◁妇产影像学▷

# 卵巢浆液性乳头状囊腺瘤的 MRI 表现与病理对照

马凤华，田晓梅，张国福
（复旦大学附属妇产科医院放射科，上海 200011）

**[摘要]** **目的**：分析卵巢浆液性乳头状囊腺瘤（SPC）的 MRI 表现，提高对该病的认识。**方法**：对 30 例共 31 个 SPC 行术前 MRI 扫描，观察肿瘤的部位、形态、大小、囊液信号、囊壁及分隔厚度、结节或乳头状突起、实性区域和增强表现，结果与病理对照。**结果**：30 例单侧 29 例，双侧 1 例，所有病例均为囊性为主肿块，肿瘤边界清，最大径 2.2~13.7 cm，平均（5.6±2.3）cm。29 例患者采用腹腔镜下囊肿剥除或附件切除，1 例患者经腹囊肿剥除。术前 MR 约 51.6%诊断为良性肿瘤，诊断交界性或恶性肿瘤约占 48.4%。单房囊性肿块 20 个（64.5%），7 个囊液呈 $T_1$WI 稍高、$T_2$WI 高信号；13 个囊液呈 $T_1$WI 低、$T_2$WI 高的水样信号；囊壁薄而均匀，囊壁单个或多个乳头状突起，大小约 0.4~3.4 cm，均呈 $T_2$WI 低信号；多房囊性肿块 10 个（32.3%），单侧 9 例，双侧 1 例，3 个囊液呈 $T_1$WI 稍高、$T_2$WI 高信号；7 个囊液呈 $T_1$WI 低、$T_2$WI 高的水样信号。囊壁薄而均匀，1 个囊壁未见乳头状突起，9 个囊壁见单个或多个乳头状突起，大小约 0.9~3.1 cm，6 个呈 $T_2$WI 低信号，3 个呈 $T_2$WI 稍高信号；实性肿瘤 1 个（3.2%），单侧、表面乳头状表现，呈 $T_1$WI 低、$T_2$WI 稍高信号，增强后明显强化。**结论**：SPC 典型表现为单房或多房囊性肿块，伴囊壁单个或多个乳头状突起，$T_2$WI 低信号并轻度强化为其特征性表现。

**[关键词]** 囊腺瘤，乳头状；卵巢肿瘤；磁共振成像
**[中图分类号]** R737.31；R445.2 **[文献标识码]** A **[文章编号]** 1008-1062（2025）02-0117-04
DOI:10.12117/jccmi.2025.02.010

**Ovarian serous papillary cystadenoma: MRI findings and correlation with pathology**

*MA Feng-hua, TIAN Xiao-mei, ZHANG Guo-fu*
*(Department of Radiology, Obstetrics & Gynecology Hospital, Fudan University, Shanghai 200011, China)*

**Abstract: Objective:** To investigate MRI findings of ovarian serous papillary cystadenoma (SPC) to improve the diagnosis of SPC. **Materials and Methods:** Thirty patients with 31 SPC preoperatively underwent MRI. Images were evaluated and correlated with pathology for the location, shape, size, loculation, signal intensity, thickness of the wall and septation, nodules or vegetations and solid area. **Results:** In 30 cases, 29 were unilateral and 1 was bilateral. All cases were cystic masses with clear boundaries, and with average diameter of (5.6±2.3) cm(maximum diameter: 2.2~13.7 cm). Twenty-nine patients underwent laparoscopic or adnexal excision, and one patient underwent abdominal excision. About 51.6% of the patients were diagnosed with benign tumors and 48.4% were diagnosed with borderline or malignant tumors. There were 20 single-locular cystic tumors, and the cyst fluid of 7 cystic masses showed slightly high signal on $T_1$WI and high signal on $T_2$WI. The cyst fluid of 13 cystic masses showed the same signal intensity as water with low signal on $T_1$WI and high signal on $T_2$WI. The cyst wall was thin and smooth with single or multiple papillary projections(about 0.4~3.4 cm in size) of low $T_2$WI signal. There were 10 multilocular cystic masses, 9 unilateral cases and 1 bilateral case. The cyst fluid of 3 cystic masses showed slightly high signal on $T_1$WI and high signal on $T_2$WI. The cyst fluid of 7 cystic masses showed the same signal intensity as water with low high signal on $T_1$WI and high signal on $T_2$WI. The cyst walls were thin and smooth. No papillary projection was found in 1 cyst wall, and single or multiple papillary projections were found in 9 cyst walls, with the size of 0.9~3.1 cm. On $T_2$WI, papillary projections showed low signals in 6 cases, slightly high signals in 3 cases. There was one solid mass with unilateral, superficial papillary appearance, low signal on $T_1$WI, slightly high signal on $T_2$WI, and obvious enhancement after enhancement. **Conclusion:** The characteristic MRI findings are a unilocular or multilocular cystic mass with single or multiple papillary projections. The papillary projections exhibit low signals on $T_2$WI and slight enhancement.

