

Laparoscopic treatment of endometriosis

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Abstract

Endometriosis is a chronic disease, difficult to treat and occurring in 6–10% of women at reproductive age [1]. The most common symptoms of endometriosis are: dysmenorrhea, dyspareunia, dysmenorrhea, infertility. Therapeutic methods used in endometriosis are: pharmacological treatment focused primarily on alleviating pain, surgery and the combination of both. The gold standard in endometrial surgery is laparoscopy. Diagnostic laparoscopy performed to confirm endometriosis is an effective method that allows for quick diagnosis. Due to laparoscopy, usually a long-term, analgesic therapy, which cannot effectively cure and improve the quality of patients'

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lives, can be shortened. Polish Gynecological Society recommendations for surgical treatment of endometriosis include: pain in the pelvic, infertility in the course of endometriosis, deep infiltrative endometriosis and endometrial ovarian cysts. The cyst resection decreases endometriosis relapse unlike cyst ablation or vaporization. On the other hand, more and more research provides evidence that laparoscopic excision of endometrial cysts adversely affects the functions of the ovaries and the ovarian reserve.

Introduction

Endometriosis is a chronic disease, difficult to treat and occurring in 6–10% of women at reproductive age [1]. Among women treated for infertility, the occurrence of endometriosis increases to 35–50%. The disease involves the presence of endometrial tissue (including stromal cells and glandular cells) outside the uterine cavity. The most common symptoms of endometriosis are: pain, menstrual disorders, infertility. Clinically, the pain is in the form of dysmenorrhea (about 50–60%), dyspareunia, abdominal pain radiating to the back or pain in the lumbar region. Often, the pain lasts for years and becomes a chronic pain (more than 6 months). The time from the first symptoms occurrence to the diagnosis of endometriosis takes on average 8–10 years. This diagnostic delay has an impact on the choice of the optimal treatment and contributes to the worsening of results. The therapeutic methods used in endometriosis are: pharmacological treatment focused mainly on alleviating pain, surgeries and the combination of both. The gold standard in endometriosis surgeries is laparoscopy. Unfortunately, the treatment is often ineffective, with a high frequency of recurrences in the case of the lack of radical excision of lesions. The most common locations of endometrial implants are: pelvic peritoneum, ovaries and rectovaginal septum. Less often, endometriosis is diagnosed in the colon, bladder, diaphragm or in remote places such as the lungs, navel, pericardium.

Diagnostics

The diagnostics of the disease includes a thorough medical history, the assessment of the subject symptoms and a patient's examination. The evaluation of

the endometriosis advancement and the final diagnosis confirmation is possible during laparoscopy with the histopathological examination. Nonsurgical methods such as transvaginal ultrasound or MRI are characterized by high sensitivity (80–90%) and specificity (60–98%) in ovarian cysts detection, yet they are not applicable in the case of peritoneal changes and adhesions diagnostics [2]. A typical single-chamber endometrial cyst usually is not difficult to assess in the ultrasound. Often, however, there are, depending on the stage of development of endometriosis, fields of heterogeneous echogenicity due to varying degrees of blood hemolysis and clots inside the cyst. Additional difficulties are adhesions, acoustic shadows resulting from the location of the ovaries behind the uterus and the presence of many chambers, fields of solid and papillary outgrowths. Unusual images of endometrial cysts always require histopathological verification during laparoscopy [3]. The diagnostics of the deep infiltrating endometriosis (DIE) includes a transvaginal and transrectal ultrasound, MRI [4]. The Rossi et al. research showed the significant relevance of the transrectal ultrasound in the assessment of the endometriosis location in the muscle layer of the rectum (100%) and in the assessment of infiltration of the intestinal mucosa (89%) [5]. High sensitivity of the method in conjunction with the transvaginal ultrasound allows for planning the extent of the laparoscopic surgery. Symptoms associated with endometriosis often overlap with symptoms of other diseases. Not every pelvic pain results from endometriosis. The differential diagnosis of pain should include other gynecological diseases: pelvic pain, ovarian cysts or tumors, fibroids and diseases of the gastrointestinal tract and urinary tract: irritable bowel syndrome, inflammatory bowel disease, cystitis.

Recommendations

Polish Gynecological Society recommendations for surgical treatment of endometriosis include: pain in the pelvic, infertility in the course of endometriosis, deep infiltrative endometriosis and endometrial ovarian cysts. Laparoscopy performed to confirm endometriosis is an effective method that allows for quick diagnosis. Due to laparoscopy, usually a long-term therapy, which cannot effectively cure and improve the quality of patients' lives, can be avoided.

Reducing the pain

The pain of various character occurs in approx. 66% of patients with endometriosis [6]. The degree of pain intensity often does not correlate with the degree of the disease advancement. Acute pain occurs in the case of small, surface changes in the peritoneum while the pain is absent in the case of large ovarian cysts [7]. In the research of Khan et al. pain occurred in 85% of patients with endometrial cysts and coexisting outbreaks in peritoneum in comparison with 38% of patients with cysts only [8].

