

Case Report

A warning to young women: a case of giant ovarian mature cystic teratoma with squamous cell carcinoma transformation in a 22-year-old female and analysis of its molecular features

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Abstract: Malignant transformation of ovarian mature cystic teratoma (MCT) is rare, with squamous cell carcinoma (SCC) as the most frequent subtype. Because it usually occurs after menopause, cases in young adults may be overlooked. A 22-year-old nulligravid woman presented with progressive abdominal distension and acute worsening abdominal pain. Contrast-enhanced abdominopelvic computed tomography showed a huge mixed cystic-solid mass (22.5 × 14.1 × 27.8 cm) containing fat and calcifications, with a strongly enhancing mural nodule. Preoperative workup included broad laboratory testing and tumor markers, showing elevated serum squamous cell carcinoma antigen (SCC-Ag) and CA 19-9. Fertility-sparing comprehensive staging surgery confirmed well-to-moderately differentiated SCC arising in MCT, staged as International Federation of Gynecology and Obstetrics stage IA. Immunohistochemistry showed mutant-type p53 overexpression, diffuse epidermal growth factor receptor expression, and high programmed death-ligand 1 (PD-L1). SCC-Ag declined to 2.396 ng/mL after surgery. Six cycles of adjuvant paclitaxel liposome (240 mg) plus carboplatin (650 mg) were administered, and the patient remains clinically well with no evidence of disease to date. This case supports early recognition and timely management of suspicious MCTs in young adults.

Keywords: Mature cystic teratoma, squamous cell carcinoma, young adult, case report, malignant transformation

Introduction

Ovarian mature cystic teratoma (MCT) is the most common ovarian germ cell tumor in young women. It is typically benign and accounts for 10%-20% of ovarian tumors [1]. Malignant transformation, however, can occur rarely, with a reported incidence of 0.17%-2% [2]. Squamous cell carcinoma (SCC) is the predominant histologic type, representing more than 80% of transformations [3]. Because this event is classically described in postmenopausal women [4, 5], clinicians may be less alert to the possibility in younger patients.

Preoperative diagnosis remains challenging. Symptoms are often nonspecific, and potentially informative biomarkers such as serum squamous cell carcinoma antigen (SCC-Ag) are not consistently included in routine testing [6]. Imaging may raise suspicion, as enhancement of solid components is a key radiologic feature [7], yet definitive confirmation still depends on postoperative pathology. Importantly, most published evidence and clinical guidance derive from older cohorts, leaving limited data to inform care in younger patients, including risk stratification, surgical extent, fertility preservation, and decisions about adjuvant therapy [8].

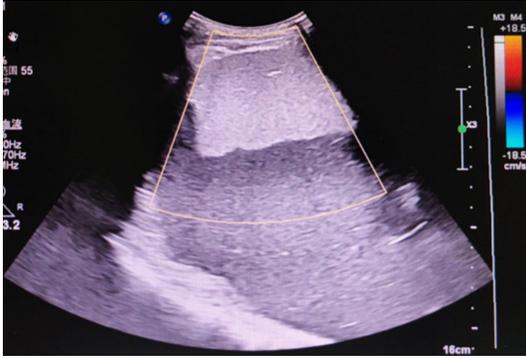


Figure 1. Transabdominal ultrasound demonstrates a giant abdominopelvic cystic-solid mass with a clear internal stratification and mild posterior acoustic enhancement, favoring a mature cystic teratoma in the clinical context.

Genomic studies have likewise focused mainly on older patients, suggesting that MCT-SCC is usually HPV independent and driven by TP53 alterations [9], but whether these findings apply to young adults is uncertain.

Here, we report a case of high-to-moderately differentiated SCC arising in a giant ovarian MCT in a 22-year-old woman. This case highlights a rare presentation in early adulthood and provides clinically relevant detail on diagnosis and management, including fertility-sparing comprehensive staging and postoperative molecular and immunohistochemical profiling. Together with a literature review, we aim to improve recognition of this uncommon entity and inform future risk-adapted, individualized strategies for young patients.

