Avoiding ileocolic vessel injury in the second stage of a three-stage ileal pouch anal anastomosis: an observational study

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Ileal pouch anal anastomosis is a commonly performed procedure. The operation can be completed in one stage, two stages, or three stages depending on the general condition of the patient and the local condition of the bowel. The J pouch is the most commonly performed pouch design. After construction, the pouch mesentery can be short, necessitating ligation and division of the superior mesenteric pedicel to allow the pouch reach the anal canal at ease. In this case, the ileocolic pedicle should be intact to give alternative blood supply to the newly constructed pouch. The ileocolic pedicle can be inadvertently injured during dissection to take down the ileostomy in the second stage of a three-stage operation. This can risk the pouch integrity in case the superior mesenteric pedicle needs to be divided. We are describing a method to avoid such inadvertent ileocolic vessel injury. After adopting this method, we did not have a single incident of ileocolic vessel injury in the second stage of a three-stage ileal pouch anal anastomosis.

Keywords:
ileal pouch, ileocolic, J pouch

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Introduction

Ileal pouch anal anastomosis (IPAA) is the standard treatment for many patients suffering from ulcerative colitis (UC) and familial adenomatous polyposis (FAP) [1]. Among the different pouch designs, the J pouch is commonly performed because of the simplicity of its construction and its acceptable long-term function [2]. The operation can be completed in one stage, two stages, or three stages depending on the general condition of the patient and the local condition of the bowel. In the three-stage procedure, colectomy with terminal ileostomy is performed in the first stage; the pouch is constructed and a loop ileostomy is raised in the second stage; and finally the loop ileostomy is closed in the third stage.

After construction, the pouch mesentery can be short, preventing it from reaching the anal canal at ease. Pouch anal anastomosis that is performed under tension can result in anastomotic leak, poor pouch function, and even pouch failure [3,4]. A commonly performed maneuver to lengthen a short pouch is ligation and division of the superior mesenteric pedicel (SMP), in which case the ileocolic pedicle (ICP) should be intact to give alternative blood supply to the newly constructed pouch [5].

In the second stage of a three-stage IPAA, the ICP can be inadvertently injured during dissection to take down the ileostomy, or it can be found inadequate due to prolonged constriction of the terminal ileal mesentery by the contracting edge of the ileostomy wound. This can risk the pouch integrity in case the SMP needs to be divided. Should the terminal ileal mesentery not be brought out in the ileostomy wound at the end of the first stage of the procedure, the two mechanisms of ileocolic vessel injury could possibly be avoided. We are describing a technique that can fulfill this hypothesis.

Surgical technique

In the first stage of three-stage IPAA, standard abdominal exploration and total colectomy is performed with ligation and division of the middle colic, right colic, and left colic vessels. If the cecum is not affected by the original disease, like in case of distal proctosigmoiditis, the ICP is neither dissected nor ligated in this stage and the ileocecal junction is kept intact. The colon is divided few centimeters distal to the ileocecal junction and is brought out as a stoma. In the second stage, the ascending colostomy is taken down, the ICP is carefully dissected and preserved, the residual cecum and ascending colon are resected, and the pouch is constructed as usual (Figs 1 and 2).

If the cecum is affected by the original disease necessitating its resection with the colon in the first

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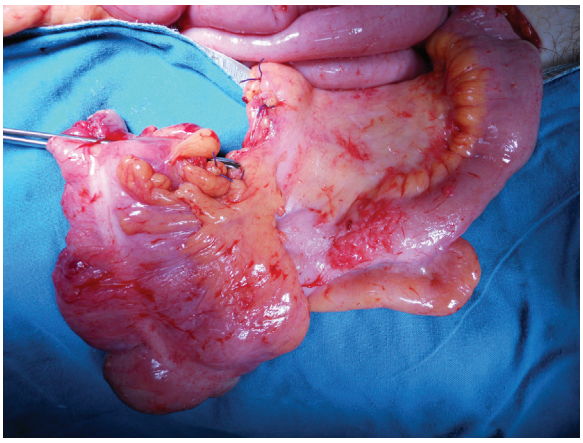
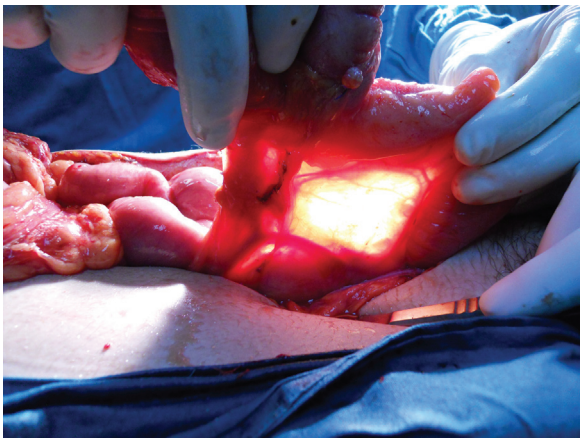
Figure 1



