

Peritoneal Cysts and Ovary: A Potential Anatomic Dead Spaces for Ovarian Entrapment

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Abstract

Many names have been used across the medical literature for peritoneal cysts. Pelvic peritoneal cysts may occur mostly after surgery or any pelvic pathology. History of surgery seems the main cause that traumatized surfaces, especially peritoneal edges and exposed retroperitoneal tissue become adhesive and can lead to the formation of new pouches. The occurrence of pelvic peritoneal cysts is rare but almost all affected patients are premenopausal women. It brings to mind that functioning ovaries are related to pelvic peritoneal cyst. On the other hand, peritoneal cysts are mostly located on left side of pelvis. The pelvic space is separated into right and left hemi-spaces in midline by their border with recto-sigmoid and uterus or in cases with a previous hysterectomy, with vaginal cuff and bladder. These spaces create potential anatomic dead spaces for peritoneal cyst housed an ovary. The role of the pelvic dead spaces and their surrounding anatomic structures has never been questioned before why peritoneal cysts mostly prefer to develop on left side of pelvis. Nowadays, as the functioning ovaries are left during hysterectomies and visceral peritoneum left unclosed, pelvic peritoneal cysts may occur more frequently in the future than that of in the past. We would like to share our comments on the subject in this new era.

Keywords: Hysterectomy; peritoneal cyst; ovarian cyst

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Current Commentary

Peritoneal cysts (PC) are benign peritoneal cystic structures that located in the abdomen and pelvis. They rarely occur but almost all patients are premenopausal women. Nevertheless, it may be encountered at any time after a hysterectomy operation. In a study, the prevalence of PC was reported as 6% and almost all patients were premenopausal [1].

Several names have been used across the medical literature for PCs such as benign encysted fluid, inflammatory cyst of the peritoneum, peritoneal pseudocyst, entrapped ovarian cyst, multilocular

peritoneal cyst, and postoperative peritoneal cyst [2]. Indeed, these cysts are pseudocysts that are lined by proliferating mesothelial cells. A fibrous and inflammatory granulation tissue acts as a cyst wall which has adhesive characteristics [3]. In cases with ovarian involvement, usually a pedicle like structure connects the ovary to peritoneum and cyst fluid is mostly produced by the result of ovarian function [3,4,5].

In recent years, it has been shown that long lasting ovarian function may have some advantages. Therefore, ovaries are usually kept in place during hysterectomies with benign indications in late reproductive-age women rather than removed as in late postmenopausal women. Another element to consider is that the pelvic peritonization has been widely abandoned and functional ovaries are more frequently left in the pelvis without peritonization. When functioning ovaries are left during hysterectomy, they can be entrapped in a PC formation. Apart from pain and other pressure related symptoms, difficulty in clinical decision-making process for malign-benign differentiation can also be a problem. In the past, the radiologists considered to evaluate PCs for preoperative diagnosis because the high recurrence rate after surgery and conservative approach was important. Due to the resemblance, entrapped ovary in a PC after hysterectomy was sometimes named as “spider in web” by radiologist [4]. It can be hypothesized that in the presence of a functional ovary, leaving the peritoneum unclosed creates higher risk for ovarian entrapment and PC formation than that of pelvic peritoneal closure and/or oophorectomy during a hysterectomy operation. In this respect, we would like to share our experience with a new perspective to the formation of PCs in pelvic space (pouch of Douglas), referring basic pelvic anatomy. Here we present some figures that developed PCs after hysterectomy. Figures 1-6 show ovarian entrapment in these PCs.

Being the majority of peritoneal cysts (PC) are encountered in premenopausal women implies the role of an ongoing ovarian activity [6]. On the other hand, a history of a previous pelvic/abdominal surgery almost always exists [6]. The period between the most recent surgery and the detection of a PC is reported to be in a range from months to many years. There are several hypotheses for the occurrence of PCs. It is assumed that follicular fluid produced by the ovaries is normally absorbed by peritoneum, but when the peritoneal integrity is disrupted as a result of a surgery or inflammation, the peritoneum loses its ability to absorb fluids [4, 7]. In addition, postsurgical adhesions can entrap ovarian follicular fluid that is no longer being absorbed by the non-functioning peritoneum and a complex cystic pelvic mass is formed [3]. However, the position of the pelvic dead spaces and their surrounding anatomic structures have never been questioned before in terms of postoperative re-formation of potential anatomic dead spaces and their relation to PC development.

