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Case Report

Borderline ovarian tumor and MRI evaluation of a case report☆

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ABSTRACT

Borderline ovarian tumors or atypical proliferative tumors are abnormal cells that arise from ovarian epithelium in contrast to ovarian cancers which form from stroma, the supportive tissue of ovaries. They are not invasive and tend to grow slowly. Many patients with BOTs are asymptomatic, while others have nonspecific symptoms like abdominal pain or abdominal distension. The absence of symptoms makes Borderline Ovarian Tumor hard to diagnose until it is in an advanced size or stage. Very rarely, the borderline tumor cells change into cancer cells. It usually affects patients at the reproductive age, for whom preserving the childbearing potential plays a very important role.

In this report, we present the case of 58-year-old female patient who is presented to the neurosurgeon's office with complaints of lower abdominal pain. Incidentally while investigating the intervertebral discs through a lumbar MRI, an abnormal finding was present in the coronal view, where a mass was noted on the lower right adnexal region of the abdomen. The patient was referred to a gynecologist for further investigations,

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This case report emphasizes the high sensitivity and specificity of contrast MRI in the diagnosis of various pelvic pathologies in female patients.

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Introduction

Ovarian tumors are classified into epithelial, germinal, or sexual cord tumors. Epithelial tumors are the most prevalent, accounting for 65%-70% of all cases [1–4,7]. Borderline ovarian tumors (BOT) represent 10%-20% of all ovarian epithelial tumors and they are characterized by nuclear atypia and up-regulated cellular proliferation without stromal invasion. [1–4,7].

They have a low incidence of 4.8/100,000 (Europe) and 1.5-2.5/100,000 (United States) new cases per year [1–4,7]. BOTs have also been found to have a better prognosis than other ovarian epithelial tumors [1–4,7]. Even though its characteristics and presentation are less aggressive, the age of onset (40 years) raises a concern for fertility in these women [1–4,7]. Clinical presentation, as well as imaging studies, are highly unspecific, so the definitive diagnosis relies on histologic analysis [1–4,7]. The following case presentation will help to have another view of the disease presentation as well as the diagnostic and therapeutic approach.

Case presentation

A 58-year-old female patient presented to the neurosurgeon's office with complaints of lower abdominal pain, predominantly in the right lower quadrant, lasting for a period of several months. A diagnosis of right lumboischialgia caused by a herniated disc in the lower segment of the spine (at the level of L4-L5 vertebrae) was suspected and a lumbar MRI was ordered to confirm the diagnosis.

Pre-contrast MRI images of the lumbar spine were obtained using TSE/T2W sequence in sagittal and axial planes (Fig. 1-5).

The MRI noted an accentuation of the lumbar lordosis with a decrease in T2 signal intensity of the lumbar intervertebral discs. Moderate facet joints and ligamentum flavum hypertrophy were noted at all levels with minimal intra-articular effusion present. All the intervertebral discs from the level of L2 to the level of S1 had diffuse bulging with protrusion and annular tear present. Subcutaneous fatty tissues edema was also present. All other lumbar intervertebral discs were normal in morphology. Vertebral bodies were normal in height and cortical and/or trabecular signals were normal at all levels. There were no lytic or sclerotic lesions. Posterior neural arch integrity was intact. Visualized distal spinal cord was normal in caliber and signal. Conus medullaris ended at normal level. Filum terminale was normal in thickness. Cauda equina was normal in trace, morphology, and signal. There were no pathologic findings in paravertebral soft tissue.

An abnormal finding was present in the coronal view of the lumbar MRI, where a mass was noted on the lower right adnexal region of the abdomen.

The patient was referred to a gynecologist for further investigations and after an ultrasound was performed, a pelvic and abdominal contrast MRI was recommended.

Pre-contrast T2W images in axial and/or sagittal and/or coronal planes and fat-suppressed T1W-T2W images obtained in axial planes. DWI images for diffusion-weighted imaging were also obtained. *Post-contrast* images were obtained with fat suppression T1W axial, sagittal, and coronal planes.

