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Tube caeco-ileostomy with repair: An innovative surgical technique for typhoid perforation

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Abstract

Background: Typhoid ileal perforation is still a common surgical emergency in tropical countries. Several surgical procedures have been reported by various surgeons from all over the world with varied reports about post-operative outcome and complications. The given study describes an innovative surgical technique “Tube Caeco-ileostomy with repair of perforation” for patients of typhoid perforation presenting in resource limited set-up.

Methods and Material: This series includes clinical, post-operative complications and mortality data of 68 patients operated with this technique, from May 1997 to April 2017 at Patna Medical College and Hospital and Sanjeevani Hospital, Patna, India.

Results: Wound infection, wound dehiscence, residual abscess, incisional hernia and faecal fistula was found in 30%, 20%, 10%, 10% and 8% of the cases respectively. Septicemia was seen in 20% cases with a mortality rate of 4.4%.

Conclusion: The encouraging results with this procedure strongly advocates further studies at other centers.

Keywords: typhoid, ileal perforation, tube caecocolicostomy, repair

1. Introduction

Typhoid fever is an infective disease caused by a gram-negative bacillus and is endemic in many parts of the world. As per a global estimate study, the number of typhoid fever episodes in 2010 was reported to be 13.5 million [1]. The majority of disease burden has been observed in South and South-East Asia and in sub-Saharan Africa. Transmission is through the faeco-oral route from contaminated food and water and so, it is commonly seen in impoverished, overcrowded areas of the developing world, with lack of safe drinking and sanitation [2]. The disease manifests with various degrees of severity determined by the virulence of the organism and the immunity of the host. The common symptoms in uncomplicated cases include fever, abdominal pain, change in bowel habit, anorexia, and nausea. Involvement of Peyer's patches in the ileum leads to necrosis and ulceration, which causes the two common complications, bleeding and perforation. Perforation of the ileum is the commonest life-threatening complication of typhoid fever and usually presents as a surgical emergency in tropical countries [3]. The reported incidence ranges from 0.8% to 39% with a marked difference between high-income and low-middle income countries [4]. Resuscitation of the patients is done with fluids, electrolytes, antibiotics and, sometimes, blood transfusion. This is followed by laparotomy with closure of perforation and peritoneal toileting [5]. Various surgical techniques have been tried and reported from all over the world. Simple repair of gut perforation followed by peritoneal toileting, proximal ileostomy, proximal ileo transverse anastomosis, side to side, proximal end to side anastomosis with distal ileum pulled out of abdomen, resection and anastomosis of gut have been tried with varied reports on mortality and post-operative complications [6-10]. Post-operative leakage is common as the lower ileum lumen becomes narrow and contents become viscus resulting in an increased intraluminal pressure in the distal ileum leading to perforation on the same site or other. However, ileal perforation continues to be a fatal complication still today. In an effort to reduce the morbidity and mortality, we developed a new surgical technique to decompress the intestine causing both healing as well as avoidance of a second operation

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needed in case a proximal ileostomy is done. Tube caecilie ostomy after a simple repair of perforation sites in two layers was started by our team with a very successful outcome and a study based on results using this technique compared to others is being presented in this paper.

2. Material and Method

This is a retrospective analysis of the patients who presented with features of peritonitis and history of prolonged fever at Patna Medical College and Hospital, Patna and Sanjeevani Hospital, Patna from May 1997 to April 2017 and were admitted through surgical emergency. They were subjected to all relevant investigations including routine blood tests, Widal test, and Elisa for Koch's. All these patients also had a plain x-ray abdomen in erect posture. An Ultrasonography of abdomen was also done. The patients were put on nasogastric suction through a wide bore Ryle's tube and given intravenous fluid and antibiotics. 68 patients of typhoid ileal perforation, who were treated. The variables studied included demographics, clinical features, post-operative complications and mortality.