**Key words:** Cystadenoma, Papillary; Ovarian Neoplasms; Magnetic Resonance Imaging

卵巢浆液性肿瘤为最常见的卵巢上皮性肿瘤，约占所有卵巢肿瘤的 53%，其中 31%为良性，5%为交界性，17%为恶性[1]。大体病理上，浆液性囊腺瘤又分为单房囊性、多房囊性，囊性伴乳头突起，囊性伴实性组织（囊腺纤维瘤常表现为此种形式）、囊性肿块伴实性组织及乳头突起，浆液状表面乳头状腺纤

**[收稿日期]** 2024-11-29
**[作者简介]** 马凤华（1978-），女，山东莘县人，副主任医师。E-mail：mafenghua9602@163.com
**[通信作者]** 张国福，复旦大学附属妇产科医院放射科，200011。E-mail：zhangguofu1452@fckyy.org.cn

维瘤[2]。浆液性乳头状囊腺瘤(Serous papillary cystadenoma,SPC)因其囊壁外生或内生乳头结构,术前易误诊为交界性肿瘤。尽管所有卵巢包含乳头的肿块需要进行手术切除,但术前评估肿瘤的良性、交界性或恶性还是非常重要，有助于妇科医生决定手术范围及类型,尤其是保留生育能力的年轻患者[3]。磁共振成像具有更好的软组织对比度，在鉴别卵巢良性和恶性肿瘤中具有重要价值[4]。笔者对 30 例共 31 个卵巢 SPC 的磁共振图像进行分析，并与病理对照,旨在加深 SPC 的认识,提高 MRI 的诊断准确性,避免过度治疗。

## 1　材料与方法

### 1.1　病例资料

收集 2012 年 3 月—2024 年 3 月 30 例 SPC 患者的 MRI 资料,年龄 18~70 岁,平均(33.8±3.6)岁。30 例患者共 31 个病灶,1 例为双侧，均经手术和病理证实。研究通过医院伦理审查和患者知情同意。

### 1.2　扫描方法

采用 1.5T (Avanto,Siemens,Germany) 或 3.0T (Ingenia,Philips)MR 超导扫描仪,相控阵体线圈。患者仰卧，先行常规定位扫描，采用快速成像序列,1.5T 扫描序列:横断位、矢状位及冠状位 $T_2$ 单采集单次激发自旋回波序列(HASTE)、横断位 $T_1$ 真实稳态进动快速成像(true FISP)序列;DWI 采用单次激发平面回波成像(EPI)序列，对附件区肿块范围内进行轴位扫描,b 值为 0 s/mm² 和 1 000 s/mm²，TR 3 100 ms,TE 81 ms,激励次数(NEX)4,视野(FOV) 270 mm×320 mm,矩阵 292×320,层厚 5 mm,层距 1.5 mm,扫描时间为 74.4 s。3.0T 扫描序列:横断位、矢状位及冠状位单次激发半傅立叶快速自旋回波技术 SSh-TSE、横断位 $T_1$ 快速场回波 (FFE) 序列。FOV 350 mm×400 mm;矩阵 256×256;层厚 4.0~5.0 mm,层距 1.2 mm。DWI 采用频率衰减反转恢复序列(SPAIR)序列,扫描参数:b 值为 0 s/mm² 和 1 000 s/mm²,TR 3 000 ms,TE 64 ms,FOV 270 mm×320 mm,矩阵292×320,层厚 5~6 mm,层距 1.5 mm,扫描时间为 90 s。

