

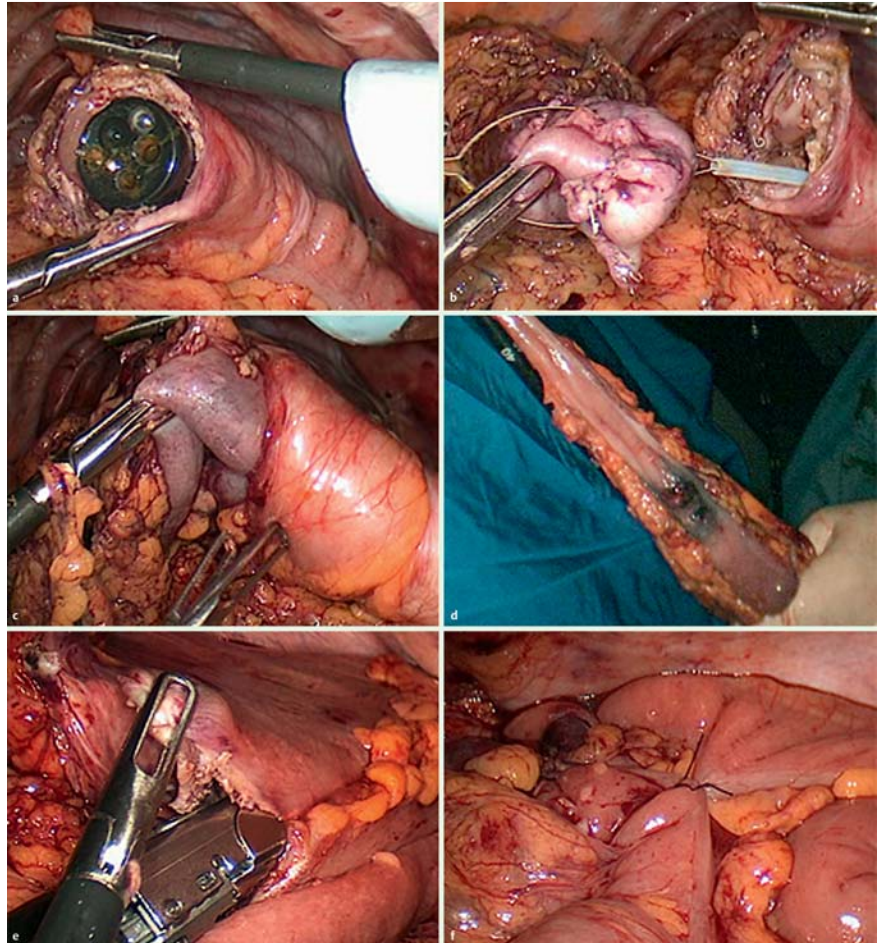
## Hybrid laparoscopic colectomy with transluminal colonoscopic specimen extraction – a step toward natural orifice surgery

Minimally invasive surgery is the method of choice when colon polyps cannot be removed endoscopically. However, laparoscopic colon resections require a 5–6-cm minilaparotomy to retrieve the specimen. This laparotomy can cause pain, wound infection, and hernia formation [1,2]. We describe a new technique to avoid a minilaparotomy by using a flexible colonoscope for transluminal specimen extraction.

A 70-year-old woman with a polyp in the mid-transverse colon was laparoscopically operated with four trocars (2 × 5 mm, 2 × 5–12 mm). Preoperative workup was standard, including bowel preparation. Briefly, laparoscopic dissection consisted of colon mobilization of the hepatic and splenic flexures. The mesentery of the transverse colon was transected by a 5-mm Ligasure device (Valleylab, Boulder, Colorado, USA) respecting oncologic principles. Linear Endo-GIAs (6 cm, blue cartridge, Tyco Healthcare, Norwalk, Connecticut, USA) were used to cut the bowel along the defined proximal and distal resection lines to obtain the specimen. A flexible colonoscope was guided to the end of the distal colon. The colon was opened and the specimen grasped with a wire loop (Fig. 1).

The specimen together with the colonoscope was then carefully pulled through the distal colon and the anus. The colon was again closed with an Endo-GIA. The resulting tiny colon remnant was removed through one 12-mm trocar. A stapled side-to-side colon anastomosis was carried out and port sites were sutured intracutaneously. Postoperative pain was solely managed by paracetamol. After an uneventful postoperative course the patient was discharged 5 days after the operation.

Natural orifice (transvaginal/transanal) specimen extraction has been described [3–5] to avoid laparotomy for laparoscopic colectomy, but these techniques are limited to female patients or to lesions of the recto-sigmoid colon. Our hybrid approach enables surgeons to perform total-



**Fig. 1** **a** The tip of the colonoscope at the previously opened end of the distal colon. **b** Catching the colon specimen with a loop wire inserted through the channel of the colonoscope. **c** Pulling the specimen through the distal colon together with the colonoscope. **d** The anus-retrieved specimen with the preoperatively ink-marked colon polyp. **e** Creation of the intracorporeal side-to-side colon anastomosis with the help of the Endo-GIA introduced through a small opening in each large bowel site. **f** Completed colon anastomosis after laparoscopic suturing of the bowel opening required by use of the Endo-GIA.

ly laparoscopic colectomies without laparotomy in order to reduce incision-related morbidity.

**Competing interests:** None

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