



Original research

Lengthening of left colon after rectal resection: What all is adequate? A prospective cohort study

Shruthi H.S. Reddy^a, Vikas Gupta^{a,*}, Thakur D. Yadav^a, Gurpreet Singh^a, Daisy Sahni^b^a Department of General Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh, India^b Department of Anatomy, Postgraduate Institute of Medical Education and Research, Chandigarh, India

HIGHLIGHTS

- Mobilization was adequate in 19% and 0% after low tie, 56% and 20% after low tie with splenic flexure mobilization and 100% and 86% on ligation of descending branch of left colic artery in addition to above two maneuvers, with partial and complete sigmoid resection respectively.
- Ligation of descending branch of left colic artery is safe and doesn't seem to increase the risk of anastomotic leak.
- Ligation of descending branch of left colic artery is particularly helpful if complete resection of sigmoid colon is to be contemplated.

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ABSTRACT

Background: Adequate mobilization of colon is essential to achieve tension free anastomosis after sphincter saving surgeries.

Methods: 26 patients undergoing of recto-sigmoid resection underwent low tie of inferior mesenteric artery (IMA), splenic flexure mobilization and descending branch of left colic artery (LCA) ligation in that order. One point at proximal 1/3rd of sigmoid colon (point of partial sigmoid resection) and another at descending-sigmoid colon junction (point of total sigmoid resection) were used for measurements and the distance was measured from pubic symphysis. Mobilization was considered adequate if colon could reach 2 cm beyond the upper border of pubic symphysis.

Results: The length gained after each maneuver was 4.2 + 3.6 cm (low tie), 5.8 + 3.7 cm (splenic flexure mobilization) and 4.7 + 4.2 cm (descending branch of LCA ligation). Mobilization was adequate in 19% and 0% (low tie), 56% and 20% (low tie with splenic flexure mobilization) and 100% and 86% (all three manoeuvres) with partial and complete sigmoid resection respectively. In 13 patients undergoing low anterior resection, adequate mobilization for anastomosis was attainable in 15.3% and 0% (low tie), 50% and 0% (low tie with splenic flexure mobilization) and 100% and 83.3% (all three manoeuvres) with partial and complete sigmoid resection respectively. 15.3% had anastomotic leak, however none of the patients undergoing descending branch of LCA ligation had anastomotic insufficiency.

Conclusions: Low tie of IMA, with splenic flexure mobilization as required results in sufficient mobilization only in 50% patients with partial sigmoid resection. Ligation of descending branch of LCA is feasible, safe and enables a tension free anastomosis and is especially beneficial when sigmoid colon is resected completely.

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1. Introduction

With improved understanding of pelvic floor physiology, use of neoadjuvant treatment and improved surgical techniques,

sphincter salvage surgery is being performed more often [1–3]. Colo-rectal anastomosis remains the integral part of the procedure; and the short and long-term outcome depends upon the integrity of this anastomosis [1,4]. Good vascularity, healthy tissues, adequate mobilization and tension free approximation of the ends are the essentials for a secure anastomosis in addition to systemic factors like nutrition status, steroids intake, anemia, systemic illnesses etc. To achieve a tension free anastomosis, one needs

* Corresponding author. Departments of General Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh, 160012, India.

E-mail address: vikaspgi@gmail.com (V. Gupta).

adequate mobilization of both the bowel ends, more so toward the colonic side of the anastomosis [1,4]. Various mobilization techniques like ligation of inferior mesenteric artery (IMA) and vein (IMV), mobilization of splenic flexure have been employed to achieve the same [1,5,6]. Whereas splenic flexure mobilization is a standard practice, there is debate regarding the level of ligation of IMA [7–9].

Previous studies done in cadavers have described the gain in length after mobilization of the colon and also after different levels of ligation of IMA [5,6]. However, these studies are limited not only by the absence of simulation anastomosis, but also by the fact that they could neither assess the physiological effect of such a vascular ligation and its outcome in a given patient. The present study is planned to evaluate the intraoperative gain of length of colon, tension and adequacy for anastomosis after commonly practiced mobilization manoeuvres in patients undergoing rectosigmoid resections.

2. Materials and methods

From July 2011 to December 2012, 27 patients undergoing open rectosigmoid resection for benign and malignant conditions were enrolled for the study in the department of General Surgery, Postgraduate Institute of Medical Education and Research, a tertiary care center in north India. Patients undergoing laparoscopic resections were not suitable for sequential measurements and were excluded from the study. The study was approved by the ethics committee of the institute. The management and surgical procedure was done as per the underlying disease process. Standard techniques and oncological principles were adhered to in patients undergoing resection for malignancy.

