Exenterative pelvic surgery remains the most extensive and complex procedure in gynecological oncology. The mutilating nature of the procedure in connection with the numerous potential life-threatening complications might seem for many surgeons and gynecologists, controversial. The aim of this study was to demonstrate these rarely performed procedures, and define their role in contemporary gynecological oncology. Another important, although more personal reason for presenting this study was the long-lasting cooperation between the authors of the study and colleagues from the Department of Oncological Gynecology. The above-mentioned is connected with the significant number of ultra-radical procedures performed on female genital organs, being connected with the expansion of our knowledge in the field of gynecology.

Total exenteration consists in the “en bloc” removal of the rectum, distal part of the colon, urinary bladder and lower segments of the ureters, reproductive organs, part of the perineum with lymph nodes draining the pelvic organs and peritoneum (1).

The beginning of exenterative surgery dates back to the forties of the 20-th century. Doctor Aleksander Brunschwig was one of the pioneers of exenterative surgery with the first publication concerning the issue dating back to 1948. Brunschwig was a general surgeon at the Memorial Hospital in New York. The first publication relating to pelvic exenteration, concerned patients with advanced cervical carcinoma, which were previously considered as inoperative and incurable (1, 2).

Eugene M. Bricker was another great pioneer of exenterative surgery, employed in one of the first opened (1939) multidisciplinary oncological centers – The Ellis Fischel State Cancer Hospital. He performed his first exenteration in 1940 on a 32-year old female patient with cervical carcinoma following radiotherapy. Analysis of the excised operative specimens, as well as the intraoperative picture demonstrated that some primary pelvic organ neoplasms, in spite of their advanced character (infiltration of surrounding organs and structures) do not lead towards metastases for a long time. Well-differentiated cervical, uteral, vulvar and rectal carcinomas are such neoplasms (non-metasizing in spite of the advanced disease). On the other hand, endometrial, ovarian, urinary bladder and prostate carcinomas present extrapelvic dissemination at the time of infiltration (3). Similar observations were published by Spratt and co-authors in 1970 (4).

The above-mentioned observations juxtaposed with the free of disease five-year survival rate amounting to 40–50% (total exenteration result in case of genital organ carcinomas), fully justify the performance of these complex and extensive procedures with the intention to cure (5-8).

At the same time, the significant progress in intensive care medicine, better surgical tools, and thus, safer surgery significantly decreased postoperative mortality, which nowadays does
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not exceed 5-10% (7, 9). Half a century ago, during the days of primitive anesthesiology, and poor intra- and postoperative monitoring, one of the most important factors decisive of the success of exenteration (low complication and mortality rate) was the short duration of the procedure. Resection, which usually lasts three hours nowadays (total exenteration) was performed in 90 minutes by Bricker: 60 minutes for the abdominal resection and 30 minutes for the perineal resection (3).

The most common (>90%) gynecological indication to perform pelvic exenteration is the presence of persistent or recurrent cervical carcinoma following radiotherapy (10, 11).

One of the problems which remains unsolved (lack of controlled investigations) is the management strategy in case of IVA (according to FIGO) primary cervical carcinoma infiltrating surrounding structures—mucous membrane of the urinary bladder and rectum, leading towards the development of fistulas. In such cases, primary radiotherapy is contraindicated. Patients with the above-mentioned problem undergo some form of suprapelvic urinary and fecal diversion, as for the fistula to heal. Thus, in such cases should we not waste time and perform primary exenteration? (7).

Excellent results obtained following primary pelvic exenterations in case of patients with IVA stage cervical carcinoma (according to FIGO—without the presence of a fistula) published by some authors (7, 11, 12) question the selection of the method of choice in case of the above-mentioned stage of disease. Should we not consider primary exenteration, especially in case of large radiotherapy-resistant tumors?

A more rare gynecological indication to perform exenteration procedures is ovarian cancer. The decision concerning pelvic exenteration might be justified by the aspiration to obtain the so-called “optimal primary cytoreduction”, which will improve the efficacy and results of ensuing chemotherapy. A direct indication to perform the above-mentioned procedure is ovarian cancer infiltrating surrounding structures or its „local”-pelvic dissemination (13, 14, 15).

Pelvic exenteration is also performed in case of local vulvar carcinoma, which cannot be removed by means of a less extensive operation. The above-mentioned most often concerns patients with IVA stage carcinoma, according to FIGO (infiltration of the upper urethra, rectal and urinary bladder mucous membrane). Another condition when pelvic exenteration should be considered is the recurrence of vulvar carcinoma following its previous radical excision (16).

It is rarely possible to perform curative exenteration (due to the significant metastasizing potential) in case of cervical carcinoma. In selected cases literature data mentioned the benefits of such management (8).