The “Pouch of Douglas” is separated into right and left hemi-spaces by their border with recto-sigmoid and uterus or in cases with a previous hysterectomy, with vaginal cuff and bladder (Fig. 3, 5, 6). Surgically traumatized surfaces, especially peritoneal edges and exposed retroperitoneal tissue become adhesive and can lead to the formation of new pouches. The suture-ligated ovarian pedicle contains transected edges of ligamentum ovary proprium and fallopian tube and it can easily adhere to the vaginal cuff at its corner just above the uterosacral ligament and between the incised broad ligament or meso-ovarium layers. As a result, ovary is replaced to a deeper position in the pelvis (Figure 1, 2, 3). Perhaps, in state of surviving in fossa ovarica, falling down of the ovary to the bottom of the pouch of Douglas may lead or contribute to occurrence of PCs.

Peritoneal cysts are usually formed on the left side of the pelvis. In a study, pelvic locations of PCs have been reported as 58 left, 19 right and 6 bilateral [8]. Similarly, we have experienced only one case on the right side PC after hysterectomy (Figures 1-6). The position of sigmoid colon may play a part in this side preference of PCs. Small intestines occupy the right side of pelvic space thus PC cannot easily forms. But, serousal surface of small intestines may rarely adhere to scarred peritoneum to form the roof of PC (Fig. 6). However, on the left side, sigmoid colon makes a left turn and covers the entire left side of rectouterine space. Therefore, this part of the rectouterine pouch becomes a half-open space with pelvic lateral side wall by normal anatomic neighborhood of sigmoid mesothelium to infundibulo-pelvic ligament and to left meso-ovarium (Figures 1-5). The left side of recto-uterine (recto-vesical) pouch seems to have a potential to create a separate dead space by sigmoid colon adhesions to anterior or posterior edges of the broad ligament or to meso-ovarium (Fig. 5). The mentioned space may become a potential trap for the left ovary, particularly when the ovary replaces downward to the rectouterine space. If there is continued ovulation, follicular fluid may add to the peritoneal fluid in this compartment.

Right-sided PCs are rare as there is no potential dead space on the right side. The major cause of PCs is postsurgical adhesions though they may develop from pelvic inflammatory disease, endometriosis or trauma. These conditions can change the natural positioning of nearby organs and therefore right-sided PCs can also be encountered occasionally [9].

Ultrasonography is easily accessible and usually superior to other imaging techniques for initial evaluation of pelvic pain cases. Moreover, ultrasonography can be used for real-time image-guided aspiration of PC fluid. During a pelvic ultrasound, cystic fluid may be observed as hyper-echogenic as it may contain serous, gelatinous or hemorrhagic substance [10]. On the other hand, a PC is typically seen on an ultrasound evaluation as a normal ovary surrounded by anechoic fluid containing multiple septations [7]. The “spider in the web” appearance of the trapped ovary within a PC must be differentiated from any tubal or ovarian malignancies [11].

Guerriero et al. reported that transvaginal sonography can be used without an additional increase of accuracy with combined use of color Doppler imaging and CA 125 plasma levels in the evaluation of peritoneal pseudo cysts [1]. However, one must keep in mind that MRI can demonstrate the characteristics of a solid mass more accurately than that of a cystic mass. In fact, combination of US and MRI or CT may give more useful information because “spider web appearance” may not appear in PCs and the appearance may occur in a benign ovarian cyst (Figures 2, 3, 7).

Several different approaches i.e., conservative management or surgery have been argued for the management of PCs. Even expectant management may be considered since the recurrence rate is usually high after surgical removal of the cyst. Conservative management includes ultrasound follow-up and sometimes combined oral contraceptives treatment (COC). COC are used to decrease the fluid in a PC by ovulation suppression and is also claimed to alleviate the pain [12]. Gonadotropin releasing hormone (GnRH) analogues may also suppress the ovarian functions. While diagnosis and follow up by ultrasound is recommended in the management of most cases with PC, surgical adhesiolysis may be preferred in endometriosis [1]. When symptoms secondary to PC are serious enough, real-time image guided percutaneous or transvaginal fluid aspiration can be a viable alternative with or without intracystic ethanol and/or povidone-iodine injection, approaches have also been suggested [13].