Tube caecilie ostomy: Exploratory laparotomy was performed under general anesthesia through Right Paramedian incision. After opening the peritoneal cavity all peritoneal exudates with flakes were quickly mopped out from both supra and infra colic compartments. The small gut was examined in its entire length and the perforation was searched and located. [Fig. 1].

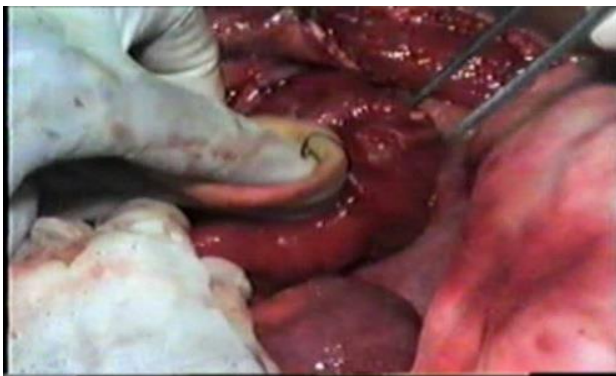


Fig 1: Showing ileal perforation

First three seromuscular sutures in posterior caecal wall and pariety of the abdomen was taken by 2-0 Mersilk. Then a curved long artery forcep was inserted through the perforation and passed up to the caecum. Then a caecostomy was done at the tip of the artery forcep and it was pushed out through it and the posterior layer of the suture was tied [Fig. 2].

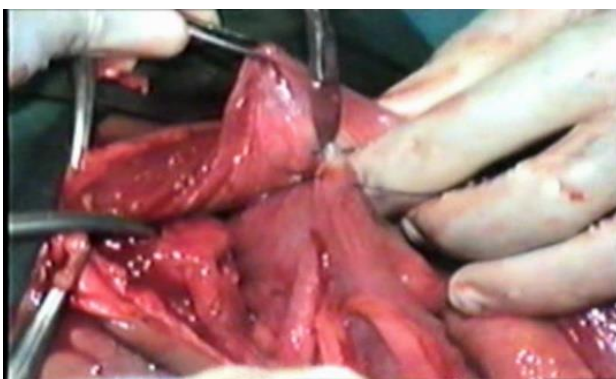


Fig 2: Showing caecostomy being done

Then a wide bore tube with multiple openings of sufficient caliber depending on age (28F – 30F) was introduced through stab wound done in the lateral wall of right iliac fossa; which was pulled through caecostomy opening by grasping in hemostat and placed about 6 inches proximal to site of ileal perforation. [Fig. 3 & 4].

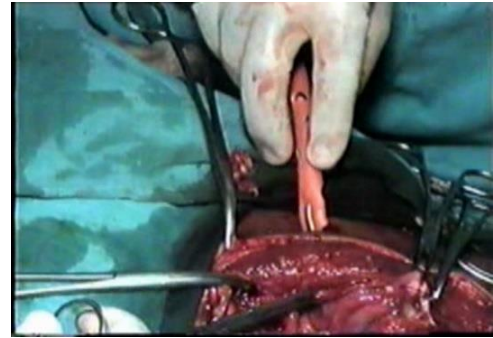


Fig 3: Showing insertion of wide bore tube through stab wound in rt. iliac fossa

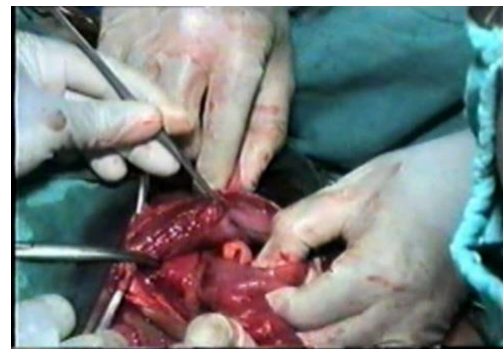


Fig 4: Showing placement of tube through caecostomy and beyond the intestinal perforation

