

Comparative Study between Ileo Colic Pedicle Versus Superior Mesenteric Pedicle Division for Mesenteric Lengthening

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ABSTRACT:

BACKGROUND:

Lengthening of the mesentery by vascular division may be necessary to perform an ileal pouch anal anastomosis without tension. Our objective is to compare the increase in mesentery length after division of ileo colic pedicle (ICP) and the superior mesenteric pedicle (SMP).

OBJECTIVE:

Was to compare the increase in length of the mesentery after division of the (ICP) and after division of the (SMP).

METHODS:

Total colectomy was performed in (14) patients. Which were then randomly divided into two groups. Pouch anal anastomosis was performed with division of the (ICP) in one group of seven patients and with division of the (SMP) in the other. The ileum was measured and the increase in length was recorded and compared statistically.

RESULTS:

The mean (s.d.) increase in length was 2.9 (0.8) cm. after (ICP) division and 6.5 (1.1) cm after (SMP) division ($P < 0.001$). The distance between the end of the ileum and the point giving the greatest length was 27.5 (4) cm in the (ICP) group and 46.8 (4.2) cm in (SMP) group ($P < 0.001$).

CONCLUSION:

The increase in mesenteric length was greater after (SMP) division than after (ICP) division, but if pouch-anal anastomosis is performed a short segment of small bowel must be removed.

KEY WORDS: ileo colic pedicle, superior mesenteric pedicle, mesenteric lengthening, ileal pouch anastomosis .

INTRODUCTION:

Since its initial description in 1978⁽¹⁾, restorative proctocolectomy with ileal pouch-anal anastomosis has become the procedure of choice for patients with chronic ulcerative colitis or familial adenomatous polyposis. Pouch-anal anastomosis may be difficult when the small bowel mesentery is too short^(2,3). In such cases, several techniques for lengthening the mesentery have been proposed, including vascular division. Division of the ileo colic pedicle (ICP) is probably the most commonly used⁽⁴⁾. If the ileum did not initially reach the anal canal, the other alternative may be division of the superior mesenteric pedicles (SMP) high in the mesentery, a maneuver previously shown to be safe with no effect on functional outcome after pouch – anal anastomosis⁽⁵⁾.

The aim of this study was to compare the increase in length of the mesentery after division of the (ICP) and after division of the (SMP).

MATERIALS AND METHODS:

This study was conducted in Al-Kindy teaching hospital between January 2002-January 2005 for 14-patients none of them had previously undergone abdominal surgery.

Surgical Procedure: Total colectomy was performed through a midline laparotomy. The terminal ileum was divided close to the caecum and the (ICP) was preserved. The posterior attachment of the entire small intestinal mesentery was mobilized up to the third portion of the duodenum. The inferior part of the head of the pancreas was mobilized. **Methods of measurement (Fig. 1)**

The point of the ileum that gave the greatest length, the best potential site for ileo anal anastomosis, was marked (I_1 point). The distance between the end of ileum (E point) and the I_1 point was recorded (EI_1). The ileum was stretched towards the lower edge of the symphysis pubis (S-point) and the distance between the (S) point and the I_1 point was recorded (SI_1).

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Vascular divisions: The patients were randomly assigned to one of two groups. In the first group of seven, the (ICP) was divided and in the second the (SMP) was divided. The (ICP) was divided at the mid point between its origin and the marginal vascular arcade (Fig. 2). The (SMP) was divided 2-3cm after the origin of the (ICP) (Fig. 3). After division of the vessels the point of the ileum that gave the greatest length had changes, this near

point was marked (I_2 point). The new distance between the end of the ileum (E point) and the I_2 point was recorded (EI_2). The ileum was stretched and the distance between the lower edge of the symphysis pubis (S-point) and the I_2 point was recorded (SI_2).

Statistical analysis: The student's **t-test** was used for statistical analysis. $P < 0.05$ was considered to be statistically significant.

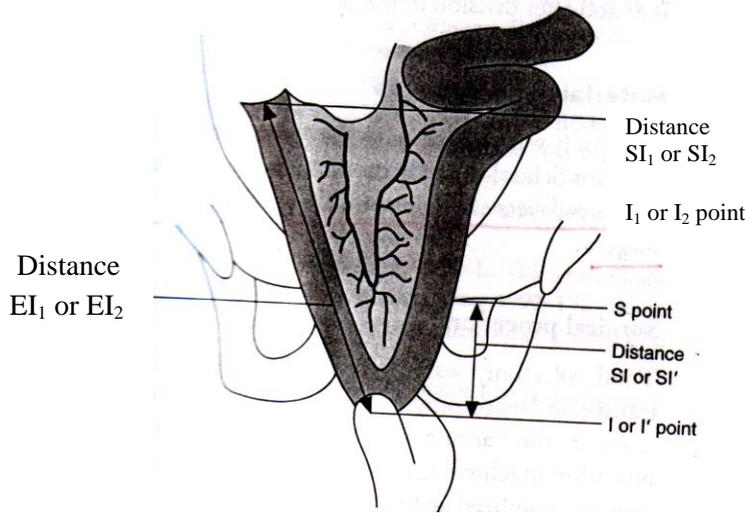


Fig. 1: Stretching of the ileum towards the symphysis pubis.