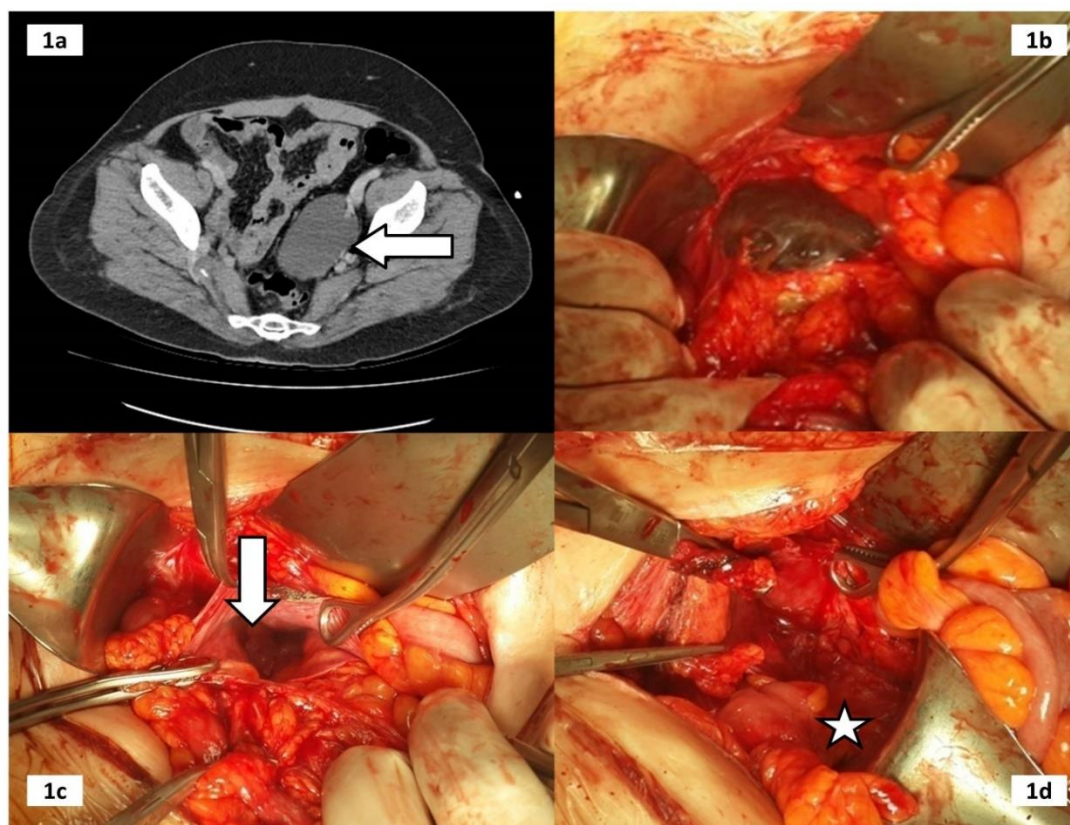


Figure 1. 1a: A computerized tomography image of a left side pelvic peritoneal cyst (PC) (arrow) that belongs to a premenopausal woman hysterectomized 2 years ago. The rectum is located medial to the cyst. **1b:** The intraoperative appearance of PC from the same patient. **1c:** The cyst wall was incised. Arrow shows the infundibulo-pelvic ligament and the left ovary at the bottom of Douglas pouch on the left pelvic side wall. **1d:** Asterisk shows rectum and the dead space of PC after removal of the ovary can be seen on left side of Douglas pouch.