### 1.3　图像分析

由两位从事腹部影像的医师分析 MRI 图像,观察肿瘤以下特征:①单侧或双侧;②大小;③乳头结构:囊内或囊外乳头大小,信号及强化特征;④信号特征、囊壁和分隔厚度;⑤增强表现。测量数值取两人测量的平均值,观察不一致时讨论达成一致。

## 2　结果

30 例患者共 31 个肿瘤,单侧 29 例,双侧 1 例。所有病例均为囊性为主肿块，肿瘤边界清，最大径 2.2~13.7 cm,平均(5.6±2.3) cm。29 例患者采用腹腔镜下囊肿剥除或附件切除,1 例患者经腹囊肿剥除。术前 MR 约 51.6%诊断为良性肿瘤，诊断交界性或恶性肿瘤约占 48.4%。

①单房囊性肿块 20 个(64.5%)。均单侧发生,呈椭圆形或类圆形。7 个囊液呈 $T_1$WI 稍高、$T_2$WI 高信号;13 个囊液呈 $T_1$WI 低、$T_2$WI 高的水样信号。囊壁薄而均匀,囊内壁见单个或多个乳头状突起,大小约 0.4~3.4 cm,呈 $T_2$WI 低信号(图 1)。②多房囊性肿块 10 个(32.3%)。单侧发生 9 例,双侧 1 例,呈类圆形或椭圆形多房囊性肿块(图 2)。3 个囊液呈 $T_1$WI 稍高、$T_2$WI 高信号;7 个囊液呈 $T_1$WI 低、$T_2$WI 高的水样信号。囊壁薄而均匀,1 个囊壁未见乳头状突起,9 个囊内壁见单个或多个乳头状突起 (图 3),大小约 0.9~3.1 cm,6 个呈 $T_2$WI 低信号,3 个呈 $T_2$WI 稍高信号。增强后囊壁及乳头状突起轻度、中度或明显强化。③实性肿块 1 个(3.2%),单侧、表面乳头状表现。肿瘤呈 $T_1$WI 低、$T_2$WI 稍高信号,增强后明显

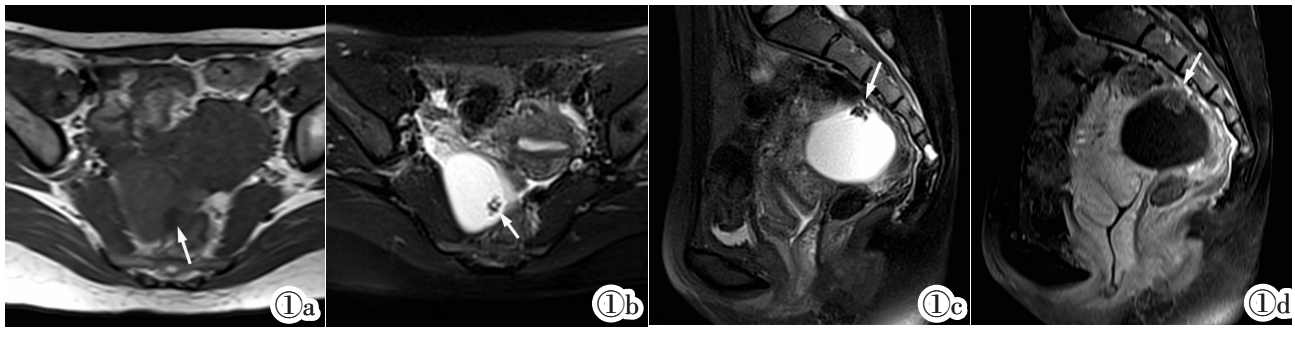


**图 1**　28 岁,右侧卵巢 SPC,体检发现右侧卵巢肿块 3 月余,MR 提示交界性肿瘤不除外。横断面 $T_1$WI(图 1a)右侧卵巢单房囊性肿块,呈等略高信号,壁结节呈低信号(箭),$T_2$WI(图 1b,1c)囊液呈高信号,壁结节呈低信号(箭),增强后矢状位 $T_1$WI 脂肪抑制(图 1d)壁结节轻度强化。

