

Intestinal anastomosis

Surgeons still debate, sometimes passionately, which is the ideal technique for joining two pieces of gut together. Even if side to side, end to side, and various other, more complicated methods of anastomosis are excluded, there are still many different views on the optimal means for securing a direct end to end anastomosis. Should the sutures be continuous or interrupted, absorbable or non-absorbable, or in one layer or two? Should they invert or exactly approximate the two ends of the gut? Should the knots be on the inside or outside of the gut? And should the sutures be full thickness or only partial, with emphasis on the submucosa? Finally, are circular stapling devices preferable to traditional suturing?

With many differences of opinion on these fine points of technique, the cynical might conclude that these details do not really matter and that the surgeon should use whatever technique he prefers. There does, however, seem to be a general agreement on some basic principles: the bowel should be as empty of solid contents as possible; there should be good, even approximation of its two ends; there should be no tension; the blood supply to both segments should be satisfactory; and there should be no complicating factors which may delay healing—for example, anaemia, uraemia, undernutrition, or previous radiotherapy. Given such ideal circumstances individual variations in anastomotic technique are probably of minor importance.

Breakdown of the anastomosis is, however, a tragedy, and if simple modifications can diminish the risk they are surely to be welcomed and followed. But it is often difficult to interpret the results of studies in animals and retrospective clinical trials. For example, encouraging results are reported in studies using full thickness single layer wire or prolene,¹ full thickness single layer polyglactin,² inner full thickness continuous locknit catgut and outer mersilene,³ and two layer polyglycolic acid,⁴ but there is no way of knowing whether these are due to enthusiasm for the technique under evaluation or a greater degree of attention to the principles listed above. In a trial comparing a two layer polyglycolic acid anastomosis with an inner catgut and outer mersilene layer the former was preferred, strands of mersilene being detected at endoscopy in two patients in the second group.⁴ Since both groups healed equally well, however, and no symptoms were attributable to the visible suture material, it is difficult to argue that one method was superior to the other in terms of the clinical outcome. That study illustrates the lack of convincing evidence to suggest that one method is so superior to all others that it should be adopted.

Many publications on the healing of intestinal anastomoses have emphasised the importance of the submucosal layer, which contains both tissue producing collagen and a rich network of blood vessels. Single layer closure requires that this important layer is included in the suture line. An ingenious way of joining this layer together precisely entails the use of polyester rings in which small magnets are embedded. Portions of mucosa and submucosa are compressed between two magnets of opposite polarity, which ensures close approximation of the infolded submucosal layers. The small entrapped ring of mucosa undergoes necrosis and then the magnets work free and are passed down the gut.⁵ This technique, reminiscent of the classic Murphy "button,"⁶ has been shown to effect more rapid direct bridging of the layers

and restoration of the villous epithelium than conventional methods. Nevertheless, it remains to be seen if it is acceptable in practice and whether it confers appreciable benefit.

A good blood supply to the cut ends of the bowel, a critical factor for satisfactory healing, is particularly important in anastomosis of the colon. The use of Doppler ultrasonography preoperatively to assess the blood supply has been explored with encouraging results.^{7,8} Measurements of blood flow have confirmed that when this is reduced to the transected bowel the mesenteric side is preferentially affected. This almost certainly accounts for the greater vulnerability of the colon at this point, which renders it liable to leak.⁷ One simple way of trying to lessen the risk of leakage is to rotate one free edge of colon through 90° axially, which will avoid conjunction of the two mesenteric edges.⁹

Of all methods used to anastomose two ends of bowel, the one which has received most interest in recent years is that using stapling devices, particularly the circular "guns," which compress and trim the two apposed ends and at the same time insert one or two layers of metal staples circumferentially. Such devices have been available for many years,¹⁰ though simple and effective models from Russia and the United States were readily available only in the mid-1970s. Inevitably, completely disposable versions are now available. Most surgeons agree that these devices may facilitate oesophago-gastric and oesophagojejunal anastomosis and allow a more distal and easier anastomosis after anterior resection of the rectum. As a result some patients will have been spared permanent colostomy. The value of stapling techniques to effect anastomosis in more accessible sites is less certain, however, and most surgeons prefer to use conventional (and cheaper) suturing techniques. Moreover, it is now also evident that stapled anastomoses are not free of the risks of leakage and stricture formation, and so their evaluation continues.

Finally, whatever method of joining two ends of intestine is used, it is worth emphasising that the outcome will primarily be determined by whether the basic requirements of clean bowel, careful apposition, no tension, and a good blood supply are met, preferably in the absence of other factors likely to delay natural healing.

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³ Krausz MM, Schiller M. A clamp technique for intestinal anastomosis. *Am J Surg* 1979;**138**:459-60.

⁴ Schoubye J. Dexon versus chromic catgut-mersilene simultaneously employed for gastro-intestinal anastomoses, evaluated endoscopically. *Acta Chir Scand* 1978;**144**:441-3.

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⁶ Murphy JB. Classic articles in colonic and rectal surgery. *Dis Colon Rectum* 1981;**24**:51-9.

⁷ Coopperman M, Martin EW Jr, Keith LM, Carey LC. Use of Doppler ultrasound in intestinal surgery. *Am J Surg* 1979;**138**:856-9.

⁸ Shikata J, Shida T, Satoh S, Furuya K, Kamiyama A. The effect of local blood flow on the healing of experimental intestinal anastomoses. *Surg Gynecol Obstet* 1982;**154**:657-61.

⁹ La Calle JP, Sole JMG, Pey GC, Garcia GP. Rotated intestinal anastomoses. *Surg Gynecol Obstet* 1982;**154**:662-6.

¹⁰ Gritsman JJ. Mechanical suture by Soviet apparatus in gastric resection: use in 4000 operations. *Surgery* 1966;**59**:663-9.