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*Case Report*

# Ovarian Sex Cord Tumours with Annular Tubules in a Child with Peutz-Jeghers Syndrome: A Case Report and Literature Review

W ***Chen***, L ***Fu***, T ***Zhang***, L ***Liu***

**Abstract** ***Introduction:*** Ovarian sex cord tumours with annular tubules (SCTAT) is extremely rare in children with Peutz-Jeghers syndrome (PJS). We reported a case of ovarian SCTAT in a girl with PJS and reviewed the literature. ***Case presentation:*** A 13-year-old girl PJS was admitted for menorrhagia during the last 1.5 years, accompanied by intermittent abdominal pain and a 2-day history of pallor. Ultrasound and computerised tomography showed bilateral ovarian tumours. Surgical resection was performed, and the patient was diagnosed as bilateral ovarian SCTAT. The patient had an uneventful follow-up. ***Conclusion:*** Fertility-sparing tumour resection is feasible for ovarian SCTAT in children with PJS. Long-term follow-up is mandatory for the postoperative patients.

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**Key words** *Child; Peutz-Jeghers syndrome; Sex cord tumours with annular tubules; Surgery*

## Introduction

Peutz-Jeghers syndrome (PJS) is a rare autosomal dominant disease characterised by mucocutaneous pigmentation, gastrointestinal hamartomatous polyps, and an increased risk for gastrointestinal and extra-gastrointestinal malignancies.[1] It is associated with germline mutations causing loss of function in the tumour suppressor gene STK11/LKB1 on chromosome 19p13.3.[2] Sex cord tumour with annular tubules (SCTAT) is a rare condition frequently seen in patients with PJS, as first described by Scully in 1970.[3] Here, we describe a case of bilateral ovarian SCTAT in a 13-year-old girl with PJS. We also review the literature to understand the clinical presentations of this condition.

**Beijing Children's Hospital, Capital Medical University, Children's National Medical Centre, Beijing 100045, China**
W **Chen**(陳巍) *MD*
L **Fu**(伏立兵) *MD*
T **Zhang**(張廷沖) *MD*
L **Liu**(劉璐) *MD*

**Beijing Tsinghua Changgung Hospital, Beijing 102218, China**
W **Chen**(陳巍) *MD*

Correspondence to: Dr W **Chen**
*Email: chenwei710@hotmail.com*

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## Case Report

A 13-year-old girl was admitted for menorrhagia during the last 1.5 years, accompanied with intermittent abdominal pain and a 2-day history of pallor in October 2019. Her medical history included laparotomy and jejunal polypectomy for intussusception at the age of 11, followed by colonoscopic polypectomy 1 month later. The diagnosis of PJS was established at that time because of circumoral and oral mucous membrane melanin pigmentation and the presence of hamartomatous polyps. She has no family history of gynaecological tumours or PJS.

Full blood count revealed red blood cell (RBC) count of $2.65 \times 10^{12}$/L ($3.50\text{-}5.50 \times 10^{12}$/L) and haemoglobin (Hb) of 56 g/L (110-160 g/L). Ultrasound showed multiple intestinal polyps, an intussusception secondary to a jejunal polyp and bilateral ovarian tumours. Computerised tomography (Figure 1) confirmed the presence of solid ovarian tumours (Left 8.8 cm, Right 3.5 cm).

After 2 IU blood transfusion, her RBC count was 3.98 × $10^{12}$/L and Hb was 90 g/L. Subsequent ultrasound screening of the thyroid, breast, and urinary systems were negative. Serum levels of carbohydrate antigen 125, neuron-specific enolase, carcinoembryonic antigen, carbohydrate antigen 19-9, alpha-fetoprotein, beta-human chorionic gonadotropin, luteinising hormone, follicle-stimulating hormone, prolactin, testosterone and progesterone were normal. The oestradiol was 254.0 pg/ml (1.6-116.8 pg/ml).

During laparoscopy, bilateral ovarian tumours (Figure 2) and multiple intestinal intussusceptions were confirmed. Frozen biopsy of ovarian tumours diagnosed SCTAT. Then laparotomic intestinal polypectomy and bilateral ovarian tumour resection were performed. Histopathologic studies of the resected ovarian tumours confirmed SCTAT (Figure 3). The postoperative course was uneventful. Menstrual flow returned to normal within two months after surgery, and she remained well during the two-year follow-up period.