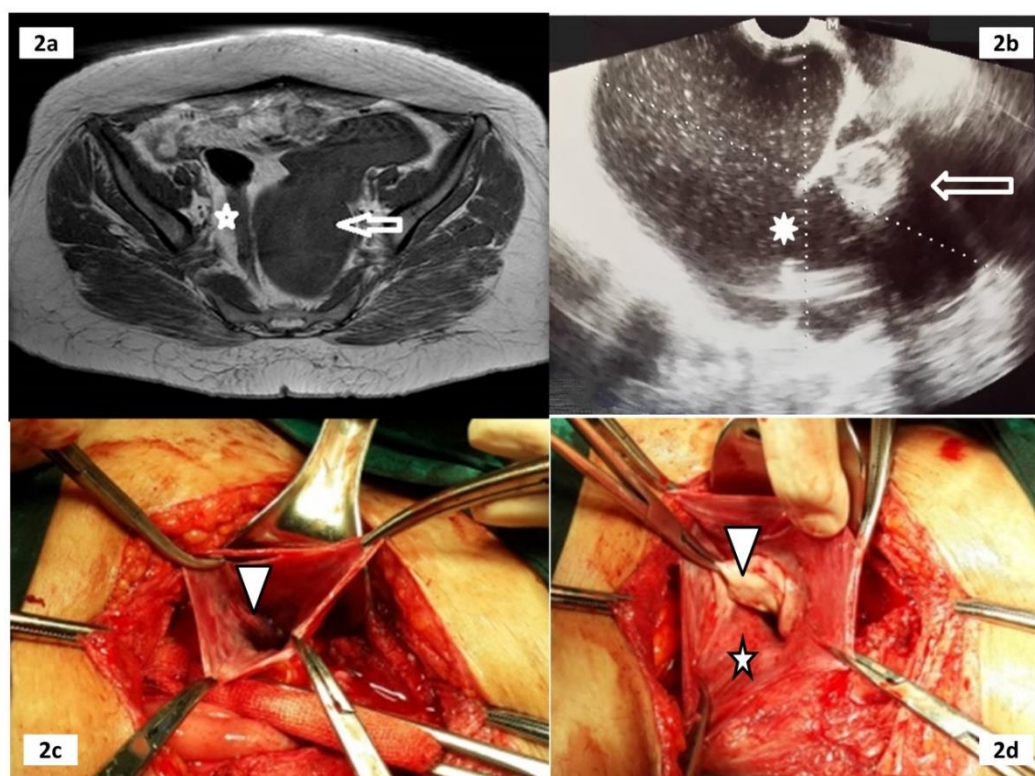


Figure 2. **2a:** A magnetic resonance image of a 14x12cm left pelvic peritoneal cyst (PC) that belongs to a premenopausal woman hysterectomized 3 years ago. The arrow indicates the cyst and the asterisk indicates the rectum. **2b:** The left pelvic PC with “spider in web” appearance of ultrasound image (arrow and asterisk). **2c:** The cyst wall was incised. An inside look into the PC. The ovary is located deeply in the cyst, arrowhead shows the ovary. **2d:** The left ovary is entrapped in a PC attached to the left pelvic side wall. The asterisk shows the ovary and the arrow head shows the PC wall.

Although the recurrence rate of PCs may be up to 50% [14], open cystectomy, open or laparoscopic adhesiolysis may be preferred in patients with severe abdominal/pelvic pain, infertility, dyspareunia, tenesmus and frequent urination/urgency [13]. In our practice, after removal of the ovaries, we close the peritoneum of PC walls and leave the cystic space open in the pelvis. If patient does not prefer oophorectomy then adhesiolysis and peritonization with ovarian reposition may be considered. In the follow-up (0-4 years after surgery) of our small PC series, there were no recurrences.

In conclusion, pelvic PCs are mostly encountered after hysterectomies and when functional ovary (-ies) left in place; they preferentially occur on the left side due to a potential dead space on the left aspect of Douglas pouch. Differential diagnosis including malignancies and relatively long follow-up may cause anxiety in patients. In the presence of symptoms, surgical intervention seems reasonable. During surgery for a pelvic PC with ovarian entrapment, we recommend reconstruct the natural anatomic space with peritoneal integrity by marsupialization of the PC walls and leaving the left side of Douglas pouch open. If the ovarian function is not essential, then adding oophorectomy would be better in order to prevent recurrences, provided that the consents were already taken before the surgery. In our experience, we believe that this approach may reduce the recurrence rate significantly. In fact, it is worth to consider the peritoneal closure of the left pelvic side wall and/or securing the left ovary to fossa ovarica with a suture in all cases undergoing hysterectomy without oophorectomy. Finally, if leaving only one ovary is an option, then the right ovary must be preferred over the left ovary.

