LAPAROSCOPIC ABDOMINOPERINEAL RESECTION OF THE RECTUM – HOW IS IT DONE; INITIAL RESULTS

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The abdominoperineal resection of the rectum is a classical operation performed in case of patients diagnosed with rectal cancer. The development of laparoscopic techniques in recent years, introduced yet another method of treatment, considering patients with rectal cancer- laparoscopic abdominoperineal resection of the rectum.

The aim of the study was to present initial treatment results considering the above-mentioned patients.

Material and methods. The study group comprised 25 patients (16 male and 9 female) diagnosed with low-rectal cancer, subjected to surgery by means of the above-mentioned method. Mean patient age amounted to 66 years. Three (12%) patients required conversion to classical surgery (laparotomy), while one patient required reoperation, due to presacral vascular bleeding. Complications were observed in 10 (40%) patients. Average hospitalization was 7 days. In case of all patients the radial margin was negative, and mean number of removed lymph nodes amounted to 9.6. Mortality was not observed during the perioperative period. Due to the initial character of the study analysis (mean observation period in case of 68% of patients was shorter than 2 years), oncological results were not subject to evaluation.

Conclusions. Laparoscopic abdominoperineal resections are considered as technically difficult operations, requiring significant experience of the operating team. However, they enable the patient to take advantage of the many assets of minimally invasive surgery, with comparable rates of postoperative complications.

Key words: rectal cancer, laparoscopy, abdominoperineal resection of the rectum

The abdominoperineal resection of the rectum was first described by Miles’ in 1908. Initially, the mortality rate amounted to 42%. Subsequent changes in perioperative care lead towards significant improvement in the above-mentioned results. The operative technique was also subject to modification. Gabriel proposed to perform the perineal stage of the operation with the patient positioned on his left side. Lloyd-Davies performed the entire operation in the lithotomic position. Currently, surgery consists in the total excision of the mesorectum, supplemented by perineal wound healing methods, especially in case of patients after neoadjuvant chemotherapy. Minimally invasive procedures have also found many followers (5).

Currently, colorectal carcinomas are considered as the most common tumors, regardless the gender. In the US, 100 thousand colon, and 40 thousand rectal carcinomas are diagnosed each year, with numbers considering rectal cancer continuously increasing (1, 2).
It is now clear, based on many randomized studies, that good laparoscopic surgical treatment results are observed in case of colon cancer, with fewer complications, faster recovery, and comparable oncological effect (with open surgery). Laparoscopy in case of rectal carcinomas, due to its specificity, difficulty, oncological radicalism, and small number of randomized studies, is still not fully accepted by many surgeons (3). All the more robotics, although more and more common, especially in cardiology and urology, considering colorectal surgery it is just “crawling” (4). In case of rectal cancer located in the lower segment of the rectum (< 5 cm from the anal sphincters), the following operations are most commonly performed: low anterior resection and abdominoperineal rectal resection. Abdominoperineal resection of the rectum requires the total excision of the rectum and anal sphincters resulting in the formation of a permanent colostomy. In spite of its one-hundred year history and development of sphincter-sparing techniques the operation continues to be an important element in the treatment of rectal cancer.

Abdominoperineal resection of the rectum is the method of choice in case a normal distal margin can not be attained, when the anal sphincters are infiltrated, or sphincter functioning is impaired, even if the low anterior resection method is technically possible (1, 5). Apart from the classical abdominoperineal resection, the laparoscopic approach is also possible. Currently, there exist many studies showing the laparoscopic method to be safe, shortening the hospitalization period. Since the lesion is removed from the perineal approach, large abdominal incisions are not required, which significantly reduces postoperative pain.

The aim of the study was to show the results of 25 laparoscopic abdominoperineal resection procedures performed at the Department of General, Oncological, and Digestive Tract Surgery, and Department of Oncology, CMKP.