The caecum was further fixed to the parietal with 3 or 4 interrupted Mersilk 2-0 stitches anterior to the caecostomy so that it gets adhered to the pariety. Then a core of tissue was taken for biopsy from the perforation site and it was repaired in two layers with 3-0 silk sutures. [Fig.5]

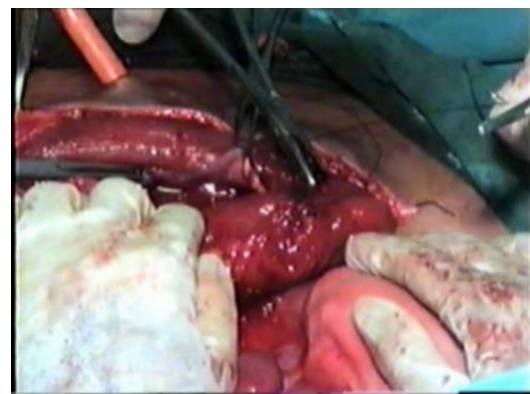


Fig 5: Showing repair of the perforation of intestine

Vigorous peritoneal toileting was done to get rid of the exudates from all quadrants of abdomen and esp. from the sub diaphragmatic space in shortest possible time. After this, a wide bore abdominal drain was placed in right paracolic gutter and pelvis for an average duration of 12 days. Abdomen was closed in single layer by using a 2-0 Nylon loop. The caecostomy tube was irrigated daily with 100cc Normal saline through a bladder

syringe (50cc done twice) so that the tube remained patent and to avoid an increase in pressure in the fragile portion of the ileum.

In post-operative period all patients were treated with nasogastric aspiration and antibiotics. Blood transfusion was done if required. I. V fluid with suitable electrolytes were given for 10 days. Then after giving liquid diet for 3 days the drain in caecum was removed. The pelvic drain was removed next day if there was no collection.

3. Observations and Results

This is a retrospective analysis of 68 patients of typhoid ileal perforation, who were treated at Patna Medical College and Hospital, Patna and Sanjeevani Hospital, Patna from May 1997 to April 2017. The variables studied included demographics, clinical features, post-operative complications and mortality. A male preponderance was seen with a male to female ratio of 5:1. The age of the patients ranged from 12 to 50 years with most of the patients in the second and third decade of life. High fever with pain abdomen was the most common presenting feature of the patients. Rigidity of the abdominal wall was mostly absent. All the patients had a toxic look with coated tongue, crusted lips, thread and rapid pulse with high temperature. leucopenia was the most common haematological finding seen in these patients. Plain X-ray of abdomen done in erect posture showed air under diaphragm in only 40 (58.80%) patients. Rest of the patients showed peritoneal collection on ultrasonography of abdomen. 60 patients had perforation in the ileum and remaining 8 patients had perforation in the jejunum near ileo-jejunal junction. 62 (88.23%) patients had a single site of perforation while 6 (11.76%) patients showed two sites of perforation. All the patients underwent laparotomy with "Tube Caeco ileostomy and repair of the perforation". The most common complications found was wound infection in 20 (30%) patients followed by wound dehiscence, and residual abscess in 14 (20%) and 6 (10%) patients respectively. Septicemia was also reported in 14 (20%) patients, with renal complications in 6 (10%) and pulmonary complications in 3 (4%) of cases. Faecal fistula was seen in 3 (4%) cases, which healed spontaneously on conservative treatment. Post-operative incisional hernia was found in 5 (10%) patients. [Table. 1] 3 patients died, 2 because of septicemia and 1 of renal failure. The average hospital stay was 14 days.