Case presentation

A 22-year-old nulligravid woman presented to the gynecologic emergency department with progressive abdominal distension for one month and an acute worsening of upper abdominal pain for one day. She reported no history of sexual activity, had regular menses, and was otherwise healthy, with no personal or significant family history of malignancy.

Transabdominal ultrasonography revealed a large cystic-solid abdominopelvic mass with a small volume of fluid from the abdominal cavity (**Figure 1**). Contrast-enhanced abdominopelvic computed tomography showed a huge mixed cystic-solid lesion measuring approximately

22.5 × 14.1 × 27.8 cm with well-defined margins, containing cranial fat-density areas and posterior tooth-like calcifications. An irregular mural nodule along the left posterior wall enhanced from ~44 Hounsfield units (HU) pre-contrast to ~104 HU post-contrast. Adjacent structures were compressed and displaced, and a small amount of fluid from the abdominal cavity was again noted, favoring a mature cystic teratoma with a suspicious solid component. Preoperative laboratory evaluation showed mild neutrophil predominant leukocytosis, with a white blood cell count (WBC) of $9.79 \times 10^9/L$, a neutrophil count (NEU) of $7.81 \times 10^9/L$, and a neutrophil percentage (NEU%) of 79.8%. Inflammatory markers were elevated, including high sensitivity C reactive protein (hs CRP) at 22.05 mg/L and interleukin 6 (IL-6) at 70.99 pg/mL. Tumor marker testing showed an increased carbohydrate antigen 19 9 (CA199) level of 157.8 IU/mL, whereas CA125 at 26.8 IU/mL, human epididymis protein 4 (HE4) at 28.55 pmol/L, carcinoembryonic antigen (CEA) at 2.296 ng/mL, alpha fetoprotein (AFP) at 2.295 IU/mL, and beta human chorionic gonadotropin (β hCG) below 0.100 mIU/mL were within the reference ranges. Given the acute pain escalation and imaging features suspicious for malignant transformation, prompt surgical exploration was undertaken to confirm the diagnosis and guide management.

Comprehensive surgical staging was performed in a single session, including left adnexectomy with mass excision, peritoneal washings, multiple peritoneal biopsies, infracolic omentectomy, left pelvic lymph node sampling, and para-aortic lymphadenectomy. Intraoperatively, a giant left ovarian mass measuring approximately 30 × 25 × 20 cm filled the pelvis and lower abdomen, with an intact capsule. Adhesions involved the omentum and lateral peritoneum, with dense plaque-like attachments to the anterior and right lateral uterine surfaces (**Figure 2**). Approximately 100 mL of pale-yellow fluid was aspirated from the abdominal cavity. No macroscopic peritoneal, omental, appendiceal, or intestinal implants were seen, and no enlarged pelvic or para-aortic nodes were palpated. The procedure concluded with no gross residual disease. Representative tumor tissue was snap-frozen in liquid nitrogen and stored at -80°C for subsequent histologic and ancillary analyses.



Figure 2. Gross specimen of the resected left adnexal mass. The excised cystic-solid ovarian tumor is shown after removal, with areas of sebaceous material and hair consistent with a mature cystic teratoma.