MATERIAL AND METHODS

The study group comprised patients subject to laparoscopic abdominoperineal resection of the rectum, due to cancer, during the period between May, 2009 and October, 2012. All patients were diagnosed with cancer during colonoscopy, being confirmed by means of histopathological examination results. The mean observation period amounted to 16.4 months. During preoperative diagnostics patients were subjected to abdominal and minor pelvis contrast CT, chest X-ray and computer tomography, as well as diagnostics of internal disease problems. Patients diagnosed with rectal cancer were qualified for surgery. Patients with unresectable tumors (infiltrating the sacral bone) were referred for palliative radio-chemotherapy. No additional pre-selection was performed when qualifying patients for laparoscopic surgery. The study group comprised 25 patients, including 16 men and 9 women, aged between 45 and 85 years (mean age – 66 years). Twenty-four patients were qualified for preoperative radiotherapy, radio-chemotherapy was used in four patients. According to the ASA (American Society of Anesthesiologists) classification the average risk of significant complications or death during the postoperative period amounted to 1,58 (9 patients – ASA 1, 16 patients – ASA 2). Thirteen patients were additionally diagnosed with concomitant diseases, with arterial hypertension most commonly observed (10 patients). Mean BMI in operated patients was 26 (18-37). In 17 patients the tumor was located posteriorly to the anal sphincters (no more than 3 cm), while in 8 patients the tumor was located 3-5 cm from the sphincters.

Operative technique

The day before surgery, if no features of intestinal obstruction were observed, patients underwent two rectal enemas. Standard laboratory results were performed: morphology, biochemical, and coagulation. Patients with coexisting diseases were consulted by an internal medicine physician or cardiologist.

The operation was performed under general anesthesia. Perioperative antibiotic prophylaxis was used according to generally accepted recommendations. After anesthesia, patients were placed in the gynecological position. For full maneuver possibilities patients were stabilized by the shoulders, chest, and lower extremities. A Foley’s catheter was introduced into the urinary bladder, as well as
Laparoscopic abdominoperineal resection of the rectum

...a gastric probe. The operative field was prepared using a skin disinfection solution, while the rectal and perineal areas with betadine solution.

The laparoscopic stage initiated the operation. The operating team (two or three surgeons) stood on the right side of the patient with the laparoscope located in front of the operating surgeon. The scrub nurse was located between the patient's legs. Figure 1 presented the distribution in the OR.

Pneumothorax (12 mm Hg) was created after the introduction of the first 10 mm trocar (Hasson's type) in the vicinity of the navel. The following two trocars were introduced into the right hypogastrium (12 mm) and mesogastrium (5 mm). Additionally, a forth trocar (5 mm) was introduced at the site of the planned stomy. Figure 2 presented the localization of the trocars.

After evaluation of the abdominal cavity organs the patient was placed in Trendelenburg's position with the tilting of the operating table to the right. The small bowel was prepared as to visualize the sigmoid colon, mesentry, rectum, and rectourinary (men), and rectovaginal recess (women). In case of a large uterus covering the rectum the above-mentioned was elevated by its horns using one or two sutures placed in the suprapubic vicinity. After elevating the sigmoid loop the inferior mesenteric vessels were identified, and prepared close to the branching from the aorta (fig. 3). The lower mesenteric artery and vein were clipped and severed. The harmonic knife (Ethicon Endo-Surgery, Inc) or LigaSure (Covidien) were used for preparation. The above-mentioned was continued from the medial side to the perineal crease. The perineum was then severed from the lateral side of the sigmoid-as in case of open surgery. During preparation the left urinary duct was identified, as well as the neural plexuses in the vicinity of the sacral bone. After finding the “holly plane” the mesorectum was prepared along Waldeyer’s and Denovilliers' fascias (fig. 4). In selected cases, for better traction and access to the prepared tissues (especially in men) the sigmoid colon was severed at this stage of the operation. Posterior preparation was continued until the level of the levator muscle of the anus. At the fundus of the pelvis the mesentery of the sigmoid colon was severed, and excised by means of an endostapler. The proximal end of the colon was exteriorized in the left hypogastrium. At this time the perineal stage of the operation began, which was performed in the gynecological position. A purse-string suture was placed around the rectum, and an elliptical incision was performed in the perineum.

Fig. 1. Distribution of equipment in the operating room

Fig. 2. Trocar placement
The incision should include the external sphincters. In case of low lesions, the cutaneous incision was extended. The ischiorectal subcutaneous tissue was incised by means of electrocoagulation. After identifying the coccygeal bone, the anococcygeal ligament was severed. The presacral fascia was attained and mesorectum prepared. One should pay special attention at this point of the operation as not to damage the presacral vessels, which might result in bleeding difficult to control, as well as avoid intestinal perforation. The surgeons continued to incise the levator muscles of the anus. The lesion was excised after severing the transverse muscles of the perineum and rectourethral muscles, followed by hemostasis. A 16F or 18F redon was introduced through the perineal wound into the fundus of the pelvis. The perineal tissues were then sutured. Recurrent abdominal insufflation (12 mm Hg) and control of the location of the drain, hemostasis, and colostomy, terminated the surgical procedure.

