

# Rupture of Krukenberg Tumor: Case Report of an Uncommon Entity

## Çok Nadir Rastlanan Bir Olgu: Krukenberg Tümör Rüptürü

Burak KAVLAĞOĞLU, MD,<sup>a</sup>  
Recep PEKÇİCİ, MD,<sup>b</sup>  
Seçkin AKKÜÇÜK, MD,<sup>a</sup>  
Süleyman ORAL, MD<sup>a</sup>

<sup>a</sup>Department of General Surgery,  
Ankara Oncology Teaching and  
Research Hospital,

<sup>b</sup>Department of General Surgery,  
Ankara Teaching and  
Research Hospital, Ankara

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Yazışma Adresi/Correspondence:

Burak KAVLAĞOĞLU, MD

Ankara Oncology Teaching and

Research Hospital,

Department of General Surgery, Ankara,

TÜRKİYE/TURKEY

bkavlakoglu@hotmail.com

**ABSTRACT** Krukenberg tumors are metastases of gastrointestinal and bladder tumors to the ovaries. Krukenberg tumors are frequently diagnosed as huge ovarian tumors. In some cases, they were identified in early stage and curative operation could be performed. We report a case of a 43-year-old woman investigated for acute abdominal pain and found to have a ruptured Krukenberg tumor from colon cancer. In physical examination severe abdominal pain, constipation and signs of peritonitis were seen. Laparotomy and abdominal exploration was performed. Ruptured Krukenberg tumor, left colonic tumor and liver metastasis were found at the time of operation. Left hemicolectomy, right salphingo-oophorectomy and liver biopsy were performed. Postoperative course was uneventful, appropriate chemotherapy regimen was added to treatment. Ruptures of ovarian cysts are one of the significant etiological factors for women with acute abdominal pain. However, Krukenberg tumor rupture related to colon cancer metastases is very rare.

**Key Words:** Krukenberg tumor; colonic neoplasms

**ÖZET** Krukenberg tümörü gastrointestinal sistemden overlere metastaz sonucu gelişir. Krukenberg tümörleri sıklıkla dev over tümörleri olarak tanı alırlar. Erken tanı alan bazı olgularda küratif ameliyat uygulanabilir. Bu olgu sunumunda, kolorektal kanser over metastazı rüptürüne bağlı olarak gelişen akut karın bulguları ile başvuran 43 yaşındaki olgu sunuldu. Fizik muayenede şiddetli karın ağrısı, kabızlık ve peritonit bulguları saptandı. Eksploratris laparotomi yapıldı. Ameliyat sırasında Krukenberg tümör rüptürü, sol kolon tümörü ve karaciğer metastazı saptandı. Sol hemikolektomi, sağ salpingooferektomi, karaciğer biyopsisi yapıldı. Postoperatif dönem sorunsuz geçti. Tedaviye uygun kemoterapi rejimi eklendi. Over kist rüptürleri akut karın ağrısının önemli sebeplerinden biridir. Bununla birlikte, karın içi kanama, çok nadir de olsa Krukenberg tümörü rüptürüne bağlı olabilir.

**Anahtar Kelimeler:** Krukenberg tümör; kolon kanseri

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**M**etastatic ovarian tumors are an important group of ovarian neoplasms. Gastric, colorectal, appendix, breast, biliary tract, gallbladder, pancreas and bladder tumors can make their metastases to the ovaries, and they are called as Krukenberg tumors. The metastatic ovarian tumors constitute 3 to 8% of all and 10 to 30% of malignant ovarian tumors and metastasis of neoplasms arising from intestines occur mostly direct spreading. Ruptures of ovarian tumors are one of the significant etiological factors for women who regards with acute abdominal pain. However,



FIGURE 1: Ruptured ovarian metastasis.



FIGURE 2: Left colonic tumor.

