



Case Report

Krukenberg Tumor of the Ovary from Cecal Carcinoma in a Young Woman

Padmapriya Balakrishnan¹, Vijayan Sharmila^{2*}, Thirunavukkarasu Arun Babu³

¹MBBS Graduate, Indira Gandhi Medical College and Research Institute, Puducherry, India

²Department of Obstetrics and Gynecology, All India Institute of Medical Sciences, Mangalagiri, Andhra Pradesh, India

³Department of Pediatrics, All India Institute of Medical Sciences, Mangalagiri, Andhra Pradesh, India

Abstract

Krukenberg tumor of the ovary is not commonly encountered in routine practice. It is a special type of metastatic bilateral ovarian tumor characterized by the presence of mucin-laden signet cells infiltrating the ovarian stroma. Signet ring cells metastasize from primary tumors of the stomach, colon, breast, appendix, and pancreatobiliary tract. We report a rare case of a Krukenberg tumor of the ovary from adenocarcinoma of the colon diagnosed in a 35-year-old female. This case report emphasizes the importance of history taking, clinical examination, and diagnostic evaluation, as there is a propensity for delayed diagnosis in majority of patients due to nonspecific and vague clinical presentation.

Keywords: Adenocarcinoma of the colon, Krukenberg tumor of the ovary, signet ring cells

INTRODUCTION

Krukenberg tumors were first described by Friedrich Krukenberg in 1896 and it accounts for 1%–2% of all ovarian tumors.^[1] Bilateral ovarian tumors can be due to primary serous or mucinous tumors of the ovary, fibroma of the ovary, metastatic ovarian tumor from a primary genital tract tumor, gastrointestinal tract, breast, or pancreatobiliary tract. When a patient has ascites associated with bilateral ovarian tumors, the preoperative possibilities include: (a) bilateral primary malignant tumors of the ovary with intra-abdominal metastasis; (b) primary malignant tumor of the uterus, cervix,

or fallopian tubes with metastasis to bilateral ovaries and abdomen; (c) primary malignant tumor of the gastrointestinal tract and breast with intra-abdominal spread; (d) Meigs syndrome consisting of bilateral benign ovarian fibromas, ascites, and pleural effusion; and (e) primary peritoneal serous carcinoma with bilateral ovarian metastasis. The importance of differentiating these conditions lies in planning for a surgical procedure and starting chemotherapy and/or radiotherapy in

Address for correspondence: Dr. Vijayan Sharmila,
Department of Obstetrics and Gynecology, All India Institute of Medical
Sciences, Mangalagiri - 522 503, Andhra Pradesh, India.
E-mail: sharu_jipmer@yahoo.co.in

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cases of malignancy. Meigs syndrome is a benign condition wherein ascites and pleural effusion subside after bilateral oophorectomy and does not require chemotherapy or radiotherapy. Radiological and histopathological investigations help to make a definitive diagnosis. Herein, we report a rare case of Krukenberg tumor of the ovary from adenocarcinoma of the colon and review of similar cases in the literature.

CASE REPORT

A 35-year-old multiparous sterilized woman presented with complaints of abdominal distension for 2 months which was acute in onset and progressive. She had regular menstrual cycles with normal flow, and there was no history of abdominal pain, fever, vomiting, and altered bladder habits. She reported history of passing dark-colored stools for the past 1 year. There was no history of early satiety, loss of appetite, or weight and no family history of genital malignancies. Her vitals were stable and she had mild pallor. Icterus, lymphadenopathy and pedal edema were absent. Cardiovascular and respiratory system examinations were normal, and breast and thyroid examinations were normal. On examination, her abdomen was distended and associated with positive fluid thrill. A per speculum examination revealed a healthy cervix and vagina. Bimanual examination revealed normal-sized anteverted uterus with bilateral firm adnexal masses. Investigations revealed microcytic hypochromic anemia of moderate degree on peripheral smear examination. A complete urine examination was normal, but a stool test for occult blood was positive. Colonoscopy was performed, which showed an ulcerated, friable cecal mass. A biopsy from the cecal mass showed features of well-differentiated adenocarcinoma on histopathological examination. Magnetic resonance imaging of her abdomen and pelvis showed bilateral ovarian masses with lobulated surfaces, the presence of an infiltrating mass in the cecum, and evidence of ascites and pericolic lymphadenopathy. A Pap smear was negative for intraepithelial lesions or malignancy, and an endometrial biopsy did not show evidence of malignancy. A chest X-ray was normal, and ascitic fluid cytology was negative for malignant cells. A preoperative diagnosis of cecal adenocarcinoma associated with bilateral ovarian masses that were probably metastatic was made (stage IV as per the AJCC). After improving her hemoglobin status, laparotomy was performed. A right hemicolectomy with ileocolonic anastomosis, appendicectomy, hysterectomy, and bilateral oophorectomy with pericolic lymphadenectomy was performed under general anesthesia, and specimens were sent for histopathological examinations. The postoperative period was uneventful, and she recovered well. Gross examination of the intestinal specimen showed a mass in the cecum measuring 6 cm × 5 cm × 3 cm which was hard, infiltrating up to the serosa without perforating the cecum and with a grayish white cut surface [Figure 1a]. The serosa appeared normal and intact, and the appendix appeared normal grossly. The left ovary was 5 cm × 4 cm × 3 cm and the right ovary was 10 cm × 7 cm × 5 cm in size. Both ovaries had bosselated external