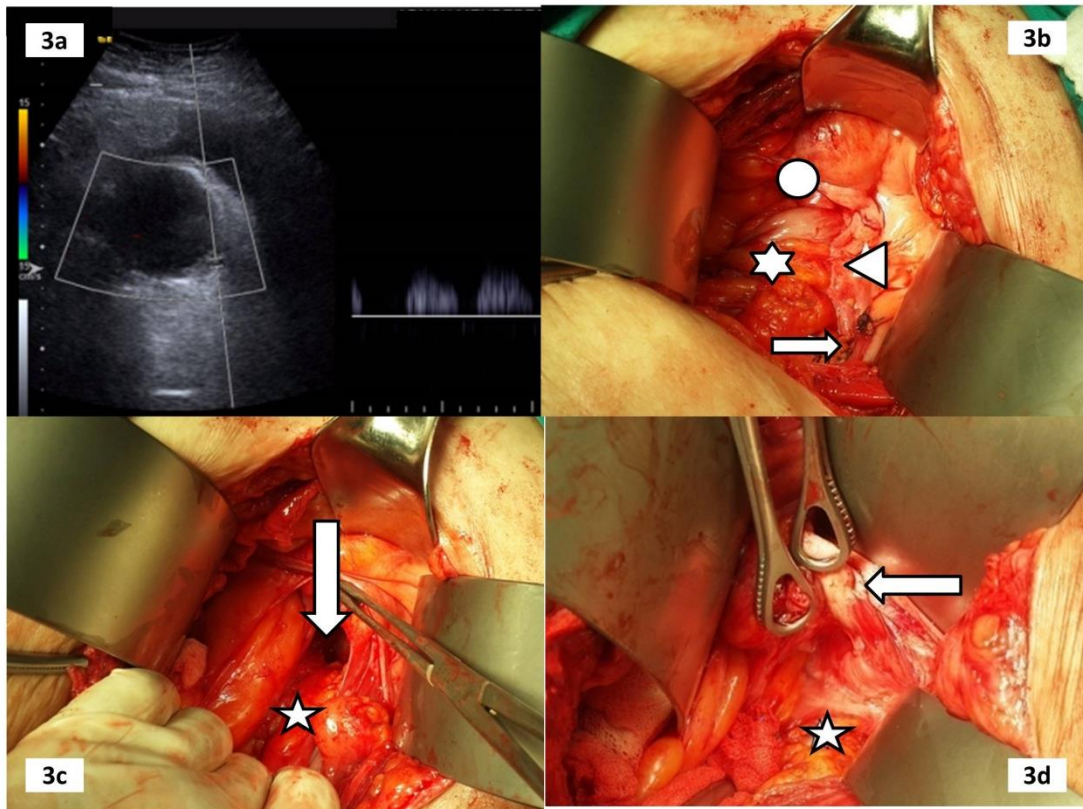


Figure 3. **3a:** Doppler ultrasound of blood flow to the left ovary in a peritoneal cyst (PC). Spider in web appearance was not discerned in this premenopausal woman with a history of hysterectomy (14 months ago). **3b:** After removal of right ovary located superficial to pelvic organs (arrow points the pedicle). The recto-sigmoid colon (asterisk) and the bladder peritoneum (arrowhead) are stuck to each other. The left ovary cannot be seen as the trapped in PC (white dot). **3c:** A left PC was incised open. The rectum is located medially (asterisk) and arrow indicates the PC space. **3d:** The left ovary was held and pulled upwards (arrow). The rectum is located on the medial wall of PC (asterisk).

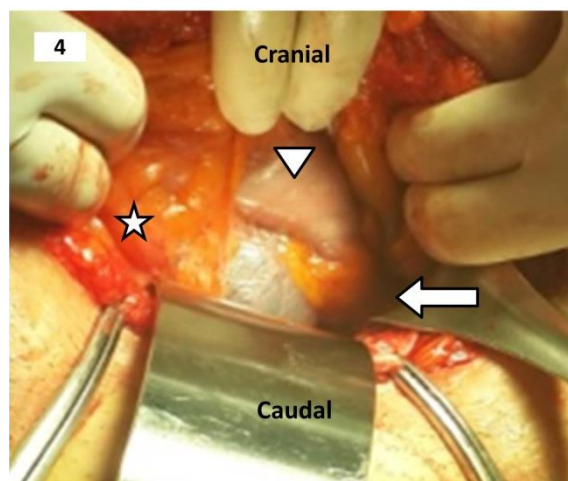


Figure 4. A left peritoneal cyst wall (arrow) under sigmoid colon (arrowhead) in a premenopausal woman with a history of hysterectomy 9 years ago. Asterisk shows omentum that covers the rectum and the bladder.

