

Original Research Article

Role of limited caecal resection in patients with acute gangrenous appendicitis

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ABSTRACT

Background: Acute appendicitis is the most common acute surgical condition of the abdomen. Diagnosis is made based on full clinical history and examination, blood investigations and imaging. Delay in diagnosis and treatment leads to its perforation. Perforated appendicitis is associated with higher mortality rate (5%). For perforated appendicitis, especially in long duration of the disease, the standard technique of the appendectomy may not be sufficient for prevention of subsequent complications (i.e. intestinal fistulae, peritonitis, intra-abdominal abscesses, and acute intestinal obstruction).

Methods: This retrospective non-randomised study was carried out in KEM hospital, Mumbai, India from 2010 to 2016. It involved 23 patients (diagnosed as acute appendicitis) who underwent limited caecal resection for the appendicular pathology where the appendicular tissue was not suitable for the placement of appendiceal ligature or caecal purse-string suture.

Results: Out of 23 patients undergoing limited caecal resection in our setup, only 1 patient (4.35%) developed a faecal fistula which was managed conservatively with application of sterile dressing daily, which healed over time.

Conclusions: This retrospective study demonstrates that the technique of limited caecal resection for appendicular base pathology (perforation and gangrene) seems a viable option in advanced cases of perforated appendix and is also helpful in reducing the chances of development of post-operative faecal fistula.

Keywords: Acute Gangrenous appendicitis, Base perforation, Limited caecal resection, Faecal fistula

INTRODUCTION

Acute appendicitis is the most common abdominal emergency for a general surgeon to deal with. Delay in the diagnosis and treatment leads to its perforation. The incidence of perforated appendix in this part of the world is still very high because of delayed presentation and carries a high morbidity and significant mortality.

The first ever appendectomy was performed in 1736 by Claudius Amyand. William Parker of New York in 1867 advised early incision in the treatment of appendicular abscess.¹ In 1880, Lawson Tait of

Birmingham removed a gangrenous appendix with full recovery of the patient. As his case was not published until 1890. So credit for the first published account of appendectomy went to Kronlien in 1886.

Taraves F and Senn N buried the stump using several Lambert sutures. Charles Mc Burney pioneered early diagnosis and early surgery and also devised the muscle splitting incisions named after him. He also described appendicitis.¹ In 1931 Professor Wilkie advised open treatment of wound in perforated appendix.² In 1983 Semm K used laparoscopy to remove the appendix of a patient with chronic appendicitis but it was not until after

1990 that this method was more commonly employed for treating acute appendicitis.

In patients with complicated appendicitis, the combination of an intense inflammatory response and infection may lead to thrombosis of veins and arteries in the appendix and the caecum. Even though the arteries supplying the caecum are branches of the ileocolic artery, which originate upstream from the appendicular artery, variation in the anatomy of the arteries may expose the blood supply of the cecum to damage and thrombosis³. Also the spread of inflammation may lead to ischemia of the appendix and the cecal wall.

For advanced perforated appendicitis, especially in long duration of the disease, the standard technique of the appendectomy may not be sufficiently effective for prevention of subsequent complications (i.e. intestinal fistula, peritonitis, intra-abdominal abscess, and acute intestinal obstruction). For such cases, certain authors noted a high efficacy of various resectional procedures: cecal resection, ileocelectomy, and even right hemicolectomy.⁴⁻¹⁰ These operations are characterised by removal of not only vermiform appendix, but of neighbouring organs secondarily involved in the pyonecrotic process, which can sometimes be very advanced and severe. This approach, related to radical removal of inflammatory focus, can reliably prevent septic complications caused by progression of the inflammation in the right lower quadrant of the abdomen.

METHODS

This a retrospective non-randomised study of 23 cases which were treated with limited caecal resection during the period from 2010 to 2016 at KEM hospital, Mumbai, Maharashtra.

Inclusion criteria

- Gangrenous appendicitis.
- Perforation at base of appendix.
- Extensively inflamed appendix till base.
- Appendicular ischemia involving base of the appendix

Exclusion criteria

All patients of appendicitis with healthy base of the appendix were excluded.

All patients were initially seen in the casualty and later referred to emergency surgical room (ESR) for further evaluation. A detailed history and clinical examination was done by senior surgical resident and consultant. The data was noted on a proforma. Baseline investigations like complete blood count, serum creatinine, BUN, serum electrolytes, chest X-ray, Electrocardiograph and random blood sugar were noted in all the cases so were Abdominal X-rays and Ultrasonography. CT scans of

abdomen and pelvis were also done in a few cases. All the patients had an acute presentation and required immediate intervention.