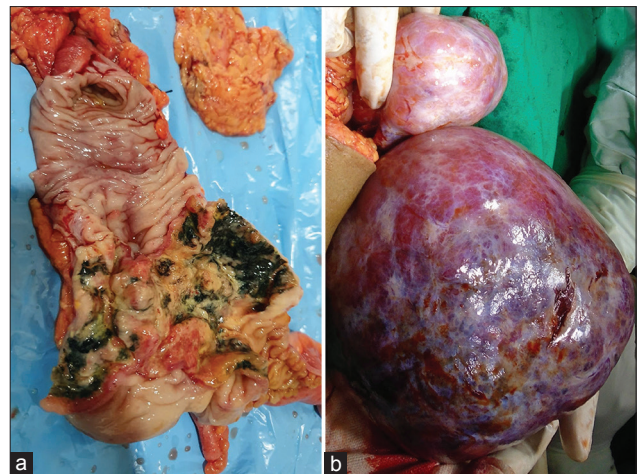


Figure 1: (a) Gross photograph of a resected intestine specimen showing a cecal mass 6 cm × 5 cm × 3 cm in size extending up to the serosa with the appendix. (b) Intraoperative photograph showing bilateral solid ovarian tumors with bosselated external surfaces

surfaces [Figure 1b] and the cut surface was predominantly solid and gray-tan with focal cystic areas filled with mucin. The mesenteric lymph node was 3 cm × 3 cm × 2 cm in size with a gray-tan cut surface. A histopathological examination of sections from the cecal mass showed well-differentiated adenocarcinoma with a tumor infiltrating up to the serosa and extracellular mucin pools separating the muscularis propria muscle fibers [Figure 2a and b]. Sections from the appendix showed that it had a normal structure. Sections from bilateral ovaries showed the presence of mucin-laden signet ring cells infiltrating the ovarian stroma with tumor cells arranged in a glandular pattern at focal areas consistent with a Krukenberg tumor [Figure 3a and b]. Two of the pericolic lymph nodes showed metastatic adenocarcinoma deposits on histopathological examination. Immunohistochemical examinations of the ovarian tumor were positive for CK20 and CDX2 and negative for CK7 in the signet ring cells. The diagnosis of well-differentiated adenocarcinoma of the cecum with Krukenberg tumor of ovaries (stage IVa - pT2, pN1a, and pM1a as per the AJCC 8th edition) was made based on clinical features, radiological findings, and histopathological and immunohistochemical examinations. The patient was then referred to a higher center for chemotherapy and further management.

DISCUSSION

Krukenberg tumors are more common in females than in males. In males, obliteration of the abdominal inguinal ring and low scrotum temperature do not favor transperitoneal metastasis of tumors to the testes.^[2] Krukenberg tumors are usually not suspected due to the nonspecific symptoms and signs.^[3,4] Abdominal pain and distension are the most common presentations, as seen in our case.^[5] Premenopausal age group is the most common age at presentation.^[6] The published case reports of Krukenberg tumors from colon carcinoma

in females are listed in Table 1. A systematic approach is needed to make a diagnosis, including a complete clinical examination and ordering appropriate investigations. Our patient had a history of passing dark-colored stools for 1 year and microcytic hypochromic anemia, which prompted us to test her stool for occult blood and perform colonoscopy, which in turn helped to identify the primary tumor. Investigations such as gastroscopy, colonoscopy, and biopsy of the lesion are necessary for a preoperative diagnosis before proceeding with laparotomy.^[4,10] Positive CK7 and negative CK20 expressions indicate primary mucinous cystadenocarcinoma of the ovary. Positive CK7 and CK20 expressions indicate a primary gastric and pancreatobiliary carcinoma. CK7 negativity and positivity for CK20, CDX2, and SATB2 indicate primary colorectal carcinoma. Colon carcinoma is the second most

common malignancy causing Krukenberg tumors next to gastric carcinoma.^[6,7] CDX2 is the most sensitive and specific immunohistochemical marker for colorectal adenocarcinoma and was positive in our case.^[7] SATB2 is a novel specific marker for lower intestinal tract malignancy (colorectal and appendiceal carcinoma). Pap smear and endometrial biopsy are necessary to diagnose malignant lesions of the cervix and endometrium respectively. Findings that favor metastatic ovarian tumors are bilaterality, bosselated external surface with maintained ovary shape, solid nature, and tumor cells being negative for CK7.^[3,11] The recommended treatment protocol for Krukenberg tumors is early excision of the primary tumor with total hysterectomy and bilateral oophorectomy followed