Peritoneal washing cytology was negative for malignancy, showing only lymphocytes, mesothelial cells, and histiocytes. Histopathology confirmed a mature cystic teratoma with malignant transformation to well-to moderately differentiated SCC. The cyst measured approximately 22.5 cm, and the invasive focus measured about 9.5 cm, infiltrating the cyst wall without transmural breach. Hematoxylin-eosin staining showed a dermoid lining with keratinizing stratified squamous epithelium and laminated keratin, immediately adjacent to infiltrative nests and tongues of atypical squamous cells with keratin pearls and intercellular bridges in a desmoplastic stroma (**Figure 3A**). Immunohistochemistry demonstrated diffuse p40 nuclear positivity in the invasive component (**Figure 3B**), patchy weak p16 staining without block-type expression (**Figure 3C**), a Ki-67 index of ~20% accentuated at the invasive front (**Figure 3D**), and mutant-type p53 overexpression in most tumor cells (**Figure 3E**). HER2 was negative (score 0) (**Figure 3F**), EGFR showed diffuse membranous overexpression (2+–3+) in ~90% of tumor cells (**Figure 3G**), and PD-L1 (22C3) was highly expressed, with a tumor proportion score of ~80% and a combined positive score of ~82 (**Figure 3H**). Based on surgical and pathologic findings, the tumor was staged as International Federation of Gynecology and Obstetrics stage IA. Given the rarity of SCC arising in a mature cystic teratoma and the exceptionally large tumor with an invasive mural component, the patient received six cycles of adjuvant chemotherapy with paclitaxel liposome 240 mg plus carboplatin 650 mg per cycle. The patient remains clinically well on

surveillance, with no evidence of disease to date.

Discussion

MCT of the ovary is the most common benign ovarian tumor in women of reproductive age, yet its malignant transformation is a rare but life-threatening complication [10]. Herein, we report a case of moderately to well-differentiated SCC arising from MCT in a 22-year-old female, an age significantly younger than the typical onset age of this disease, which serves as a clinical alert. The overall incidence of malignant transformation in MCT is estimated at 0.17%–2%, with SCC as the dominant subtype, accounting for more than 80% of cases [2]. Most patients are postmenopausal, with a mean age at diagnosis of 50–60 years [9, 11]. Accordingly, the present 22-year-old patient represents a marked age outlier, underscoring that age alone should not exclude the possibility of malignant transformation. Reported risk factors include large tumor size, postmenopausal status, elevated tumor markers, and rapid growth [12, 13]. In this case, the tumor approached 30 cm, the most compelling clinical risk feature. Kashimura et al. identified tumor size as one of the parameters most closely associated with malignant transformation [5]. Ascites can occasionally accompany benign MCT, particularly after rupture or peritoneal irritation, but fluid from the abdominal cavity in an unruptured giant MCT should raise concern. As emphasized by Rim et al., any feature deviating from the typical benign manifestations requires careful evaluation [14].

Modern imaging is central to preoperative risk assessment for malignant transformation in MCT. In this case, computed tomography showed typical MCT features, including fat density and tooth-like calcifications, together with a suspicious enhancing mural nodule, with attenuation rising from 44 to 104 HU after contrast. Magnetic resonance imaging studies similarly indicate that enhancement of solid components is among the most reliable markers for distinguishing benign from malignant MCT [15], and dynamic contrast-enhanced patterns may provide additional discriminatory information [16]. Regarding biomarkers, SCC-Ag has been proven to be a highly specific tumor marker for MCT-SCC, which can be used for preoperative