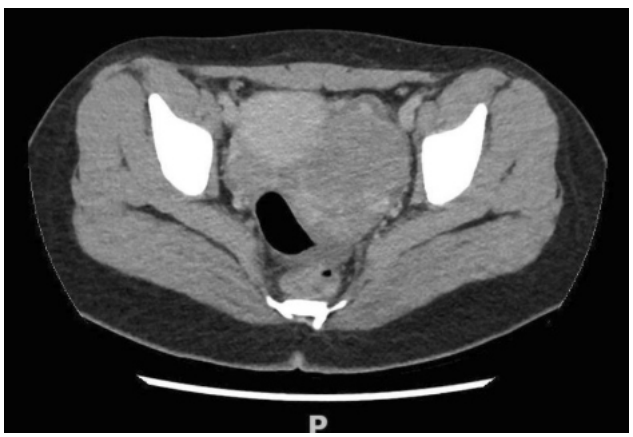


**Figure 1**. Bilateral ovarian tumours could be seen clearly in the computerised tomography.

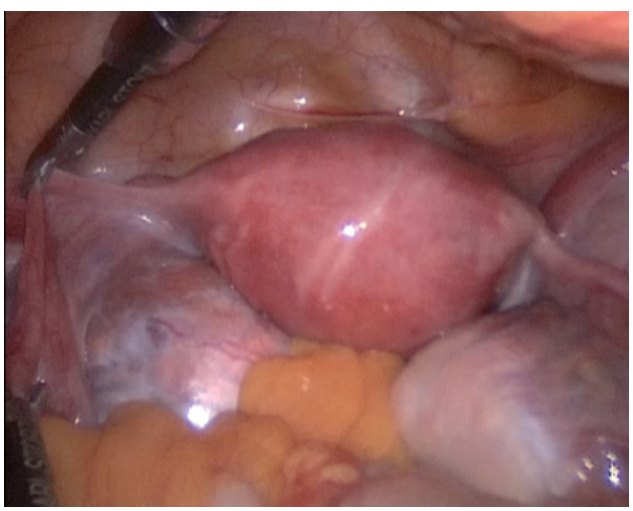

**Figure 2.** Laparoscopic view of bilateral ovarian masses.

## Discussion

Since Scully's first description of SCTAT in 1970,[3] several case series involving both PJS and non-PJS patients have been published. While SCTAT was considered the most common ovarian neoplasm in PJS patients,[4] childhood cases remain extremely rare.

We searched PubMed, Medline, OIVD and China National Knowledge Infrastructure databases using the search terms "sex cord-gonadal stromal tumours OR sex cord tumour with annular tubules OR SCTAT and children OR paediatrics and Peutz-Jeghers syndrome" for studies published between 1960 and January 2022. This search yielded 7 articles describing 10 patients summarised in Table 1.[3,5-10] The mean age at diagnosis was 13.3±5.0 years (range, 4-18 years). Of these patients, 3 presented with sexual precocity at prepuberty, while 5 presented with menstrual disturbances like menorrhagia, irregular bleeding and amenorrhoea after puberty. These clinical features may be related to the production of oestradiol and progesterone by SCTAT, which has been proved in non-PJS patients.[11-14] Accurate diagnosis of SCTAT preoperatively or even intraoperatively remains challenging due to the absence of specific clinical manifestations and laboratory tests.

Bilateral involvement and small, or microscopic size are characteristic features of ovarian SCTAT in PJS

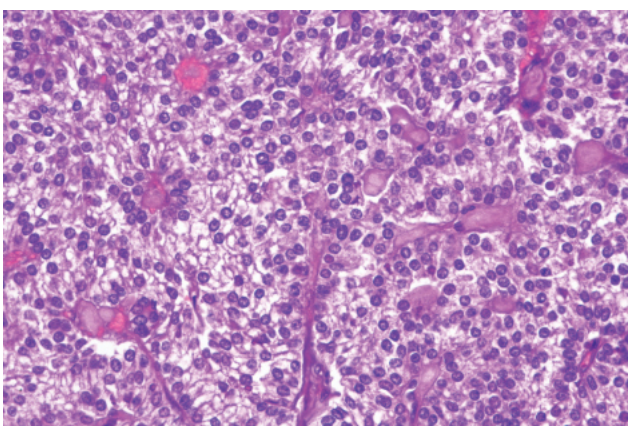

**Figure 3.** Microscopic view of the ovarian mass. Annular tubules composed of proliferating uniform cells having peripherally situated nuclei with central hyalinized bodies (HE × 400).

patients. Based on our analysis, 50% of patients had bilateral ovarian involvement and 44.4% of tumours were in microscopic size. Therefore, bilateral ovarian exploration is recommended for the PJS patients with ovarian mass(es). If the SCTAT is diagnosed in one ovary in a PJS patient, a biopsy of the contralateral ovary should be performed.