**Figure 1.**　A 28-year-old female with SPC in the right ovary. Physical examination revealed a mass of the right ovary 3 months ago, and MR indicated borderline ovarian tumor. Axial $T_1$WI(Figure 1a) shows a right ovarian cystic mass with a papillary projection with low signal. The papillary projection shows low signal on axial and sagittal $T_2$WI (arrow, Figure 1b, 1c). Axial contrast-enhanced $T_1$W fat-suppressed MR image shows slight enhancement of the papillary projections(Figure 1d).

强化(图 4),大体病理为致密乳头状结构。

SPC 31 个肿块,除 1 个无乳头,1 个实性肿块外,29 个均见大小不等的乳头状突起,其中<1 cm 者 18 个(62.1%),1~<2 cm 者 10 个(34.5%),≥3 cm 者

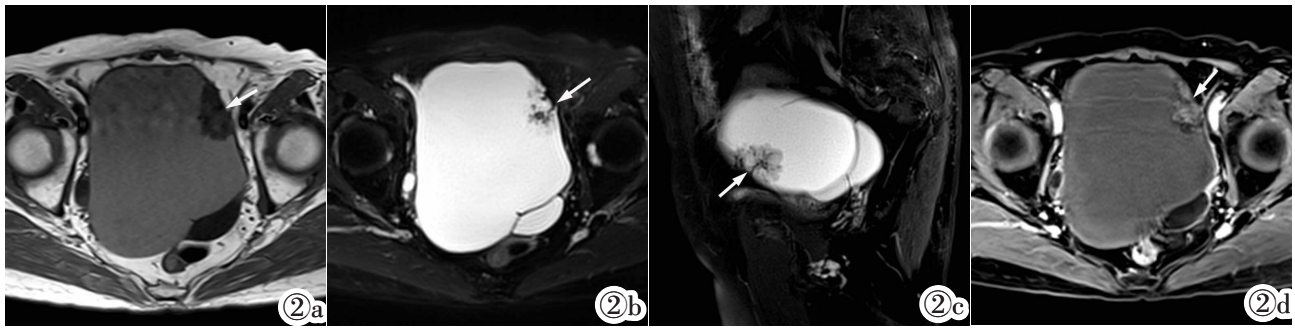


**图 2** 女,74 岁,腹胀 2 月,检查发现附件多房囊性肿块,肿瘤标志物无殊。横断位 $T_1$WI(图 2a)显示肿瘤多房,囊液信号稍高、稍低不等,局部可见低信号乳头状突起(箭);横断位及矢状位 $T_2$WI(图 2b,2c)囊液呈高信号,乳头状突起呈低信号(箭),内部可见低信号纤维分支样结构;增强后 $T_1$WI 脂肪抑制乳头状突起中度强化(箭,图 2d)。病理:左侧卵巢 SPC。

**Figure 2.** A SPC in a 74-year-old woman. Ultrasound revealed a multilocular cystic mass in the adnexa, and tumor markers were normal. Axial $T_1$WI(Fiugre 2a) shows a large multilocular cystic mass, with cyst fluid showing signals varying from slightly higher to slightly lower. The papillary projection shows low signal on axial $T_2$WI (arrow, Fiugre 2b) and has a papillary architecture and internal branching pattern on sagittal $T_2$WI (arrow, Figure 2c). Axial contrast-enhanced $T_1$W fat-suppressed MR image shows moderate enhancement of the papillary projection(Figure 2d).