SCC in young MCT

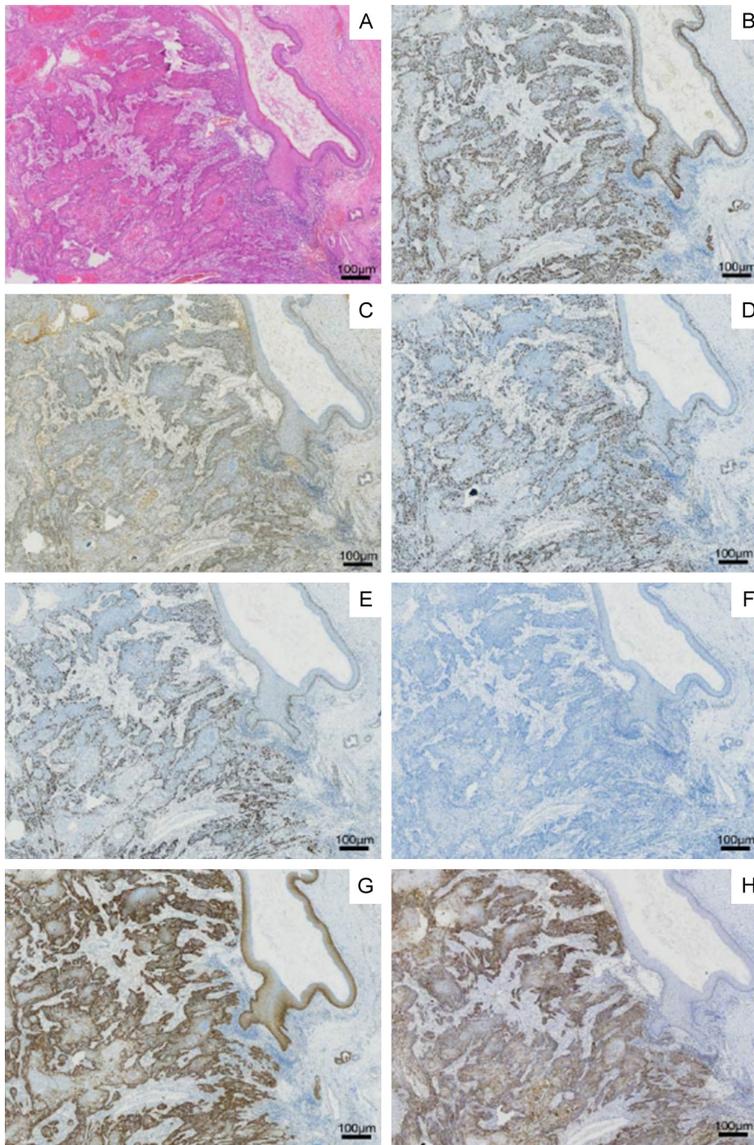


Figure 3. Histopathological and immunohistochemical features of SCC arising in a MCT (original magnification $\times 100$). A. H&E staining shows well-to-moderately differentiated invasive squamous cell carcinoma adjacent to the benign teratomatous lining. B. p40 immunohistochemistry (IHC) demonstrates strong nuclear positivity in both the dermoid lining (internal control) and invasive carcinoma. C. p16 IHC shows patchy, weak staining without block-type positivity, arguing against HPV involvement. D. Ki-67 IHC reveals a proliferative index of approximately 20%, accentuated at the invasive front. E. p53 IHC exhibits a mutant-type pattern of diffuse strong nuclear overexpression in the carcinoma. F. HER2 IHC is negative (score 0), showing no specific membranous staining. G. EGFR IHC shows diffuse, strong (2+ to 3+) membranous expression in the majority of tumor cells. H. PD-L1 IHC (22C3 assay) demonstrates high expression with a Tumor Proportion Score of $\sim 80\%$.

diagnostic suggestion and postoperative follow-up monitoring [17]. Prior reports note that SCC-Ag often decreases after resection [18]. In our patient, SCC-Ag was elevated preoperative-

ly and fell to 2.396 ng/mL after surgery. Together, these findings support prompt definitive surgery and appropriate oncologic staging when malignant transformation is suspected.

For young patients with early-stage ovarian malignancy, fertility-sparing surgery (FSS) is an established option. In this case, comprehensive staging surgery preserving the uterus and right adnexa was successfully performed. Available evidence supports the oncologic safety of FSS in selected early-stage ovarian cancers. On behalf of the European Society of Gynaecological Oncology, Morice et al. reported that FSS can achieve outcomes comparable to radical surgery in stage IA malignant germ cell tumors and selected epithelial subtypes [19], and Satoh et al. provided additional support for FSS in early-stage epithelial ovarian cancer [20]. Crucially, FSS requires complete and standardized staging. Panici et al. reviewed the role of lymphadenectomy in ovarian cancer and emphasized its importance for accurate staging, treatment planning, and prognostic assessment [21]. The systematic retroperitoneal lymphadenectomy, omentectomy, and multi-site peritoneal biopsies performed in this case ensured the accuracy of staging, providing a crucial basis for avoiding overtreatment or undertreatment in subsequent management.