Krukenberg tumor rupture related to colorectal cancer metastases is very rare. Acute abdominal pain related to metastatic ovarian cyst rupture from asymptomatic and slow prognosed colorectal cancer, may be the first finding.<sup>1,2</sup>

### CASE REPORT

Most of the nongenital cancers that metastasize to the ovaries arise from the gastrointestinal tract. In this article, a 43-year-old woman investigated for acute abdominal pain with a ruptured Krukenberg tumor from colon cancer was reported. Severe abdominal pain, constipation and signs of peritonitis were seen. As a result of the clinical and biological signs of early peritonitis, an emergency surgical exploration was performed. At exploration, ruptured ovary (Figure 1), multiple liver metastases and left

colonic tumor (Figure 2) were found. Left hemicolectomy, right salphingo-oophorectomy and liver biopsy from one metastases mass were performed. Left salphingo-oophorectomy was not performed because preoperative diagnosis was not Krukenberg tumor, and the patient's consent was not obtained.

The patient had an excellent rapid postoperative recovery and postoperative course was uneventful. Appropriate chemotherapy regimen was added to treatment and the patient was discharged 10 days after surgery. Histological examination confirmed adenocarcinoma. Four cycles of FOLFOX 4 regimen were given to the patient. Progression of the liver metastasis and contralateral ovarian metastases (Figure 3, 4) was detected 4 months after the primary



FIGURE 3: Liver metastases progressed four months later after the primary laparotomy.



FIGURE 4: Contralateral ovarian metastases detected four months later after the primary laparotomy.

laparotomy. Therefore, we planned six cycles of FOLFIRI and bevacizumab (Altuzan®) chemotherapy protocol. Progression was detected after the third cycle of treatment, and chemotherapy was stopped. Eventually, the treatment was stopped eight months after the surgery. Then, the patient died 13 months after the operation.

## DISCUSSION

Gastric, colorectal, appendix, breast, biliary tract, gallbladder, pancreas and bladder tumors can metastasize intraperitoneally to ovaries, and they are called as Krukenberg tumors. Intraabdominal bleeding is one of the rare symptoms for Krukenberg tumors. Acute abdominal pain related to metastatic ovarian cyst rupture arising from an asymptomatic and slow-growing colon cancer may be the first finding.<sup>1,2</sup>

Metastatic ovarian tumors grow slowly in elderly, however they grow rapidly in younger patients, and are frequently diagnosed as huge ovarian tumors. In some cases, they can be identified in their early stage as cystic ovarian lesions, however, since it is not realized that they are in fact metastatic masses, a curative operation is not performed. Regular postoperative pelvic CT or MRI can be helpful for diagnosis. Although serum carcinoembryonic antigen (CEA) levels do not increase in most cases, tumor marker CA125 is elevated in several cases, and thus it may be useful for the detection of ovarian metastases. Pathologic immunohistochemistry (IHC) and mucin gene antibodies (MUC2, MUC5AC) may be useful for differential diagnosis among metastatic masses and primary ovarian cancer. Especially CA125, CEA, HAM56, cytokeratin7 (CK7) and cytokeratin 20 (CK20) are used for IHC. Metastases of colorectal tumors to the ovary are stained with CEA, CK20 and MUC2 but not with MUC5AC.<sup>2-5</sup> According to study of Bayar et al. differential diagnosis of primary and metastatic tumors is very difficult. They also reported that metastatic ovarian tumors constitute 3 to 8% of all and 10 to 30% of malignant ovarian tumors and metastatic neoplasms arising from intestines occur mostly direct spread. Colonic metastases are five-times more frequent than gas-

tric tumors. Primary ovarian cancers and colonic cancers' pathologic characteristics and tumor behaviors are almost the same.<sup>2,17</sup>

Gungor et al. reported another retrospective analysis. According to this study, 17 of 168 (10.1%) metastatic ovarian cancer patients were treated between January 1986 and May 1993. All of the cases were evaluated with respect to their age on presentation, clinical findings and symptoms, the origin of the primary tumor, the gross and microscopic appearances of the tumor and the treatment modality. As a result, most frequently encountered primary site was gastrointestinal system (46.9%) followed by breast, endometrium and lungs. Metastatic ovarian cancers constitute a subgroup of ovarian cancers of profound importance. These cases are symptomatic, have bilateral involvement and poor prognosis. For this reason, authors emphasized that gastrointestinal system and breast should be investigated thoroughly in the differential diagnosis of pelvic masses.<sup>6</sup>

