

# Krukenberg tumor in a 18-year-old-female: a rare case

I. Kuno, Y. Hashiguchi, M. Kasai, T. Fukuda, T. Ichimura, T. Yasui, T. Sumi

Department of Obstetrics and Gynecology, Osaka City University, Graduate School of Medicine, Osaka (Japan)

## Summary

**Background:** Krukenberg tumors mostly occur after 40 years. Metastatic ovarian tumors in young age are very rare. **Case:** A 18-year-old female presented with colon cancer which was accompanied by Krukenberg tumor. The present case was a very rare case of metastatic ovarian tumor in very young age. The present patient presented with abdominal pain. On examination, colon tumor was detected and bilateral ovary were almost normal with only slight swelling. During the operation for colon tumor, biopsy of bilateral ovary was performed for histopathological evaluation. Although there were no specific findings in bilateral ovary, microscopic examination revealed poorly differentiated adenocarcinoma, diffusely invading the ovarian parenchyma. Diagnosis of colon cancer was made postoperatively and ovarian Krukenberg tumor was confirmed. **Conclusion:** In case of suspecting colon cancer even in very young patient with normal ovary, biopsy of ovary should be considered for the diagnosis of Krukenberg tumor.

**Key words:** Krukenberg tumor; Colon cancer; Very young age.

## Introduction

Krukenberg tumors are rare metastatic ovarian tumors arising from primaries in the gastrointestinal tract, first reported in 1896 by Krukenberg [1]. Symptoms are either absent or extremely variable with an average age of 45 years at diagnosis [2-4]. Stomach is the most common primary site, and followed by colon and rectum [3, 4]. Krukenberg tumors are advanced malignant tumors with extremely poor prognosis [2, 5].

Krukenberg tumors mostly occur after 40 years [2-6]. Krukenberg tumors are rarely seen in younger age group. To the best of the present authors' knowledge, there are only three reported cases of Krukenberg tumors in a teenage female [3,6,7]. The present case was a very rare case of a teenage female 18 years of age with colon cancer which was accompanied by Krukenberg tumor.

## Case Report

A 18-year-old female without a past medical history of interest developed abdominal pain a month before admission to the present hospital. She visited the local doctor and was initially diagnosed with acute colitis. She was admitted to the Department of Surgical Oncology of the present hospital because of persistent symptoms. Her menstrual periods were normal and regular and there were no prior or current gynecological symptoms. She had no family history of malignancy.

General examination and vital signs were normal. Although abdominal pain was observed, abdominal examination was soft and non-tender. No other symptoms such as abdominal tension, nausea or hematochezia were observed. Laboratory investigations showed no remarkable findings without slightly elevated white blood cell counts. Computed tomography (CT) examination of

the abdomen and chest demonstrated a mass of transverse colon with bowel wall thickening (Figure 1). Colon fiberoscopy demonstrated a tumor mass with ulcer in transverse colon and biopsy of tumor was performed. Contrast enema demonstrated an apple core sign in transverse colon. Magnetic resonance imaging (MRI) examination of the pelvis, which demonstrated a mass of transverse colon with bowel wall thickening (Figure 1). CT and MRI demonstrated no specific findings of bilateral ovary with slight swelling. Tumor markers showed an elevated CEA at 10.1 ng/ml and CA125 at 204 U/ml. Other tumor markers were within the normal ranges (CA19-9: 14 U/ml). Colon cancer was initially considered the most likely diagnosis.