The contrast MRI of the upper abdomen showed no remarkable findings. The liver was normal in size with smooth contours and no lesions present. Portal and hepatic veins were normal. Intrahepatic and extrahepatic bile ducts were not dilated. The gallbladder was also normal with no gallstones present. Head, body, and tail of the pancreas appeared normal. Peripancreatic fat tissue was intact. Pancreas segments and the Wirsung duct were normal. Spleen and both kidneys had normal sizes and contours with normal parenchymal signal intensity. No renal solid mass was identified before or after I.V contrast administration. A simple, non–contrast-enhanced cortical cyst was noted in the left kidney. Suprarenal glands had no identifiable lesions. Abdominal aorta and inferior vena cava were normal. No pathologically enlarged abdominal lymph nodes could be seen. No ascites or omental thickening was identified. There were no bony lesions present.

The pelvis MRI showed a morphologically normal urinary bladder and uterus. No Nabothian cyst was present at the cervix. Endometrium was regular and normal in thickness, with a normal signal of the endometrial-myometrial transition zone. A large multilobulated and septated lesion was noted in the right adnexal region, measuring 10 × 8 cm in size with internal septal formations. It showed hyperintense T2 signal intensity and hypointense T1. After administration of contrast material, it showed thick peripheral and septal contrast enhancement. The mass caused compression and moderate dilation of the right lower ureter. The anterior borders of the lesion were ill-defined from the posterior border of the uterus. There was no lesion present in the left adnexal region. Rectum wall and perirectal fat tissue were normal. No pathologic lymphadenopathy was identified in the pelvic cavity, iliac chain, or obturator areas. No bony lesions were present.

A Borderline tumor of the right ovary was suspected which required histopathologic correlation. The diagnosis was confirmed after the biopsy results of the right ovary mass.

Operation: total abdominal hysterectomy (TAH) and bilateral- salpingo- oophorectomy (BSO) since the patient was in the postmenstrual phase, also part of the omentum and appendix fatty plan have been removed after tumors muciones originate in the appendix with ovarian metastasis, but fortunately have resulted negative (Fig. 5).