The surgical treatment of pain resulting from endometriosis is recommended in the case of the lack of improvement after pharmacological treatment or if there are contraindications for this type of treatment. Surgeries as a first-line treatment are recommended in the case of ovarian cysts accompanied by pain as they do not respond to pharmacological treatment. The invasive character of the disease with the endometrial implants in the urinary bladder, bowel or pelvic nerve which are accompanied by acute pain are also an indication for surgery [9]. Sutton et al. found that after 6 months from the laparoscopic ablation of endometrial implants, the pain was reduced in 65% of cases in comparison with 22% after the diagnostic laparoscopy [10]. In the subject literature, there are numerous works confirming that endometrial cysts resection is more effective in the pain reduction than their ablation. In Hart et al. research, it was stated that after the excision of the cyst above 3 cm, the recurrence of painful menstruations

and the need of reoperation were considerably reduced compared to the group with the endometrial cyst ablation [11]. Healey et al. reported that surgical treatment allowed the alleviation of pain up to 5 years after the surgery [12]. Other research was less optimistic. The recurrence of pain was observed after 1-2 years after the surgery [13]. The time of the remission of pain correlated with the precision and experience of a surgeon, total resection of disease outbreaks, the excision of all changes in peritoneum and deep infiltrating endometriosis [14].

Yet, the scope of the surgical treatment depends on the intensification of pain, patient's procreation plans and expectations. In the cases resistant to pharmacological treatment and saving surgeries, the decision to perform hysterectomy with appendages can be made in accordance with a patient. The surgical menopause can result in the recovery from endometriosis symptoms in 80-90% [15]. In the postsurgical hormonal therapy, the estrogens together with gestagens should be applied as the estrogens alone can stimulate the development of minimal endometrial changes in the peritoneum and the recurrence of symptoms [7]. It seemed that cutting the nerve connections would be the alternative for radical surgical methods. However, laparoscopic presacral neurectomy (LPSN) and laparoscopic uterosacral nerve ablation (LUNA), which were to cut or destroy the innervation of the sexual organ, turned out to be ineffective. Additionally, it is reported that they can cause numerous side-effects i.e. pelvic organ prolapse, constipations.

Endometrial cysts resection

Laparoscopy has become a gold standard in the treatment of endometrial cysts. In the subject literature there is a number of reports recommending surgical treatment of cysts which leads to the recovery from pain, improvement of the quality of life, fertility and sexual functions [16]. However, it is controversial specifically due to the reduction of ovarian reserve, irreversible damage to the ovarian tissue with the possibility of premature ovarian failure (POF) occurrence [17]. The issues such as whether and when to

operate cysts, of what size and what technique to use are still under discussion. The laparoscopic surgery in endometriosis is one of the most difficult types of gynecological surgeries. It requires excellent operator's skills, appropriate equipment and often the cooperation with a surgeon or an urologist. The resection of the endometrial cysts reduces the frequency of recurrence of endometriosis in comparison with the ablation and vaporization of cysts [11]. On the other hand, there are more and more research confirming that the laparoscopic excision of endometrial cysts negatively influences the function of the ovaries. Tang et al. attempted to explain whether the ovarian damage during cyst resection correlated with its size. He compared antral follicle count (AFC), the number of dominant follicles (follicles ≥ 15 mm) and the number of the retrieved oocytes in the group with cyst diameters of < 4 cm and the group with cyst diameters of ≥ 4 cm. The reduction of all parameters was observed in both groups however, only in the group with cyst diameters of < 4 cm a statistically significant reduction was noted. According to the authors, the laparoscopic resection of endometrial cysts had an adverse impact on the ovarian reserve and the ovarian response to stimulation especially in the group with cyst diameters of ≥ 4 cm [18]. Donnez reported that vaporization of the cyst wall had less negative effects on the ovarian reserve than the cyst resection [19]. The ovary wall adjacent to the ovary cyst is morphologically different from a normal ovary and probably may not function properly. It results in oxidative stress which induces apoptosis and the necrosis of oocytes in vitro. The bigger a cyst is, the more damages surrounding the ovary cyst occur and the higher the oxidative stress is. Additionally, together with a bigger size of a cyst, a resection causes more damages of the adjacent ovary and the ovarian follicles. The use of coagulation results in even more damaged ovary [18]. Pergialotis compared the influence of bipolar coagulation and sewing of ovary on the anti-Müllerian hormone (AMH) levels and antral follicle count (AFC) 3 months after the surgery. He indicated that the use of bipolar coagulation led to the decrease of the marked parameters [20]. However, the blood loss was greater after sewing of an ovary. The assessment of the ovarian reserve by measuring

the levels of AMH and the number of AFC in the case of the laparoscopic excision of endometrial cysts might be ambiguous. Some authors suggest that the ovarian tissue surrounding the endometrial cyst contains less antral follicles with smaller diameters than a healthy ovary [21]. Other authors observed that patients with an endometrial cyst, even before a surgery, had lower levels of AMH and smaller number of AFC than healthy patients. After 6 months since operation, AMH was lower than before the surgery but the AFC did not show significant differences [22].

