

THE ROLE OF PELVIC EXENTERATION IN TREATING GYNECOLOGIC MALIGNANCIES

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ABSTRACT

Pelvic exenteration is a radical surgical procedure, with curative potential, which is mainly carried out in cases with cancer of the bladder or the reproductive organs. Pelvectomy was initially carried out as a palliative surgical procedure but recently the aim of performing pelvic exenteration has shifted towards a curative role. Pelvectomy is a mutilating procedure and it is no longer acceptable to perform pelvic exenteration for the purpose of palliative care. Based on the fact that pelvectomy is a mutilating and extremely difficult surgical procedure the purpose of the present work is to assist in performing a rigorous selection of the patients undergoing pelvic exenteration. This work covers the indications and contraindications of performing pelvectomy and the surgical steps will be summarized in order to better understand both its benefits and drawbacks.

KEYWORDS: *pelvectomy, pelvic exenteration, cervical cancer, bladder cancer, vaginal cancer, pelvic reconstructive surgery*

INTRODUCTION

Pelvectomy, also known as pelvic exenteration, is a radical surgical procedure during which pelvic organs such as the bladder, the reproductive organs and the rectum are removed [1]. In some cases, it is the only curative option for advanced neoplasms of pelvic organs, or in the case of tumor recurrence or persistence following radiotherapy [1].

The aim of performing pelvic exenteration has shifted from palliative care towards a curative role [2]. In order to achieve this the indications for performing the procedure have been updated, as it is no longer acceptable to remove pelvic organs for palliation due to the short and long term psychological and physical impact [2].

The mortality and morbidity following pelvic exenteration have significantly dropped since its introduction into clinical practice [3]. For such a complex surgical procedure to be successful it is necessary to perform a rigorous selection of the patients proposed for pelvectomy. This is possible by closely following the indications so as not to proceed with a pelvic exenteration in a case in which a radical resection cannot be safely performed [3].

The procedure poses a challenge to the medical team, due to the complexity of pelvic anatomy and the surgical skill required to successfully carry out the surgical procedure [1].

MATERIALS AND METHOD

In order to obtain a literature review we searched medical databases such as Google

Scholar, Web of Science and Pubmed, using keywords such as: pelvectomy, pelvic exenteration, cervical cancer, bladder cancer, vaginal cancer, pelvic reconstructive surgery. We found 32 articles of interest. We also used surgery textbooks and atlases in order to present the surgical procedure.

RESULTS AND DISCUSSION

Indications

The procedure is associated with a change of quality of life and it must be well justified [4].

In general, the procedure is recommended to patients who have been diagnosed with a recurrence of cervical cancer that has been previously treated with radiotherapy or surgery combined with radiotherapy, or in the cases of recurrent uterine cancer, vaginal cancer, vulvar cancer or in the cases of bladder and rectal cancers [5].

In the case of cervical cancer pelvic exenteration can be performed for a recurrence following radiotherapy or the persistence of disease following radiotherapy. The fundamental condition for performing pelvic exenteration is the failure of radiotherapy to prevent disease recurrence [6]. The procedure can be performed if the lesion is located solely in the pelvis and there are no metastases present [6].

Depending on the location of the tumor we can perform anterior, posterior or total pelvectomy [7].

It is rarely recommended to perform pelvectomy without neo-adjuvant radiotherapy. Pelvectomy can however be performed when radiotherapy is not feasible, or the disease is in an advanced stage, such as stage IVA [7].

The most recent studies have shown that the vast majority of pelvic cancers that have been treated by pelvectomy are cervical cancers [8, 9, 10]. In specialty literature 83% of the patients with pelvic cancers are diagnosed with squamous cell carcinomas, 8% of cases are represented by adenocarcinomas [11].

Radical surgery in vaginal cancer depends on the size and location of the tumor [12]. For tumor recurrence following radiotherapy pelvic exenteration remains the only viable option provided there are no metastases present in distant sites [12]. The

patients with the following stages of the disease are considered candidates for pelvectomy: stage II squamous cell carcinoma of the vagina (where the tumor spreads outside the vagina but it does not reach the walls of the pelvis), stage III cancers (where the tumoral invasion reaches the walls of the pelvis) and for stage IV A (where there is tumoral growth inside the bladder or the rectum, or there is tumor growth outside the pelvis) [12].

In the case of bladder cancer stages T2 to T4, for female patients, anterior pelvectomy is considered to be the only option with curative potential [13]. During anterior pelvic exenteration the following organs will be removed: the bladder, the urethra, the uterus alongside the adnexa and part of the vagina [13]. The staging of bladder tumors proposed for pelvic exenteration is as follows:

- T2: The tumor spreads to the muscle layer of the bladder wall;
- T3: The cancer has grown through the muscle layer of the bladder and into the layer of fatty tissue that surrounds the bladder;
- T4: The tumor invades any of the following: the uterus, the vagina, the pelvic or the abdominal walls [13].