Comprehensive immunohistochemistry in this case extends beyond morphology to outline a molecular profile that may inform tumor biology and potential therapeutic avenues. Mutant-type p53 overexpression together with negative, non-block-type

p16 staining supports an HPV-independent pathway in which TP53 disruption is a central event [22, 23], consistent with current genomic insights into ovarian SCC. Cooke et al. reported frequent TP53 alterations and rare HPV detection in ovarian SCC [24], and more recent sequencing studies have identified TP53 among the most commonly mutated genes in MCT-associated SCC [24, 25]. High programmed death-ligand 1 expression in this case, with a tumor proportion score of ~80% and a combined positive score of ~82, suggests immune evasion through the programmed cell death 1 and programmed death-ligand 1 axis. Although immune checkpoint blockade in MCT-derived SCC remains exploratory, evidence of benefit in recurrent or metastatic cervical cancer provides a rationale for future investigation [26], and further characterization of the immune microenvironment may identify additional targets [27]. Additionally, there is a potential targetable EGFR pathway. Diffuse overexpression of EGFR is an established therapeutic target in SCC of the head and neck, lung, and other sites [28, 29]. A study by Vermorken et al. established the role of cetuximab (an anti-EGFR monoclonal antibody) in head and neck SCC [30]. In gynecologic tumors, EGFR overexpression has been reported in ovarian SCC and linked to adverse outcomes [31]. While its role in MCT-derived SCC is not yet defined, this finding may offer a potential option if conventional therapies fail. Finally, the Ki-67 index was approximately 20% and was higher at the invasive front, indicating moderate proliferative activity, which has been associated with higher teratoma grade in prior studies [32, 33]. Therefore, this multifaceted molecular profiling not only enhances our comprehension of the oncogenesis in this rare entity but also unveils a valuable repository of actionable targets, paving the way for precision medicine in the management of similar challenging cases in the future.

For International Federation of Gynecology and Obstetrics stage IA, well- to moderately differentiated ovarian SCC, observation after complete staging surgery is an accepted option [34]. In practice, however, risk stratification within stage IA remains challenging. In this case, adjuvant chemotherapy was chosen, likely because the exceptionally large tumor burden was considered an atypical high-risk fea-

ture. A clinical study has suggested that tumor size may influence prognosis even in early-stage ovarian SCC [35]. In the absence of randomized data, treatment decisions are often informed by experience from other SCCs, where tumor size and depth of invasion contribute to risk assessment. Quesada et al. have advocated molecular signature-based basket trials for rare gynecologic malignancies to better guide systemic therapy [36]. Overall outcomes for MCT-associated SCC remain poor, with reported 5-year survival rates of 15%-52%, largely due to advanced-stage presentation [37]. By contrast, prognosis is substantially better when disease is detected at stage IA through standardized surgery, and early stage remains the strongest favorable prognostic factor [2]. Close surveillance is therefore essential. Prior work recommends follow-up every 3-6 months during the first 2 postoperative years [38], incorporating clinical assessment, imaging as indicated, and serum marker monitoring.

Overall, this case delineates the diagnostic and therapeutic course of SCC arising in an ovarian MCT in a very young patient. Comprehensive staging surgery and careful pathologic evaluation enabled accurate diagnosis and staging, while immunophenotyping suggested an HPV-independent, TP53-associated pathway with high programmed death-ligand 1 expression and diffuse epidermal growth factor receptor overexpression. Clinically, the case underscores the need for vigilance when a giant teratoma in a young woman shows atypical features, reinforces the central role of complete staging in fertility-sparing management, and highlights potential avenues for individualized therapy. Further progress will require sustained multicenter collaboration to clarify biology and optimize outcomes in this rare entity.

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Written informed consent was obtained from the patient.

Disclosure of conflict of interest

None.

