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Diagnosis and Treatment of Perineal Endometriosis

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1. Introduction

1.1 Introduction and epidemiology

Endometriosis is the extrauterine occurrence of endometrial glands and stroma, most often involving the ovaries or dependent visceral peritoneal surfaces. This tissue responds to the hormone variations in the cycle similar to eutopic endometrium.

Endometriosis is most commonly a disease of women in the second half of their reproductive life, between 30 and 45 years, and tends to regress at the menopause or even before. As a significant gynecological problem, endometriosis occurs in 7%–10% of the general population and up to 50% of premenopausal women (Wheeler, 1989). It is found in 20%–50% (mean 38%) of infertile women (Rawson, 1991; Strathy, 1982; Verkauf, 1987), and in 71%–87% of those with chronic pelvic pain (Carter, 1994; Koninckx et al., 1991; Ling, 1999). Endometriosis is responsible for 20% of all gynecologic operations and is the single leading nonobstetric cause (.5%) of hospitalization for women age 15–44 years. Although benign, endometriosis is progressive, tends to recur, may be locally invasive, may have widespread disseminated foci (rare), and may exist in pelvic lymph nodes (30%) (Martin & Pernoll, 2001).

Endometriosis is commonest in the pelvis. It is very occasionally found in bizarre sites such as the pleura, umbilicus, Caesarean section scars, perineam or vagina, diaphragm, arm, leg or kidney, but these cases are rare. The following statistical data shows the order of frequency: ovaries (30%), uterosacral and large ligaments (18–24%), fallopian tubes (20%), pelvic peritoneum, pouch of Douglas and gastrointestinal tract. Extraperitoneal locations include cervix (0.5%), vagina and rectovaginal septum, round ligament and inguinal hernia sac (0.3–0.6%), navel (1%), abdominal scars after gynecological surgery (1.5%) and cesarean section (0.5%). Endometriosis rarely affects extra-abdominal organs such as the lungs, urinary system, skin and central nervous system (Bergqvist, 1993; Lin et al., 2006).

Perineal endometriosis (PEM) is the presence of endometrial tissues in the perineal sites. It has been published in obstetric and gynecologic literature since 1949. A retrospective study in Peking Union Medical College Hospital shows 17263 women received surgical treatment for endometriosis between Jan 1992 and Apr 2011. Of them, 64 women (3.7‰) were with PEM. Of these 64 women, cases of PEM with anal sphincter involvement were 31 (1.8‰). That is, in nearly half of women with PEM, the lesions erode into anal sphincter.

2. Pathogenesis

The etiology and pathogenesis of endometriosis are complex and still incompletely understood. So many theories have been developed:

1. Implantation theory. Theory of implantation was described by Sampson in 1921 (Sampson JA, 1921). Retrograde menstruation (Sampson's theory) occurs possibly as a result of a hypotonic uterotubal junction in women with endometriosis, allowing increased menstrual regurgitation. Endometrial cells shed from the uterus at menstruation spread in a retrograde manner passing along the fallopian tube to the peritoneal cavity. This theory would account for by far the highest incidence of endometriosis occurring in the pelvis.
2. Coelomic metaplasia. Under the influence of certain unspecified stimuli, mesothelial cells might undergo a metaplastic change to endometrium.
3. Transplantation of exfoliated endometrium. Lymphatic, vascular and iatrogenic routes may disseminate endometriosis. Transtubal regurgitation is the most common route.
4. Altered immunological recognition of endometrial tissues allowing acceptance of emboli of endometrium in these sites. Probably a combination of the first and last theories is most likely to be responsible for endometriotic lesions in different sites of the body.

Transplantation theory actually is divided from the first theory (implantation theory). During vaginal delivery, viable endometrial cells become implanted in the perineum, including the site of episiotomy and result in endometriotic lesions. Perineal lesion often occurs during vaginal delivery, but the incidence of PEM is rare. The reasons for rare incidence may include: (1) Bacteria existing in the perineal wound which can cause infection or even necrosis of the local tissues. The infection and necrosis is not appropriate for transplanted endometrial cells to live. (2) After delivery, the level of estrogen decreases, which also makes the growth of transplanted endometrial cells difficult.

We reported one case of PEM with no history of surgical manipulation or trauma of her perineal area. Perineal endometriosis without history of delivery can not be explained by transplantation theory. We tried lymphatic dissemination theory on this patient (Zhu et al., 2003). As there are rich lymphatic communications between uterus, cervix, vaginal and perineum, endometrial tissues can be transported by lymphatic routes and result in perineal endometriosis.