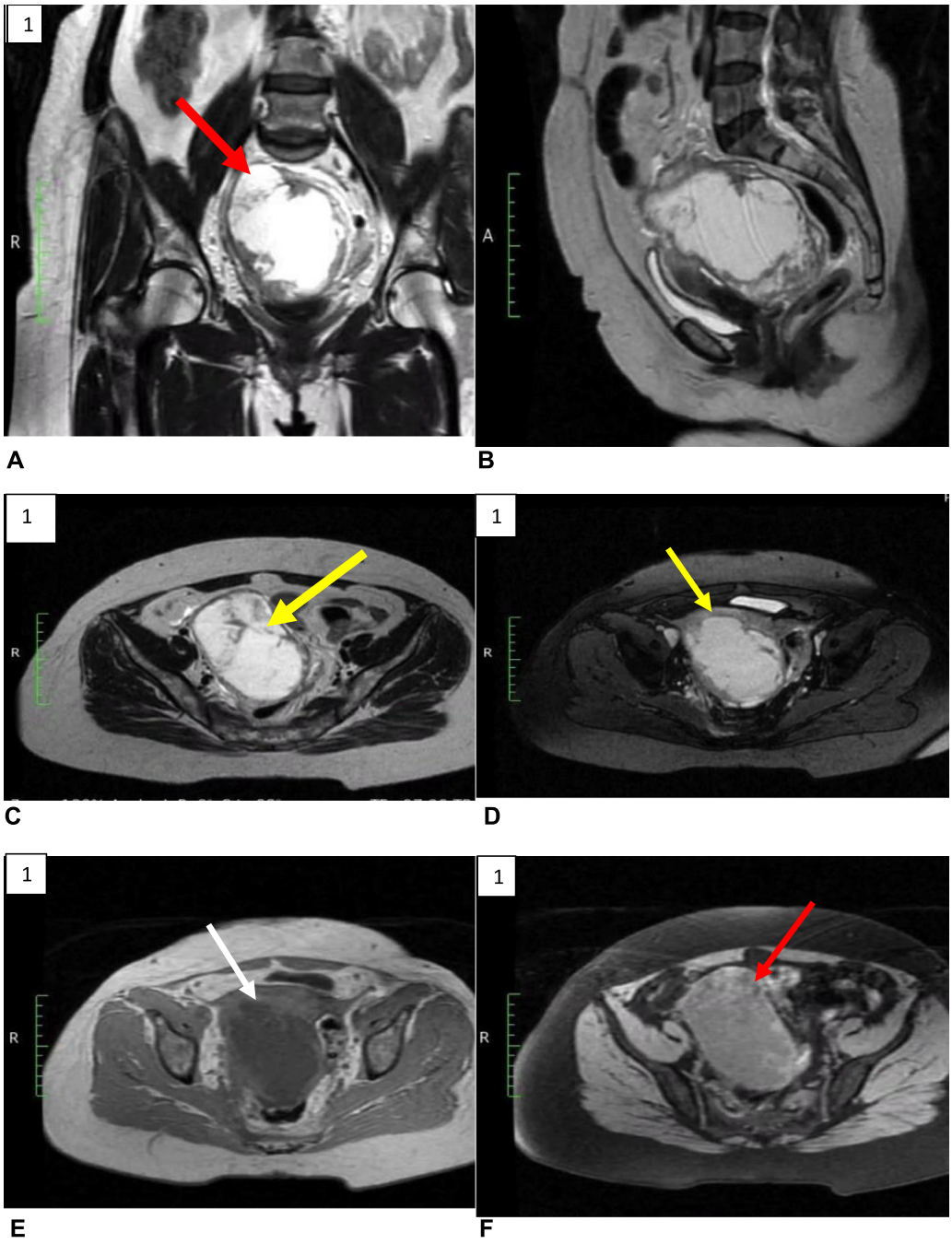

Fig. 1 – (A) T2 coronal sequence precontrast present, a large multilobulated and septated lesion is noted which is located in the right adnexal region, (red arrow) measuring 10 × 8 cm in size with internal septal formations. It shows hyperintense T2 signal intensity. (B) T2 sagital sequence precontrast present, a large multilobulated and septated lesion is noted which is located in the right adnexal region,(white arrow) measuring 10 × 8 cm in size with internal septal formations. It shows hyperintense T2 signal intensity. (C) T2 axial sequence precontrast present, a large multilobulated and septated lesion is noted which is located in the right adnexal region, (yellow arrow)measuring 10 × 8 cm with internal septal formations. It shows hyperintense T2 signal intensity. (D) Fiesta Fatsat T2 axial sequence precontrast present, a large multilobulated and septated lesion is noted which is located in the right adnexal region, (yellow arrow) measuring 10 × 8 cm in size with internal septal formations. It shows hyperintense T2 signal intensity. (E) T1 axial sequence precontrast present, a large multilobulated and septated lesion is noted which is located in the right adnexal region,(white arrow) measuring 10 × 8 cm in size with internal septal formations. It shows hypointense T2 signal intensity. (F) T1 axial Fat Sat sequence precontrast present, a large multilobulated and septated lesion is noted which is located in the right adnexal region, (red arrow)measuring 10 × 8 cm in size with internal septal formations. It shows hypointense T2 signal intensity (Color version of the figure is available online.)

