

Massive Intraoperative Bleeding after Laparoscopic Assisted Abdominoperineal Resection: A Case Report and Systematic Review of the Literature

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Rezumat

Sângerare masivă intraoperatorie după rezecție abdominoperineală asistată laparoscopic: prezentare de caz și revizia sistematică a literaturii

Introducere: Rezecția abdominoperineală asistată laparoscopic s-a dovedit a fi asociată cu o perioadă mai scurtă a recuperării postoperatorii, cu rezultate oncologice echivalente și o supraviețuire similară chirurgiei deschise, pentru pacienții cu neoplasm de rect inferior.

Metodă: Prezentare de caz, a unei hemoragii masive intraoperatorii în timpul unei rezecții abdominoperineale asistată laparoscopic, și review-ul sistematic al literaturii de specialitate, utilizând bazele de date PubMed/MedLine, ISI Thomson, OVID și EMBASE.

Rezultate: Pacient în vârstă de 58 de ani, internat în condiții de urgență pentru rectoragii. Tactul rectal a evidențiat o formațiune tumorală protruzivă, friabilă, localizată la 2 cm de linia anocuanată. Colonoscopia a relevat o formațiune tumorală protruzivă, infiltrativă, la 2 cm de orificiul anal, cu extensie cranială de 5 cm, fără alte leziuni asociate intraluminale colonice. Computer Tomografia a evidențiat o îngroșare

a peretelui rectal de 4,5 cm, fără invazia mezorectului sau metastaze ganglionare. Pacientul este transportat în sala de operație, unde se efectuează rezecția abdominoperineală asistată laparoscopic. În timpul hemostazei realizată la finalul intervenției chirurgicale, se produce o sângerare masivă de la nivelul plexului venos presacrat, cu impact hemodinamic major. Această sângerare nu a putut fi controlată laparoscopic, fiind necesară conversia la laparotomie, cu meșaj pelvin. După 48 de ore se realizează demeșarea pelvină, fără a se vizualiza semne de reluarea a sângerării. S-au aplicat agenți hemostatici locali și s-a suturat plaga perineală. Evoluția postoperatorie a fost favorabilă. Concluzii: Pentru a preveni mortalitatea și morbiditatea semnificativă secundară unei sângerări de la nivelul plexului venos presacrat este necesar controlul rapid și eficient al acesteia. Packing-ul pelvin rămâne o metodă salvatoare de viață, la care trebuie apelat în cazurile severe.

Cuvinte cheie: Cancer de rect, rezecție abdominoperineală asistată laparoscopic, sângerare intraoperatorie masivă.

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Abstract

Introduction: The laparoscopic-assisted abdominoperineal resection (LAPR) has been proved to be associated with a shorter postoperative recovery, with equivalent oncological results and similar survival when compared with conventional open surgery, for patients with low rectal cancer.

Method: Case report of a massive intraoperative bleeding during LAPR and systematic review of the English language literature, using PubMed/Medline, ISI Thompson, OVID

and EMBASE databases.

Results: 58 years old patient admitted in emergency setting for rectal bleeding. Rectal examination revealed a protruding, frail tumor, located 2 cm from the anal verge. Total colonoscopy revealed an infiltrative, protruding tumor, situated at 2 cm from the anal verge, with a 5 cm cranial extension, without any additional colonic lesions. Computed Tomography showed a 4,5 cm circumferential rectal wall thickening, without any enlarged mesorectal or abdominal lymph nodes. The patient was transported to operating room for a LAPR. During final hemostasis, at the level of perineal surgical wound, an acute massive bleeding occurred from the presacral vessels with severe blood loss. This bleeding could not be managed laparoscopically and conversion to laparotomy was decided, with pelvic packing. At 48 hours after the initial surgical approach, the tamponing packs were removed, without signs of active bleeding. There were applied haemostatic agents and the perineal wound was sutured, without further bleeding during in-hospital stay.

Conclusions: A rapid and effective control of the presacral bleeding is mandatory to prevent a fatal outcome. Pelvic packing remains a life-saving procedure and the treatment of choice in severe cases.

Key words: Rectal cancer, laparoscopic assisted abdominoperineal resection, massive intraoperative bleeding

Introduction

The laparoscopic approach is increasingly used worldwide for colorectal cancer resections. The laparoscopic-assisted abdominoperineal resection (LAPR) has been proved to be associated with a shorter postoperative recovery, with equivalent oncological results and similar survival when compared with conventional open surgery, for patients with low rectal cancer (1).

