Int J Clin Exp Med 2018;11(5):5227-5231
www.ijcem.com /ISSN:1940-5901/IJCEM0061235

*Case Report*

# Co-existing mature cystic teratoma and borderline ovarian mucinous cystadenoma: a report of three cases

Qi Shen[1], Jinyi Tong[2], Jingjing Xiang[3], Lei Lai[4], Hongkai Shang[2,5]

*[1]Department of Gynaecology and Obstetrics, Meternal and Child Care Service Centre, Changzhou 213003, Jiangsu Province, China; Departments of [2]Gynecology, [3]Pathology, [4]Ultrasound, Hangzhou First People's Hospital, Hangzhou 310006, Zhejiang Province, China; [5]Nanjing Medical University, Jiangsu Province, China*

Received July 11, 2017; Accepted February 6, 2018; Epub May 15, 2018; Published May 30, 2018

**Abstract:** Mature cystic teratoma (MCT) is the most frequent germ cell tumor of ovary, but the co-existence of borderline mucinous cystadenoma (BMC) with MCT is rarely reported. In this study, we presented three rare cases of BMC co-existed MCT in the early stage. Along with the collection of basic information and symptoms of patients, transvaginal ultrasonography and pathohistology were used to confirm the tumor type and construction. Meanwhile, tumor markers: Ca199, Ca125, Ca242 and carcinoembryonicantigen (CEA) in serum were detected. For case 1, a MCT with BMC was revealed in the right ovarian and a typical MCT was depicted in the left. Levels of Ca199 and 242 were significantly upregulated, but obviously returned to normal levels after surgery for 2 months. For case 2, a MCT with BMC was also detected in the right ovarian, but the Ca199 and Ca125 levels always stayed at the normal level both before and after surgery. For case 3, ultrasound examination identified a non-homogeneous mass with multiple separations at a site of low blood flow resistance, and histological analysis also observed a co-existed BMC with MCT. But the levels of Ca125, Ca242, and CEA were only slightly higher than normal after surgery, while Ca199 level was always under the positive criteria. Surgery was adopted to do the treatment and all the postoperative courses were uneventful. Taken together, Ca199 may be a promising biomarker to distinct borderline mucinous tumor co-existed with MCT from MCT.

**Keywords:** Borderline mucinous cystadenoma, intestinal type, mature cystic teratomas, Ca199

## Introduction

Mature cystic teratoma (MCT) is the most prevalent neoplasm of the ovary [1]. However, the co-existence of mucinous cystadenoma with MCT has been reported in only several cases (**Table 1**) [2-11]. Herein, we present three cases of co-existing mature ovarian teratomas and intestinal borderline mucinous cystadenoma (BMC). Furthermore, we present data from experiments with several tumor biomarkers and report novel diagnostic insights regarding co-existing intestinal BMC with MCT.

*Case report*

This study was approved by the ethical committee of Hangzhou First People's Hospital.

*Case 1*

A 33-year-old woman ($G_0P_0$) visited our gynaecological clinic and presented with unusual expression levels of the tumor markers Ca199 (893 U/ml) and Ca242 (> 150 U/ml). Transvaginal ultrasonography revealed an obvious 39 × 29 × 30-mm-sized mass with fat-fluid in a right ovarian cyst and another mass measuring 26 × 21 × 18 mm in a left ovarian cyst (**Figure 1A** and **1B**). Bilateral laparoscopic oophorocystectomy was performed, and patho-histological detection analyses of tumor tissues showed typical MCT in the left cyst (**Figure 1C**) and co-existence of MCT with intestinal type of BMC in the right cyst (**Figure 1D**). Following quickly postoperative recovery, serum Ca199 and Ca242 expression levels remarkably decreased to 547 and 141 U/ml on the postoperative day 6 and returned to normal levels after 2 months later.