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References

- [1] Chao A, Lai CH, Chao AS, Lin CY, Wang YC, Huang HJ and Wu RC. Molecular characterization of ovarian squamous cell carcinoma originating from mature teratoma. *J Mol Med (Berl)* 2025; 103: 101-111.
- [2] Hackethal A, Brueggmann D, Bohlmann MK, Franke FE, Tinneberg HR and Münstedt K. Squamous-cell carcinoma in mature cystic teratoma of the ovary: systematic review and analysis of published data. *Lancet Oncol* 2008; 9: 1173-1180.
- [3] Özdem F, Kaymak SD, Turhan B, Hanedan C, Barlas S, Demirsoy Ö and Kavak RP. A rare case of malignant transformation: squamous cell carcinoma arising on the basis of an ovarian mature cystic teratoma. *BMC Womens Health* 2025; 25: 213.
- [4] Addis NA, Yigzaw KT, Alemu BA, Zegeye KB, Tadesse EN and Yigezaw GS. Squamous cell carcinoma arising from mature cystic teratoma of the ovary in a premenopausal women: a rare case report. *Int J Surg Case Rep* 2025; 131: 111403.
- [5] Kashimura M, Shinohara M, Hirakawa T, Kamura T and Matsukuma K. Clinicopathologic study of squamous cell carcinoma of the ovary. *Gynecol Oncol* 1989; 34: 75-79.
- [6] Isikhuemen M, Ezeanochie M, Okonkwo C and Okonofua F. Squamous cell carcinoma antigen levels in women with cervical cancer and those without cervical cancer: a cross-sectional study among women of African descent. *Eur J Med Res* 2025; 30: 573.
- [7] Park SB, Cho KS and Kim JK. CT findings of mature cystic teratoma with malignant transformation: comparison with mature cystic teratoma. *Clin Imaging* 2011; 35: 294-300.
- [8] Gadducci A, Pistolesi S, Guerrieri ME, Cosio S, Carbone FG and Naccarato AG. Malignant transformation in mature cystic teratomas of the ovary: case reports and review of the literature. *Anticancer Res* 2018; 38: 3669-3675.
- [9] Wu SY, Giannini A, Girardo M, Schmitt A, Magrina JF and Butler K. Malignant transformation of squamous cell carcinoma in mature cystic teratoma of the ovary: a systematic review and meta-analysis of data. *Gynecol Obstet Invest* 2025; 90: 255-267.
- [10] Maurac Pašalić I, Sabol M, Prtenjača E, Puvačić Solomun L and Pavić M. Mature cystic teratoma and their malignant transformation. *Eur J Surg Oncol* 2025; 51: 109641.
- [11] Abdoli Shadbad M, Derogar R, Shekarchi AA, Akbari F and Jafari Shobeiri M. Mature cystic ovarian teratoma with squamous cell carcinoma transformation: a case report and literature review. *Horm Mol Biol Clin Investig* 2024; 45: 35-39.
- [12] Yamanaka Y, Tateiwa Y, Miyamoto H, Umemoto Y, Takeuchi Y, Katayama K and Hashimoto K. Preoperative diagnosis of malignant transformation in mature cystic teratoma of the ovary. *Eur J Gynaecol Oncol* 2005; 26: 391-392.
- [13] Chen RJ, Chen KY, Chang TC, Sheu BC, Chow SN and Huang SC. Prognosis and treatment of squamous cell carcinoma from a mature cystic teratoma of the ovary. *J Formos Med Assoc* 2008; 107: 857-868.
- [14] Rim SY, Kim SM and Choi HS. Malignant transformation of ovarian mature cystic teratoma. *Int J Gynecol Cancer* 2006; 16: 140-144.
- [15] Kido A, Togashi K, Konishi I, Kataoka ML, Koyama T, Ueda H, Fujii S and Konishi J. Dermoid cysts of the ovary with malignant transformation: MR appearance. *AJR Am J Roentgenol* 1999; 172: 445-449.
- [16] Park SB, Kim JK, Kim KR and Cho KS. Preoperative diagnosis of mature cystic teratoma with malignant transformation: analysis of imaging findings and clinical and laboratory data. *Arch Gynecol Obstet* 2007; 275: 25-31.
- [17] Fu J, Wang W, Wang Y, Liu C and Wang P. The role of squamous cell carcinoma antigen (SCC Ag) in outcome prediction after concurrent chemoradiotherapy and treatment decisions for patients with cervical cancer. *Radiat Oncol* 2019; 14: 146.
- [18] Kikkawa F, Nawa A, Tamakoshi K, Ishikawa H, Kuzuya K, Suganuma N, Hattori S, Furui K, Kawai M and Arii Y. Diagnosis of squamous cell carcinoma arising from mature cystic teratoma of the ovary. *Cancer* 1998; 82: 2249-2255.
- [19] Morice P, Denschlag D, Rodolakis A, Reed N, Schneider A, Kesic V and Colombo N. Recommendations of the fertility task force of the european society of gynecologic oncology about the conservative management of ovarian malignant tumors. *Int J Gynecol Cancer* 2011; 21: 951-963.
- [20] Satoh T, Hatae M, Watanabe Y, Yaegashi N, Ishiko O, Kodama S, Yamaguchi S, Ochiai K, Takano M, Yokota H, Kawakami Y, Nishimura S, Ogishima D, Nakagawa S, Kobayashi H, Shiozawa T, Nakanishi T, Kamura T, Konishi I and Yoshikawa H. Outcomes of fertility-sparing surgery for stage I epithelial ovarian cancer: a proposal for patient selection. *J Clin Oncol* 2010; 28: 1727-1732.
- [21] Panici PB, Maggioni A, Hacker N, Landoni F, Ackermann S, Campagnutta E, Tamussino K, Winter R, Pellegrino A, Greggi S, Angioli R,