During the postoperative period, patients received morphine, as analgesia, on the day of the operation, followed by non-steroid anti-inflammatory drugs (tramal, paracetamol). Oral nutrition was usually introduced on the second day after surgery. LMWH was continued for 30 days after surgery.

Mean hospitalization after surgery amounted to 7.4 days, ranging between 5 and 13 days.

Three patients (12%) required conversion to classical surgery. All were male patients: two because of a narrow pelvis and one because of uncontrolled bleeding from the presacral area. The remaining patients were subject to laparoscopic intervention. The average duration of the operation was 212 minutes, ranging between 150 and 260 minutes.

All patients were diagnosed with rectal adenocarcinoma. One patient was diagnosed with high-grade carcinoma (G3), while the remaining patients – G2.

Postoperative samples showed an average of 9.6 lymph nodes (ranging between 0 and 30). In 8 patients, lymph node metastases were observed. Table 1 presents a summary of the TNM classification.

All patients had a free radial margin in the histopathological examination. One female patient required additional inguinal lymph nodes excision, prior to radiotherapy.

During the postoperative period, 12 complications were subjected to treatment, diagnosed in 10 (40%) patients. Significant intra- and postoperative complications were observed in 4 (16%) patients: one patient required reoperation (day 0), due to presacral vascular bleeding. In the absence of the possibility to perform effective hemostasis, surgical drape tamponade was performed, being removed after 48 hours. The postoperative course proved uneventful. In case of a second patient perineal bleeding was observed during the postoperative period, requiring blood and plasma transfusions, subsiding spontaneously. The remaining two patients were diagnosed with urethral damage. One of the abovementioned, after prior prostatectomy, suffered from intraoperative longitudinal division of the urethra. The damage was sutured by

<p>| Table 1. TNM evaluation in operated patients |
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means of interrupted sutures with Foley’s catheter left in place. The patient had a cystostomy for three months. The second patient complained of urinal leakage from the perineal wound three weeks after surgery. The patient required conversion to open surgery. Probably, intraoperative thermal damage to the urethra was observed, which subsequently lead to perforation. Healing was observed after cystostomy. The remaining complications were of minor clinical importance. One female patient complained of transient small bowel obstruction on the sixth postoperative day, which subsided after conservative treatment.

Three patients complained of perineal wound suppuration requiring outpatient control. One female patient observed serous content leakage lasting 14 days, and urinary bladder innervation paralysis, which lead to urine retention requiring three weeks of catheterization. A similar problem with urine retention was observed in two other patients. After 3-4 weeks normal urinary bladder functioning was observed in all patients.

One patient was diagnosed with peripheral paresis of the upper extremity, which subsequently subsided after therapy and rehabilitation.

Six patients required intraoperative or postoperative blood/plasma transfusions. Apart from the patient who required conversion to open surgery, due to presacral vascular bleeding, and the one who required reoperation, all bleeding episodes were observed during the perineal stage of surgery. Intraoperative blood loss in case of laparoscopy did not exceed 200 ml.

Three patients were diagnosed with the following during 3 to 6 months after surgery: peristomal hernia, perineal hernia, and stomy prolapse, respectively. The initial two patients will be qualified for surgery, while the patient with stomy prolapse underwent sigmoid colon segmental resection, followed by recurrent stomy formation. All complications were successfully treated. Perioperative mortality was not observed.

**DISCUSSION**

The role of minimally invasive procedures in the management of rectal and anal diseases is still debated. There is constant controversy as to the effectiveness and range of mesorectal excision, appearance of local recurrence, and survival after laparoscopic resections. Although the most common indication for abdominoperineal resections is cancer, it is also performed in case of inflammatory diseases, and anal squamous cell carcinomas (6).

The study was aimed at presenting initial treatment results, considering 25 patients subjected to laparoscopic abdominoperineal rectum resections.