Table 1: Table show complication number and percentage

Complication	Number	Percentage (%)
Wound Infection	20	29.41
Wound Dehiscence	14	20.58
Residual abscess	6	8.82
Septicemia	14	20.58
Renal Complications	6	8.82
Pulmonary complications	3	4.41
Faecal fistula	3	4.41
Incisional hernia	5	7.35

4. Discussion

Typhoid remains a significant burden in India, despite an apparent decline in prevalence. Intestinal perforation is the most serious complication seen in these patients with a variable incidence across different regions of the world [11]. 56 out of 68 patients were male in our series which is similar to several studies showing a male predominance. Ileum has been found to be the most common site of perforation in various studies accounting for up to 80% of the cases, similar to our series of

patients. This is followed by perforation seen in jejunum, caecum, colon and occasionally gall bladder. Typically, these perforations appear as "punched out" holes on the anti-mesenteric border of the bowel [12]. The perforation is commonly single in number, as seen in our study where 88.23% of the patients had a single perforation. Typhoid fever produces hyperplasia of the reticuloendothelial system especially in the Peyer's patches causing its necrosis and ulceration. The preponderance of Peyer's patches, which is the common site of ulceration, might explain the high proportion of perforations occurring in the terminal ileum. Recent insights into the pathology suggest the mechanism of intestinal injury complicating enteric fever to be immunologically mediated, through release of cytokines from macrophages which are activated by *Salmonella typhi* directly by their Toll-like receptors or indirectly through antigen presenting cells [13].

The pre-operative diagnosis is usually based on high clinical suspicion and often serologically positive Widal test for *Salmonella* infection. The characteristic presence of free intraperitoneal gas in typhoid patients with perforation has been found to be uncommon, but few authors have reported a positive finding in about 65% of their patients, it was 58.80% in our series [14]. Some authors have shown that ultrasonography is a useful diagnostic modality when x-rays does not reveal pneumoperitoneum in patients with suspected perforation. Ultrasonography can detect free air in the peritoneum along with localized fluid collection and thickening of bowel loops.

Perforation of bowel leads to peritonitis which may lead to septicemia causing death of the patient, if not treated immediately. The treatment of typhoid perforation has evolved from conservative to prompt surgical intervention as various surgical techniques have shown a substantial decline in mortality in these patients as compared to non-surgical management. Huckstep in 1960 recommended a conservative treatment with Chloramphenicol; avoiding any surgical treatment as he thought that it was futile to repair a friable and thin segment of intestine [15]. However, Franklin from the University of Hong Kong at the same time strongly advocated surgery as drainage of pus from the peritoneal cavity lessens toxemia and advances recovery [16]. In addition to an adequate peritoneal toilet, an appropriate management of the perforation is also essential. Review of literature shows a wide variety of operative procedures being used by different surgeons in an effort to reduce the rate of complications and associated mortality. Various surgical procedures tried include simple closure of the perforation, local wedge resection of the ulcer, resection of the affected ileum sometimes combined with right hemicolectomy, side-to-side ileotransverse colostomy, temporary ileostomy or ileostomy through the perforation in combination with chloramphenicol and other antibiotics [6-10].

Shukla *et al.* advocates simple closure of single perforation as opposed to segmental resection because of the speed and ease of this procedure in a critically ill patient [17]. On the other hand, segmental resection is based on the principle of complete removal of inflamed, unhealthy bowel around one or multiple perforations and construction of a single anastomosis using viable bowel with better chances of healing and less risk of reperforation or anastomotic leakage. Ameh *et al.* in a prospective nonrandomized study done in Nigeria showed that patients who had segmental resection and anastomosis had lower reperforation and mortality rates than simple closure and wedge resection and closure [18]. These findings were further supported by Athie C G *et al.* from Mexico in a series involving 352 patients over 25 years, who reported the benefits of segmental

