Combined laparoscopic and endoscopically assisted reversal of Hartmann's procedure (CLEAR technique)

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Abstract

Introduction: Although evidence is growing that most patients who need an operation for a left sided colonic or sigmoid disease can be treated by a single-stage procedure, a two-stage procedure will still be necessary in some patients because of significant sepsis or technical difficulties. Restoration of colorectal continuity is the second step of the procedure originally described by Hartmann in1923 for the treatment of sigmoid colon cancers. It is a complex procedure, which needs a meticulous surgical technique and is associated with a significant morbidity. In recent years, enthusiasm for laparoscopic reversal of Hartmann's procedure has increased, with the outcomes of many series suggesting that it has a reduced morbidity and mortality compared with the open procedure.

Aim of the work: The aim of this paper is to describe a new minimally invasive combined laparoscopic and endoscopically assisted approach to restore bowel continuity after Hartmann's procedure. CLEAR= Combined Laparoscopic and Endoscopically Assisted Reversal.

Conclusion: In this novel technique, the combination of the laparoscopic and endoscopic views as well as trans-illumination, gives the surgeon additional feedback as regards the proper plane of dissection especially in attempting Hartmann's reversal of a difficult rectal stump.

Background:

Restoration of colorectal continuity is the second step of the procedure originally described by Hartmann in1923 for the treatment of sigmoid colon cancers. It is a complex procedure, which needs a meticulous surgical technique and is associated with a significant morbidity.[1] In light of this, many patients (44-49%) elect not to undergo reversal.[2] On the other hand, a short rectal stump, situated below the peritoneal reflection, is often difficult to identify because of the depth of the field especially in the presence of extensive adhesions with the surrounding structures owing to previous sepsis or if the patient had received pelvic irradiation.[3] In recent years, enthusiasm for laparoscopic reversal of Hartmann's procedure has increased, with the outcomes of many series suggesting that it has a reduced morbidity and mortality compared with the open procedure.[2]

Aim:

The aim of the present study is to describe a new minimally invasive combined laparoscopic and endoscopically assisted approach to restore bowel continuity after Hartmann's procedure.

Surgical technique:

This technique was developped in Demerdash University Hospital, Ain Shams University.

Preoperative preparation:

Standard preoperative preparation for colorectal surgery is performed and DVT prophylaxis given and the proximal bowel as well as the distal rectal stump cleansed with an enema. Other precautions include:

- Gastrograffin loopogram & enema, gives an idea about the remaining colon.
- Proximal colonoscopy to assure a disease free colon as well as proctoscopy to ensure disease free rectum.
- Digital rectal examination to assess sphincter tone.

OR setup:

The patient is positioned supine in the usual modified lithotomy position with both arms tucked to his side. The thighs are abducted and slightly elevated on Allen or Lloyd Davis stirrups to allow access to the anus for endoscopy and stapler placement, and also provide space for the surgeon. The surgeon stands first between the patient's legs during dissection of the splenic flexure if required, then to his right side at the start of rectal stump dissection and restoring the bowel continuity. The camera operator stands on the patient's right with the first assisting surgeon next to him. The scrub nurse stands on the left side. The surgeon's monitor trolley is placed on the left side near the patient's left shoulder, facing both the operating surgeon and camera operator. This trolley is equipped with the laparoscopic camera system, light source, insufflator, suction/irrigation system and VCR. A second monitor placed on the left side near the foot of the bed for video-sigmoidoscopy together with the endoscopic light source, suction/irrigation system and image recording during the procedure.

The procedure:

After general anesthesia with good muscle relaxation and endotracheal intubation, an indwelling urinary catheter is placed and antibiotics given and continued till the second postoperative day. The left iliac colostomy is taken down and dissected free as usual from the surrounding skin and fascia with care, meticulously freshening the edges trying to preserve as much of viable colon as possible. The anvil of the circular stapler (eg. premium plus CEEA® , Tyco, Norwalk, CT) is secured to this end of bowel by a nylon or polypropylene 2/0 airtight purse-string suture and dropped down inside the abdomen **Figure(1)**. Any adhesions on the undersurface are dissected free under direct vision. The fascial defect is closed with interrupted sutures around an open Hasson cannula where insufflation starts. After pneumoperitoneum, visual abdominal exploration is done through the Hasson port (usually in the left iliac area) to assess the field, adhesions and note any pathology which may require early conversion to totally open technique.