- Manci N, Scambia G, Dell'Anna T, Fossati R, Floriani I, Rossi RS, Grassi R, Favalli G, Raspagliesi F, Giannarelli D, Martella L and Mangioni C. Systematic aortic and pelvic lymphadenectomy versus resection of bulky nodes only in optimally debulked advanced ovarian cancer: a randomized clinical trial. *J Natl Cancer Inst* 2005; 97: 560-566.
- [22] Regauer S and Reich O. The histologic and molecular spectrum of highly differentiated HPV-independent cervical intraepithelial neoplasia. *Am J Surg Pathol* 2023; 47: 942-949.
- [23] Mannweiler S, Sygulla S, Winter E and Regauer S. Two major pathways of penile carcinogenesis: HPV-induced penile cancers overexpress p16ink4a, HPV-negative cancers associated with dermatoses express p53, but lack p16ink4a overexpression. *J Am Acad Dermatol* 2013; 69: 73-81.
- [24] Cooke SL, Ennis D, Evers L, Dowson S, Chan MY, Paul J, Hirschowitz L, Glasspool RM, Singh N, Bell S, Day E, Kochman A, Wilkinson N, Beer P, Martin S, Millan D, Biankin AV and McNeish IA. The driver mutational landscape of ovarian squamous cell carcinomas arising in mature cystic teratoma. *Clin Cancer Res* 2017; 23: 7633-7640.
- [25] Schwaederle M, Elkin SK, Tomson BN, Carter JL and Kurzrock R. Squamousness: next-generation sequencing reveals shared molecular features across squamous tumor types. *Cell Cycle* 2015; 14: 2355-2361.
- [26] Chung HC, Ros W, Delord JP, Perets R, Italiano A, Shapira-Frommer R, Manzuk L, Piha-Paul SA, Xu L, Zeigenfuss S, Pruitt SK and Leary A. Efficacy and safety of pembrolizumab in previously treated advanced cervical cancer: results from the phase II KEYNOTE-158 Study. *J Clin Oncol* 2019; 37: 1470-1478.
- [27] Heong V, Ngoi N and Tan DS. Update on immune checkpoint inhibitors in gynecological cancers. *J Gynecol Oncol* 2017; 28: e20.
- [28] Dequanter D, Shahla M, Paulus P and Lothaire PH. The role of EGFR-targeting strategies in the treatment of head and neck cancer. *Onco Targets Ther* 2012; 5: 127-131.
- [29] Hirsch FR, Redman MW, Moon J, Agostoni F, Herbst RS, Semrad TJ, Varella-Garcia M, Rivard CJ, Kelly K, Gandara DR and Mack PC. EGFR high copy number together with high EGFR protein expression predicts improved outcome for cetuximab-based therapy in squamous cell lung cancer: analysis from SWOG S0819, a Phase III Trial of chemotherapy with or without cetuximab in advanced NSCLC. *Clin Lung Cancer* 2022; 23: 60-71.