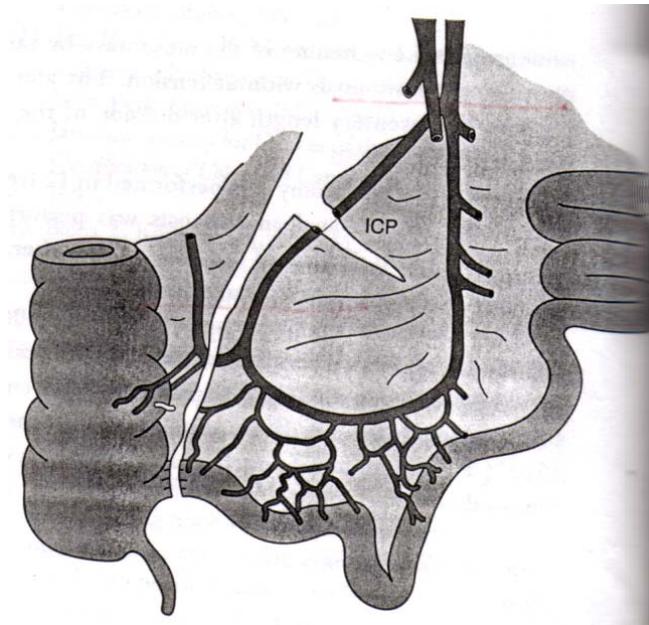


Fig. 2: Division of the ileo colic pedicle (ICP).

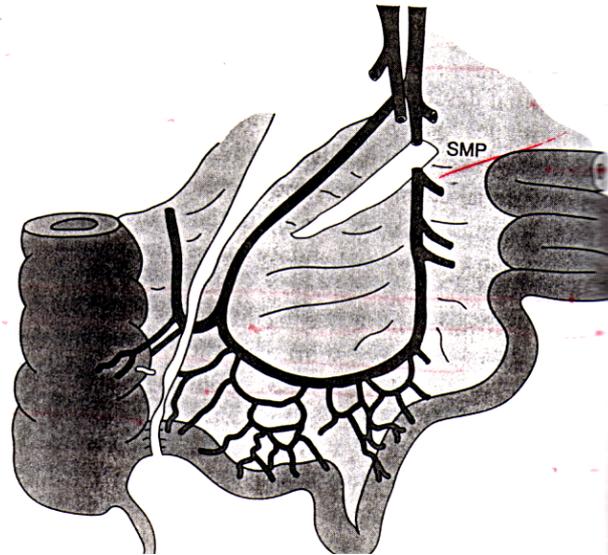


Fig. 3: Division of the superior mesenteric pedicle (SMP).

RESULTS:

The two groups of patients had a similar mean age, sex ratio (Table 1). **Before vascular division:** The mean (s.d.) distance between the point of the ileum giving the greatest length (I₁ point) and the extremity of ileum (E point) was 25 (3.4) cm in the ICP group and 23.2 (6.0) cm in the SMP (Table 2). The mean distance between the I₁ point and the lower edge of the symphysis pubis (S-point) was 0.3(2.7) and 1.5(2.8) cm respectively (Table 2). **After vascular division:** The new point of the ileum giving the greatest length (I₂ point) was very close to the original I₁ point after ICP division (EI₂

=27.5(4)cm. In contrast, the I₂ point was further than I₁ point after SMP division [EI₂ = 46.8(4.2) cm] (P<0.001) (Table 2). The distance between the I₁ and I₂ points was 2.5(3) cm after ICP and 23.6 (4.5) cm after SMP division. After vascular division, the mean distance between I₂ point and the lower edge of the symphysis(s) was 3.2(2.1) cm after ICP division and 8.0(2.6) cm after SMP division (P<0.01) (Table 2). The mean increase in mesentery length was 2.9(0.8) cm after ICP and 6.5(1.1) cm after SMP division (P<0.001) (Table 2).

Table 1: Comparison of the two groups regarding age, sex.