A second 10 mm port is inserted under vision in the umbilical area and the camera now switched to it. In the infraumbilical area a 5mm working port is inserted for a non-traumatic grasper and ten mm dissecting instruments are inserted in the left iliac (Hasson) port. A fourth port may be needed in the right lumbar area during pelvic dissection. The patient can be rolled slightly to the right, in reverse Trendelenburg position. Dissection now starts cephalad by dividing adhesions around the descending colon up to the splenic flexure. The assistant surgeon applying adequate counter-traction to the proximal segment using an endo-babcock medially and caudally from the right side. Assessment of the required length is made and the proximal stump is drawn gently to the pelvis to assure adequate tension free anastomosis to the rectal stump. In case of difficult or short distal stump anticipation, further careful mobilization is done at this stage to bring the required length of colon down to the pelvis. Adequate assessment of the stump could be done preoperatively by gastrografin enema or more accurately by intraopearative endoscopy. The inferior mesenteric vein may need to be divided if not done previously. This would provide further few centimeters of colon length.

The operating surgeon now swaps places with the assistant surgeon, the patient returned to supine position in steep Trendelenburg tilt. Adherent small bowel loops are gently pulled back and dissected until the pelvis is cleared of it. The dissection of the rectal stump starts by identification of the plane between the rectal wall and bladder in males or the vagina in females. The assistant, standing now between the patient's legs, introduces a video-sigmoidoscope into the distal rectal stump, gently inflating and straightening it as a bougie and trans-illuminating the rectal walls **Figure(2)**, thus helping to identify it abdominally and dissecting it free. This is similar to trans-illumination done in percutaneous endoscopic gastrostomy in which the scope transilluminates the gastric and anterior abdominal wall. The scope can also be introduced vaginally in case of previous pan hysterectomy trans-illuminating it to avoid

injury to its walls.

The operating surgeon can now proceed to identify adequately the dissection plane guided by two images; the laparoscopic view and the endoscopic view. The sigmoidoscope can be gently manipulated to help dissection to continue till an adequate length of rectal stump mobilized, without injury to the vaginal walls prostate or bladder. The sigmoidoscope is withdrawn after completion of dissection and assessment of adequacy of the length of both the proximal colon and the distal rectal stump.

The stapler in then introduced by the assistant per rectum after a betadine/saline rectal wash and the spike advanced until it pierces the posterior rectal wall. The anvil is mated to the spike under laparoscopic control, the stapler approximated and fired after orientating the position of the colon and mesentry to avoid any twist. The complete doughnuts are examined. The endoscope is again introduced to visualize the anastomotic line **Figure(3)**, and the pelvis filled with saline while the patient is positioned in reverse Trendelenburg. Air insufflation is done by the endoscope while applying a non traumatic occluding clamp to the colon distally. Air leak test is concluded. The procedure is finalized, the abdomen deflated and port sites sutured. Nasogastric tube is removed and urinary catheter removed next morning to assure adequate urine output.

Discussion:

Hartmann's procedure remains a safe and suitable option in patients with left sided colonic emergencies.[4] Although evidence is growing that most patients who need an operation for a left sided colonic or sigmoid disease can be treated by a single-stage procedure, a two-stage procedure will still be necessary in some patients because of significant sepsis or technical difficulties.[5] Chiarugi in 1998 demonstrated that restoration of the bowel continuity after Hartmann's procedure is safe and has an acceptable rate of general and anastomosis-related morbidity. Moreover, most of the anastomotic complications will resolve without further surgery.[6] Bosotti et al, described a technique of gasless laparoscopically assisted technique of reversal of ileostomy and Hartmann's procedure and defined the advantages that make such a laparoscopic approach suitable, especially in elderly patients with cardiovascular compromise, including reduced trauma related to a second major abdominal operation, reduced postoperative pain, and fewer cutaneous tissues exposure to bacterial contamination.[7] Golash in 2006 demonstrated the feasibility, safety and practicality of laparoscopic reversal of Hartmann's procedure in 10 out of 12 consecutive patients over 3 years with no mortality. Main reasons reported for conversion to open were dense abdominal-pelvic adhesions secondary to the primary operation, difficulty in finding the rectal stump and rectal scarring. Leaving long non-absorbable suture ends at the rectal stump or suturing it to the anterior abdominal wall helps in its localization. Other relative limitating factors could be a large incisional hernia from the previous laparotomy and contraindications to general anesthesia and laparoscopy.[8]

The chances of regaining normal rectal function are much better for benign disease. Complications from second-stage re-anastomosis are not determined by timing of the closure, provided the septic episode has subsided.[9] The author believes that the best chance for reversal would be in the first three months in benign left colonic lesions, and definitely prior to radiation therapy in malignant lesions to minimize the rate of open conversion due to dense adhesions rendering the laparoscopic approach unfavorable.

This new described technique features ergonomic position of the surgical team and ports with minimal swap of places, open laparoscopy using Hasson technique taking advantage of a previous stomal wound. Moreover, the start with colostomy closure saves time as there is no loss of pneumoperitoneum later on to finish the procedure. Transillumination of the rectal stump by a flexible sigmoidoscope allows direct abdominal identification of the stump and helps dissection without risk of blind perforation. Instrumentation of the vaginal stump in case of pan-hystrectomy, helps avoiding risk of a rectovaginal fistula by blind stapling of rectum to posterior vaginal wall.

The use of the flexible sigmoidoscope allows visual inspection of the anastomosis and performing the air leak test. The combination of the laparoscopic and the endoscopic view gives the surgeon additional visual feedback regarding the plane of dissection of a difficult rectal stump.

To the author's knowledge, this technique was not previously described in the literature.

It is a demanding technique requiring advanced laparoscopic and endoscopic skills. However, the described technique respects the general considerations of safe and cost effective surgery and proves that Hartmann's reversal is feasible and even more straight- forward procedure laparoscopic than by conventional open surgery.

Figure (1): Stoma freed from skin & fascia and anvil fixed with purse-string suture.

Figure (2): Trans-illumination used to locate the rectal stump.

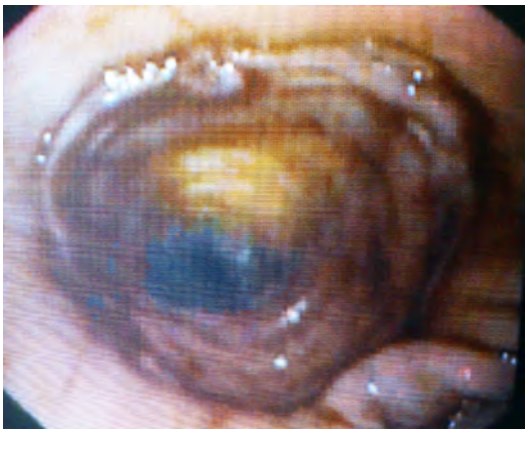

Figure (3): Visual colonoscopic inspection of the final colorectal anastomosis.

Conclusion:

Contrary to the general misconception, restoration of the bowel continuity after Hartmann's procedure is feasible and safe, particularly laparoscopic. In this novel technique, the combination of the laparoscopic and endoscopic views gives the surgeon additional feedback as regards the proper plane of dissection especially in attempting Hartmann's reversal of a difficult rectal stump. The introduction of the video-sigmoidoscope adds to the technicality and crowding of the operating theater with equipments, which may be reflected on the total cost. However, for restoration of bowel continuity with a rectal stump frozen with adhesions, CLEAR technique may worth a trial. Short and long term results are awaited.

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