Standard LAPR technique

The patient should be placed in Lloyd-Davis position, with lower limbs in abduction and slightly flexed, 15° -25° head down and 10° right clockwise rotation (2). For a better exposure of the operative field, during the laparoscopic approach is very important to use Trendelenburg position, to displace in the right upper abdominal quadrant the small bowel loops. For usual LAPR, Leroy et al. recommend six trocars, as following: (1) a supraumbilical, optical trocar of 12 mm, (2) a 5 mm working trocar in the right flank, (3) a 5 mm working trocar in the right lower quadrant, which will be replaced at the end with a 12-15 mm one for stapling, (4) a left flank trocar, used for exposure, (5) a 10 mm suprapubic trocar, used for exposure, and (6) a 5 mm trocar located in the right upper quadrant (2). Rectosigmoid colon dissection

and mobilization: The rectosigmoid colon is retracted to the midline and to anterior, with the peritoneal incision at the right aortic flank. The dissection continues laterally in the Toldt fascial plane, thus the rectosigmoid colon mobilization being performed in a medial to lateral fashion (3). This dissection must be in the avascular plane, between the two coalescing layers of the Toldt fascia: the anterior layer remains attached to the left mesocolon and the posterior layer will remain attached to the fascia of Gerota. Under the posterior layer of Toldt fascia and Gerota fascia are located the left ureter and genital vessels (4). The left colonic flexure needs to be mobilized in order to keep a tension free anastomosis. Vascular transection: While some surgeons prefer a high ligation of inferior mesenteric artery (IMA), at its emergence from the aorta, others ligate the IMA after the emergence of the left colic artery. To protect the superior hypogastric nervous plexus and to prevent its damage, the high ligation of IMA should be done 1cm above the aorta (5). The pathological studies revealed malignant invasion of the lymph nodes located between the IMA origin and the emergence of the left colic artery in 11-22% of cases (6,7). Circumferential dissection of the rectum: Posterior dissection is started at the promontory level, identifying the limit between mesorectal fascia and presacral fascia. The two hypogastric nerves are adherent at this level to the mesorectal fascia. To prevent their injury, a carefully dissection in this area with nervous lowering in the posterior plane (4). The retrorectal space dissection is continued down, incising the rectosacrate fascia located at the level of fourth sacral vertebra. This should be transected with electrocautery in order to continue the dissection down to the levator anal muscles. The dissection plane should not be posterior to the presacral fascia, to avoid the troublesome bleeding from the presacral veins. Lateral dissection continues the circumferential plane created posterior to the rectum. At this level we must protect the inferior hypogastric plexuses, which are adherent to the lateral mesorectal fascia. Too much traction or electrautery usage at this lateral aspect of the lower rectum will injured the nerves with consequent urinary and sexual morbidities. Anterior dissection begins by cutting the peritoneum in the Douglas pouch, 1 cm anterior to its reflection on the bladder or on the vagina (8). The initial dissection is anterior to the Denonvilliers' fascia. One centimeter inferior to the base of the prostate in men this anatomical structure is sectioned transversely. From here the dissection is continued posterior from Denonvilliers' fascia, but anterior to the mesorectal fascia (9). Distal rectum transection: After complete mobilization of the rectum and mesorectum, the surgeon should decide the distal oncologic safety margin and then to transect distally the rectum. In 1951 Goligher presented a distal oncological safety margin of 5 cm for rectal tumors. The current evidence shows that the intramural dissemination of rectal cancer rarely exceeds 1-2 cm (10). Less than 2-4% of the rectal cancers will have a distal intramural dissemination more than 2 cm (11). However, a distal margin equal to 2 cm is considered ideal. For superior rectal

cancers, histopathological studies did not find invaded mesorectal lymph nodes lower than 5 cm from the lower tumor margin. Therefore a partial mesorectal excision with, a 5 cm distal safety margin, is considered appropriate for upper rectal cancers (12). For a partial mesorectal excision the mesorectum should be sectioned perpendicular to the rectal wall.

Case report

We are presenting the case report of a massive intraoperative bleeding during a laparoscopic abdominoperineal resection for a low rectal cancer. To compare our approach to this intraoperative incident we have done the systematic review of the English language literature, from PubMed/Medline, ISI Thompson, OVID and EMBASE databases. We have used in different combinations, "rectum", "resection", "cancer", "intraoperative", "bleeding", "minimally invasive", "laparoscopy" as truncated words or MeSH terms.

A 58 years old patient was admitted in emergency setting for rectal bleeding, associated with rectal tenesmus and narrow stools. Clinical examination showed no pain or palpable abdominal mass. Rectal examination revealed a protruding, frail tumor, located 2 cm from the anal verge on the posterior rectal wall, which bleeds easily at touching. Blood test showed only an elevated carcinoembryonic antigen (5,98 ng/ml) and serum bilirubin (1,78 mg/dL), without anemia or leukocytosis. The colonoscopy showed an infiltrative, protruding tumor, situated at 2 cm from the anal verge, with a 5 cm cranial extension, without any additional colonic lesions. Computed Tomography (Fig. 1) showed a 4,5 cm circumferential rectal wall thickening, without any enlarged mesorectal or abdominal lymph nodes.