Pre-operative management

Before undergoing surgery following steps were taken:

- 1) Initially resuscitation was carried out with intravenous fluids (Ringer's lactate)
- 2) Foley's catheterisation and nasogastric tube insertion was done.
- 3) Intake output charts were maintained.
- 4) Intravenous antibiotics (ceftriaxone and metronidazole) were given.
- 5) All the patients were assessed by one anaesthetist, written and informed consent was taken after counselling regarding the condition of the patient and the possible surgical outcomes which were:-
 - A. Appendicectomy
 - B. Limited caecal Resection
 - C. Right Hemicolectomy with intestinal anastomosis
 - D. Right hemicolectomy with Stoma.

A and B could be managed through McBurney's incision while C and D would require vertical midline exploration.

Surgical technique

Most of the patients were given spinal anesthesia (20 of 23) while 3 required general anaesthesia (Table 1). The operative field was prepared with povidone iodine scrub (10%) and all the patients underwent appendicectomy, which could be managed through McBurney's incision. All patients who had appendicular base perforation or sloughed off appendix were identified (Figure 1). The surgical procedure (Limited caecal resection) was conducted in cases with appendicular base perforation. In these patients, a 5 mm circumferential disc of normal caecum surrounding the appendix was resected along with the appendix (Figure 2). The defect so created (Figure 3) was closed with Mersilk 3-0 in an interrupted manner in two layers (Figure 4, 5). The caecum is usually sufficiently mobile 32 F UMA ADK drain was placed near the caecum after thorough lavage of the peritoneal cavity was done.

Table 1: incisions used for perforated appendix.

| Anesthesia | Cases | Percentage |
|--------------------|-------|------------|
| Spinal anesthesia | 20 | 86.96% |
| General anesthesia | 3 | 13.04% |



Figure 1: Appendix gangrenous with base sloughed off.



Figure 2:-Resection of circumferential disc of caecum.



Figure 3:-Defect created after resection of disc of caecum.

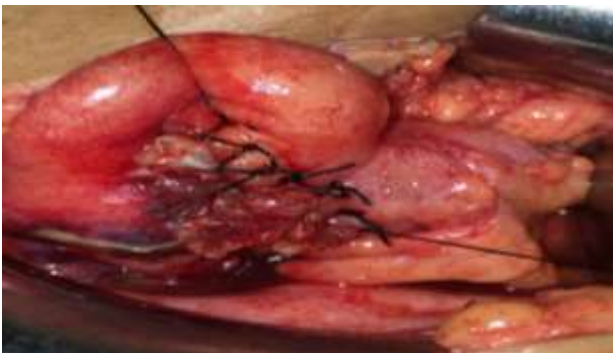


Figure 4:-Closure of the defect in 2 layers: 1st layer.

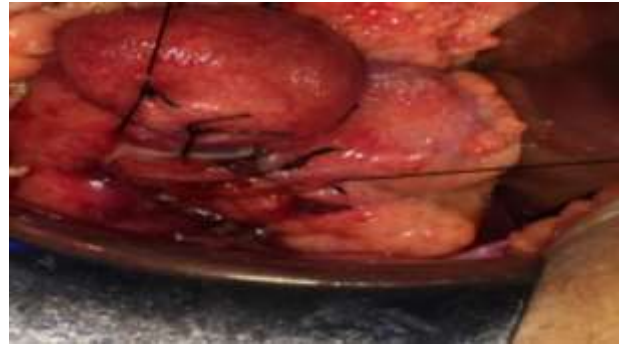


Figure 5: Closure of the defect in 2 layers:2nd layer.

Post-operative management

After recovery from anesthesia these patients were shifted to general ward for further management.

- 1) Patients were kept nil per oral till return of bowel activity and nasogastric suction was continued for 24-48 hrs.
- 2) Fluid and electrolyte balance was maintained.
- 3) Intravenous antibiotics and regular analgesia was given.
- 4) Early ambulation was encouraged and orals were started according to return of bowel activity.
- 5) Post-operative complications were recorded and managed accordingly.
- 6) Patients were discharged when they were fully ambulant, had opened bowel and had clean wound.
- 7) Follow up was arranged on outpatient basis.

Statistical analysis

Data was entered in SPSS version 24.0 and statistical analysis was done. Mean was calculated for descriptive variables like age, sex.

RESULTS

A total of 23 patients with appendicular base perforation were studied from 2010 to 2016. There were 17 males (73.91 %) and 6 females (26.08 %). Average age of presentation was 38 years with a range of 18-86 years (Table 2) Majority of the patients were in younger age group, which was a reflection of the disease affecting younger working population. Most of the patients presented with abdominal pain, nausea, vomiting and low grade fever (Table 3).