Contraindications to pelvic exenteration

The absolute contraindications to pelvectomy are such as follow: peritoneal metastases, distant metastases, paraaortic lymph node metastasis [5]. Extension of tumor to pelvic walls is considered a contraindication for performing the procedure, but there are cases where the surgeon considers a more radical resection is possible and structures of the pelvic wall are also removed [5].

Surgical technique for performing pelvectomy

Total pelvectomy removes the bladder, the uterus, the adnexa (if they are present), the rectum, with the surrounding tissue [4]. Total pelvic exenterations are subclassified based on the extent of pelvic floor muscle and vulvar resection into the following types:

- supralelevator pelvectomy (type I), which can be used when the tumor is relatively small and there is no involvement of the lower half of the vagina.

- infralevator (type II), which is chosen when anterior hysterectomy is performed or it is not possible to have safety margins.
- -infralevator with vulvectomy (type III) [14].

Surgical steps are as follows: midline vertical incision is ideal as it offers access to the abdominal cavity and the pelvis, and it is possible to explore the peritoneum, the surface of the liver, the intestines, paraaortic lymph nodes and the pelvic walls [5]. If any metastases are identified the procedure is aborted [11]. Pararectal, paravesical and Retzius spaces are exposed. The retroperitoneum is dissected with the identification of the ureters and the external and internal iliac vessels. Following the identification of iliac vessels, the Mackenrodt ligaments are dissected, clamped, cut and suture ligated. The ureters are then clipped and cut, leaving as much of the ureter as possible. The retroperitoneal space between the sigmoid, the sacrum and the coccyx is dissected [5]. The sigmoid arteries and the superior rectal arteries are clamped, cut and ligated. The sigmoid colon is cut and removed with the help of a stapler [5].

During the type I intervention, the supralelevator pelvectomy, the rectum is elevated from the sacrum and the ligaments are cut with the use of a linear stapler. Anteriorly, the bladder is freed from the pubic symphysis and the vesicoureteral junction is identified. The levator ani muscles are dissected free from the structures that are removed. The inferior part of the vagina is separated from the tumor with adequate safety margins [14].

In type II, infralevator pelvectomy, radical colpectomy and radical urethrectomy are performed by making a circumferential incision at the level of the vulva. The vagina is dissected free from the levator ani muscles, provided that the cancer has not spread to the levator ani muscles [14]. The rectum is cut and closed with a stapler at the level corresponding to the middle part of the vagina (in the absence of a complete resection of the perineum) and it is removed. Unless vaginal reconstruction is planned the perineum is sutured [14].

The rate of perioperative death following total pelvectomy is 5% and the recurrence of the disease is 50% greater following surgery [15].

During anterior pelvectomy the bladder, the urethra, the ureters, and the vagina are removed while preserving the rectum [4]. The most common indication is cervical or vaginal tumoral recurrence following radiotherapy [10, 12]. Uterosacral ligaments and the rectal pillars are cut and ligated in order to mobilize the pelvectomy specimen. The cardinal ligaments, ureters and the iliac vessels are clamped, cut and ligated. After the removal of the specimen the urethra is left free and the vaginal cuff is sutured [14].

Posterior pelvectomy is carried out mostly for recurrences following radiation therapy in the posterior vaginal wall or the existence of rectovaginal fistula simultaneously with cancer recurrence. The aim of this procedure is to remove the uterus, the vagina, the rectum and the parametrial tissue while preserving the ureters and the bladder [5].

After the existence of metastases has been ruled out the surgical team has to make sure the tumor is safely resectable [11]. If these conditions are met the ureters and the bladder are dissected free from the vagina and the cervix, and the uterine arteries are ligated at their origin from the internal iliac artery and the parametrial tissue is separated from the pelvic wall [14]. The colon and the sigmoid are detached together with the mesosigmoid and the mesocolon. The retrorectal space is dissected and the rectal pillars are cut alongside the uterosacral ligaments in order to mobilize the rectum. The dissection is circumferential and it is continued until the levator ani muscles are reached. The surgical resection specimen is removed, and the vaginal cuff is closed [14]. Following this type of pelvectomy urinary tract complications are less frequent [16]. The more frequent urinary tract complication is urinary incontinence [16].

Reconstructive procedures

Different types of urinary, vaginal, gastrointestinal and pelvic reconstructions have been conceived for different types of pelvectomy in order to improve the quality of life [17].