Due to the ongoing rectal bleeding, after few days of fluid replacement therapy and blood transfusions, the multidisciplinary team decided the surgical approach first, prior to chemoradiotherapy. The patient was transported to operating room for a LAPR. The surgical resection was uneventful with the sigmoid colon transection, using the EndoGIA 45 mm stapler and whole tumor removal. No tumor invasion of the mesorectal tissue, enlarged lymph nodes or visible liver metastasis was observed. The specimen removal was done through the perineal incision. During final hemostasis, at the level of perineal surgical wound, an acute massive bleeding occurred from the presacral vessels (Fig. 2) with severe blood loss (1500 ml). This bleeding could not be managed laparoscopically and conversion to laparotomy was decided, with pelvic packing. (Fig. 3, 4)

In postoperative period the patient was admitted in the Intensive Care Unit, and received 2 plasma and 11 red blood cell units, crystalloids along with broad spectrum antibioprophylaxis and tromboprophylaxis. At 48 hours after the initial surgical approach, the tamponing packs were removed, without signs of active bleeding. There were applied haemostatic agents (Tachocomb and Surgicel), and the perineal wound was sutured, without further bleeding during in-hospital stay. The patient had a favorable postoperative recovery, without local



Figure 1. Computed Tomography of the pelvis revealing the lower rectal tumor

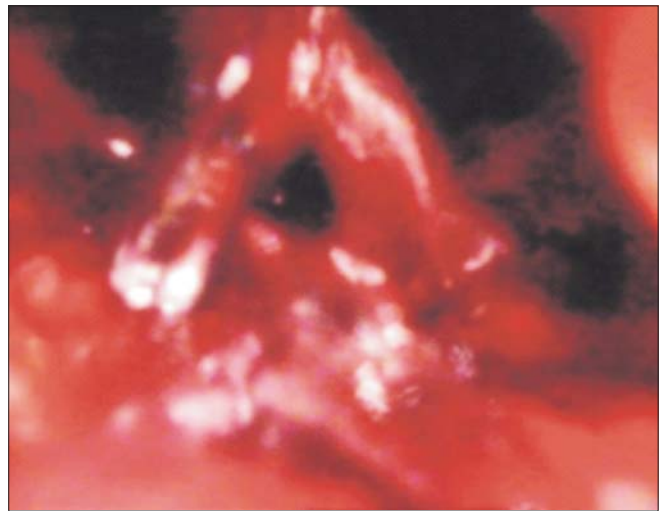


Figure 2. Massive bleeding from presacral veins

or general complications, with a functional colostomy and a serum haemoglobin level 11g/dl at discharge.

Discussions

Prior to the publication in 1908 of William Ernest Miles's capital paper, entitled "A Method of Performing Abdomino-Perineal Excision for Carcinoma of the Rectum and Terminal Portion of the Pelvic Colon", the abdominoperineal resection was scarce applied (13). In an effort to decrease the local recurrence rate in rectal cancer, Heald developed in 1982 the concept of total mesorectal excision (TME). In 1986, Heald et al. reported a local recurrence rate of 5%, and Enker et al reported a rate of 7% in 1995, (14, 15). This evidence supported the TME as a main factor in decreasing the rate of positive circumferential resection margin (CRM) and local recurrence after rectal cancer resections.

The TME technique implies the dissection at the level of the "holly plane", located between the parietal pelvic fascia and mesorectal fascia. Circumferential dissection in this avascular



Figure 3. Surgical specimen. We may observe the lower margin of the tumor 2 cm from anal verge

plane allows removing all the mesorectum, a fatty atmosphere with lymphatic tissue and vessels which surrounds the rectum.