*Case 2*

A 40-year-old woman ($G_1P_1$) underwent left adnexectomy and right oophorocystectomy for

**Table 1.** Previous studies reported on the co-existence of mature cystic teratoma and mucinous cystadenoma

| Published year | Authors | Title |
|---|---|---|
| 2003 | Tang P, et al. | Mature Cystic Teratoma of the ovary associated with Complete Colonic Wall and Mucinous Cystadenoma |
| 2004 | Moid FY, Jones RV | Granulosa cell tumor and mucinous cystadenoma arising in a mature cystic teratoma of the ovary: a unique case report and review of literature |
| 2004 | Oliveira FG, et al. | Evidence of parthenogenetic origin of ovarian teratoma: Case report |
| 2006 | Chatzipantelis P, et al. | Ovarian neoplasm composed of an insular carcinoid tumor and a borderline mucinous cystadenoma arising in a mature cystic teratoma: a case report |
| 2006 | Stewart CJ, et al. | Ovarian mucinous tumor arising in mature cystic teratoma and associated with pseudomyxoma peritonei: report of two cases and comparison with ovarian involvement by low-grade appendiceal mucinous tumor |
| 2007 | Russell Vang, et al. | Ovarian Mucinous Tumors Associated with Mature Cystic Teratomas: Morphologic and Immunohistochemical Analysis Identifies a Subset of Potential Teratomatous Origin That Shared features of Low Gastriointestinal Tract Mucinous tumors More Commonly Encounted as Secondary Tumors in the Ovary. |
| 2008 | Mckenney JK, et al. | Ovarian Mature Teratomas With Mucinous Epithelial Neoplasms: Morphologic Heterogeneity and Association With Pseudomyxoma Peritonei |
| 2008 | Park JH, et al. | An ovarian mucinous cystadenocarcinoma arising from mature cystic teratoma with para-aortic lymph node metastasis: a case report |
| 2014 | Fujii K, et al. | Ovarian mucninous tumors arising from mature cystic teratomas-a molecular genetic approach for understanding the cellular origin |
| 2016 | Roy et al. | Mature cystic teratoma with co-existent mucinous cystadenocarcinoma in the same ovary-A diagnostic dilemma |

bilateral cystic ovarian teratomas 14 years ago. Twelve years ago, a slow growing neoplasm recurrence was identified in her right adnexa; transvaginal ultrasonography revealed the presence of a cystic and heterogeneous mass measuring 13.1 × 7.5 × 10.9 cm with internal separations in the right adnexa (**Figure 2A**). Serum tumor markers Ca199 (15 U/ml) and Ca125 (10 U/ml) remains under the cut-off criteria. The mass was completely removed by laparoscopy and MCT with BMC of the intestinal type was identified using paraffin-section histology (**Figure 2B**). After 2 months, physical re-examination revealed no abnormal conditions, and serum levels of Ca199 (12 U/ml) and Ca125 (9 U/ml) remained within normal ranges.

*Case 3*

A 70-year-old ($G_4P_4$) postmenopausal woman complained of sustained lower abdominal pain and painful urination for 2 weeks associated with 5 kg weight loss. Transabdominal and transvaginal ultrasound examinations revealed a 22.4 × 10.5 × 17.6-cm-sized non-homogeneous mass with multiple separations at a site of low blood flow resistance (**Figure 3A**). Moreover, computed tomography revealed a cystic solid mass and pelvic effusion simultaneously (**Figure 3B**). Her serum levels of Ca125 (56 U/ml), Ca242 (21.6 U/ml) and CEA (6.7 U/ml) were slightly higher than the normal level, whereas those of Ca199 (22.2 U/ml) were within normal levels. BMC skin appendage and hair, cartilage, gland cell, and adipose tissue were confirmed via frozen-section histological analysis (**Figure 3C** and **3D**), and extensive abdominal hysterectomy, bilateral adnexectomy, greater omentum resection, and pelvic and abdominal aorta lymph node dissections were performed. Concurrently, another massive mass with regular division was identified with profuse yellow-grey jelly-like matter effusing from its crevasse. Finally, MCT in the left ovary was classified into two types: MCT with cutaneous appendages cling to cyst wall and BMC of the intestinal type. Repeated physical examinations and ultrasonography were conducted after 3 months; and no recurrence was observed.