- [30] Vermorken JB, Mesia R, Rivera F, Remenar E, Kawecki A, Rottey S, Erfan J, Zabolotny D, Kienzer HR, Cupissol D, Peyrade F, Benasso M, Vynnychenko I, De Raucourt D, Bokemeyer C, Schueler A, Amellal N and Hitt R. Platinum-based chemotherapy plus cetuximab in head and neck cancer. *N Engl J Med* 2008; 359: 1116-1127.
- [31] Bartlett JM, Langdon SP, Simpson BJ, Stewart M, Katsaros D, Sismondi P, Love S, Scott WN, Williams AR, Lessells AM, Macleod KG, Smyth JF and Miller WR. The prognostic value of epidermal growth factor receptor mRNA expression in primary ovarian cancer. *Br J Cancer* 1996; 73: 301-306.
- [32] Hongo-Kohama M, Kurata A, Hashimoto H, Fujita K, Horiuchi H, Nagao T and Kuroda M. Vascular smooth muscle cell maturation stage and Ki-67 index are diagnostic biomarkers for pathologic grade of ovarian teratoma. *Int J Gynecol Pathol* 2017; 36: 582-592.
- [33] Ueda T, Takamochi K, Yoshimoto T, Ichikawa T, Matsunaga T, Hayashi T and Suzuki K. Apocrine adenocarcinoma arising from mature cystic teratoma in the anterior mediastinum: a case report. *Pathol Int* 2025; 75: 34-39.
- [34] Armstrong DK, Alvarez RD, Bakkum-Gamez JN, Barroilhet L, Behbakht K, Berchuck A, Chen LM, Cristea M, DeRosa M, Eisenhauer EL, Gershenson DM, Gray HJ, Grisham R, Hakam A, Jain A, Karam A, Konecny GE, Leath CA, Liu J, Mahdi H, Martin L, Matei D, McHale M, McLean K, Miller DS, O'Malley DM, Percac-Lima S, Rattner E, Remmenga SW, Vargas R, Werner TL, Zsiros E, Burns JL and Engh AM. Ovarian cancer, version 2.2020, NCCN clinical practice guidelines in oncology. *J Natl Compr Canc Netw* 2021; 19: 191-226.
- [35] Oranratanaphan S and Khemapech N. Characteristics and treatment outcomes of patients with malignant transformation arising from mature cystic teratoma of the ovary: experience at a single institution. *Asian Pac J Cancer Prev* 2013; 14: 4693-4697.
- [36] Quesada S, Bini M, Lebreton C and Ray-Coquard I. Update on new treatments for rare ovarian tumours. *Curr Opin Obstet Gynecol* 2023; 35: 27-33.
- [37] Dos Santos L, Mok E, Iasonos A, Park K, Sollow RA, Aghajanian C, Alektiar K, Barakat RR and Abu-Rustum NR. Squamous cell carcinoma arising in mature cystic teratoma of the ovary: a case series and review of the literature. *Gynecol Oncol* 2007; 105: 321-324.
- [38] Li S, Peng J, Zhang Y, Liu D, Li L and Nai M. Subsequent ovarian yolk sac tumor after operation of ovarian mature teratoma: a case report and review of the literature. *Front Oncol* 2023; 13: 1327724.