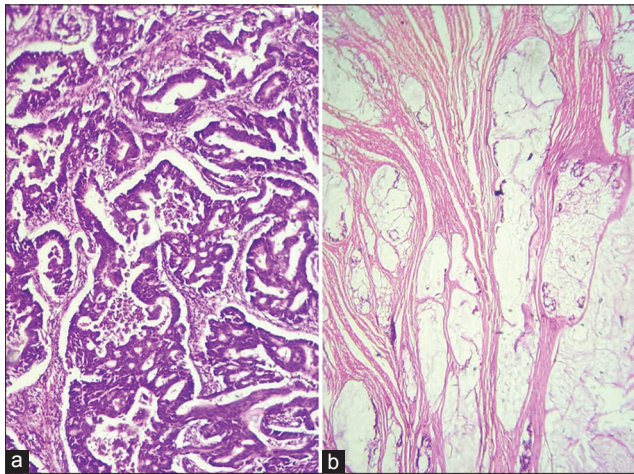


Figure 2: (a) Photomicrograph of the cecal mass showing well-differentiated adenocarcinoma (H and E, ×100). (b) Photomicrograph of the cecal mass showing extracellular mucinous pools separating muscularis propria muscle bundles (H and E, ×100)

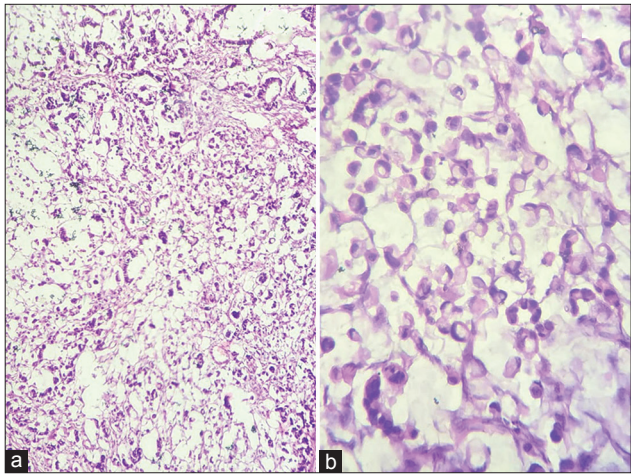


Figure 3: (a) Photomicrograph of the left ovarian mass showing metastatic tumor cells infiltrating the ovarian stroma and forming glands at focal areas (H and E, ×40). (b) Photomicrograph of the left ovarian mass showing metastatic mucin-laden signet ring cells with vacuolated cytoplasm and peripheral pushed nucleus (H and E, ×400). Right ovary also showed similar microscopic features

Table 1: Previously published reports of Krukenberg tumors from colon carcinoma in females				
Author name	Year of publication	Patient's age	Site of primary tumor	Treatment
Index case	2020	35 years/female	Cecum	Right hemicolectomy Total abdominal hysterectomy Bilateral salpingo-oophorectomy Platinum based chemotherapy
Luo <i>et al.</i> ^[7]	2017	47 years/female	Transverse colon	Transverse colon radical resection bilateral salpingo-oophorectomy breast radical mastectomy
Umakanthan <i>et al.</i> ^[4]	2015	36 years/female	Ascending colon	Partial colectomy Total abdominal hysterectomy Bilateral salpingo-oophorectomy Platinum-based chemotherapy
Shiono <i>et al.</i> ^[8]	2014	44 years/female	Ascending colon	Radical hysterectomy Bilateral salpingo-oophorectomy Partial colectomy Platinum-based chemotherapy
An <i>et al.</i> ^[9]	2019	66 years/female	Caecum	Ileocecal resection Right salpingo-oophorectomy Systemic chemotherapy

by platinum-based chemotherapy.^[1,4,10] The outcome is very poor in terms of reduced survival rate, even with aggressive treatment.

CONCLUSION

We report a case of a Krukenberg tumor of the ovary from a well-differentiated adenocarcinoma of the cecum in a 35-year-old multiparous woman. We strongly recommend detailed history-taking, complete clinical examination, and evaluation of women who present with vague symptoms to diagnose a primary tumor of the gastrointestinal tract and to do appropriate investigations to detect Krukenberg tumor of the ovaries. These efforts will save the patient's and surgeon's time and lead to early synchronous management of the primary tumor and Krukenberg tumor, leading to a better prognosis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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