Table 2: Age distribution.

| Age in years | Number of patients | Percentage |
|--------------|--------------------|------------|
| 18-30 | 4 | 17.40% |
| 31-45 | 14 | 60.86% |
| 46-60 | 3 | 13.04% |
| 61-80 | 2 | 8.70% |
| Total | 23 | 100% |

Table 3: Symptoms of perforated appendix.

| Symptoms | Cases | Percentage |
|--------------|-------|------------|
| Pain abdomen | 23 | 100 % |
| Fever | 18 | 78.26 % |
| Nausea | 22 | 95.65 % |
| Anorexia | 20 | 86.95 % |
| Vomiting | 14 | 60.86 % |
| Diarrhoea | 6 | 26.08 % |

The diagnosis was mostly clinical with X-rays and ultrasound done in a select few cases. Tachycardia, rigidity and rebound tenderness was present in 100% of the patients (Table 4).

Table 4: Signs of perforated appendix.

| SIGN | Cases | Percentage |
|--------------------------------|-------|------------|
| Tachycardia (Pulse>100) | 23 | 100% |
| Rigidity | 23 | 100% |
| Tenderness | 23 | 100% |
| Diminished/absent bowel sounds | 18 | 78.26% |
| Abdominal distension | 16 | 69.56% |

Post-operatively 3 patients had developed superficial wound infection which was managed with dressings and antibiotics while 1 patient had developed a faecal fistula which was managed conservatively and had over a period of time (Table 5).

Table 5: Post-operative complications.

| Complications | Cases | Percentage |
|---------------------------|-------|------------|
| Wound infection | 3 | 13.04% |
| Faecal fistula | 1 | 4.34% |
| Chest Infections | 0 | 0 |
| Iatrogenic colonic injury | 0 | 0 |

DISCUSSION

Acute appendicitis is the most common surgical emergency. In an Indian setup, where the health facilities are far from ideal, it is not surprising that a large number of patients reach the hospital when the appendix has already perforated. Late presentation and delayed surgical intervention are well recognised causative factors for appendicular perforation.¹⁰ Economic impact of this disease is enhanced by the fact that it affects young members of the community, as noted by other authors too.^{11,12} With a better understanding of this disease and its management the mortality has dropped to less than 1%. We encountered no mortality during this study but others have reported 0.4% and 2.35%.^{13,14} Although the mortality of perforated appendix has decreased significantly, a high morbidity still exists.

The weakest point of surgery for advanced destructive appendicitis, usually complicated by peri-appendiceal or peri-caecal abscess, is the peritonization of the appendiceal stump. The very rigid and inflamed caecal wall around the appendiceal stump cannot be used for a reliable stump inversion. In those cases the risk of development of suture leakage and consequently, intra-abdominal abscess or peritonitis, is substantial. Extension of gross inflammation and necrosis outside the area of appendix can lead to delayed abscess or fistula formation even in consistent stump closures. Post- appendicectomy faecal fistula formation, though it is a rare complication, is associated with significant morbidity.¹⁵ It was given the first place among the unfortunate sequelae of appendicectomies by Royster in his work on appendicectomy.¹⁶

These complications can be prevented by the resectional procedures with the removal of organs secondarily involved in severe inflammatory/necrotic processes. The extent of resectional procedures can vary from a limited caecal resection to a right hemicolectomy. The most important condition for the success of such a surgery is the creation of a resection line within the healthy tissues. Results of the resectional procedures, from the earlier literature, can be considered as very good.⁵⁻⁹

In the third world countries like India where the health facilities are far from ideal and out of reach of a common man, a lot of patients reach the hospital with a perforated appendix. Early referral and prompt treatment is recommended to prevent perforation of appendix and its consequent morbidity. It is suspected that the surgeons worldwide are not ready to pursue the appropriateness, both medical and economic, of limited caecal resection for advanced appendicitis with base perforation, but it is hoped that this procedure will be used in rare situations where simple appendicectomy is not safe due to wide extension of the necrotic process.

CONCLUSION

Appendicular base perforation, though a relatively rare entity, is associated with high morbidity and incidence of complications and is equally difficult to treat. Limited caecal resection as a surgery for base perforated appendix has shown promising results and is recommended in patients with base perforations in whom simple appendicectomy has a high chance of complications. The preserved IC junction during limited caecal resection had the added advantage of preventing associated malabsorption syndromes as well as avoidance of midline laparotomies and the associated complications.

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Ethical approval: The study was approved by the institutional ethics committee

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