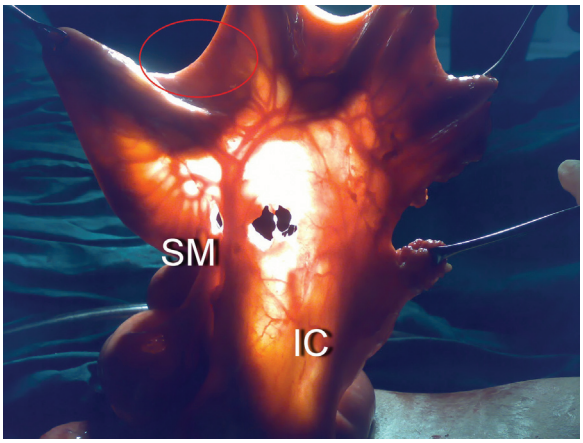
Ascending colon is resected distal to the ileocolic pedicle and ascending colostomy is prepared as a stoma.

Figure 2



Ascending colostomy before fixation as a stoma. Notice the ileocolic pedicle is kept intact with its ileal branches.

Figure 3



Blood supply to the terminal ileum as shown by transillumination during surgery. Notice anastomotic branches between the ileocolic (IC) and superior mesenteric (SM) vessels and mesenteric windows around the SM pedicle preparing it to be ligated and divided. The red mark shows the site of temporary loop ileostomy through which staplers will be introduced to create the J pouch.

stage, careful dissection of the ICP is performed with ligation and division of its colic branch and preservation of its ileal branch. The ileum is carefully divided flush with the cecum with a linear stapler. Instead of fashioning a terminal ileostomy, the ileum is brought out as a loop ileostomy 15–20 cm from its divided end, thus avoiding taking out the edge of the ileal mesentery that contains the ICP in the ileostomy wound. In the second stage, the loop ileostomy is taken down and the opening in the ileum is used to introduce the linear cutter for J-pouch construction, followed by the anvil of the circular stapler for the pouch anal anastomosis (Fig. 3).

Patients and methods

This is an observational before–after study. Patients were recruited from the waiting list for IPAA at the Unit of Colorectal Surgery (6 Surgery), Ain Shams University, during the period between 2010 and 2015. The indications for surgery were UC refractory to medical treatment and FAP. Patients requiring three-stage procedures due to general condition of the patient or local condition of the bowel (patients on high doses of steroids and patients with acute severe colitis, colon perforation, peritonitis, or toxic dilatation) and below 70 years of age were included in the study. All operations were performed at Ain Shams University Surgery Hospitals using the above-described technique modification. All patients were followed up postoperatively for a median of 6 months. Follow-up was scheduled weekly in the first month postoperatively, and then monthly for 6 months. History, abdominal examination, and DRE were carried out at every visit. The primary outcome of the study was successful pouch construction assessed during surgery by constructing a J-pouch 15–20 cm long that is successfully anastomosed to the anal canal with no tension and with complete doughnuts. Secondary outcomes were immediate or delayed pouch complications such as leaks, constriction, or ischemia. The comparison group included patients requiring three-stage IPAA for same indications before the year 2010, the time at which we adopted the modified technique. Data of those patients were acquired by revising the patients' files and the operative records. This study was approved by the local ethical committee.

Results

We adopted the above-described technique since the year 2010. Before that date, we performed 32 IPAA (20 male, median age 25 years, range 13–52 years). Two patients had FAP and 30 patients had UC.