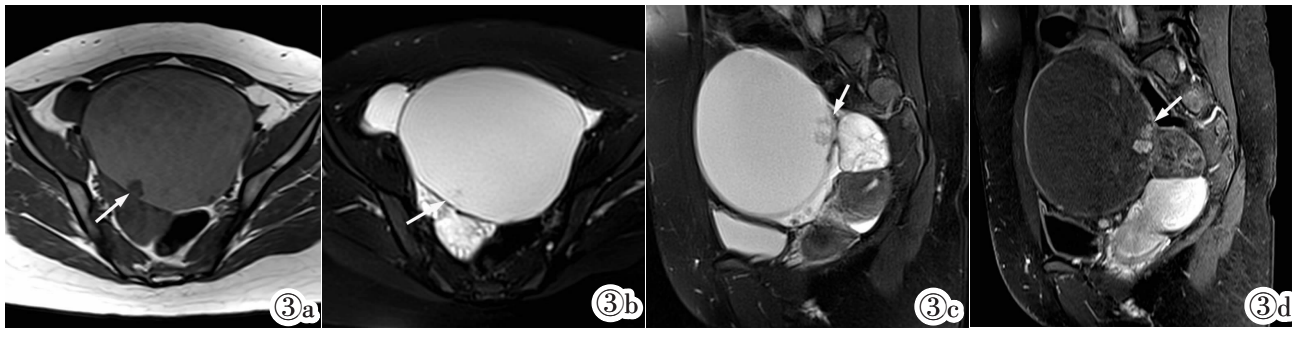


**图 3** 女,22 岁,下腹痛 6 天,加重 2 h。横断位 $T_1$WI(图 3a)显示右侧卵巢表面双房囊性肿块,囊液呈稍高信号,局部可见低信号乳头状突起(箭);横断位及矢状位 $T_2$WI(图 3b,3c)囊液呈高信号,乳头状突起呈稍高信号(箭);增强后矢状位 $T_1$WI 脂肪抑制多发壁结节明显强化(箭,图 3d)。病理:左侧卵巢 SPC。

**Figure 3.** A SPC in a 22-year-old woman with lower abdominal pain for 6 days, aggravated for 2 hours. Axial $T_1$WI (Figure 3a) shows a bilocular cystic mass on the surface of the right ovary, with a slightly higher signal in the cystic fluid and a localized low-signal papillary projection(arrow). On axial and sagittal $T_2$WI(Figure 3b, 3c), the cyst fluid shows high signal, and the papillary projections show slightly high signal(arrow). Sagittal contrast-enhanced $T_1$W fat-suppressed MR image shows significant enhancement of the multiple papillary projections(Figure 3d).

