CASE REPORT

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Synchronized Bilateral Giant Krukenberg Tumor Originating from the Colon

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ABSTRACT In this article, we presented clinical and histological findings of a very rare case of metastatic bilateral synchronous giant Krukenberg tumor (KT) in very young age and presented with ileus, abdominal pain and swelling. Descending colon tumor, peritoneitis carcinomatosa (PC), bilateral ovarian giant tumor were detected during the emergency operation for ileus. Histomorphologically, the primary focus of bilateral ovarian tumors and PC was located in the descending colon. There was microscopic examination revealed mucinous adenocarcinoma (MAC) accompanied by signet ring cell carcinoma, diffusely invading the ovarian parenchyma in bilateral ovaries. In these case the choice of treatment is more difficult and prognosis is also worse with fatal outcome in one year. Early diagnosis, complete resection and intraoperative chemotherapy are the only possible hope.

Keywords: Krukenberg tumor; ovary; colon

Krukenberg tumours (KTs) are defined by the World Health Organization as metastatic ovarian tumours originating from gastrointestinal adenocarcinomas. Up to 30% of ovarian malignancies are in fact metastatic tumours. Stomach is the most common primary site followed by colorectum, appendix, breast, biliary system, jejunum, pancreas.[1-4]

Krukenberg tumor constitutes 1–2% of all ovarian tumors.[2] It is bilateral in 80% of the cases.[4] Histologically these are usually poorly differentiated intestinal type adenocarcinoma, sometimes producing mucins and the mucin-laden signet ring cells may be assosiated.[2-4] Additionally, peritoneal metastasis is one of the most common forms of colon cancer metastasis. KT is considered as a metastatic disease with very poor prognosis/[1,5] Treatment and prognostic factors are not well established.[3]

CASE REPORT

A 18-year-old female was admitted to emergency service for severe abdominal pain and swelling on 20.11.2016. In computed tomography (CT) images, a solid mass covering abdomen was seen. Additionally, ileus findings were observed in CT and X-ray images (Figure 1). The patient was taken for urgent operation. A giant tumor that originated from right ovary was seen during the operation. Furthermore, there was a big tumor in the left ovary. Extensive adhesions were seen between the surface right over and the peritoneum. Numerous white nodules were also observed on the omentum, peritoneal

and liver surfaces (Figure 2 A). At the same time, on exploration, a hard mass was detected descending colon with obvious ileus findings.

Histomorphological examination:

1) Colonic tumor was approximately 7x6x5 cm in dimension, hard consistency, and was infiltrative/endophytic, intraluminal/serosal growth, and annular with circumferential involvement of colon wall and obstruction of the lumen (Figure 2 B).

2) Right ovarian mass was 2420 g on weight, 22x21x13 cm in dimensions, lobulated, elastic consistency, creamy-gray colored. Capsule integrity has preserved. At the serosal surface of over, there was approximately 17x12x0.6 cm in dimension peritoneal membrane, had including the largest approximately 1 cm in diameter numerous cream colored nodule. At the cut surface was observed creamy-white colour solid areas, light gray-brown colour necrotic areas and a few cysts of the largest 5 cm in diameter (Figure 2 C, D).

3) Left ovarian mass was 450 g on weight, 14x9x9 cm in dimensions, lobulated, elastic consistency, creamy-gray colored. Capsule integrity has preserved. The cut surface was observed creamy-white colour solid and light green colour gelatinous necrotic areas (Figure 2 E).

In the microscopic examination, at the section of all tumour tissues was observed an abundance of mucin pools, eliminating the normal colonic, ovarian and peritoneal structures. Mucin pools were usually lined by cytologically atipical epitelium (Figure 3 A, B, C). There were mixture of mucinous adenocarcinoma (MAC) and signet ring cells carcinoma (volume is approximatelly 20%) in some areas. At the immunohistochemical examination, all organ tumors was positive for cytokeratin 20 (Figure 3 D), and negative for cytokeratin 7. These histomorphological findings and clinical results confirmed the diagnosis of ovarian metastasis from colon cancer. There was no pathologic feature in the endometrium. Ovarian tumors were diagnosed as KT. For Lynch syndrome, in our department in Somalia could not studied using immunohistochemistry (MSH2, MLH1, PMS2), microsatellite instability (MSI), mononucleotide markers (D2S123, D5S346, D17S250), dinucleotide markers (BAT25, and BAT26) and DNA mismatch repair (MMR) gene (i. e., MSH2, MLH1, MSH6) because of it was very expensive. In addition to, there was no cancer story in our patient's father and uncle.