Nicola Cinardi et al., reported a special case of perineal scar endometriosis ten years after Miles' procedure for rectal cancer. The patient was a 35-year-old-female who was treated 10 years earlier at the same institution for a low rectal cancer. She presented with two discrete subcutaneous bulges within her perineal wound. Since the patient was asymptomatic and the complete work up for recurrent disease showed no evidence of malignancy, first line therapy was conservative. After two pregnancies and a caesarean section, the patient presented at our observation with enlarged and tender perineal nodules. The patient was treated with a wide excision of the perineal scar en-bloc with the nodules. Final pathology report was consistent with perineal scar endometriosis. In the report, the author suggests that direct implantation of endometrial tissue cannot explain all the cases. There are a variety of cases of primary cutaneous endometriosis without previous abdominal surgery at different sites such as umbilicus, vulva, perineum, groin, and extremities (Healy et al., 1995;

Ideyi et al., 2003). From an etiologic perspective, the present case can be explained with postoperative menstrual implantation within the open perineal wound resulting from the procedure. Another mechanism of transplantation would see silent foci of unknown, asymptomatic pelvic endometriosis that could have been present at the time of surgery and have been disseminated within the wound edges. These foci developed into overt disease several years after surgery (Nicola et al., 2011).

3. Malignant transformation

There is a growing awareness of risk of possible transformation of endometriosis into an invasive malignancy. This is rare but well documented, and theoretically, it can occur in any gonadal or extragonadal site of endometriosis. Since 1925, more than 200 cases of malignant transformation of endometrioma have been reported in the literature (English). Heaps et al. found that 79% of such cases occurred in the ovary, the reminder occurring in extragonadal sites, usually in rectovaginal septum, pelvic peritoneum, colon, rectum, and vagina. The 5-year survival rate in patients with localized disease treated with surgery and postoperative radiation is about 80% (Heaps et al., 1990). Malignant transformation of extraovarian endometriosis is uncommon and only 60 cases have been reported world widely until 1990; of them, ninety percent are endometroid carcinomas (Johana et al., 2007).

Johana Castillo Bustamante et al. reported a 41 year-old female patient with an episiotomy in her delivery and a myomectomy performed at 31 year-old. She had symptoms for a year like progressive pain and tumour at the perineum and glutei area and cyclic bleeding. The core biopsy reported endometrioid carcinoma of perineum. She was diagnosed of "1. Pelvic tumour: Hematometra or ovarian tumour; 2. Solid tumour of right isquiorrectal area: endometroid carcinoma". When laparotomy was performed, the uterus was absent, a left ovarian endometrioma cyst and a right follicular cyst were detected, and appendix had endometrial tissues. Six months after the surgery the patient had liver metastases and she died 2 months later (Johana et al., 2007).

4. Clinical findings and diagnosis

4.1 Clinical features

Almost all patients with PEM are of reproductive ages and has a history of vaginal delivery. The perineal mass is often found in the episiotomy site or laceration site after vaginal delivery. Most patients have perineal cyclic pain corresponding to menstrual periods. Usually there is a mass between left labium majora and labium minora close to the clitoris. Perineal mass can be big and tender. Mostly the color of mass is normal. Sometimes the color of perineum is blue. Some patients have cyclic bleeding in perineal mass.

We analyzed 36 patients with perineal endometriosis who were operated on between 1983 and 2007 at Peking Union Medical College Hospital (PUMCH) retrospectively. The mean age of the 36 patients was 30.7 years (range, 23-44 years). Mean gravidity was 2.05 (range, 1-6) and mean parity was 1.03 (range 1-2). The median latent period (time from delivery to the women having perineal pain or nodule) of these 36 cases was between 4 months and 13 years after delivery. All cases had cyclical perineal pain, which was progressive and correlated with their menstrual cycles (Zhu et al, 2009).

4.2 Physical examination

A thorough physical examination, which included a bimanual gynecologic examination, a trimanual gynecologic examination and a digital rectal examination (DRE), was performed on each case. The exam revealed a hard perineal nodule corresponded to the episiotomy scar or perineal laceration scar. In a patient with PEM and anal sphincter involvement, the nodule was also associated with part of the anal sphincter. In nearly half of all patients with PEM at PUMCH, the endometrioma eroded into the anal sphincter. Thus, it is imperative that further examination (including DRE and endoanal ultrasonography) should be used to confirm whether the anal sphincter is involved in a patient with PEM. Physical examination (including DRE) could provide extremely important additional clues. The mass is generally hard, frequently adjacent to an existing episiotomy scar or previous site of tearing or injury. For some patients, the skin color over the perineal lesions may be brownish on examination. Some may have cyclic ulceration or bleeding from the perineal mass.