On hospital day 6, she underwent an operation for colon cancer before making a pathological diagnosis of biopsy of tumor due to developing pain. Macroscopically there was tumor of transverse colon (size: 3 x 2 cm) with ulcer. There was disseminated disease in the abdominal cavity. The bilateral ovary and uterus were unremarkable. Biopsy of bilateral ovary was performed for histopathological evaluation. Finally, the pathological examination of the colon tumor showed poorly differentiated adenocarcinoma (Figure 2). Moreover, biopsy of bilateral ovary revealed poorly differentiated adenocarcinoma, diffusely invading the ovarian parenchyma (Figure 2). Immunohistochemistry of colon tumor and bilateral ovary showed positivity for CK20 and negativity for CK7. The authors confirmed the diagnosis of colon cancer which was accompanied by Krukenberg tumor. The diagnosis was established postoperatively. To date, the patient received palliative chemotherapy using mFOLFOX therapy (leucovorin calcium, fluorouracil, and oxaliplatin) plus bevacizumab.

## Discussion

Krukenberg tumors are rare metastatic ovarian tumors arising from primaries in the stomach, breast, appendix, colon, small intestine, rectum, urinary bladder, gallbladder,

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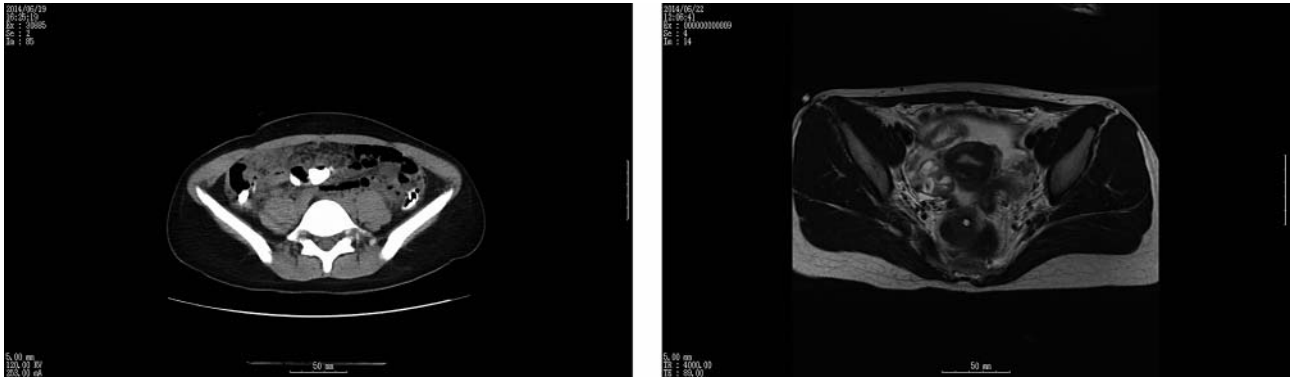


Figure. 1 — Left: CT examination of the abdomen, which demonstrates a mass of the transverse colon with bowel wall thickening. Right: MRI examination of the pelvis, which demonstrates no specific findings of bilateral ovary with slight swelling.