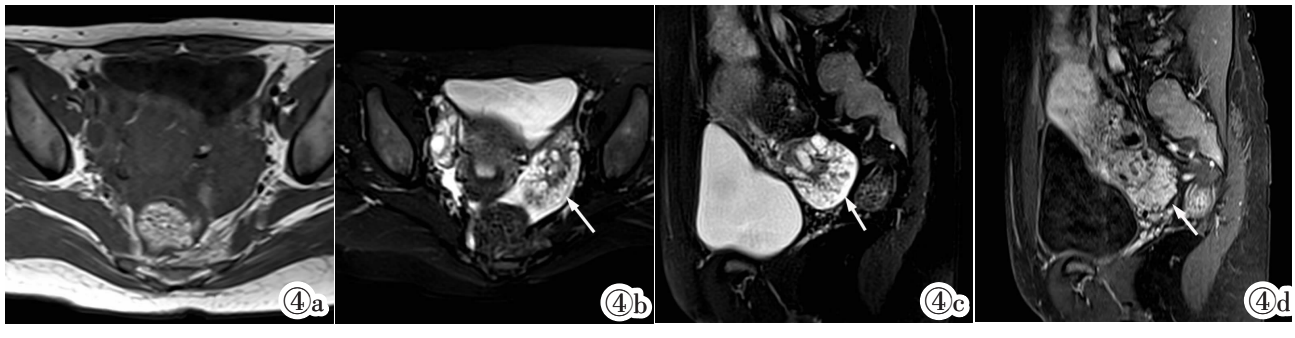


**图 4** 22 岁,检查发现盆腔肿块 4 月余。横断位 $T_1$WI(图 4a)显示左侧卵巢增大,呈低信号;横断位及矢状位 $T_2$WI(图 4b,4c)左侧卵巢(箭头)表面可见外生实性乳头结构,呈不均低信号,表面可见高信号(箭);增强后矢状位 $T_1$WI 脂肪抑制实性乳头结构明显(箭,图 4d)。病理:左侧卵巢 SPC,局灶区上皮增生(<10%区域)。

**Figure 4.** SPC in a 22-year-old patient with a solid ovarian mass found for 4 months. Axial $T_1$WI(Figure 4a) shows a low-signal solid mass of the left ovary, which has an exophytic growth from the ovaries, and a papillary architecture and internal branching pattern with heterogeneous low-signal intensity on $T_2$WI (Figure 4b, 4c, arrow), mimicking serous BOT. Sagittal contrast-enhanced $T_1$W fat-suppressed MR image(Figure 4d) shows significant enhancement of the solid mass.

1 个(3.4%)。以子宫肌层强化为参照,1 例实性肿块显著强化，余 29 例乳头状突起轻度强化 17 个(58.6%)，中度强化 6 个 (20.7%)，明显强化 6 个(20.7%)。

## 3　讨论

良性浆液性肿瘤由不同比例的非分层的立方体或柱状细胞 (类似于管状分泌细胞或纤毛细胞)组成,病理又分为浆液囊腺瘤、浆液腺(囊腺)纤维瘤及表面乳头状瘤 (Serous papillary cystadenoma,SPC)三种亚型。大体病理上,又分为单房囊性、多房囊性,囊性伴乳头突起,囊性伴实性组织[2]。浆液性囊腺瘤以囊性为主,内壁常光滑。腺纤维瘤由纤维间质基础上的腺体及囊肿组成；浆液性囊腺纤维瘤在突出的纤维瘤间质内嵌有囊肿和宽而单一的乳头状瘤,以纤维间质增生为主的肿瘤称为腺纤维瘤或囊腺纤维瘤。SPC 则以单纯性囊壁内小乳头状突起为特征。如果肿瘤总体积的 10%以内显示囊肿内上皮增生,则该肿瘤被指定为浆液性囊腺瘤伴局灶性上皮增生,否则定性为浆液性交界性肿瘤[5]。虽然 SPC 可见于围绝经期妇女,但在育龄妇女中最为常见[6]。肿瘤通常<10 cm，双侧病例约占 12%~23%。肿瘤标志物 CA125 和 CA19-9 通常正常。

本组 30 例患者共 31 个肿瘤，单侧发生 29 例(96.7%)。1 个实性为主肿块,余 30 个肿块均为囊性为主,肿瘤边界清,最大径 2.2~13.7 cm,平均(5.6±2.3) cm。29 例患者采用腹腔镜下囊肿剥除或附件切除,1 例患者经腹囊肿切除。术前 MR 约 51.6%诊断为良性肿瘤,诊断交界性或恶性肿瘤约占 48.4%。乳头状突起在病理学上被定义为折叠增生的肿瘤上皮生长在中央纤维血管间质核心上,而不是实体组织。乳头状突起是卵巢上皮性肿瘤的独特病理特征,可见于良性、交界性或恶性肿瘤[1-4,7]。乳头状突起主要位于囊肿内壁(内生性乳头状突起),较少位于囊壁分隔或肿块外壁(外生性乳头状突起)。