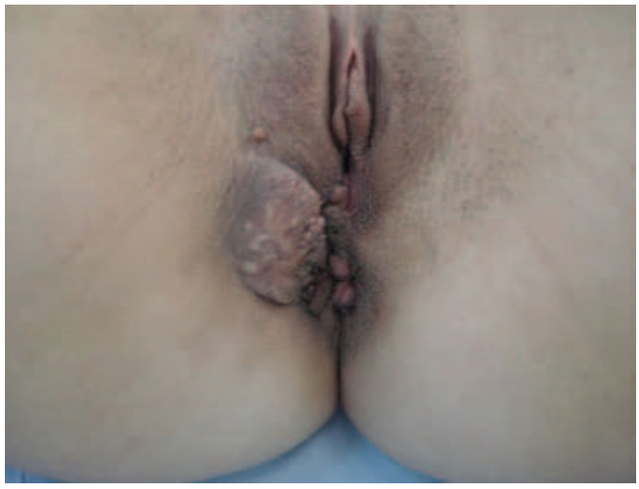

Fig. 1. Preoperative status with firm nodule in the episiotomy scar (Odobasic et al., 2010)

4.3 Lab examination

Our study of 36 patients with Perineal Endometriosis (PEM) between 1983 and 2007 in PUMCH revealed serum CA_{125} was elevated in 2 (6.7%) of 30 patients (CA_{125} levels were measured in 30 patients of these 36 patients) (Zhu et al., 2009). In 31 cases of perineal endometriosis with anal sphincter involvement, level of serum CA_{125} was elevated (>35U/ml) in 2 (6.5%) cases because of simple PEM with anal sphincter involvement. An analysis Of 101 patients with abdominal wall endometriosis (AWE) between 1992 and 2005 in PUMCH showed level of serum CA_{125} was abnormal (>35U/ml) in 20.5% of them (Cheng et al., 2007). These studies indicate the preoperative level of serum CA_{125} is insensitive for the diagnosis of AWE, PEM or PEM with anal sphincter involvement.

Ultrasound is an easy and non-invasive examination that could be prescribed in general practice. Perineal ultrasonography shows irregular hypoechoic mass in the perineal region with rounded or oval anechoic areas in it. With some patients of PEM, the examination shows a heterogeneous mass containing cystic anechoic and hyperechoic areas. Perineal ultrasonography can help in the diagnosis of the lesion, but it fails in

revealing the involvement of anal sphincter. Preoperative endoanal ultrasonography, on the contrary, is a reliable technique for visualizing perianal endometriosis and for diagnosing anal sphincter involvement. The ultrasonographic features of the lesion are similar to those mentioned above. Its advantage over perineal ultrasonography is that it can reveal the involvement of anal sphincter clearly. Besides, endoanal ultrasonography can also help in the differential diagnosis of perianal lesions: ultrasonography of perianal abscess shows homogeneous hypoechoic lesions; ultrasonography of perianal fistula shows hypoechoic fistula passes through the longitudinal muscle tissues; ultrasonography of anal carcinoma and melanoma show solid lesions. As 16.7% of patients with PEM are concomitant with pelvic endometriosis, pelvic examination and pelvic ultrasonography should be taken to exclude pelvic endometriosis (Bacher et al., 1999; Toyonaga, 2006; Watanabe et al., 2003).