Complementary aggressive surgical operation and oncologic treatment planned but our patient did not accept next complementary aggressive surgery. Our patient died on 15 March 2017.

DISCUSSION

Krukenberg tumors constitute 1% to 2% of all ovarian neoplasms occurring in females <40 years of age.[2,4] These patients present with symptoms of abdominal pain and distension, palpable mass, loss of appetite, weight loss, menstrual cycle changes, and dyspareunia.[3] Ascites is seen in 50% of the cases.[3] In our patient, abdominal swelling, disten-

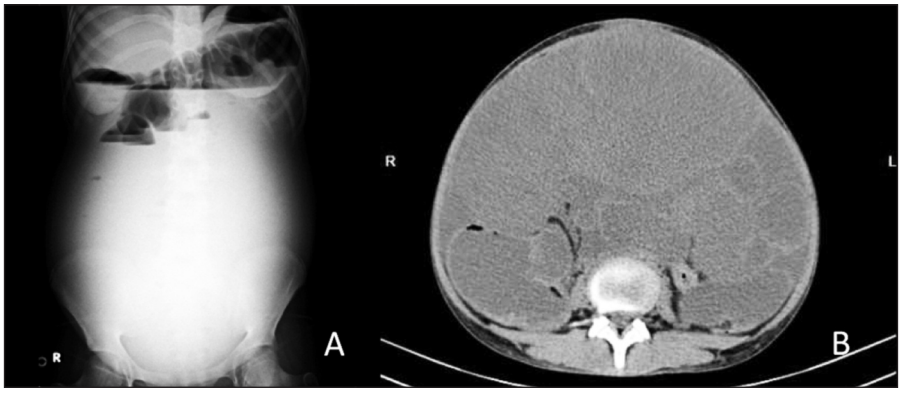

FIGURE 1: Air liquid level in direct standing abdominal X-ray **(A)**. Abdominopelvic mass images in CT **(B)**.

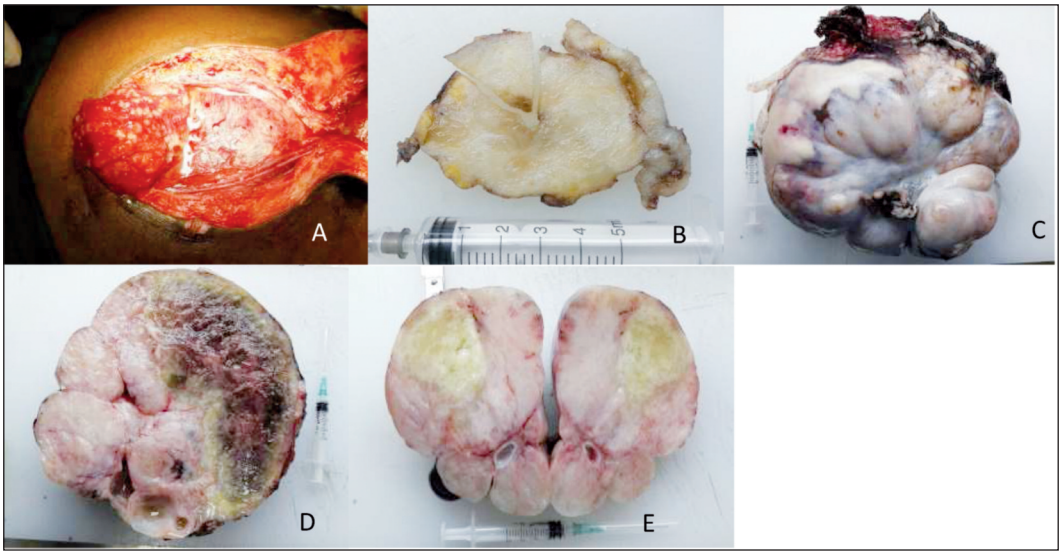

FIGURE 2: Peritoneal and omental many nodul with abdominopelvic giant mass were observed during the operation **(A)**. The section perpendicular to long axis of colon tumor **(B)**. Right overian mass **(C)**. At the cut surface of right overian mass was observed creamy-white colour solid areas, light gray-brown colour necrotic areas and cysts **(D)**. At the cut surface of left overian mass was observed creamy-white colour solid and light green colour gelatinous necrotic areas **(E)**.