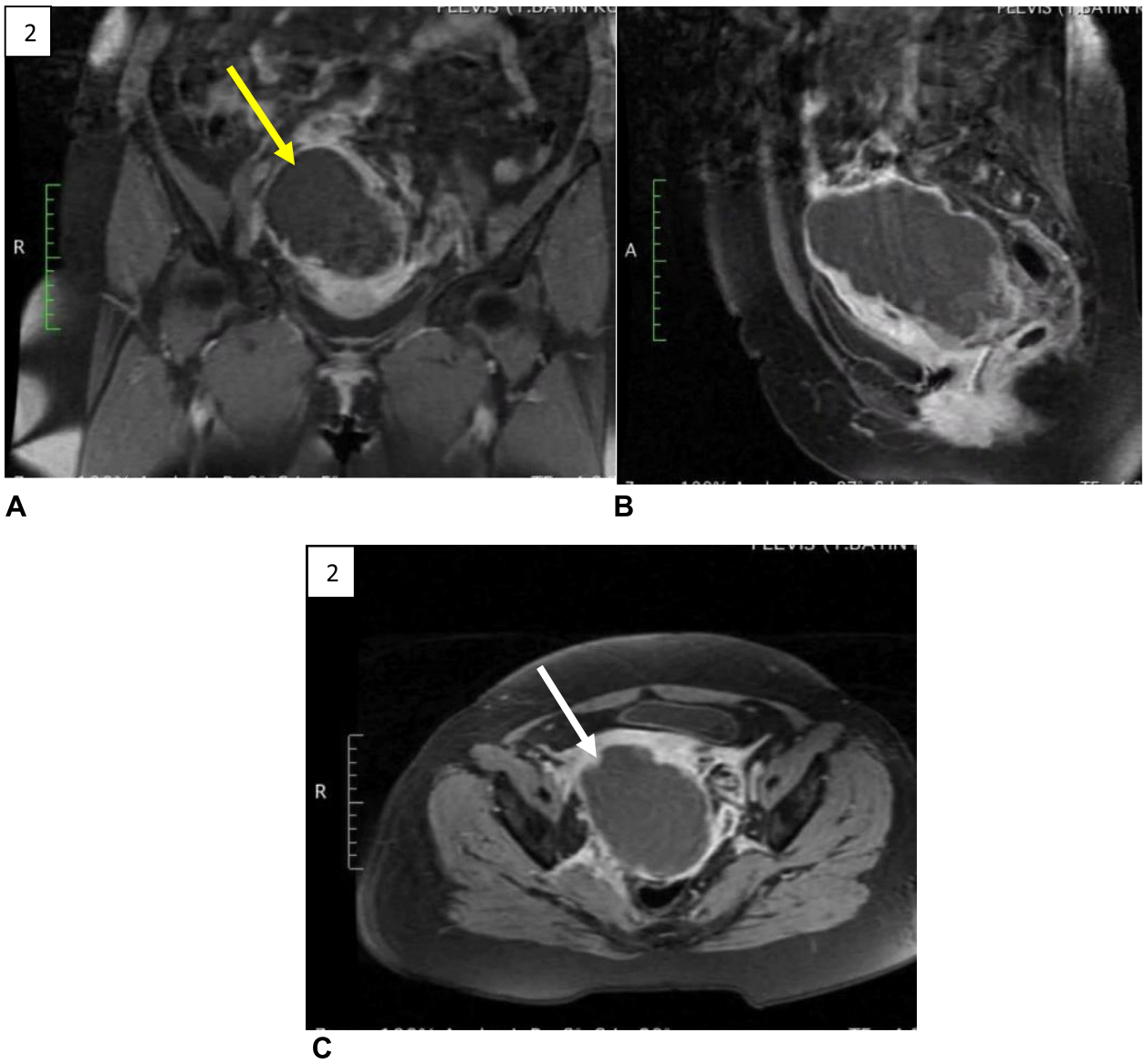

Fig. 2 – (A) T1 coronal Fat Sat sequence post-contrast presents a large multilobulated and septated lesion is noted which is located in the right adnexal region,(yellow arrow) after administration of contrast material, it shows thick peripheral and septal contrast enhancement. It causes compression of the distal ureter and moderate dilation of the right ureter. The anterior borders of the lesion are ill-defined from the posterior border of the uterus. (B) T1 sagital FatSat sequence post-contrast presents a large multilobulated and septated lesion is noted which is located in the right adnexal region, (red arrow) after administration of contrast material, it shows thick peripheral and septal contrast enhancement. It causes compression of the distal ureter and moderate dilation of the right ureter. The anterior borders of the lesion are ill- defined from the posterior border of the uterus. (C) T1 coronal Fat Sat sequence post-contrast presents a large multilobulated and septated lesion is noted which is located in the right adnexal region, (white arrow) after administration of contrast material, it shows thick peripheral and septal contrast enhancement. It causes compression of the distal ureter and moderate dilation of the right ureter. The anterior borders of the lesion are ill-defined from the posterior border of the uterus (Color version of the figure is available online.)

This case report emphasizes the high sensitivity and specificity of contrast MRI in the diagnosis of various pelvic pathologies in female patients (Fig. 1, 2, 3, 4, 5)

MRI precontrast

MRI post contrast

MRI e upper abdomen

Discussion

Borderline ovarian tumors (BOTs) represent a distinct pathologic entity within malignant epithelial ovarian tumors [1–7]. They are defined as low malignant potential tumors, primarily