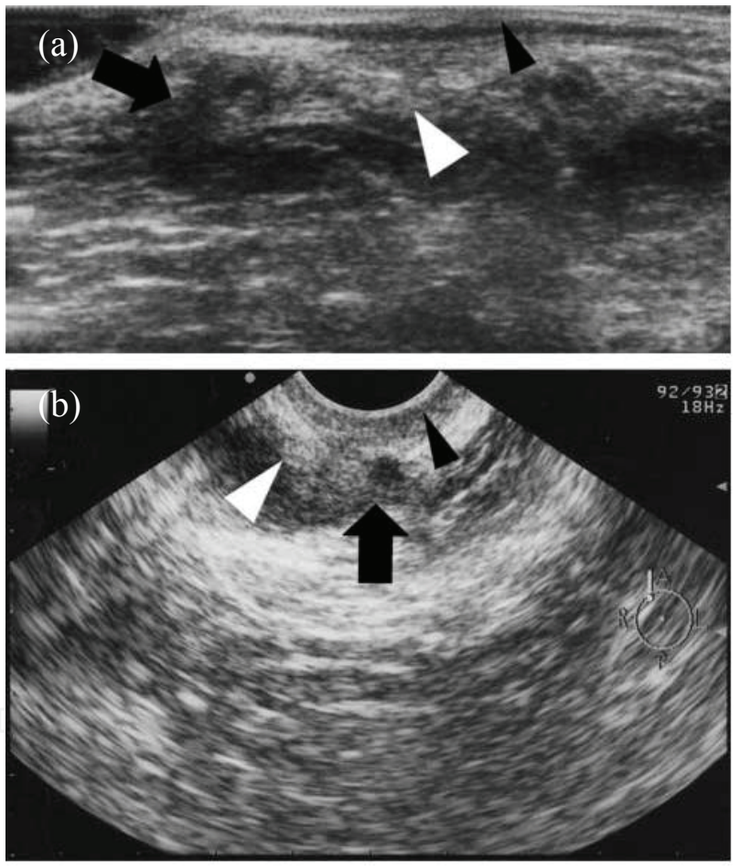

Fig. 2a,b. A 30-year-old woman with a mass in the right anterior perineal region adjacent to an episiotomy scar. Linear (a) and radial (b) ultrasound showed a heterogeneous mass containing cystic anechoic areas (black arrow) in the right anterior perianal region;the mass seemed to involve the external anal sphincter (white arrowhead) and not to involve the internal anal sphincter (black arrowhead). (Toyonaga, 2006)

Computer tomography (CT) also can be used in the diagnosis of perineal endometriosis by some authors. The value of CT however remains to be determined as it is both expensive and uses ionizing radiation. (Amato& Levitt, 1984). Fine needle aspiration cytology of the

lesion to demonstrate histological evidence of endometriosis is recommended for an accurate diagnosis (Griffin & Betsill, 1985).

4.4 Diagnosis

Perineal endometriosis can be diagnosed on the basis of clinical features. According to our retrospective study of the 36 cases of PEM, 26 were PEM with anal sphincter involvement (Zhu et al., 2009). The early diagnosis and treatment of PEM is important for the prevention of progressive involvement of surrounding tissue (especially the anal sphincter), thus decreasing the risk of postoperative fecal incontinence. A detailed medical history is of great significance for the diagnosis. Three typical characteristics of perineal endometriosis for women of reproductive ages should be considered when taking a history: (1) past perineal tearing of episiotomy during vaginal delivery; (2) a tender nodule or mass at the perineal lesion; and (3) progressive and cyclic perineal pain. If these 3 criteria were met, the predictive value of perineal endometriosis was 100% (Zhu et al., 2009).

All cases of PEM (including 31 cases of PEM with anal sphincter involvement) at PUMCH met the abovementioned criteria on history and physical examination. Preoperative endoanal ultrasonography is a reliable technique for visualizing perianal endometriosis and for diagnosing anal sphincter involvement. Preoperative endoanal ultrasonography enables the surgeon to determine the operative approach and to explain the possible complications of sphincteroplasty to the patient (Bacher et al., 1999; Toyonaga, 2006; Watanabe et al., 2003).

Serum CA_{125} levels are of great clinical importance in the diagnosis of pelvic endometriosis. In other types of EM, the serum level of CA_{125} is of little significance. However, pelvic examination and ultrasonography should be performed when serum CA_{125} levels are elevated in a patient with PEM to exclude pelvic endometriosis.

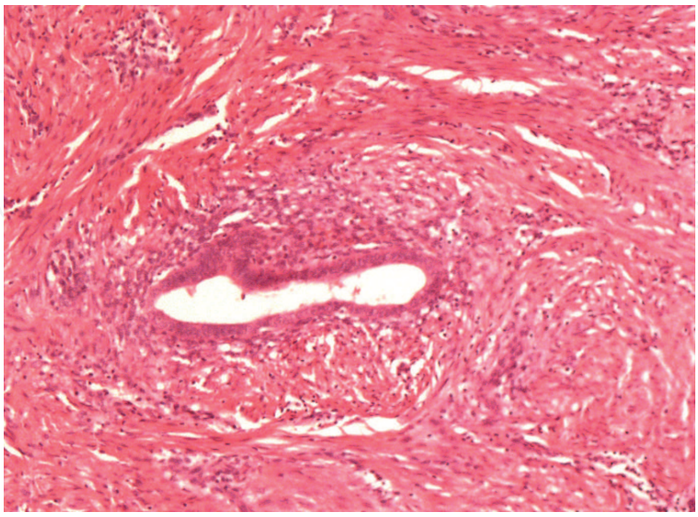

Fig. 3. Histopathology: an endometrial gland in the sphincteric muscular tissue (H & E, ×100)