In the subject literature, the analysis whether the resection of endometrial cyst increases the chance for stimulation and the IVF procedure stays in focus. In the research of Yang from 2015, it was not reported that the endometrial cyst resection had an influence on the increase of IVF chances [23]. In the Cochrane database, there was a meta-analysis presented in which the authors stipulated that the surgical treatment (a cyst resection or an aspiration) did not influence the increase of pregnancy rate during IVF procedure. The aspiration was connected with a greater number of mature oocytes. The resection as well as the aspiration demonstrated the same number of oocytes and the estradiol levels in blood serum during the ovarian puncture [24].

According to the ESHRE recommendations from 2014, in the case of the I and II stage of endometriosis as stated by the American Society of Reproductive Medicine (ASRM), the surgical laparoscopy (release of adhesions, excision, coagulation or ablation of endometriosis) increases the pregnancy rate. In patients with the III and IV stage of endometriosis the surgical laparoscopy should be considered to restore the normal anatomical conditions, remove the possible endometriosis implants and increase a chance for spontaneous pregnancy. In the case of an endometrial cysts, it is more recommended to excise them rather than coagulate the walls or aspirate the cysts. ESHRE does not recommend the cysts smaller than 3 cm to be resected before the IVF procedure. The cysts above 3 cm are only an indication for laparoscopic excision if they are accompanied by pain or unable the access to the follicles during ovarian puncture in IVF procedure [9].

The asymptomatic endometrial cysts constitute the separate issue. Maggiore et al. presented the data suggesting that the cysts of the diameter > 6 cm did not influence the number of spontaneous ovulations [25]. According to the ESHRE recommendations, there is no need of conducting the routine surgical treatment in patients with asymptomatic cysts i.e. without pain and infertility [9].

Endometrial cyst is classified as benign ovarian disease. Yet, it should be remembered that the risk of cancer transformation in the case of endometrial cysts is approx. 1%. Kadan et al. attempted to determine the predictive factors of such a transformation and these were: patients above 49 years of age (sensitivity 80.6%, specificity 82.9%) and ultrasound features such as multi-chamber cysts and the presence of solid elements. The antigen CA 125 was higher in the group of patients with a malignant transformation (204 IU/ml) in comparison to endometriosis (23.71 IU/ml), but it had no prognostic value. Cancer changes were characterized by higher dynamics of growth than endometrial cysts [26].

Deep infiltrating endometriosis

Deep infiltrating endometriosis (deep infiltrating endometriosis, DIE) occurs most often in the form of nodules larger than 1 cm, located in the rectovaginal septum, rectum, urinary bladder, cross-uterine ligaments or pelvic peritoneum [27]. DIE infiltrating the structure of pelvic or bowel gives a strong pain, pain during intercourse, urination, passing stool, and is often accompanied by infertility. Surgical treatment is difficult and there is a high risk of complications. Therefore, before deciding on the scope of surgery, it is important to locate endometriosis accurately and the surgery should be performed by experienced operators often in cooperation with a gynecologist, surgeon and urologist. The preferred technique is laparoscopic excision of nodules, reconstruction of anatomical structures and adhesions release. Classical surgery often including the resection of intestine portion is a radical surgery and it is burdened with a high rate of complications. The diagnostics of the deep infiltrating

endometriosis includes palpation, vaginal ultrasound (TVS), rectal ultrasound (TRUS), MRI and an X-ray of the colon with contrast. In the study by Donnez, 500 laparoscopic procedures performed with a shaving technique were presented. It involved dissection of the anterior wall of the rectum from the rear wall of the vagina and systematic separation of endometrial nodules from the rear wall of the cervix together with an excision or ablation of these changes. The complications connected with the procedure included perforation of rectum in 7 cases, damage to the ureter in 4 cases (including 3 cases of damage during coagulation), retention of urine in 3 cases. According to the authors, shaving technique is a saving method allowing for pain relief and the improvement of patient's quality of life, yet less radical. When compared with the radical method - partial excision of the rectum - is also fraught with less risk of complications.

Conclusion

The success of laparoscopic treatment of endometriosis depends on the total excision of lesions. Relapses occur mainly at the site of the original outbreak, as a result of an incomplete resection or ablation of endometriosis. The assessment of the disease extent and the decision about the surgery requires careful medical imaging: TVS, TRUS, MRI. The complications of a laparoscopic treatment are rare, most often these are intestine, ureter and bladder damages caused by radical excision of deep infiltrating endometriosis and large endometrial cysts. In the case of patients of the reproductive age, it should be remembered that cystic endometrial resection reduces the ovarian reserve.

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