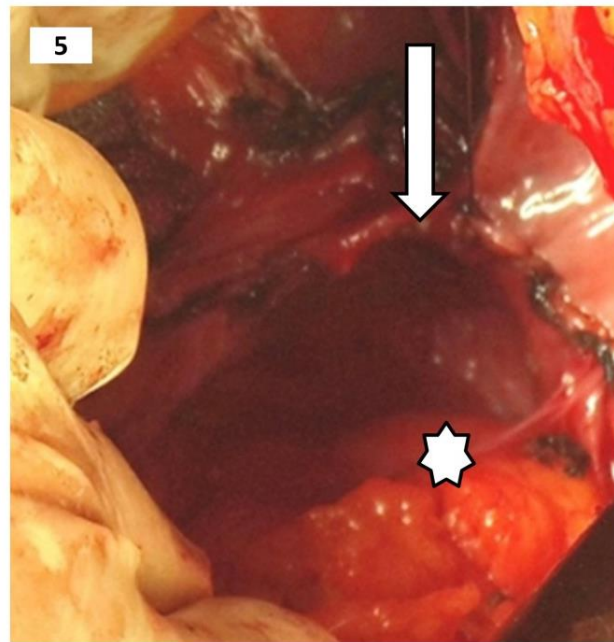


Figure 5. The image of a left side Douglas pouch after removal of the ovary inside the left peritoneal cyst (PC) and marsupialization of cyst wall to the peritoneum aimed to prevent recurrence of PC. The asterisk indicates rectum and the arrow points left pelvic side wall. The potential dead space of PC is located between these marks (image from a premenopausal woman, hysterectomized 4 years ago).

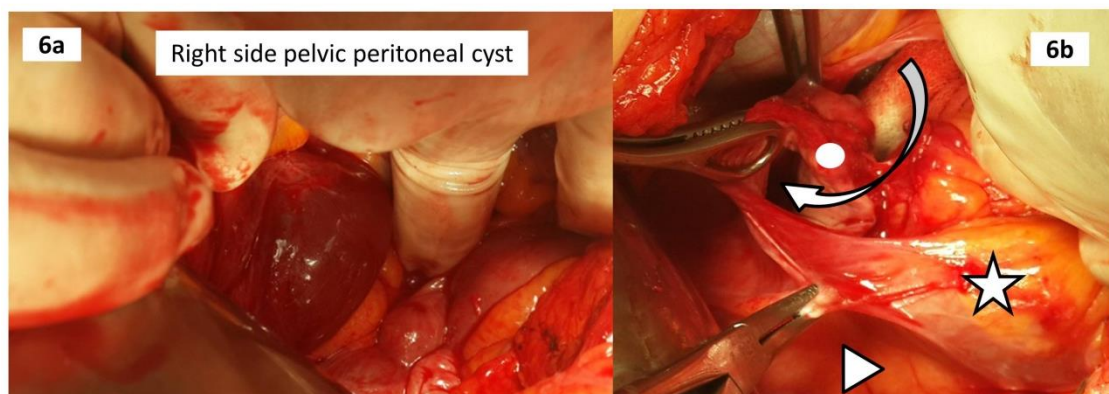


Figure 6. 6a: A right pelvic peritoneal cyst of a premenopausal woman with a history of hysterectomy 3 years ago. **6b:** The cyst opened (arrow). Small intestine serosa constitutes the cyst roof (asterisk) partially that adhered to bladder peritoneum (arrowhead) and right meso-ovarian peritoneum. The ovary (white dot) and the infundibulo-pelvic ligament on are the right pelvic wall. The rectum located deeply on medial side wall of the cyst wall.

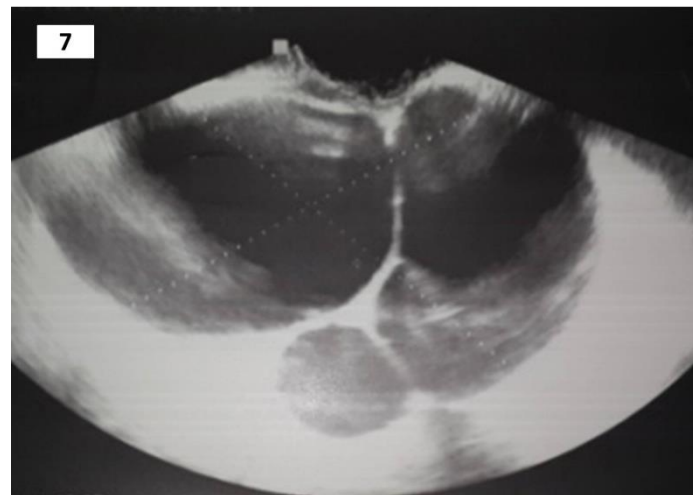


Figure 7. Ultrasound appearance of a mucinous cystadenoma (definitive pathologic diagnosis). The cyst was located on left ovary in a postmenopausal (fifty-three years old) woman hysterectomized 12 years ago without oophorectomy. It may be difficult to distinguish it from the “spider in web” appearance.

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