Quite common problems after abdominoperineal operations are associated with perineal wound healing disturbances, such as wound dehiscence, wound suppuration, eversion, delayed healing, and persistent fistulas. The above-mentioned is often associated with prolonged hospitalization, recurrent hospitalizations, or prolonged outpatient treatment. Additionally, patients with difficult healing perineal wounds are at increased risk of local recurrence, which is probably associated with delayed adjuvant therapy. Considering literature data the percentage of patients with wound healing difficulties ranges between 14 and 80%. Most authors underlined the fact that poor perineal wound healing is significantly increased in patients after radiotherapy. In our study perineal wound healing problems were observed in three patients, including prolonged serous content leakage, and wound suppuration. One way to improve wound healing consists in the grafting of well-vascularized musculo-cutaneous flaps from areas devoid of radiotherapy. The most common flaps used for perineal reconstruction after APR include pedunculated greater omentum, abdominal rectus and gracilis muscle flaps. The use of flaps reduces the risk of poor healing to 0-30% (7, 8, 9). Another method consists in the use of collagen mesh Permacol™ (Covidien), a bioimplant obtained from the clear porcine cutaneous collagen (10).

Amongst other common complications, which occur after abdominoperineal rectum resections, one should not forget about peristomal hernias, and stomy prolapse. Considering our study, we observed one peristomal hernia, one perineal hernia, and one stomy prolapse. Peristomal hernias are a common problem, considering patients with a stomy, observed in 30-50% of patients. Hernias least often occur after loop ileostomy, end ileostomy,
and double colostomy. The risk of stomy appearance is greatest in the initial two years. Simple reconstructive operations, which consist in the closure of the hernial ring lead to recurrence in 38% to 100%. In case of mesh closure the recurrence rate ranges between 0% and 33% (11).

According to literature data conversion to open surgery is observed in 1.4% to 48% of cases. The reason for conversion in our study was bleeding, inability to obtain proper access to the tumor, and tumor size. A critical moment, which can lead to bleeding is the preparation of the mesorectum, where one may observe presacral plexuses damage, and difficult to control bleeding (12, 13, 14). It is emphasized the the choice of the method (open or laparoscopic) should depend on proper patient selection and surgical experience (5). Amongst other reasons, which require conversion to open surgery, one should include difficulties in identifying the ureters or changes associated with prior radiotherapy, as well as adhesions.

Laparoscopic rectal cancer operations are difficult procedures requiring advanced techniques experience. The learning curve considering colorectal laparoscopic operations ranges between 30 and 70 procedures, and thus, after the above-mentioned one may observe a reduction in postoperative complications and duration of surgery (6). According to our subjective experience (no comparison between open and laparoscopic surgery), considering patients subjected to low-cancer operations the perineal stage of the procedure seems to be more difficult, as compared to the classical method. This is probably associated with the fact that during laparoscopic surgery one cannot precisely evaluate how low the mesorectal resection was performed, as in case of open surgery. During the perineal stage one may have a longer segment to prepare, which might pose visualization difficulties, especially in obese patients. Thus, the reason for some complications, such as bleeding, lymph node leakage, or urethral damage.

In our material, we observed no metastatic lesions at the site of trocars introduction. Such complications are observed in 0.1% of cases (meta-analysis), comparable to values observed in case of laparotomy (3).

Amongst complications which occur relatively often, one should mention presacral autonomic neural plexus disturbances that affect sexual and urological functioning. When preparing the pelvis there are many potential areas of neural damage. According to literature data the rate of the above-mentioned complication ranges between 10% and 60%. Preparation of the promontorium might lead to hypogastric nerve damage, especially during complete mesorectal excision. Autonomic neural damage may occur in case of wide lateral preparation or extended lymphadenectomy. Such neural damage might lead to urinary bladder dystonia, and ensuing permanent or transient urine retention. Considering our study patients urine retention was observed in three cases, requiring three weeks of catheterization. Afterwards, normal urinary bladder functioning was observed.

In case of male patients one may observe sexual dysfunctions, such as lack of erection or retrograde ejaculation. No such complications were observed in our patients (5).

An important advantage of laparoscopic abdominoperineal resections consists in the fact that extensive abdominal incisions are avoided, the cosmetic effect is satisfactory (fig. 5), and postoperative pain less extensive enabling faster return to physical activity.

Since in case of 68% of patients the observation period was shorter than two years the study did not mention oncological results.

CONCLUSIONS

1. Laparoscopic abdominoperineal rectal resections are considered difficult operations with a long learning curve, requiring significant experience.
2. The advantage of these operations consists in the rapid return to everyday activities with a good cosmetic effect, and acceptable percentage of significant complications.

3. Based on the experience of the authors, the perineal stage of the operation seems to be more difficult in case of laparoscopic techniques, as compared to open surgery.

REFERENCES


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