The pathology result of the excised lesions (endometrial glands and stroma in hyperplastic connective tissues) confirmed the diagnosis.

5. Management

Management of perineal endometriosis can be classified into surgical management and medical management.

5.1 Surgical management

Surgical excision of endometrioma is recommended in all perineal endometriotic cases, in spite of a case of spontaneous regression of endometrioma after subsequent pregnancy reported in the literature. Wide excision of the endometrial tissues with a good healthy margin is important even if this necessitates primary sphincteroplasty when the anal sphincter is involved. It has the best chance of cure and is recommended in all cases where such an excision does not compromise function of adjacent structures and organs (Barisic et al., 2006).

In our analysis of 36 cases of perineal endometriosis in 2007, 10 patients with no anal sphincter involvement had complete excision of the endometrial tissue and did not receive hormonal treatment before or after surgery. None of these 10 patients had recurrence or fecal incontinence at the follow-up between 4 and 11 years. There were no postoperative complications after surgical excision. Surgical intervention with complete excision of the mass included a resection margin of 0.5–1 cm of surrounding healthy tissue (Zhu et al., 2009).

Of the 26 patients with perineal endometriosis and anal sphincter involvement, 18 cases received complete excision and had no recurrence or fecal incontinence during follow-up between 4 and 11 year. Of these 18 patients, 7 patients had no hormonal treatment and remaining patients had hormonal treatment after surgery. Of the remaining 8 patients with anal sphincter involvement, disease recurred after incomplete excision in 7 of them and complete excision in 1 of them. After a second complete wide surgical excision of perineal endometriomas, there were no recurrence during follow-up between 6 months to 5 years (Zhu et al., 2009).

Based on this analysis, Lan Zhu et al. suggest surgical excision is the first choice of treatment for perineal endometriosis. The relevance between the recurrence rate of perineal endometriosis and anal sphincter involvement makes preoperative evaluation of anal sphincter important (Zhu et al., 2009).

Anal sphincter invasion of the endometrioma provides an interesting dilemma. The goal is to excise the endometrioma completely, which may compromise the anal sphincter. This may necessitate primary sphincteroplasty to lesson the risk of fecal incontinence. A PubMed search showed only 13 cases of perineal endometriosis with anal sphincter involvement in eleven different case reports since 1957 (Bacher et al., 1999; Barisic et al., 2006; Beischer et al., 1966; Dougherty & Hull, 2000; Gordon et al., 1976; Hambrick et al., 1979; Kanellos et al., 2001; Martı´nez et al., 2002; Prince & Abrams, 1957; Sayfan et al., 1991; Toyonaga, 2006). In

the 13 cases of PEM with anal sphincter involvement, the wide excision (WE) and primary sphincteroplasty (PSp) were performed in 6 cases, narrow excision (NE) and PSp in 5 cases, and incomplete excision (IE) in 1 case, and spontaneous regression after a subsequent delivery was registered in 1 case. In cases where NE was performed, there were no complications associated with this procedure, but, in two cases, recurrence developed requiring subsequent hormonotherapy (Prince & Abrams, 1957; Gordon et al., 1976). In the group where WE was performed, there were no complications, no incontinence or recurrence during variable follow-up (minimal 3 months, maximal 36 months). Based on these studies, WE and PSp is recommended as the best treatment for PEM with anal sphincter involvement (Barisic et al., 2006; Dougherty & Hull, 2000; Kanellos et al., 2001; Martı´nez et al., 2002; Sayfan et al., 1991; Toyonaga, 2006).

Some authors suggest in younger patients, wide excision with PSp may be optimal to obviate the need for additional therapy. In older patients closer to menopause, narrow or incomplete excision with subsequent hormonal therapy could (when endometriosis tends to regress) lessen the risk of incontinence with sphincter resection (Dougherty & Hull, 2000).