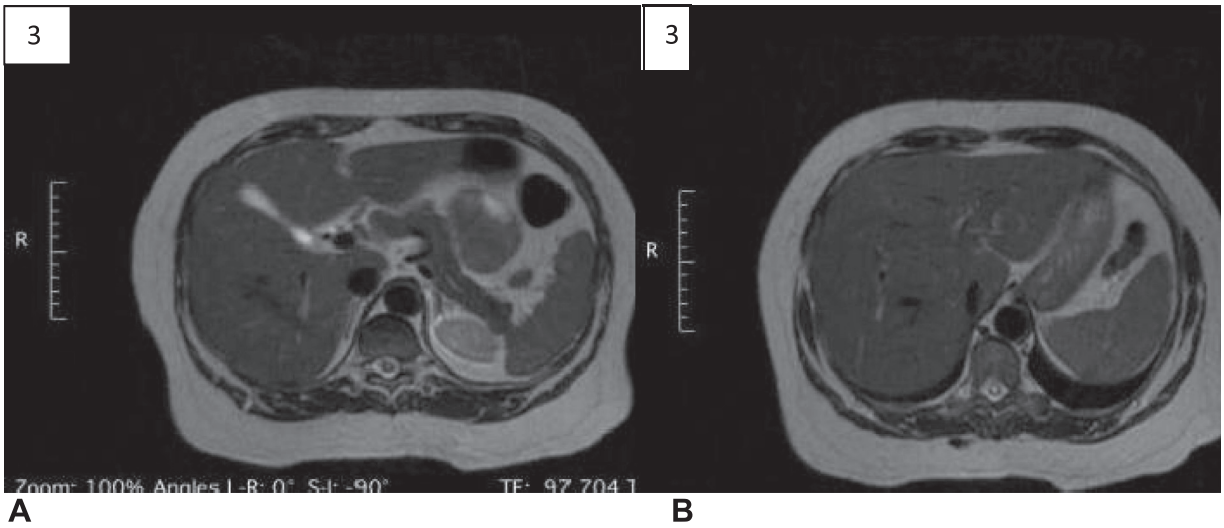

Fig. 3 – (A) T2 axial presents normal parenchymal organs without signs for focal lesions. (B) T2 axial presents normal parenchymal organs without signs for focal lesions.

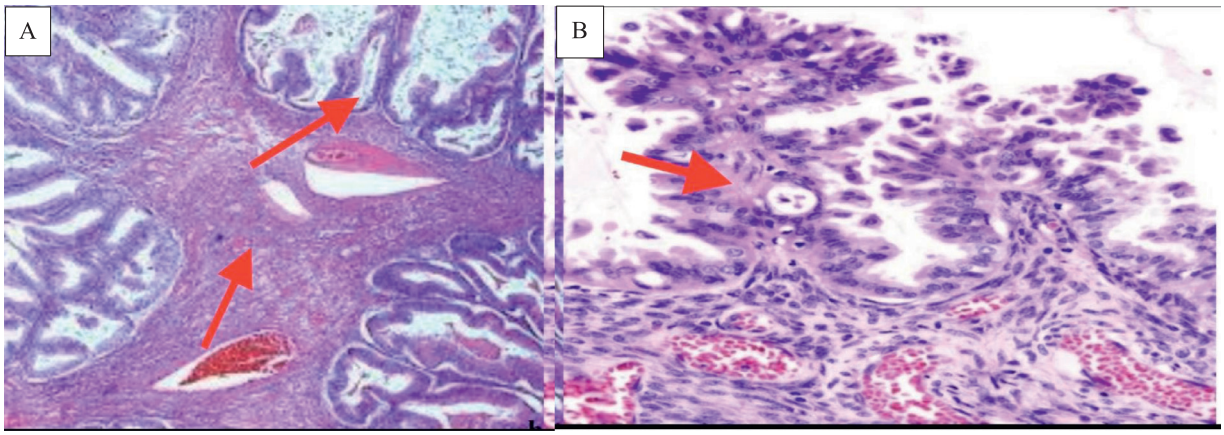

Fig. 4 – (A, B) Histologic findings resulted in Borderline atypical epithelial tumor proliferation without stromal invasion. Hematoxylin and eosin (H&E) (A,40xmagnifivation) and (B,100xmagnification).

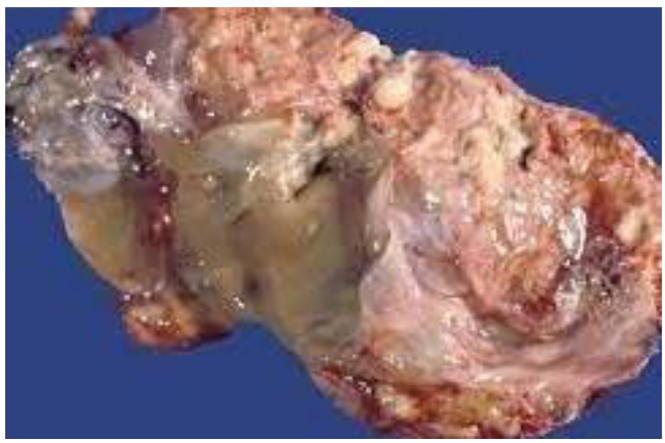

Fig. 5 – Postoperative appearance of the mass from right borderline tumor adnexa measuring 13 cm.