	ICP	SMP
Sex ratio (M:F)	3 : 4	3 : 4
Age (years)	42 (10)	45 (6)

Table 2: Changes in measurement after division of the ileo colic pedicle or superior mesenteric pedicle.

	ICP ^{(*)1}	SMP ^{(*)1}	P ^{(*)2}
EI ₁ (cm)	25 (3.4)	23.2 (6.0)	0.14
SI ₁ (cm)	0.3 (2.7)	1.5 (2.8)	0.4
EI ₂ (cm)	27.5 (4)	46.8 (4.2)	< 0.001
SI ₂ (cm)	3.2 (2.1)	8.0 (2.6)	< 0.01
Increase in length (cm)	2.9 (0.8)	6.5 (1.1)	< 0.001

(*)¹ Values are means (Sd.) ICP, ileo colic pedicle, SMP, superior mesenteric pedicle. EI₁ and EI₂, distance between the end of the ileum and the point of the ileum giving the maximum length; SI₁, SI₂, distance between the point of the ileum giving maximum length and the lower edge of the symphysis pubis.

(*)² Student t-test.

DISCUSSION:

The blood supply of the terminal ileum arises from the terminal branches of the superior mesenteric vessels. These terminal branches classically form anastomosis with the marginal vascular arcade of the right colon, which itself originates from the ileocolic artery and the right colic pedicle and forms anastomosis with branches of the inferior mesenteric pedicle⁽⁶⁾. If there is sufficient flux and the marginal vascular arcade is preserved, vascularization of the terminal ileum may theoretically be achieved by only one of the pedicles or by the arcade itself⁽⁷⁾. During pouch-anal anastomosis, simple maneuvers to increase the length of the mesentery are performed, such as moving the posterior attachment of the entire small bowel mesentery up to the inferior portion of the head of the pancreas and division of the peritoneum of the mesentery on the anterior and posterior sides⁽⁸⁾. If such maneuvers are insufficient to achieve anastomosis without tension, vascular division is necessary. This is particularly true if the mesentery is short, as in an obese patient with a narrow pelvis. Division of two or three distal branches is thought to be hazardous owing to the risk of segmental necrosis of the terminal ileum^(9, 10). Proximal division is therefore favored. The right colic pedicle is not usually preserved during colectomy; the technique most frequently used to lengthen the mesentery is division of the ICP, but division of the SMP high in the mesentery, 2-3cm beyond the origin of ICP, because in most patients in whom the terminal ileum is stretched at the anus the axis of tension corresponds to the SMP. This maneuver is safe if the colour of the ileum remains unchanged after clamping of the SMP for at least 15min before division, and has no effect on functional outcome after pouch-anal anastomosis^(5,11). This study shows that the increase in length of the mesentery is greater after division of the SMP high in the mesentery than after division of the ICP. The I₁ point is generally further away from the end of the ileum after division of the SMP. In this study the mean distance between the end of the ileum and the I₁ point was 23cm, whereas after SMP division the distance between the end of the ileum and the I₂ point was 47cm. If the 18cm of one limb of the future J pouch is subtracted from the 47cm, this leaves about 30cm of the ileum that must be removed. This resection is, of course open to criticism because the overall length of small bowel has a major effect on the quality of function after pouch-anal anastomosis.

After clinical practice of pouch-anal anastomosis with division of the SMP, the length of small bowel removed never exceeds 20cm. The volume of stool may be increased in patients with a terminal ileostomy if 20cm of terminal ileum is lost, in clinical experience; there was no difference in stool frequency after pouch-anal anastomosis with division of the SMP and the procedure without pedicle division⁽¹²⁾.

This was explained partly by the short segment of small bowel that was removed, but also by the function of the pouch, which probably reduced the consequences of the loss of intestine. A study done by Burnstein M.J. *et al* on 159 consecutive J. reservoir procedures, state that careful attention to technical details with particular reliance on the division of branches between the primary and secondary arcade vessels within the mesentery, sufficient length can be achieved in each case with an acceptable complication rate⁽²⁾. Ricarde N. *et al* state that patients who have a shorter mesentery and concern of excessive mesenteric tension should have colectomy performed, preserving the marginal vascular arcade (MVA) from the middle colic artery to the ileal branch of the ileocolic artery.

The preserved (MVA) can be a reliable alternative blood supply to the pouch if more mesenteric vessel legations are necessary⁽¹⁰⁾.

CONCLUSION:

The increase in mesenteric length was greater after (SMP) division than after (ICP) division, but if pouch-anal anastomosis is performed a short segment of small bowel must be removed.

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