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An observational study addressing the anatomic basis of mesosigmoidopexy as a rational treatment of non-gangrenous sigmoid volvulus

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SUMMARY

Sigmoid volvulus is a common cause of bowel obstruction.We describe mesosigmoidopexy, an accepted surgical technique for the management of non-gangrenous sigmoid volvulus, and provide anatomic correlations supporting the therapy. Mesosigmoidopexy should be considered as a rational alternative to resection and anastomosis when operating on non-gangrenous sigmoid volvulus.

Introduction

Sigmoid volvulus is common throughout much of Africa, India, Iran and Russia.[1] In one series from Nigeria, sigmoid volvulus accounted for 50% of all cases of obstruction.[2] Although it has been recognized since before the time of Hippocrates,[3] the aetiology of sigmoid volvulus is unclear. In areas where sigmoid volvulus is endemic, it is hypothesized that both diet and anatomic variations predispose patients to this disease.

Treatment modalities for sigmoid volvulus vary according to the disease status and the preference of the surgeon. In general, cases of gangrenous sigmoid volvulus are managed with a Hartmann's procedure or resection and primary anastomosis. Non-gangrenous cases are managed with mesosigmoidoplasty, mesosigmoidopexy or resection and primary anastomosis.[4] For non-gangrenous sigmoid volvulus at Kamuzu Central Hospital (KCH), mesosigmoidopexy is used as an alternative to sigmoid resection and primary anastomosis because it is a shorter procedure, avoids the potential complications of anastomotic leak and has a lower probability of a surgical site infection.

We examine a case series of patients who have undergone mesosigmoidopexy to: (1) determine the anatomic dimensions of the sigmoid colon before and after mesosigmoidopexy; and (2) compare these changes with recent research into the anatomical basis of sigmoid volvulus.

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Methods

This observational study was conducted at KCH in Lilongwe, Malawi, after approval by the Institutional Review Boards of both Malawi and the University of North Carolina. Intraoperative measurements of the sigmoid mesenteric length and width (both maximal width and root width) were obtained according to methods described by Bhatnagar *et al*.[5] Preintervention measurements were taken after colonic decompression and compared to the postintervention measurements taken after performing a mesosigmoidopexy. Data were analysed using a paired *t*-test.

The mesosigmoidopexy was performed by dividing the lateral peritoneal surface of the sigmoid mesentery from the apex of the sigmoid colon to the white line of Toldt. Then each leaf of the peritoneum was dissected off the mesenteric fat and vessels for 1 cm for the entire length from apex to the white line of Toldt. Next, the white line of Toldt was divided proximally to the splenic flexure and distally to the pelvic brim. A running non-absorbable monofilament suture was then used to secure the cephalad leaf of the peritoneum dissected off of the sigmoid mesentery to the peritoneum along the white line of Toldt, starting at the base of the sigmoid mesentery up to the splenic flexure. Similarly, the caudad leaf of the peritoneum dissected off the sigmoid mesentery was sutured to the peritoneum along the white line of Toldt heading distally to the pelvic brim.

Results

A total of six subjects underwent mesosigmoidopexy. The mesenteric root height of the sigmoid colon was much shorter after mesosigmoidopexy when compared to the preprocedure measurements ($P = 0.002$), while the mesenteric widths (both root and maximal) did not show a statistically significant difference between pre- and postprocedure measurements (Table 1).

Conclusions

Mesosigmoidopexy, when performed properly, is a viable approach for the management of non-gangrenous sigmoid volvulus, offering several potential advantages over sigmoid resection and anastomosis, including a shorter operative time, the reduced likelihood of surgical site infection and the avoidance of anastomotic leaks.

The aetiology of sigmoid volvulus is thought to relate to anatomy, as it is due to a long mesosigmoid (from mesenteric root to sigmoid apex). As early as 1888, Nicholas Senn noted that volvulus `can occur where the mesentery of the bowel is of considerable length'.[6] More recent research also supports this hypothesis,[7] and we confirm that the mesosigmoid of our patients in Malawi was much longer in patients with sigmoid volvulus than in the controls.[8] Mesosigmoidopexy shortens the mesosigmoid which is the predominant anatomic predictor of volvulus.

Mesosigmoidopexy has both advantages and drawbacks compared to resection and anastomosis for the treatment of non-gangrenous sigmoid volvulus. One limitation of mesosigmoidopexy is that it is thought to have a relatively higher recurrence rate – over 20% in one report.[4] However, some of the additional advantages of mesosigmoidopexy over resection and anastomosis are: a lower rate of surgical site infections (clean versus contaminated case); shorter procedure duration and faster recovery; and the avoidance of the morbidity and mortality of an anastomosis.

Before accepting mesosigmoidopexy as a non-inferior or equivalent procedure to resection and anastomosis, further research needs to be conducted into the risks and benefits of each

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approach in this environment. Our case series shows that the anatomic alterations conferred by a mesosigmodopexy appear to support the assumption that this procedure is a viable option for the management of non-gangrenous sigmoid volvulus.

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Table 1

Sigmoid colon dimensions pre- and postmesosigmoidopexy (MS), average (range) in cm (n = 6)

	Pre MS	Post MS	*P* value*
Mesenteric root width	8.7 (6.5–12)	8.8 (5–12)	0.55
Mesenteric height	28.8 (7.5–34)	12.5 (7–18)	0.002
Maximal mesenteric width	12.2 (8–16)	10.2(6–15.5)	0.20

* Paired *t*-test