resection of 10 cm of small bowel proximal and distal to the perforation site reducing morbidity and mortality to 1.72% compared to 33.47% and 7.20% when conventional simple closure or resection and anastomosis are used [10]. Atamanalp *et al.* from Turkey reported 12.86% mortality in 70 patients treated with simple closure for single perforation, segmental resection and anastomosis for multiple perforations and ileostomy for severe peritoneal contamination from 1978 to 1990 [19]. Prasad *et al.* treated 100 cases of typhoid perforation in 2 layers using chromic 2-0 for the inner layer and silk 2-0 for seromuscular layer followed by proximal ileotransverse anastomosis [7]. This procedure though successful in healing of perforation caused distal blind loop situation due to proximal bypass. Ileostomy as a first line surgery for perforation has been recommended for patients with severe peritoneal contamination; enhancing intestinal decompression with improved healing. Lozoya introduced tube ileostomy in 1948 using a 24 G Foley's catheter and passing it through either the perforation or the stab wound in the least inflamed part of the intestine [20]. Singh K.P *et al.* used loop ileostomy or proximal ileostomy with varying results [9]. Pandey *et al.* reported successful use of T-tube as an alternative to open ileostomy in 12 patients with severe peritoneal contamination, extubating after an average of 13.2 days with healing of post T- tube fistula in 8.58 ± 2 days [21]. Further, Ramchandran C S *et al.* reported successful management of 6 consecutive cases of enteric perforation laparoscopically with acceptable results [22].

Though there are several surgical methods reported in literature, none has proved to be very satisfactory. Simple closure of gut is always at risk owing to edematous gut wall and poor immunity due to typhoid bacillaemia. Proximal ileostomy is a good procedure reducing intraluminal pressure in affected gut but needs a second operation for stoma closure. Our procedure of tube caeco ileostomy reduces intraluminal pressure effectively and supported by intensive anti typhoid drugs, has given good results. Further, it does not require any second operation for closure of caecal fistula. Another advantage is that it requires about 30 minutes so, the surgeon gets sufficient time for peritoneal toileting especially of both sub diaphragmatic regions. The shift from nonoperative management to aggressive resuscitation and early surgery, change of antibiotic policy from chloramphenicol only to combinations, availability of intensive care and organ-system support contributed to reduction in mortality rate from this disease shifting the focus to the high morbidity rate and prolonged hospital stay.

Our series reports septicemia in 20%, renal failure in 10%, pulmonary complications in 5% and faecal fistula in 5% of the cases which is much less than those reported in earlier studies. Archampong in his series of 121 cases had reported pulmonary complications in 12.39% of cases, faecal fistula in 12%, and wound sepsis in 54% of the cases [3]. Wound infection reported in our series was 30% as compared to 70.8% in a study by Adesunkami AR and Ajuo OG in 1996. Talwar S *et al.* encountered wound infection in 79.1% cases and faecal fistula in 8.35 of cases [23]. Singh *et al.* observed faecal fistula in 5 out of his 42 patients (8.4%) in the post-operative period [9]. Beniwal US (2003) found common post-operative complications as wound infection in 23%, bleeding in 5.5%, and faecal fistula in 16.5%. There were 10 deaths in 33 patients with faecal fistula [25].

There has been an enormous variation in reporting of the mortality rate in typhoid perforation. However, it ranges from 6 to 65%. The current study has a very low mortality rate of only 4.4%, which too could have been prevented with better

supportive care. Prasad *et al.* reported 20% mortality in his series [7]. Singh KP *et al.* from Ludhiana reported an improved mortality rate of only 14.2% with ileostomy [9]. Vaidyanathan in 1992 reported mortality rate of 10% in his series where patients were treated with repair of perforation in 2 layers with Prolene 4-0 suture and an omental patch [26].

Karmacharya B *et al.* in 2006 reported a very low mortality of 6.86% in his series of 189 patients showing no difference in mortality rate with different procedures he used [27].

5. Conclusion

Tube Caeco ileostomy method supported by good peritoneal toileting and anti-typhoid chemotherapy shows good results with respect to healing and less post-operative complications which are very common in cases of typhoid ileal perforation. The encouraging results with this procedure strongly advocates further studies at other centers. This method can be adopted in multiple injuries of ileum due to trauma also as every centimeter of ileum has importance in absorption of nutrients.

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