Due to the extensive and mutilating character of pelvic exenteration, and the potential significant number of life-threatening complications, the above-mentioned procedures are performed in cases with the intention to cure. That is when the surgeon-gynecologist expects to perform R0 resections in a patient without neoplastic dissemination. The presence of distant metastases or peritoneal carcinomatosis is an absolute contraindication to perform pelvic exenteration. Thus, thorough preoperative diagnostics seems essential when qualifying patients towards the above-mentioned procedures. Every patient should undergo preoperative thoracic, abdominal and pelvic computer tomography (1, 3, 7, 10). Some authors call for the need to perform diagnostic laparoscopy before the pelvic exenteration, as to determine the stage of cancer and thus, in 50% enabling to withdraw from the planned procedure (17, 18).

The presence of enlarged pelvic lymph nodes, which prove cancerous during the intraoperative examination is considered as a contraindication to perform exenterative surgery. Such patients should be subjected to intraoperative examination of the lower periaortic lymph nodes. In case of metastasis the patient is diagnosed with generalized neoplastic disease, which excludes the possibility to perform pelvic exenteration (10).

Practically the only exception to the rule as not to perform pelvic exenteration in case of disease dissemination is the diagnosis of ovarian cancer, and the aim to obtain optimal cytoreduction (13, 14, 19).

The traditional contraindication to perform pelvic exenteration, due to cervical carcinoma is the infiltration of the lateral wall of the pelvis, which is evidence of the inability to perform R0 resections. Clinical symptoms of such an infiltration would include one-sided ureter
distension often coexisting with ascites (obstructive uropathy), sciatic pain, lower limb edema, and fixation of the tumor during examination under anesthesia (EUA). Most gynecological patients qualified towards pelvic exenteration were previously subjected to irradiation. Thus, preoperative distinction between neoplastic infiltration of the lateral cervical wall and postirradiation lesions (fibrosis) seems essential, as the latter are a contraindication to pelvic exenteration. It seems that magnetic resonance imaging (MRI) is the best examination visualizing the borders of the tumor in relationship to the fascial spaces, muscles and pelvic bones. In difficult, ambiguous cases the above-mentioned can be supplemented by PET, EUS and guided biopsy of the lateral wall infiltration. In spite of all these examinations we often visualize the infiltration during explorative surgery (1, 3, 7, 10).

At this point we should mention the laterally extended endopelvic resection (LEER), which additionally to pelvic exenteration consists in the „en bloc” resection of the inner iliac vessels, part of the pelvic fascia, and lateral wall muscles (internal obturator, iliococcygeus, pubococcygeus and coccygeus). Thus, some tumors traditionally considered as inopera
tive can be subjected to resection, and the histopathological examination of exenterative specimens confirms R0 resections. According to the above-mentioned conception the “untouchable” area of the minor pelvis is limited to part of the postero-lateral wall in the vicinity of the greater sciatic foramen and lumbosacral plexus (20, 21, 22).

The qualification towards such extensive procedures requires evaluation of the patients’ general condition, nutrition, and concomitant diseases. An absolute condition to perform surgery is the patients’ understanding of the procedure, and its limitations (3).

Considering the indications and contraindications of exenterative procedures, one should not forget about palliative exenterations. As previously mentioned such an extensive procedure is undertaken in case of the vision of complete patient recovery or at least in case of prolonging the patients’ life. However, one should not forget that in some patients palliative exenteration is the only procedure enabling dignified life and expiration. Palliative exenteration should be considered when the progression of the disease (vulvar expansion, tumor prolapse through the vagina), and postirradiation complications (radionecrosis of the pelvic organs) render impossible normal functioning and proper patient hygiene, leading towards “decay” during the patients’ lifetime (10, 23, 24). The number of complications after palliative exenterations does not necessarily have to exceed that following therapeutic exenterations (25).

Due to the extent and range of pelvic exenterations these procedures can be divided into four groups (anterior, posterior, total, and extended) and three types (supralevator, infralevator, and infralevator with vulvectomy) (25).

It was not the aim of the authors of this study to demonstrate technical details of the above-mentioned procedures, which were described previously (1, 26, 27).

Pelvic exenteration is a combination of three large procedures: abdominoperineal resection or anterior resection of the rectum with vaginal and urinary bladder extirpation. Thus, experience is recommended considering the above-mentioned three procedures and in the so-called “pelvic surgery”. The scale of difficulty of the procedure is unquestionable, due to the fact that most patients were previously subjected to multiple irradiations. The surgeon performing pelvic exenterations must be above all an excellent anatomist (1).

At this point it is worth mentioning of the first attempts in performing pelvic exenterations by means of laparoscopy (28, 29).

An inseparable part of pelvic exenterations is the reconstruction phase following the surgical resection. Reconstruction is aimed at minimizing the unfavorable effect of the pelvic exenteration on the patients’ future life. The four phases of reconstruction are as follows: 1) fecal diversion, 2) urinary diversion, 3) reconstruction of the pelvic fundus, 4) reconstruction of the vagina (30).