In another analysis of 31 cases of perineal endometriosis with anal sphincter involvement in our hospital, NE and PSp was carried out in 30(96.8%) patients. IE was applied in the remaining 1 (3.2%) patient because her endometrioma was too large to excise completely. Of these 31 cases, hormonotherapy was applied to 21 (67.7%) cases preoperatively. For patients who received hormonotherapy preoperatively, pathological examination of the resected lesions showed gland atrophy and interstitial hyperplasia. These provided evidence for the effectiveness of hormonotherapy. As an adjuvant treatment, hormonotherapy in PUMCH (GnRH-agonist as the first choice) should be administered preoperatively for 2-4 months when physical examinations of patients revealed lesions involved with the anal sphincter. The aim was to reduce the size of endometrioma and make boundaries of these lesions clearer, thus to make the complete excision of lesions easier and reduce damage to surrounding tissues. With no recurrence in the NE and Psp group, we suggest preoperative hormonotherapy for every PEM with anal sphincter involvement patinet. For patients (≥40 years) whose perineal lesions are too large to excise clearly, to avoid postoperative fecal incontinence and recurrence, hysterectomy and bilateral salpingo oophorectomy could be considered instead after discussing with the patient.

No recurrence or fecal incontinence was found in the NE group and 1 recurrence occurred with the IE patient during a variable follow-up period from 6 to 78 months. This may be relevant to the use of preoperative hormonotherapy in the NE group. We recommend NE and PSp with preoperative hormonotherapy as an appropriate treatment for PEM with anal sphincter involvement. Hormonotherapy immediately after surgery could be omitted, provided the lesion was resected completely.

5.2 Medical management

Medical management (including oral contraceptives, danazol, progestogens, gonadotrophin-releasing hormone agonists (GnRH- agonists and gestrinone) could produce

temporary relief of symptoms. No drug eradicates endometriosis or produces long-term cure.

Beischer et al. reported that 1 patient had spontaneous regression of perineal endometriosis after a subsequent pregnancy, suggesting that the endometriosis was related to the change in hormone levels (Beischer et al., 1966). In our analysis of 36 cases with perineal endometriosis, one patient underwent hysterectomy and bilateral salpingo-oophorectomy for a recurrence of perineal endometrioma seven years after complete excision of perineal endometriosis. The patient was then followed up for 2 years; the perineal endometrioma decreased gradually and then could not be detected (Zhu et al., 2009). This also supports the theory that endometriosis was related to the change in hormone levels.

In all the masses resected from our patients who had hormone treatment before surgery, the pathologic examination of the excised specimens showed gland atrophy and interstitial hyperplasia. These cases confirmed the effectiveness of hormone treatment. However, hormone treatment provided only short-term success in alleviation of symptoms and recurrence was common after the hormone therapy was stopped, so the hormone could be used only as an adjuvant therapy. In our hospital, GnRH agonists are the first choice. We also use oral contraceptive pills, progestogens either preoperatively or postoperatively (Zhu et al., 2009).

In our analysis of 31 cases of perineal endometriosis with anal sphincter involvement in our hospital, hormonal treatment was applied to 21 (67.7%) cases preoperatively and 14 (45.2%) cases postoperatively. For patients received hormonal therapy preoperatively, pathological examination of the resected lesions revealed responsive tissues after medical treatment. These provided evidence for the effectiveness of hormonal therapy preoperatively. As an adjuvant treatment, GnRH- agonists are the first choice in our hospital nowadays.

GnRH- agonists could effectively deplete the pituitary of endogenous gonadotropins and inhibit further synthesis, thus interrupting the menstrual cycle and resulting in a hypoestrogenic state, endometrial atrophy, and amenorrhea. In our hospital, the aim of GnRH- agonists used preoperatively for 3-4 months was to reduce the size of endometrioma, make boundaries of these lesions clearer thus to reduce intraoperative damage to the surrounding tissues and make the complete resection of lesions easier.

6. Conclusion

Three typical characteristics of perineal endometriosis for women of reproductive ages include: (1) past perineal tearing of episiotomy during vaginal delivery; (2) a tender nodule or mass at the perineal lesion; and (3) progressive and cyclic perineal pain. If these 3 criteria were met, the predictive value of perineal endometriosis was 100% (Zhu et al., 2009). Based on these two studies of patients of perineal endometriosis in our hospital, Lan Zhu et al. suggests complete excision of the endometrioma is the first choice of treatment for perineal endometriosis (Zhu et al., 2009). When the perineal endometrioma invades into anal sphincter, we recommend NE and PSp with preoperative hormonal therapy as an appropriate treatment.