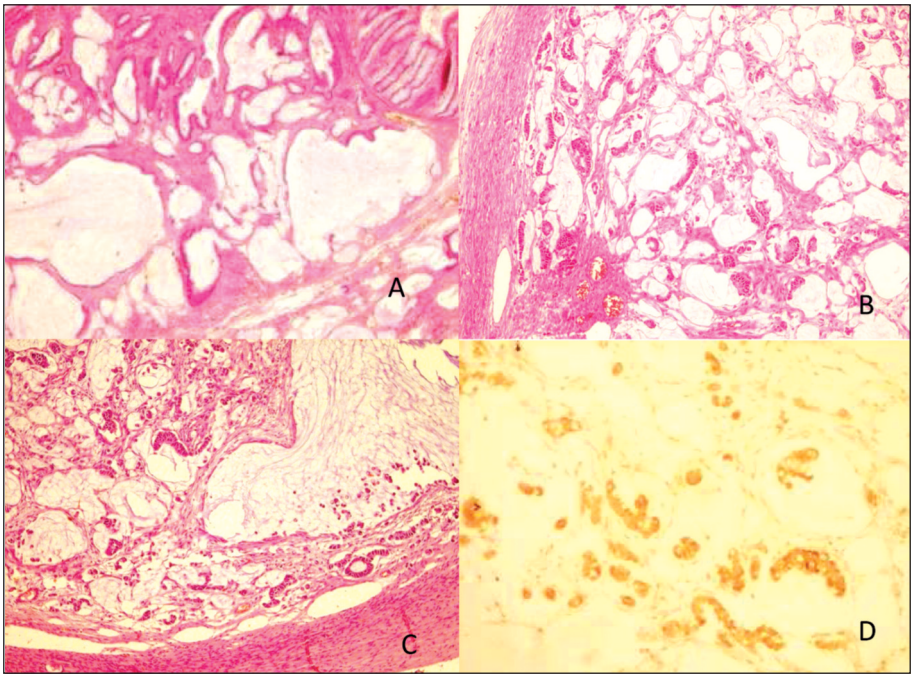

FIGURE 3: At the section of colonic **(A)**, right **(B)** and left **(C)** ovarian tumour tissues was observed an abundance of mucin pools accompanied by signet ring cell carcinoma that were usually lined by cytologically atipical epithelium (H&E, x100). **(D)** Immunohistochemical findings of all tumors showed positive staining for CK20, (x200).

sion and pain were obvious complaints, and both primary colonic tumor and PC and bilateral ovarian masses were found during surgery for urgent ileus (Figure 1, 2).

Majority of cases they are synchronous KT, but 20% to 30% occur as metachronous lesion after removal of primary.[1,6] In a study of Tan et al. with 25 KTs, 16 patients (64%) had ovarian metastasis at

the time of diagnosis of the colorectal cancer.[6] Eleven patients (44%) had unilateral ovarian involvement. Nineteen patients (76%) had PC.[6]

The classical gross pathological features of KT are bilateral, asymmetrically enlarged ovaries with a nodular growth pattern and presence of tumour on the surface and/or in the superficial cortex of the ovary such as our case and our patient was containing with peritoneal tumor noduls and adhesions (Figure 2).[2,7]

Histological features that favour ovarian metastases include an infiltrative growth pattern with stromal desmoplasia, a nodular growth pattern, involvement of the ovarian surface and superficial cortex and hilar and lymphovascular space invıolvement. In contrast, primary ovarian tumours lack these features and have a confluent, glandular growth pattern.[7] Ovarian clear cell carcinomas (CCCs) can be mistaken with KT, because CCCs can fokally contain signet ring cells with intracytoplasmic mucin. KTs are usually bilateral, whereas CCCs are almost always unilateral.[8] Furthermore, KTs have a characteristic prominent cellular stroma with uniformly distributed signet ring cells predominate. In addition to, CCCs are negative for CK20 but positive for CK7.[8]