## Discussion

MCTs are the common ovarian neoplasm in children and young adults, but can occur at any age. Mostly, MCTs have large sizes with average size of 18~22 cm, and presented with multi-

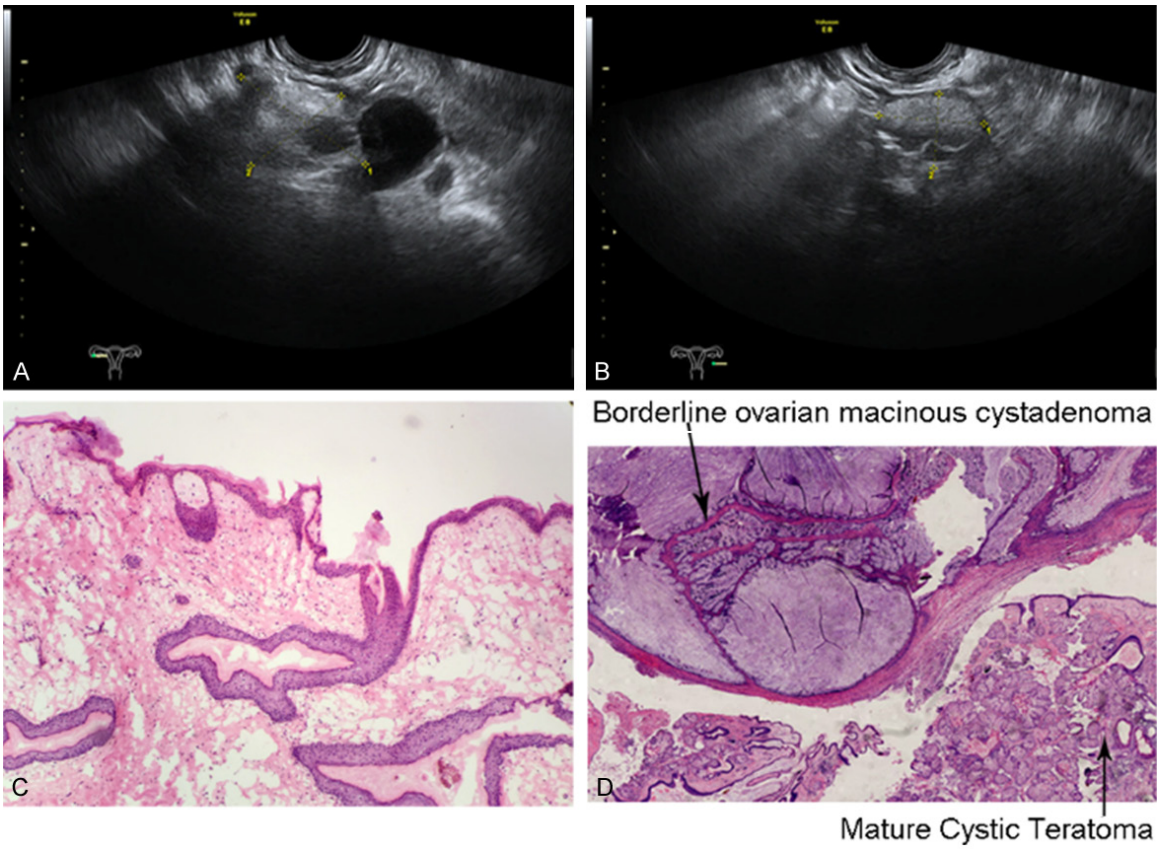


**Figure 1.** Diagnostic results for tumors identified in case 1 with mature cystic teratoma-derived borderline mucinous cystadenoma. A. The transvaginal ultrasonography shows a 39 × 29 × 30-mm-sized mass with a dough sign in the right ovary. B. Transvaginal ultrasonography showing a 26 × 21 × 18-mm-sized mass with a fat-fluid level sign in the left ovary. C. Pathohistological assessments show a typical mature cystic teratoma in the left cyst. D. Pathohistological assessment presents a co-existence of mature cystic teratoma and borderline mucinous cystadenoma. Specifically, the mature cystic teratoma and borderline mucinous cystadenoma were pointed using arrow lines.