affecting women in childbearing years [1,2,5]. Histopathologically, they derive from the ovarian surface epithelium cells and are characterized by slight nuclear atypia, increased cellular proliferation, high mitotic rate without destructive, infiltrative ovarian stromal invasion [1,3–6]. The lack of stromal invasion serves as an important diagnostic criterion; however, BOTs have been associated with microinvasion, lymph node involvement, non–invasive peritoneal implants, and intraepithelial carcinomas [3,4].

Based on their histologic features, BOTs are classified as serous, mucinous, endometrioid, clear cell, transitional cell, mixed epithelial cell, and Brenner tumors [1–7]. Serous borderline ovarian tumors (SBOTs) account for the majority 50% of all BOTs, mucinous borderline ovarian tumors

(MBOTs) comprise 45% and the remaining histologic subtypes are less frequent [3]. Close to 80% of BOTs present as lesions limited to the ovaries (FIGO stage I) and they are associated with an excellent prognosis [1,3]. Invasion of the pelvic structures (FIGO stage II-III) and spreading outside the abdomen (FIGO stage IV) are remarkably rare [1]. Hence, long-term prognosis is excellent with a 5-year survival of 100% and a 10-year survival rate of 90%-95%, depending on the histologic subtypes [3,5]. However, recurrences associated with a worse prognosis have also been reported [3,5].

The molecular pathogenesis of BOT remains elusive, nevertheless, several genes have been implicated in the carcinogenesis. Current literature proposes a classification in type I lesions (low-grade tumors) and type II lesions (high-grade tumors), suggesting that type I tumors arise in a stepwise process from benign to borderline to malignant tumors, whereas type II tumors are aggressive and do not derive from a common preinvasive lesion [5,7]. Mutations in codon 12 and 13 in K-Ras gene, in codon 599 in BRAF gene, and ERBB2 gene have been reported in SBOTs and in the adjacent cystadenoma epithelium [5–8]. These mutations constitutively activate the RAS and/or RAF and/or MEK and/or MAPK signaling pathways, leading to increased cell proliferation [6–8]. Mutations in both BRAF and K-Ras genes are believed to participate in the transformation of benign ovarian serous tumors to serous borderline ovarian tumors (SBOTs), but only K-Ras mutations have been associated with SBOTs to low-grade serous ovarian carcinoma [6,8]. These findings suggest that mutations in K-Ras and BRAF genes precede the development of SBOTs and represent early oncogenic events [5–8]. As for the other histologic subtypes, mutations in K- Ras gene alone have been reported in borderline mucinous tumors, mutations in β-catenin gene have been found in borderline endometrioid tumors and borderline clear cell tumors, along with mutations in PTEN gene and loss of heterozygosity [5–7].

The importance of delineating the underlying molecular mechanisms of the pathogenesis of BOTs, lies in the ability of clinicians to recognize them early in their clinical course, high-risk patients for BOT recurrences and progression to malignant tumors.

Traditionally, ultrasound has been the primary diagnostic modality, however high-resolution, cross-sectional imaging studies are being increasingly incorporated in the diagnosis of BOTs [7,9,10]. Our case report is more in line with studies suggesting that MRI assists in the differential diagnosis of BOTs, by detecting several features associated with malignancy [10]. Diagnosis is ultimately established through histopathologic examination, nevertheless MRI aids in distinguishing between benign and malignant lesions, as well as pre-operative planning, surgical, and management strategies [10].

Conclusion

Borderline ovarian tumors predominately affect patients at the reproductive age, but there are cases that might occur at a later age. The diagnosis of Borderline Ovarian tumor is difficult to be made due to the insignificant clinical presentation. Our patient, a 56-year-old female, was incidentally diagnosed with Borderline ovarian tumor. These lesions have a more favorable outcome than the other ovarian cancers, but there have been reported complicated cases. Furthermore, the correct diagnosis helps not only the prognosis of the patient, but also decides how conservative the treatment will be based on it. The purpose of this case report is to assess and emphasize the important role in establishing the final diagnosis and treatment planning in patients with various pelvic pathologies.

Patient consent

Written informed consent has been obtained from the patient to publish this paper.

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