7. References

Amato M, Levitt R. (1984). Abdominal wall endometrioma: CT findings. *J Comput Assisted Tomography*, Vol.8, (1984), pp. 1213-1214, ISSN 0363-8715

Bacher H, Schweiger W, Cerwenka H & Mischinger HJ. (1999). Use of anal endosonography in diagnosis of endometriosis of the external anal sphincter: report of a case. *Dis Colon Rectum*, Vol.42, No.5, (May, 1999), pp. 680-682, ISSN 0012-3706

Barisic G, Krivokapic Z & Jovanovic D. (2006). Perineal endometriosis in episiotomy scar with anal sphincter involvement: report of two cases and review of the literature. *Int Urogynecol J,* Vol.17, (2006), pp. 646-649, ISSN 0937-3462

Beischer NO. (1966). Endometriosis of an episiotomy scar cured by pregnancy. *Obstet Gynecol,* Vol.28, (1966), pp. 15-21, ISSN 0029-7844

Bergqvist A. (1993). Different types of extragenital endometriosis: a review. *Gynecol Endocrinol*, Vol.7, (1993), pp. 207-221, ISSN 1473-0766

Carter JE. (1994). Combined hysteroscopic and laparoscopic findings in patients with chronic pelvic pain. *J Am Assoc Gynecol Laparosc*, Vol.2, (1994), pp. 43-47, ISSN 1074-3804

Cheng Ninghai , Zhu Lan et al. (2007). Clinical analysis of 101 cases of abdominal wall endometriosis. *J Reprod Med*, Vol.16, No.2, (2007), pp. 82-85, ISSN 0024-7758

Dougherty LS & Hull T. (2000). Perineal endometriosis with anal sphincter involvement: report of a case. *Dis Colon Rectum*, Vol.43, (2000), pp. 1157–1160, ISSN 0012-3706

Gordon PH, Schottler JL, Balcos EG & Goldberg SM. (1976). Perianal endometrioma: report of five cases. *Dis Colon Rectum*, Vol.19, (1976), pp.260-265, ISSN 0012-3706

Griffin JB & Betsill WL. (1985). Subcutaneous endometriosis diagnosed by fine needle aspiration cytology. *Acta Cytol*, Vol.29, (1985), pp. 584-588, ISSN 0001-5547.

Hambrick E, Abcarian H & Smith D. (1979). Perineal endometrioma in episiotomy incisions: clinical features and management. *Dis Colon Rectum*, Vol.22, (1979), pp. 550-552, ISSN 0012-3706

Healy JT, Wilkinson NW & Sawyer M. (1995). Abdominal wall endometrioma in a laparoscopic trocar tract: a case report. *Am Surg,* Vol.61, (1995), pp. 962-963, ISSN 0002-9610

Heaps JM, Nieberg RK & Berek JS. (1990). Malignant neoplasms arising in endometriosis. *Obstet Gynecol*, Vol.75, (1990), pp. 1023-1028, ISSN 0029-7844

Ideyi SC, Schein M, Niazi M & Gerst PH. (2003). Spontaneous endometriosis of the abdominal wall. *Dig Surg*, Vol.20, (2003), pp. 246-248, ISSN 0253-4886

Johana Castillo Bustamante, Francisco Loreto & Doris Digianmarco, et al. (2007). Endometriosis Perineal Malignizada. *Rev venez Oncol*, Vol.19, No.4, (2007), pp. 337-343, ISSN 0798-0582

Kanellos I, Kelpis T, Zaraboukas T & Betsis D. (2001). Perineal endometriosis in episiotomy scar with anal sphincter involvement. *Tech Coloproctol*, Vol.5, (2001), pp. 107-108, ISSN 1123-6337

Koninckx PR, Meuleman C, Demeyere S, Lesaffre E & Cornillie FJ. (1991) .Suggestive evidence that pelvic endometriosis is a progressive disease, whereas deeply

infiltrating endometriosis is associated with pelvic pain. *Fertil Steril*, Vol.55, (1991), pp. 759-765, ISSN 0015-0282

Lin YH, Kuo LJ & Chuang AY. (2006). Extrapelvic endometriosis complicated with colonic obstruction. *J Chin Med Assoc,* Vol.69, (2006), pp. 47-50, ISSN 1726-4901