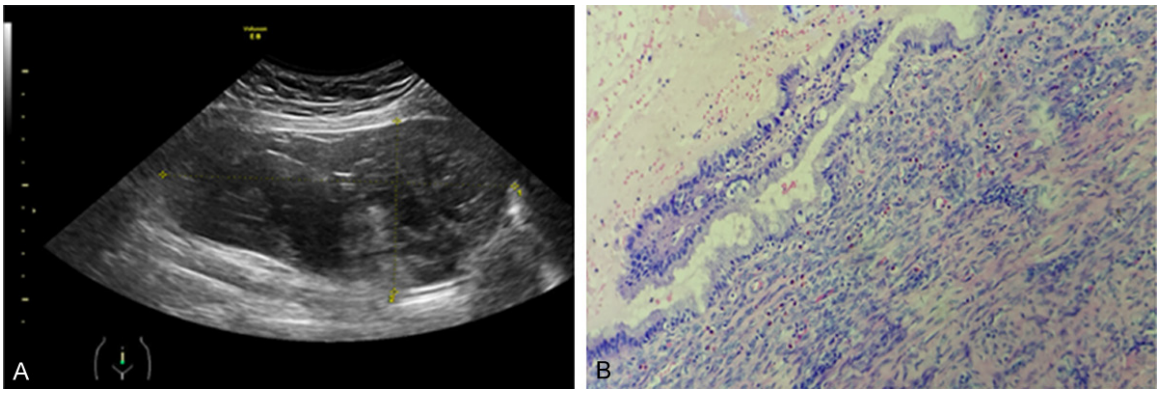


**Figure 2.** Diagnostic results for tumors identified in case 2 with mature cystic teratoma-derived borderline mucinous cystadenoma. A. Ttransvaginal ultrasonography showed a 13.1 × 7.5 × 10.9-cm-sized cystic with internal separations on the right adnexa. B. Paraffin-section presented an intestinal type of borderline mucinous cystadenoma.

nodular cystic masses containing water, or secretions with smooth white capsules. In this study, 3 cases reported in this study were also showed large tumor sizes with typical intestinal mucinous borderline. Meanwhile, frozen-section histological analysis of case 3 also showed typical low-stage cervical intraepithelial neoplasia in MCT tissues.