Stoma formation is the final effect of infralevator exenteration. In case of supralevator exenteration we should strive towards the reconstruction of the continuity of the digestive tract performing a low colorectal anastomosis by means of the „double stapling” method. One should not forget that gynecological exenteration is most often performed in patients previously subjected to aggressive irradiation
therapy. Thus, in case of low colorectal anastomoses, tension reducing stomas should be maintained for a period of 3 months. Some authors also mentioned the favorable effect of omentoplasty on the intestinal anastomosis (favorable effect on the angiogenesis of irradiated tissues) (10, 19).

Urinary diversion after the exenterative procedure with resection of part of the urinary bladder is possible by means of the following:
- creation of an orthotrophic neobladder,
- supravesical urinary diversion by means of continent urinary diversion or non-continent urinary diversion.

The method of urinary diversion elaborated by Bricker more than half a century ago using an ileal conduit is to this day the most common method used after pelvic exenterations. Its never ending popularity can be attributed to the simplicity, speed, and relatively small amount of complications. An undoubted drawback of the method is the permanent need to carry an urostomy sac. In case of gynecological exenterations the ileal conduit is more often created from the transverse colon. Thus, fewer complications connected with intestinal irradiation (31, 32).

The creation of a continent urinary diversion is technically more difficult, requires experience, being laborious and time-consuming and burdened with a greater number of significant complications. The above-mentioned is compensated by urine retention and thus, the stomal sac is no longer required. In conclusion, the choice of method considering urinary diversion elaborated by Bricker is dependent of many factors, such as:
- the experience of the surgeon in creating such urine cisterns,
- the course of resection-exenteration (duration, occurrence of serious complications?),
- general patient condition.

Little experience of the operating surgeon, long duration of the resection stage, intraoperative complications, and poor patient general condition should be decisive considering the choice of the ileal conduit, as the method of urinary diversion (7, 10, 33, 34).

Total infrapelvis exenteration is connected with the creation of a large pelvic fundus depletion, which unfortunately cannot be closed by means of simple sutures. Reconstruction of the pelvic fundus should fulfill two basic roles:
- prevent organ eventration and development of postoperative hernias,
- supply good material filling the empty pelvis.

The large volume of the empty pelvis (inevitable effect of resection in case of extensive exenteration) should be reduced at all costs during the reconstructive stage of the exenterative procedure. The above-mentioned is connected with increased risk of significant septic complications (the large space surrounded by poorly supplied in blood and irradiated tissues is the “promised land” for all pathogens), and results in the development of fistulas and mechanical ileus after the transfer of intestinal loops into the pelvis (possibility of adhesions).

Mechanical ileus and intestinal fistulas are one of the most frequent complications after exenterative procedures (35, 36, 37).

The prevention of these complications consists in the closure of the pelvic inlet (using the pedunculated omentum), as well as the filling of the pelvis with well-supplied in blood musculo-cutaneous flaps, which are used for the reconstruction of the vagina and pelvic fundus. Thus, the creation of the so-called “neovagina” not only favorably influences the psyche of the patient, her self-perception, and possibility to continue on with a normal sex life, but also is an important element of the reconstruction of the pelvis and the exenterative procedure. Depending on the conditions the following musculo-cutaneous flaps can be used for vaginal reconstruction: rectus muscle of the abdomen, gracilis muscles, as well as the sigmoid colon. The best material for the creation of the “neovagina” and pelvic fundus reconstruction, according to physicians and patients is the rectus muscle of the abdomen (38, 39).

The pelvic inlet can be closed using pedunculated, right gastro-epiploic vessels or performing the cecal pelvic transposition (40, 41).

Some authors also apply a silicone expander following cecal pelvic transposition, which is removed several days after the procedure by means of the perineum. The above-mentioned reduces the possibility of pelvic intestinal loop presence (42).

What should be remembered is the time required for vaginal reconstruction-usually 2 -3 hours in the hands of an experienced surgeon. Thus, not all patients will be ideal candidates for such procedures (10).
In case of impossibility or difficulties in the reconstruction of the pelvic fundus using own tissues the dura mater can be used covered by a pedunculated omental flap (10).

In spite of the passing years, reduced mortality rate, better intensive care therapy, and safer surgery the postoperative morbidity rate remains elevated (nearly 50%). The significant amount of complications is most likely connected with the more and more intricate reconstruction methods. However, the use of the above-mentioned is fully justified with the aim to improve the postoperative patients’ quality of life (7).

In conclusion, gynecological exenteration is a recognized and effective method of treating patients with genital organ neoplasms, which due to its complexity and extensiveness requires the cooperation of many specialty physicians. Only multidisciplinary teams will obtain satisfying results, both considering the patient and physician.

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