Maslekar et al. correlated the quality of the TME specimen with the local and overall recurrence (16). In 47% of the patients the TME was optimal, in 40% of the patients the TME was nearly complete and in 13% of the patients the TME was incomplete. In case of incomplete TME the rate of local recurrence was 41% (59% overall recurrence), for patients with nearly complete TME the rate of local recurrence was 6% (17% overall recurrence). For patients with optimal TME, the reported rate of local recurrence was less than 2% (1,6% overall recurrence) (16). (Table 1)

The initiation of total mesorectal excision (TME) in combination with neoadjuvant radiotherapy (nRT) have

considerably improved the treatment of mid-low rectal cancer. Combined nRT and TME, has demonstrated better local control and efficiency in treatment of locally advanced rectal cancer (17-19). With the downstaging and downsizing effect of nRT and a better understanding of tumor spread, sphincter-preserving surgery for low-lying tumor now can be safely performed with 1-cm distal margin (20). Nevertheless, abdominoperineal excision still has indications for low-lying tumors, which invade levator ani muscle or are resistant to nRT (21). However, after radiotherapy the anatomical relationships of pelvic structures are widely modified; around the rectum, the cellular adipose tissue becomes of increased consistency and tenacious sticking to the small pelvic structures, mainly to the posterior presacral fascia.

References to increased rates of involved circumferential resected margin and local failure can be a consequence of using improper traditional APR (abdominoperineal resection) surgical techniques. A lower rate of circumferential margin involvement and an improved local control rate can be obtained using extended APR such as cylindrical resection, instead of conventional APR, according to some researchers (22, 23).

Laparoscopic-assisted approach, compared to open approach, is followed by faster restore of bowel function, earlier mobilization and less analgesic use. The conclusion is also demonstrated by studies on patients with abdominoperineal resection. The advantages of minimally invasive surgery could be contrabalanaced by the presence of a perineal wound. In fact, the oncological clearance and long-term survival are not compromised by laparoscopic-assisted approach (24). During the abdominal part of abdominoperineal resection, severe bleeding from the rectum-surrounding tissues did appear, mainly from the presacral veins localized under the sacral fascia or from the injured mesorectum.

Fleshman et al. presented a retrospective study on abdomino-perineal resection. This study included 8 cases of intraoperative hemorrhage in open group, 1 case for complete laparoscopic and 2 cases for converted laparoscopic group. was defined as intraoperative hemorrhage bleeding followed by unplanned transfusion during procedure, a change in surgical method or prompt measures taken to get over ongoing blood loss (e.g., thumbtack, ligation, or internal iliac) (25).

Bleeding of the presacral veins may be a potentially life-threatening complication of rectal surgery. Although uncommon, it has an incidence of 3 up to 9.4% (26), being more frequent for patients who have undergone preoperative radiotherapy. Studying 258 patients with TME for rectal cancer, the authors observed a rate for unstoppable presacral bleeding of

Table 1. Recurrence after radical resection for rectal cancer (Adapted from 16)

| Quality of the surgical specimen | Patients % (No.) | Local recurrence (%) | Overall recurrence (%) |
|----------------------------------|------------------|----------------------|------------------------|
| Optimal TME | 47% (61) | 1,6% | 1,6% |
| Nearly complete TME | 40% (52) | 5,7% | 17% |
| Incomplete TME | 13% (17) | 41% | 59% |

2% (5 patients) (27). The underlying venous plexus is covered and protected by presacral fascia. This venous network is located both, on and beneath the surface of the sacral periosteum. A correct surgical dissection is kept ventral along the presacral fascia. The fascia may be torn by improper manipulation, outside the avascular mesorectal space, producing damage of the underlying thin-walled veins. These veins are without intraluminal valves, and intraoperatively may reach a very high hydrostatic pressure. With the patient in lithotomy position, inside presacral veins may be a hydrostatic pressure up to three times higher than the Inferior Vena Cava. So, a massive presacral bleeding can rapidly destabilize the patient. Blood loss from the cut ends of presacral veins, with a 2 – 4 mm diameter, can reach up to 1000 ml per minute. The blood loss increases almost three-fold for just 1 mm increasing in the diameter of the injured vein. This fact is demonstrated by Wang and colleagues (28) during experimental studies.

Conventional hemostatic procedures, like tamponing, suturing or cauterization, can not solve the hemorrhage. Recommended traditional methods for stopping this bleeding are pelvic packing and metallic or titanium thumbtacks. The main disadvantage of pelvic packing is the necessity for reoperation to remove the packs, and the persistent risk of re-bleeding. Fortunately, from experience, pelvic packing rarely fails (29).

Other adjuvants methods to stop the bleeding may be: tissue expanders or a saline bag for tampon, hemostatic sponges fixed to the sacrum with endoscopic helical tacks. Very effective seems to be the coagulation through a muscle fragment: in the bleeding area positioned using a forceps a segment of the rectus abdominis muscle, of 1 – 2 cm diameter, and then electrocautery is applied to the forceps (30).

Conclusions

A rapid and effective control of the presacral bleeding is mandatory to prevent a fatal outcome. The coagulation and sutures should be avoided, knowing that they can exacerbate the bleeding, with significant blood loss. Pelvic packing remains a life-saving procedure and the treatment of choice in severe cases.

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