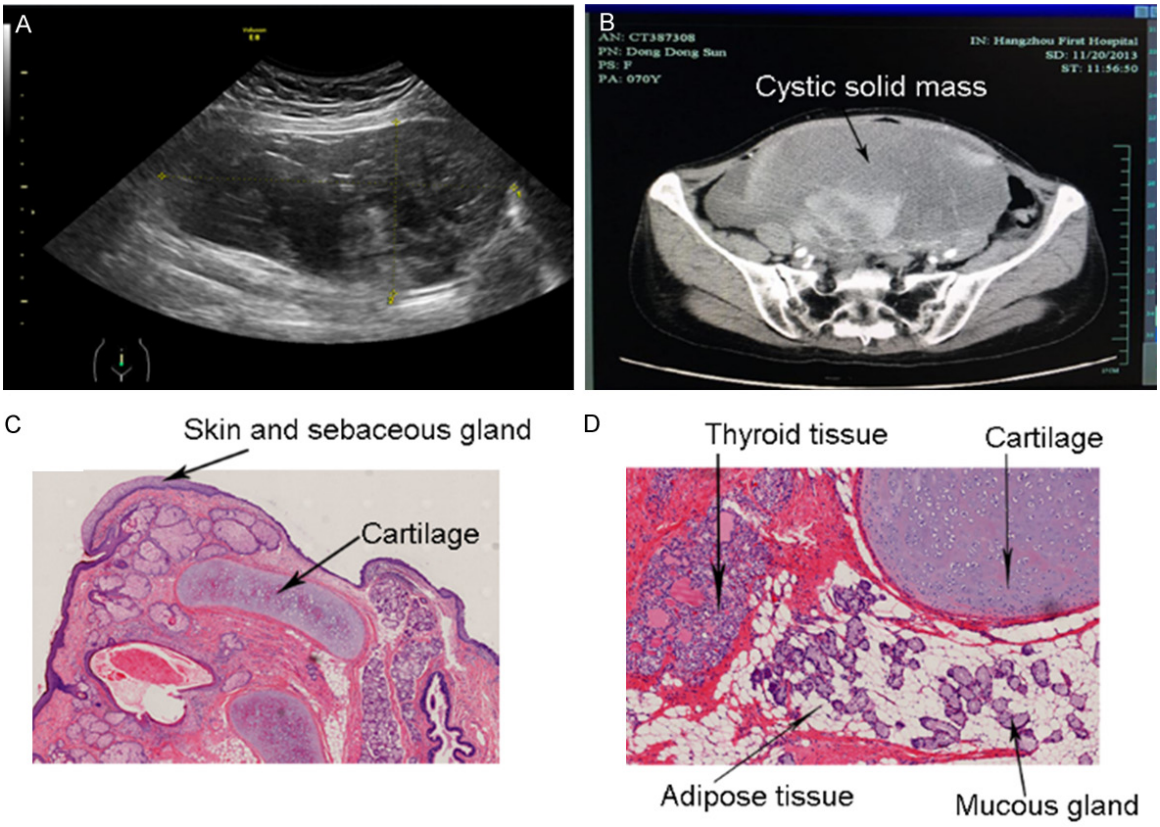


**Figure 3.** Diagnostic results for tumors identified in case 3 with mature cystic teratoma-derived borderline mucinous cystadenoma. A. Transabdominal and transvaginal ultrasound examinations show a 22.4 × 10.5 × 17.6-cm-sized non-homogeneous mass with multiple separations. B. Computed tomography presented a solid mass in ovarian. C and D. Hematoxylin-eosin staining showed histological differentiation of tumor. The differentiation of tumor is pointed out using arrow line in images.

Previous studies indicate that mucinous cystadenocarcinoma can originate from MCT; and CK7 and CK20 are reportedly promising biomarkers for the diagnosis and prognosis of BMC arising from MCT [10, 12]. As Ca199 is predominantly utilized for cancer diagnosis [13]. Chen *et al*. also showed that serum Ca199 is higher in bilateral ovarian tumor than that in unilateral tumors [14], whereas elevated Ca199 was only identified in case 1 with a bilateral co-existing BMC and MCT, but not unilateral case 2 and case 3. These indicated that Ca199 might distinguish bilateral ones from unilateral co-existing BMC and MCT. Moreover, Claudin-18 is overexpressed in intestinal-BMC, and can serve as a biomarker to distinguish intestinal-BMC from endocervical-like BMC. This indicates that there are still some different between different tumor types. Besides, KRAS mutations are implicated in MCT initiation [15], and thus, further experiments are required to determine the status of KRAS in patients with co-existing BMC and MCT.

This study was reported 3 cases of BMC that were derived from an early-stage of MCT, and showed that Ca199 might act as a biomarker to distinguish bilateral ones from unilateral BMC deriving from MCT. However, further biomarkers are required to confirm the co-existence of these cancer types.

## Acknowledgements

This work was supported by Zhejiang Provincial Natural Science Foundation of China (Grant number LY12H16018).

## Disclosure of conflict of interest

None.

**Address correspondence to:** Hongkai Shang, Department of Gynecology, Hangzhou First People's Hospital, No.126, Huansha Road, Shangcheng District, Hangzhou 310006, Zhejiang Province, China; Nanjing Medical University, Jiangsu Province,

China. Tel: +86-15990032799; Fax: +86-0571-56005013; E-mail: shan64397260@163.com

## References

[1] Mabuchi Y, Ota N, Kobayashi A, Tanizaki Y, Minami S and Ino K. Identical twins with mature cystic teratomas treated with laparoscopic surgery: two case reports. Mol Clin Oncol 2017; 6: 276-278.