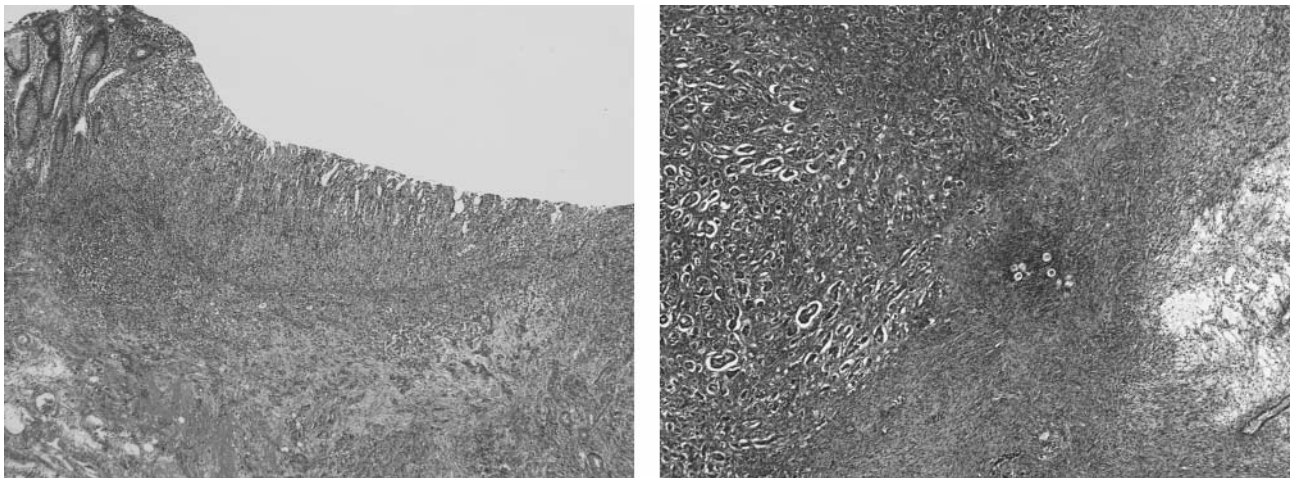


Figure. 2 — Left: histologic image of colon cancer tumor cells (Hematoxylin & Eosin, x20). Right: histologic image of ovarian tumor cells (Hematoxylin & Eosin, x20).

biliary tract, pancreas, ampulla of Vater, and uterine cervix [8]. The mode of spread of the tumor cells to the ovaries are direct, hematogenous or through lymphatics [8]. Stomach is the most common primary site, and followed by colon and rectum [3, 4]. Most Krukenberg tumors found in both ovaries are consistent with metastatic nature [2]. Symptoms are either absent or extremely variable [2-4]. Krukenberg tumors are advanced malignant tumors with extremely poor prognosis and median survival of 7–14 months [2, 5].

Seventy percent of patients with Krukenberg tumors reported were older than 40 years, with an average age of 45 years at diagnosis [2-6] and were rarely seen in younger age group. To the best of the present authors' knowledge, there are only three reported cases of Krukenberg tumors in teenage females; 11-years-old, 13-years-old, and 18-years-old [3, 6, 7]. The present case was a very rare case of Krukenberg tumor in a teenage female.

The distinction between primary ovarian mucinous adenocarcinoma and ovarian metastatic mucinous adenocarcinoma may be difficult [6]. Both tumors can be differentiated on the basis of clinical features, morphological, and pathological findings. The presence of signet ring cells is one of the most important morphological features of metastatic mucinous carcinoma of ovary, which are rare in primary ovarian mucinous tumors [9]. The features favoring Krukenberg tumors are surface tumor deposits, a nodular growth pattern, and lymphovascular permeation [6,9]. The immunohistochemistry may be useful in diagnosing Krukenberg tumor from primary ovarian mucinous adenocarcinoma [10]. The tumors that are immunoreactive for CK20 and negative for CK7 are more likely to be of colorectal origin. However, the tumors that are immunoreactive to CK7 and CK20 are more likely to be of gastropancreatobiliary origin. CK7 and CK20 are usually reactive in primary ovarian mucinous adenocarcinoma [10]. In the present case, immunohistochemistry of

colon tumor and bilateral ovary showed positivity for CK20 and negativity for CK7. This findings further strengthen the diagnosis of metastatic ovarian adenocarcinoma from colon.

Previous reports revealed that the size of Krukenberg tumors varied from almost normal ovary to 30 x 20 cm in size [3]. In the present case, bilateral ovary was almost normal with slight swelling. Although possibility of Krukenberg tumor seemed to be very low, the authors performed biopsy of bilateral ovary for histopathological evaluation. In case where no biopsy of ovary was taken, the diagnosis of Krukenberg tumor was not confirmed at operation. In case of suspecting colon cancer, even in very young patients with normal ovary, a biopsy of it should be considered for the diagnosis of Krukenberg tumor.

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Address reprint requests to:  
 Y. HASHIGUCHI, M.D.  
 Department of Obstetrics and Gynecology  
 Osaka City University  
 Graduate School of Medicine  
 1-4-3 Asahimachi, Abeno-ku  
 Osaka 545-8585 (Japan)  
 e-mail: hashiguchi@med.osaka-cu.ac.jp