Ovarian SCTAT exhibits low malignant potential and typically presents with late recurrence.[12] Notably, all 3 reported cases of malignant ovarian SCTAT occurred in adults.[15-17] While ovarian SCTAT in PJS patients rarely exhibits malignant behaviour, it may coexist with other malignancies. In our review, two cases presented with concurrent tumours: one with ovarian serous cyst and another with cervical adenocarcinoma diagnosed at age 23.[5] Therefore, comprehensive screening of the digestive tract, thyroid, breasts, testes or uterus and ovaries is crucial for children with PJS.

Due to the rarity of ovarian SCTAT in children with PJS, a standardised treatment protocol is lacking. Considering the low malignant potential of SCTAT in children with PJS and the future reproductive needs, fertility-sparing surgery is the preferred approach whenever feasible. For children with unilateral disease, unilateral ovarian tumour enucleation (if possible) or oophorectomy can be performed. In cases of bilateral ovarian involvement, ovarian tumour enucleation is recommended.

The prognosis for ovarian SCTAT in PJS patients is generally favourable. While no cases of malignant SCTAT have been reported in children with PJS, one patient diagnosed with ovarian SCTAT in childhood died from cervical cancer at age 26. Therefore, long-term follow-up is essential for children with ovarian SCTAT, extending into adulthood.

We present this case and review the literature to

**Table 1** Ovarian sex cord tumours with annular tubules in children with Peutz-Jeghers syndrome

| Author | Year | Age (y/o) | Clinical manifestation | Laterality | Size | Treatment | Follow-up |
|---|---|---|---|---|---|---|---|
| Scully[3] | 1970 | 17 | Irregular vaginal bleeding from the menarche | Bilateral | 1 cm | Bilateral OWR | 9 years follow-up, had no children for 5 years marriage |
| Young et al[5] | 1982 | 23 (17)* | Menometrorrhagia then amenorrhoea for 6 months | Bilateral | L) 3 cm R) Micro | HE, Right SOE, LE, Left OE (six years previously because of SCTAT) | Dead 3 years of CAM |
| | | 4 | Sexual precocity, left adnexal mass | Right | Micro | SOE | Well 11 years |
| | | 6 | Sexual precocity, left adnexal mass | Left | Micro | SOE | Well 18 months |
| | | 14 | Left adnexal mass | Bilateral | Micro | SOE, contralateral OB | NA |
| Bulun et al[6] | 1994 | 16 | Breast development at age 5, menstrual irregularity after age 14 | Bilateral | NA | Surgery (Method NA) | NA |
| Feng et al[7] | 1995 | 18 | Menorrhagia then amenorrhoea for 7 months | Left | 11 cm | SOE, post-surgery chemotherapy | Well in 30 months |
| Swanger and Brudnicki[8] | 2007 | 11.5 | Abnormal vaginal bleeding | Bilateral | NA | NA | NA |
| Chen et al[9] | 2011 | | Progressive abdominal distention | Left | 30 cm | Surgery (Method NA) | NA |
| Ravishankar et al[10] | 2016 | 11 | Chronic abdominal pain | Left | 4.5 cm | Left OE and Right OB | NA |
| Our study | 2022 | 13 | Menorrhagia, abdominal pain and anaemia | Bilateral | L) 8.8 cm R) 3.3 cm | Bilateral OTR | Well in 6 months |

*Age at diagnosis of SCTAT

NA: not available; OWR: ovarian wedge resection; HE: hysterectomy; SOE: salpingo oophorectomy; LE: lymphadenectomy; OE: oophorectomy; CAM: cervical adenoma malignum; OB: ovarian biopsy; OTR: ovarian tumour resection

highlight the importance of increased awareness and understanding of ovarian SCTAT in children with PJS among paediatricians. Fertility-sparing complete tumour resection is the recommended approach for SCTAT in this population, and long-term follow-up is mandatory for all the postoperative patients.

## Compliance with Ethical Standards

### *Conflict of Interest*

All authors have disclosed no conflicts of interest.

### *Informed Consent*

Informed consent for publishing clinical photos and clinical information was obtained from her parents.

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