2.1. Reference points

After lower midline vertical laparotomy, without any mobilization, marking seromuscular sutures as reference points were placed along the antimesenteric border [Fig. 1] –

- Point A (denotes partial sigmoid resection):** at the junction of proximal one third and distal two third of sigmoid colon (this was taken after measuring the length of sigmoid colon using a thread)
- Point B (denotes complete sigmoid resection):** at the descending and sigmoid colon junction
- Point X (Zero reference point):** upper border of pubic symphysis on the skin surface

The length of the points A and B falling short of zero reference were noted in negative values while those exceeding it were noted as positive values.

Baseline measurements (without any mobilization) were taken from the marking ligatures at points A and B to zero reference point (point X). Mobilization was deemed adequate if the proposed points could reach 2 cm below the upper border of pubic symphysis.

AX: How much partial sigmoid resection falls short of pubic symphysis?

BA: How much complete sigmoid resection falls short of pubic symphysis?

Dissection was carried out as per standard anterior or low anterior resection around the tumour and into the pelvis.

2.2. Sequence of mobilization

Mobilization maneuvers were then performed sequentially in

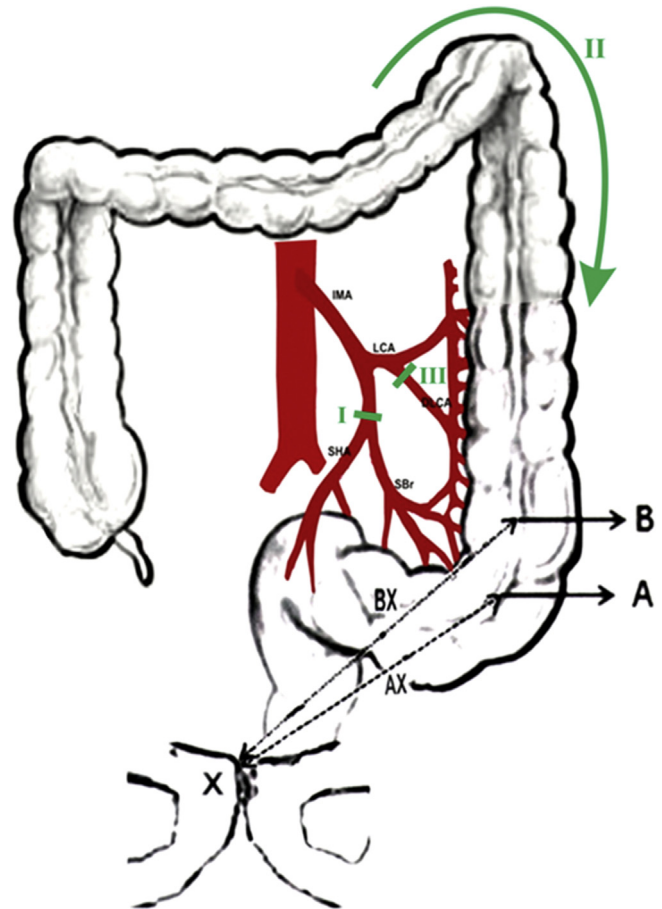


Fig. 1. Schematic diagram; A represents point at proximal one third of sigmoid colon (partial sigmoid resection), B represents junction of descending and sigmoid colon (complete sigmoid resection), X is superior border of pubic symphysis (zero reference point). AX and BX are the distance between the reference points. I represent low ligation of Inferior mesenteric artery (IMA), II represents mobilization of sigmoid colon, III represents ligation of descending branch (DLCA) of left colic artery (LCA). SHA-Superior Hemorrhoidal A., SBr- Sigmoidal Branches.

the following order.

- Low Ligation of IMA (1st maneuver):** i) Low ligation of IMA was performed first. Dissection was carried out at the origin of IMA. In patients with malignancy, lymphadenectomy was performed preserving the vessels, while this was omitted in patients undergoing resection for benign disease. Origin of left colic artery was identified and defined. IMA was ligated flush beyond the origin of LCA in all the patients. ii) Inferior mesenteric vein (IMV) was ligated at the lower border of pancreas in all the cases. After the completing ligation of both the vessels, measurements were taken.
- Rectal and tumour dissection was now done.
- Splenic Flexure Mobilization (2nd maneuver):** Descending colon and splenic flexure were mobilized from lateral to medial side along the avascular plane. Mobilization was complete once the flexure was brought down. Measurements were repeated.
- Ligation of Descending Branch of LCA (3rd maneuver):** Descending branch of LCA was identified, ligated and divided just beyond the bifurcation of the main trunk of left colic artery so as to preserve the marginal arcade. All the avascular mesenteric attachments from the descending branch to the

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