In our cases, the histopathologic diagnosis of primary colon tumor, peritoneal and bilateral ovarian tumors was mucinous adenocarcinoma accompanied by signet ring cell carcinoma. In immunohistochemical examination, as in the study of Berezowski et al. in our case, all organ tumors were positive for CK20 (Figure 3D) and negative for CK7.[7]

In ovarian mucinous tumours, CK7 is typically positive whereas CK20 displays variable positivity-whereas metastatic gastrointestinal carcinoma is CK7 negative and CK20 positive.[3,8,9]

Radiologically, KTs typically appear as bilateral, irregular, hyperechoic solid pattern with well-defined cystic areas producing a prominent vascular signal along the cystic wall. CT scans show solid ovarian masses with strong contrast enhancing walls which are absent in primary ovarian cancer as in our case.[3]

The literature review for the treatment strategy showed that surgical resection and aggressively targeted chemotherapy have a better outcome.[10]

According to the study of Jun and Park even if surgery was performed, the mean survival period was 18.8 months.[10] Nonetheless, the 3-year survival rate was 15.8%, and so attempts to resect tumors as the second tumor reduction seem worthwhile. Although several factors may mediate effects on the survival rate, the most important factor that affects the survival rate is the complete resection of tumors. Yet the recurrence patterns are important, and aggressive efforts not to leave residual cancer cells at the second surgery are required.[10] In the study of Tan et al. median time between diagnosis of KT and death was 19 months.[6] Our patient died 3 months after the emergency operation.

Peritoneal carcinomatosis is one of the most common forms of colon cancer metastasis, and about 10%-35% of PC is found in a solitary form without other metastasis.[5] Synchronous PC is found in 10%-15% of colorectal cancer patients such as in our patient. It is more inclined local recurrence and prognosis is extremely poor with a mean life expectancy of only 6 months.[5]

As shown in previous publications, patients in the study of Xu et al[1] were diagnosed with KTs at a median age of 49 years. Since our patient is 18 years old, a genetic disorder like Lynch syndrome has come to mind too, but there was no cancer story in patient's father and uncle.

Lynch syndrome is an autosomal dominant tumor predisposition condition caused by mutations in the mismatch repair genes. The lifetime risk of LS-associated ovarian cancer is in the region of 6-14%.[11] Each year, Lynch syndrome accounts for 1%-3% of all colorectal cancer cases.[12]

For Lynch syndrome, in our department in Somalia could not studied using immunohistochemistry (MSH2, MLH1, PMS2), microsatellite instability, (analysis with the Bethesda panel), mononucleotide markers (D2S123, D5S346, D17S250), dinucleotide markers (BAT25, and BAT26) and DNA mismatch repair gene (i.e.,

MSH2, MLH1, MSH6) because of it was very expensive.[13]

In conclusion, our patient was originally a case of MAC with synchronous bilateral giant KT and PC. Bilateral giant KT is rare presenting with abdominal swelling and ileus symptoms. When a patient presents with non-specific abdominopelvic symptoms because of ileus or masses leading to suspicion of an ovarian tumour. As in our case, patients who underwent urgent surgery with abdominopelvic complaints may require a second aggressive surgical treatment for prognosis. In addition to, in such patients, the possibility of lynch syndrome should be kept in mind.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Yılmaz Baş;* ***Design:*** *Yılmaz Baş;* ***Control/Supervision:*** *Ali Kalyoncu;* ***Data Collection and/or Processing:*** *Ali Bulgan, Yılmaz Baş;* ***Analysis and/or Interpretation:*** *Yılmaz Baş, Ali Bulgan;* ***Literature Review:*** *Ali Bulgan, Yılmaz Baş;* ***Writing the Article:*** *Yılmaz Baş;* ***Critical Review:*** *İkram Abdulkarim İbrahim, Ali Kalyoncu;* ***References and Fundings:*** *Ali Kalyoncu;* ***Materials:*** *Yılmaz Baş.*

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