Twenty patients required three-stage procedure and we had five (25%) incidents of inadvertent injury of ICP in the second stage: three were caused by direct injury during dissection to take down the terminal ileostomy, and two were cause by vessel constriction by the ileostomy wound edge. In two patients, pouch anal anastomosis was performed without the need to ligate the SMP; one patient developed Wilkies syndrome on the fifth postoperative day and was treated by means of gastrojejunostomy. In three patients, the SMP or one of its terminal branches needed to be ligated to allow the pouch to reach the anal canal; two patients developed immediate pouch ischemia and required pouch excision, one was treated with delayed redo S pouch, and one is living with a permanent ileostomy. Delayed pouch ischemia occurred in one patient and this was treated with redo J pouch construction.

After the year 2010 we performed 23 IPAA (14 male, median age 32 years, range 12–60 years). Two patients had FAP, one patient had attenuated FAP, and 20 patients had UC. Eleven patients required three-stage procedure. None of those patients had ileocolic vessel injury in the second stage and all had their J pouches constructed safely. The difference in the rate of ileocolic vessel injury before and after adopting this technique was statistically significant ($P<0.05$, z test for comparing percentages).

Discussion

Parks and Nicholls [6] were the first to describe the operation of restorative proctocolectomy or IPAA to treat patients with UC and FAP late in the 20th century. The operation was rapidly accepted by the surgical community because it cured the original disease and at the same time, it ridded the patients from living with a permanent stoma. In the majority of patients the operation can be completed without difficulty. Occasionally, because the terminal ileum is naturally tethered by the SMP, the pouch can be short and needs lengthening to reach the anal canal at ease. Different maneuvers have been described to improve the reach of the pouch to the pelvis. Multiple peritoneal incisions over the major mesenteric blood vessels is a simple maneuver that can add extra 2 cm to the pouch. It is especially useful in case previous laparotomy has resulted in mesenteric fibrosis and shortening [7]. The S pouch can reach lower in the pelvis compared with the J pouch; however, changing the pouch design is rarely resorted to because construction of the S pouch is more complicated and difficulty in its evacuation has been reported [2,3]. Metcalf *et al.* [8] reported a case in which they lengthened an extrashort pouch mesentery using an interposition vein graft to the superior mesenteric. This is obviously a major procedure and the authors recommended it to be used as a last resort.

Ligation and division of selected mesenteric vascular pedicles is the most commonly performed procedure to lengthen a short pouch [7,9,10]. Many vascular ligations have been described to achieve this goal. Burnstein *et al.* [7] recommended the ligation of two or three small ileal mesenteric vessels between the primary and secondary ileal arcades. They claimed this can add extra 2–5 cm length to the pouch [7]. However, this technique can be hazardous, risking segmental necrosis in some areas of the pouch. Goes *et al.* [10] found that the maximum length to the pouch can be achieved by dividing the small marginal vessels between the colon and the marginal artery in the area between the middle colic and the ICPs, the pouch being supplied by the middle colic artery through the marginal artery. The excess length provided by this technique is rarely needed and the marginal artery can be insufficient, especially when the right colic artery is absent [11]. Moreover, radical resection and lymphadenectomy are not performed in this procedure, making it unsuitable for patients with associated right-sided cancer or severe dysplasia.Ligation and division of one of the two major vascular pedicles supplying the terminal ileum – namely, the SMP or the ICP – can give 2–7 cm extra length to the pouch [3,5,9,10]. This is usually all that is needed to make the pouch reach the anal canal at ease [5]. Thirlby [5] found that 48% of their patients needed lengthening of the pouch by ligating the ICP and 29% needed ligation of SMP, the rest of their patients did not need any maneuvers to lengthen the pouch.

By bringing out the ascending colon or the ileum 15–20 cm from the ileocecal junction as a stoma at the end of the first stage in a three-stage procedure, we were able to avoid bringing out the terminal ileal mesentery that contains the ICP at its edge in the stoma wound, and we consequently avoided dissection and possible damage of the ICP during taking down the stoma in the second stage. We also avoided the possible constriction of the ICP by the contracting edge of the stoma wound that inevitably occurs during the waiting period between the first and the second stage. This was reflected in the fact that we did not have any incident of ileocolic vessel injury in the second stage of three-stage IPAA after adopting this technique, as compared with 25% incidence of ileocolic vessel injury, with all its consequences, before adopting this technique.

Conclusion

We are describing a simple modification in the classic technique of the three-stage IPAA that secures the ICP. We recommend using this technique as it might have a significant implication on the rate of successful pouch construction and avoiding a permanent stoma.

Study limitations

The small number of patients and the retrospective nature are evident limitations of the present study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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