我们回顾了 SPC 磁共振图像,SPC 可分三种表现:①单房囊性肿块(64.5%);囊壁薄而均匀,囊壁单个或多个乳头状突起，大小约 0.4~3.4 cm，均呈 $T_2$WI 低信号，这与卵巢交界性浆液性肿瘤(SBT) $T_2$WI 稍高或高信号不同；②多房囊性肿瘤 10 个(32.3%),3 个囊液呈 $T_1$WI 稍高、$T_2$WI 高信号;7 个囊液呈 $T_1$WI 低、$T_2$WI 高的水样信号。囊壁薄而均匀,9 个囊壁见单个或多个乳头状突起,大小约 0.9~3.1 cm,6 个呈 $T_2$WI 低信号,3 个呈 $T_2$WI 稍信号;③实性肿瘤 1 个(3.2%),单侧、表面乳头状表现,呈 $T_1$WI 低、$T_2$WI 稍高信号,增强后明显强化,术前误诊为 SBT。虽然良性与恶性或交界性的明确诊断只能在显微镜下做出，但这些乳头状突起的宏观表现可以高度提示诊断[3-4]。实性成分内含 $T_2$WI 低信号、弱强化的纤维分支结构是 SBT 特征性表现[8-10]。与 SBT 的较大纤维分支样乳头结构的明显强化不同,SPC 的乳头状突起通常更小,31 个肿块,除 1 个无乳头,1 个实性肿块外,29 个均可大小不等的乳头状突起,其中<1 cm 者 18 个 (62.1%),1~<2 cm 者 10 个(34.5%),>3 cm 者 1 个(3.4%)。SBT 的乳头结构多数显著强化,而 SPC 的乳头状突起则以轻度强化为主,本组 29 个乳头状突起轻度强化 17 个(58.6%),中度强化 6 个(20.7%),明显强化 6 个(20.7%)。

总之,SPC 是一种少见的卵巢良性浆液性肿瘤,多见于育龄期女性。通常无临床症状,多数体检偶然发现,肿瘤标志物正常。SPC 典型 MRI 特征为单房或多房囊性肿块伴较小乳头状突起 (<1 cm),$T_2$WI 典型呈低信号,增强后轻度强化。少数囊性肿块伴较大乳头状突起并明显强化时，术前易误诊为卵巢交界性肿瘤。

**[参考文献]**


[1]Cheung AN, Ellenson LK, Gillks CB, et al. Tumors of ovary. In: WHO Classification of Female Genital Tumors [M]. 5th ed. Lyon, France: IARC, 2020: 31-167.

[2]Seidman JD, Russel P, Kurman RJ. Surface epithelial tumors of the ovary. In: Kurman RJ (ed) Blaustein's pathology of the female genital tract[M]. New-York: Springer, 2004: 791-904.

[3]Hassen K, Ghossain MA, Rousset P, et al. Characterization of papillary projections in benign versus borderline and malignant ovarian masses on conventional and color Doppler ultrasound[J]. AJR, 2011, 196(6): 1444-1449.

[4]Taylor EC, Irshaid L, Mathur M. Multimodality imaging approach to ovarian neoplasms with pathologic correlation[J]. Radiographics, 2021, 41(1): 289-315.

[5]Folkins AK, Longacre TA. Low-grade serous neoplasia of the female genital tract[J]. Surg Pathol Clin, 2019, 12(2): 481-513.

[6]Taylor EC, Irshaid L, Mathur M. Multimodality imaging approach to ovarian neoplasms with pathologic correlation[J]. Radiographics, 2021, 41(1): 289-315.

[7]Park SB, Lee JB. MRI features of ovarian cystic lesions [J]. J Magn Reson Imaging, 2014, 40(3): 503-515.

[8]Zhao SH, Qiang JW, Zhang GF, et al. MRI appearances of ovarian serous borderline tumor: pathological correlation [J]. J Magn Reson Imaging, 2014, 40(1): 151-156.

[9]Tanaka YO, Okada S, Satoh T, et al. Ovarian serous surface papillary borderline tumors form sea anemone-like masses [J]. J Magn Reson Imaging, 2011, 33(3): 633-640.

[10]Capozzi VA, Scarpelli E, Monfardini L, et al. Do exophytic and endophytic patterns in borderline ovarian tumors have different prognostic implications? A large multicentric experience [J]. J Clin Med, 2023, 12(10): 3544.