[2] Tang P, Soukkary S and Kahn E. Mature cystic teratoma of the ovary associated with complete colonic wall and mucinous cystadenoma. Ann Clin Lab Sci 2003; 33: 465-470.

[3] Moid FY, Jones RV. Granulosa cell tumor and mucinous cystadenoma arising in a mature cystic teratoma of the ovary: a unique case report and review of literature. Ann Diagn Pathol 2004; 8: 96-101.

[4] Oliveira FG, Dozortsev D, Diamond MP, Fracasso A, Abdelmassih S, Abdelmassih V, Gonçalves SP, Abdelmassih R and Nagy ZP. Evidence of parthenogenetic origin of ovarian teratoma: case report. Hum Reprod 2004; 19: 1867-1870.

[5] Chatzipantelis P, Mavrogiorgis A, Kairivassilatou E and Pafiti A. Ovarian neoplasm composed of an insular carcinoid tumor and a borderline mucinous cystadenoma arising in a mature cystic teratoma: a case report. Eur J Gynaecol Oncol 2006; 27: 636-637.

[6] Vang R, Gown AM, Zhao C, Barry TS, Isacson C, Richardson MS, Ronnett BM. Ovarian mucinous tumors associated with mature cystic teratomas: morphologic and immunohistochemical analysis identifies a subset of potential teratomatous origin that shares features of lower gastrointestinal tract mucinous tumors more commonly enco. Am J Surg Pathol 2007; 31: 854-869.

[7] McKenney JK, Soslow RA, Longacre TA. Ovarian mature teratomas with mucinous epithelial neoplasms: morphologic heterogeneity and association with pseudomyxoma peritonei. Am J Surg Pathol 2008; 32: 645.

[8] Park JH, Whang SO, Song ES, Choi SJ and Lee WY. An ovarian mucinous cystadenocarcinoma arising from mature cystic teratoma with paraaortic lymph node metastasis: a case report. J Gynecol Oncol 2008; 19: 275-8.

[9] Stewart CJ, Junckerstorff R and Tsukamoto T. Ovarian mucinous tumor arising in mature cystic teratoma associated with pseudomyxoma peritonei: a case with possible respiratory epithelial differentiation. Pathology 2006; 38: 534.

[10] Fujii K, Yamashita Y, Yamamoto T, Takahashi K, Hashimoto K, Miyata T, Kawai K, Kikkawa F, Toyokuni S and Nagasaka T. Ovarian mucinous tumors arising from mature cystic teratomas--a molecular genetic approach for understanding the cellular origin. Hum Pathol 2014; 45: 717-724.

[11] Roy S, Mukhopadhayay S, Gupta M and Chandramohan A. Mature cystic teratoma with Coexistent mucinous cystadenocarcinoma in the same Ovary-A diagnostic dilemma. J Clin Diagn Res 2016; 10: ED11-ED13.

[12] Kukreja P, Yeshvanth SK, Shrinivas T, Agrawal T and Shetty JK. Mucinous cystadenocarcinoma Co-Existing with mature cystic teratoma: a rare case report. J Clin Diagn Res 2015; 9: ED07-8.

[13] Sagi-Dain L, Lavie O, Auslander R and Sagi S. CA 19-9 in evaluation of adnexal mass: retrospective cohort analysis and review of the literature. Int J Biol Markers 2015; 30: 60-89.

[14] Chen JM, Gao HY, Wang Q and Li Q. Expression and clinical significance of tumor markers in ovarian mature cystic teratoma. Clin Exp Obstet Gynecol 2015; 43: 397-400.

[15] Boban S, Radan D, Vladimir S, Zorka M, Vesna K, Petar R, Marko B, Bozidar R, Lidija T and Bogomir D. Unilateral follicular variant of papillary thyroid carcinoma with unique KRAS mutation in struma ovarii in bilateral ovarian teratoma: a rare case report. BMC Cancer 2012; 12: 224.