15 min in 7 (28%) patients while in Group-B in 20 (71.42%) patients, repair was done in <15 min (Shown in Figure 1). Likewise overall duration of surgery revealed that 12 (48%) patients in Group-A and 20 (80%) patients in Group-B, took upto one hour to accomplish the surgery. So that these observations show that single layer repair took less time to perform in comparison of double layer repair, consequently patient had more anaesthesia and its complications in double layer repair technique. In present study 9 (36%) patients in Group-A and 15 (60%) patients in Group-B passed flatus within 4th POD, in the same way 9 (36%) patients in Group-A and 18 (72%) patients in Group-B tolerated orally within 6th POD. 4 (16%) patients in Group-A and 12 (48%) patients in Group-B passed stool in within 4th POD. Above findings suggest that patients operated for single layer returns their bowel movements earlier to that repaired with double layer repair technique.

As far as complications are concerned, 4 (16%) patients in Group-A and 1 (4%) patient in Group-B had leakage from repair site and formed faecal fistula. One patient in Group-A was died on 16th POD due to faecal fistula and remaining 3 patients in Group-A and one patient in Group-B were treated conservatively (by blood transfusion, TPN, constipation diet, P/R enema etc.). In the study of Shukla et al, faecal fistula formation was 8% and 4% in double layer and single layer repair respectively.¹⁶ So above findings suggest that the incidence of faecal fistula formation is more with double layer repair than single layer repair (Figure 2).

Other complications (Figure 2) like wound infection in 10 (40%) and 6(24%) patients, wound dehiscence in 4 (16%) and 3 (12%) patients, respiratory problems in 4 (8%) and 6 (12%) patients were noted in Group-A and Group-B respectively. In Group-A 9 (36%) patients required hospitalisation for <15 days and 16 (64%) patients were required hospitalisation for >15 days and in Group-B 18 (72%) patients were hospitalised for <15 days and only 7 (28%) patients kept hospitalise for>15 days. So, the findings suggest that patients operated by single layer technique got discharge earlier than those operated by double layer repair.

CONCLUSION

After analysing the result of this study, it can be concluded that single layer repair for enteric perforation can be constructed in less time and with less complications rate compared with the conventional two

layer repair technique. It also recovers the patient early and helps in early restoration of bowel activity.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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