Vaginal and perineal reconstruction reduces the morbidity and the incidence of fistulas and obstructions [18].

Reconstruction of the vagina is currently done using flaps from gracilis muscle, rectus

abdominis muscle, or from the omentum and skin [5].

For interventions done without resection of the perineum, the vagina can be reconstructed by using a flap from the large omentum which is positioned around an inflatable device fixed from the vulvar orifice (this intervention is associated with a 35% risk of stenosis) [19]. Segments from the sigmoid or the cecum can be used, with the most frequent complication being inflammation, which can be treated with vaginal irrigation [20].

In the cases where the perineum is resected musculocutaneous flaps from gracilis or rectus abdominis muscles are used for reconstruction [21]. Possible complications are stenosis and abdominal wall hernia [22].

In order to reconstruct the urinary tract two techniques are currently used:

1. Bricker bladder, without urinary continence: it involves the anastomosis of the ureters to a portion of the ileum, which has not been affected by the radiation therapy, this ileal segment is brought at the level of the right iliac fossa, where it opens through a stoma [23].
2. Miami Pouch technique, which preserves urinary continence, involves the anastomosis of ureters to a low-pressure reservoir such as a segment of ileum or of right colon. A high-pressure valve seated at skin level prevents urinary incontinence [23]. Other versions of the Miami Pouch are: Rome, Indiana, Maint I and II [23]. The main long-term complications of this technique are urinary tract infections, ureteral obstructions, which are more frequent in cases where urinary continence is maintained [24].

Gastrointestinal reconstructive surgery

The gold standard is a definitive colostomy in the left iliac fossa. Intestinal anastomosis is more desirable in regards to the quality of life, but these methods are associated with a great rate of complications, dehiscence of the anastomosis being the most frequent, even in the case of patients with proximal stoma [24].

Complications

Types of complications that appear following a pelvectomy depend on the chosen

procedure, the most common being fever, infections, ileus, intestinal occlusion, fistulas, thromboembolic events or pelvic and abdominal abscess [25].

The most common immediate complications (up to 30 days after surgery) are gastrointestinal fistulas which open at the level of the skin, or into the urinary system or inside the vagina [23]. Thromboembolic complications and leaks at the site of anastomosis are also common, alongside urinary tract infections and suture infection [23]. The frequency of immediate complications is increased by preoperative irradiation, which affects the tissue as well as by the duration of the surgical procedure [23, 26].

Studies have shown that the immediate complications rate is about 27% -70% of cases, the most frequent complications are intestinal occlusion 4-26%, thromboembolic complications 2-17%, wound dehiscence 6-17%, pneumonia 6-8%, acute kidney failure in 2-14% of cases [16,27,28,29].

The most frequent late complications (30 days after surgery) include: enterocutaneous fistulas, vaginal fistulas, ureteral obstruction and strictures, urinary tract infections and pyelonephritis [26,30]. These complications appear following postoperative adhesions, tumor recurrence and urinary tract infections favored by catheterization [18,26].

Anterior pelvectomy with urinary reconstruction with ileal reservoir raises the risk of urinary tract infection, urethral stricture, urinary lithiasis and incontinence [31]. Studies have shown that the late complications rate is about 19%-49% of cases, the most frequent complications are urinary tract infections: 9-21 %, intestinal occlusion 10-13%, wound dehiscence 2-33% of cases, wound infection 6%, acute kidney failure in 3-6 % of cases [16,27].

Tumor recurrence

Literature data show that in 51% of the cases there is a recurrence of the tumor. We can find recurrences of tumors at the site of the vaginal cuff in 4 % of cases, in the pelvis in 15% of cases, or distance metastases in 10% of cases [11,32]. The mean period of time until the recurrences are identified is about 7 months [11].

In literature it has been reported that the mean period of hospital stay varies between 14 and 26 days [16,33,34]. The mean reported

survival time following pelvicotomy is between 10 and 50 months [11,28,33,35].

CONCLUSION

The patients who are candidates for pelvicotomy as the last line of curative treatment are those with pelvic neoplasia, with central location, with the possibility of complete resection, without distant metastasis and without the possibility of undergoing a less radical surgical procedure. The majority of cases where this procedure can be done are those with neoplasia of the cervix where radiotherapy has failed. The parameters which require evaluation and which are a contraindication for the procedure are: tumoral invasion of pelvic wall, para-aortic adenopathy, peritoneal invasion and distant metastasis. Despite the rigorous selection of patients, the improvement of techniques, the experience of the surgical team, the potential of pelvic exenteration to be a source of severe complications is important. Despite the decrease of quality of life, pelvicotomy has curative potential and it can increase the survival in the case of patients with advanced local disease.

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