Ling FW. MD.& The Pelvic Pain Study Group. (1999). Randomized controlled trial of depot leuprolide in patients with chronic pelvic pain and clinically suspected endometriosis. *Obstet Gynecol*, Vol.93, (1999), pp. 51-58, ISSN 0029-7844

Martin L, Pernoll, M.D. (2001). Endometriosis and Adenomyosis, In: Benson & Pernoll's handbook of Obstetrics & Gynecology 10th ed, 0071383522, McGraw-Hill Companies, United States of America

Martı´nez P, Villanueva E & Alvarez F, et al. (2002). Endoanal sonography in the assessment of perianal endometriosis with external anal sphincter involvement. *J Clin Ultrasound*, Vol.30, (2002), pp. 245-8, ISSN 0091-2751

Nicola Cinardi, Salvatore Franco & Danilo Centonze, et al. (2011). Perineal scar endometriosis ten years after Miles' procedure for rectal cancer: Case report and review of the literature. *International Journal of Surgery Case Reports,* Vol.2, (2011), pp. 150-153, ISSN 2210-2612

Odobasic, A., A. Pasic & IIjazovic-Latifagic, et al. (2010). Perineal endometriosis: a case report and review of the literature. *Tech Coloproctol*, Vol.14, No. Suppl 1, (Nov 2010), pp. S25-27, ISSN 1123-6337

Prince LN, Abrams J. (1957). Endometriosis of the perineum: review of the literature and case report. *Am J Obstet Gynecol,* Vol.73, (1957), pp. 890-893, ISSN 0002-9378

Rawson JM. (1991). Prevalence of endometriosis in asymptomatic women. *J Reprod Med*, Vol.36, (1991), pp. 513-515, ISSN 0024-7758

Sampson JA. (1921). Perforateing hemorrhagic cysts of the ovary: their importance and especially their relation to pelvic adenomas of emdometrial type ('adenoma' of the uterus, rectovaginal septum, sigmoid etc.). *Arch Surg*, Vol.3, (1921), pp. 245, ISSN 0004-0010

Sayfan J, Benosh L, Segal M & Orda R. (1991). Endometriosis in episiotomy scar with anal sphincter involvement. Report of a case. *Dis Colon Rectum,* Vol.34, No.8, (Aug 1991), pp. 713-716, ISSN 0012-3706

Strathy JH, Molgaard CA, Coulam CB & Melton LJ 3d. (1982).Endometriosis and infertility: a laparoscopic study of endometriosis among fertile and infertile women. *Fertil Steril*, Vol.38, (1982), pp. 667-672, ISSN 0015-0282

T. Toyonaga, M. Matsushima & Y.Tanaka, et al. (2006). Endoanal ultrasonography in the diagnosis and operative management of perianal endometriosis: report of two cases. *Tech Coloproctol,* Vol.10, (2006), pp. 357-360, ISSN 1123-6337

Watanabe M, Kamiyama G & Yamazaki K, et al. (2003). Anal endosonography in the diagnosis and management of perianal endometriosis: report of a case. *Surg Today*, Vol.33 , (2003), pp. 630-632, ISSN 0941-1291

Wheeler JM. (1989). Epidemiology of endometriosis-associated infertility. *J Reprod Med*, Vol.34, (1989), pp. 41-46, ISSN 0024- 7758

Zhu L, Lang JH, Wong F & Guo L. (2003). Perineal endometriosis without perineal trauma: a case report. *Chin Med J*, Vol.116, No.4, (2003), pp. 639-640, ISSN 0366-6999

Zhu Lan, Lang Jinghe & Wang Hanbi, et al. (2009). Presentation and management of perineal endometriosis. *Int J Gynaecol Obstet*, Vol.105, No.3, (Jun 2009), pp. 230-232, ISSN 0020-7292

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This book provides an insight into the emerging trends in pathogenesis, diagnosis and management of endometriosis. Key features of the book include overviews of endometriosis; endometrial angiogenesis, stem cells involvement, immunological and hormonal aspects related to the disease pathogenesis; recent research reports on infertility, endometrial receptivity, ovarian cancer and altered gene expression associated with endometriosis; various predictive markers, and imaging modalities including MRI and ultrasound for efficient diagnosis; as well as current non-hormonal and hormonal treatment strategies This book is expected to be a valuable resource for clinicians, scientists and students who would like to have an improved understanding of endometriosis and also appreciate recent research trends associated with this disease.

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