Overview on Compression Anastomoses: Biofragmentable Anastomosis Ring

Multicenter Prospective Trial of 1666 Anastomoses

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Abstract. This study represents a European prospective clinical multicenter trial and was undertaken to evaluate the applicability of the biofragmentable anastomosis ring (BAR) as a routine anastomotic tool in teaching hospitals. The trial results analyzed consisted of 1666 BAR anastomoses performed in 1360 patients from March 1989 to May 1996 in the upper (1042 anastomoses) and lower (624 anastomoses) gastrointestinal (GI) tract. Only patients selected for elective procedures and having previously undergone orthobridge bowel cleansing were entered into the trial. In the upper GI tract six anastomoses (0.58%) developed clinically relevant and radiologically detectable leaks with indications for reoperation. In the lower GI tract six anastomoses (0.73%) showed a radiologically detectable leak with clinical manifestations in 28 cases (4.48%). Reoperation was performed in 18 cases (2.8%). The overall leakage rate with clinical relevance was 2.04%. Three gastrojejunosomy episodes of bleeding were observed (0.18%) at the BAR anastomotic site. During the early postoperative course there was no ileus due to obstruction of a BAR anastomosis. Reintroduction of diet after the operation was not delayed. In two centers a follow-up evaluation reported no BAR-related late anastomotic stenoses. There were no intraoperative deaths, but 54 patients died postoperatively. Peritonitis following anastomotic leakage was responsible for postoperative deaths in four cases; three of them were related to BAR anastomoses. In conclusion, the BAR anastomotic procedure is an established, rapid, simple to learn, highly standardized, safe technique with the advantage of no persistent foreign material in the anastomotic region and therefore no induction of stenosis. At present, the application of anastomoses in various segments of the GI tract, from the stomach to the middle third of the rectum, can be recommended.

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Clinically, every gastrointestinal (GI) anastomosis is a compression anastomosis, independent of the manual or mechanical technique used. Sutures, staples, or buttons cause preliminary compression of the intestinal ends until wound healing finally links the adapted bowel ends. Other anastomotic principles, such as laser welding or glue, which are without a compression component, have not yet reached the standard of clinical applicability. In the medical literature, however, the term “compression anastomosis” refers to anastomoses performed by means of buttons.

Since the mid-1980s three types of compression ring have been developed and used in experimental and clinical trials. The AKA II [1] and the ring developed by Rosati et al. [2] consist of insoluble material and therefore are not resorbable or biofragmentable. As a consequence, they cannot be applied in all regions of the GI tract, only in the colorectal area. This is because it should be possible to extract the rings that become mechanically impacted, and therefore these devices are suitable only for the distal colon and rectum. These anastomotic principles also require an application device comparable to staplers. Notwithstanding good wound healing results, these rings are indicated in limited cases.

Broad international interest and application has been reserved for the biofragmentable anastomosis ring (BAR), created by Hardy et al. [3], which represents a redesigned Murphy button. The anastomotic button created by Murphy from Chicago in 1892 [4] was the single most useful implanted anastomotic device during the last century. The BAR, which is biofragmentable and detectable on radiographs (87.5% polyglycolic acid and 12.5% barium sulfate), has a wide internal lumen and a constant anastomotic gap (Fig. 1). The present study represents a European prospective clinical multicenter trial and was undertaken to evaluate the applicability of the BAR as a routine anastomotic tool in teaching hospitals. The trial results analyzed consisted of 1666 BAR anastomoses performed in 1360 patients in both the upper and lower GI tracts. Surgeons of varying experience, from general surgery residents to staff members, were involved.

Methods

This evaluation involved six surgical centers in Austria and Germany. It began in Neumünster (Germany)1 in 1989 and was...
Fig. 1. View of the Murphy button (replica) and the Valtrac biofragmentable anastomosis ring (BAR) (Sherwood-Davis and Geck, USA).

Fig. 2. Multiple application of BAR. a. Reconstruction of the intestinal continuity after gastrectomy by jejunal interposition and J-pouch.
A: BAR anastomosis interposed jejunum–duodenum; B: BAR jejunoojejunostomy. b. Radiograph of jejunal interposition and J-pouch after gastrectomy. A: duodenal anastomosis; B: jejunoojejunostomy. Radiologic control of the anastomoses by water-soluble contrast medium on day 8 postoperatively. No signs of leakage or disturbed passage were seen.

Fig. 3. a. Inconspicuous radiograph of colorectal anastomosis with water-soluble contrast medium on day 10 postoperatively (BAR in situ). b. Colorectal anastomotic site 3 weeks after the operation. The BAR is completely eliminated.