In some studies, the incidence of Krukenberg tumors is reported as 0.7-6%.<sup>6,10</sup> On the other hand, studies about acute abdomen due to Krukenberg tumor is very rare. Ovarian metastases from colorectal cancer was 6% according to study of Birnkrant et al.<sup>7</sup> Ovarian metastases were more common at premenopausal women, however oophorectomy did not affect survival significantly survival in their study. They also suggested ooforectomy if there was a suspicion for ovarian metastases during colorectal surgery. According to the study of Sakakura et al. the growth of metastatic ovarian tumors is rapid in younger patients and they are frequently diagnosed as huge ovarian tumors.<sup>8</sup> They also reported that cystic ovarian lesions could be identified in their early stage but could not be diagnosed as ovarian metastases, and later a curative operation could not be performed in some cases. They found normal CEA, but elevated CA 125 levels. Median survival was 20.8 months. Their two cases who lived more than five years had radical resections.<sup>8</sup>

Findings of peritonitis were found on first physical examination in our case. We performed emergent laparotomy without colonic preparation.

The primary site of malignancy was descending colon. There were a number of metastatic nodules in liver, and we found a rupture at right ovary due to metastasis of colon cancer. We performed palliative unilateral salpingo-oophorectomy and left hemicolectomy. CEA and CA19-9 levels were high in early postoperative period. Due to presence of the metastatic disease, five year survival was expected approximately as 5%. Synchronous metastases to ovary from colorectal cancer (Krukenberg tumors) is rare. According to the study of Wright et al., abdominal pain was the most common symptom at presentation. Only 14% of the 28 patients presented with gastrointestinal bleeding. At exploration, the ovarian metastases were significantly larger than the primary colon tumors. The only pathological variable associated with survival was tumor grade. The median overall survival was 18.4 months in this study.<sup>10</sup> In our case, we found the ovarian metastases during laparotomy.

The Krukenberg tumors have bad prognostic factors, so the expected median survival is short. McGill et al. reported only seven cases of Krukenberg tumor among 1016 cases.<sup>11</sup> The average survival of these seven patients was 12.3 months and one patient who had a secondary debulking and chemotherapy had the longest survival in this study (26 months). They suggested prophylactic oophorectomy during colon cancer surgery, even if there were no signs of ovarian metastases. Oophorectomy was performed during their colon cancer surgery in 19/788 (2.4%) women and only two of them had (10.5%) Krukenberg tumors. Authors also reported that Krukenberg tumors were more common in premenopausal women.<sup>11,12</sup> In another study, Mrad et al. reported 14 cases of Krukenberg tumor, the median survival was 14 months, and the authors suggested bilateral prophylactic oophorectomy for postmenopausal patients.<sup>13</sup> We resected the ruptured ovary and preserved the other ovary since preoperative diagnosis was peritonitis with abdominal pain and we have no informed consent.

Krukenberg tumors may appear even after several years. Praz and et al reported a case of Krukenberg tumor from colon cancer, three years after

the surgery.<sup>14</sup> The ovarian involvement reported to be hematogenous, lymphatic or due to contiguous extension from the primary colonic tumor; they also reported that there might be some anatomic predispositions such as utero-ovarian vessel anastomosis in the ligamentum latum or peritoneal adhesions.<sup>14</sup> We detected the primary site and metastatic site of tumor at first laparotomy.

In another study, Kim et al. reported the median survival as 7.7 months in 34 cases.<sup>15</sup> The most significant factor over the prognosis was the residual tumor status after the first operation.<sup>15</sup> There was no residual tumor, but many liver metastases in our case.

Sugimoto et al. analysed CA125, CEA, CA19-9 levels of patients with Krukenberg tumors. All of three markers were high at time of diagnosis, and after the resection of primary tumor and metastatic organs the levels of three markers became normal. We performed an emergent laparotomy, so we could not measure CEA, CA125, CA19-9 levels. However the levels of these markers were high in early postoperative period.<sup>16</sup>

Krukenberg tumors are the most common secondary ovarian neoplasm to mimic an ovarian primary tumor. Even after histologic examination, metastases often are mistaken for endometrioid carcinoma. According to study of Lash et al. the clinical and pathologic features of 22 cases of documented colorectal carcinoma metastatic to the ovary were analyzed. In this study, the intestinal carcinomas were resected previously from 4 to 60 months before removal of the ovarian metastases in nine patients (41%). On the other hand, there were no published data about the synchronous resection of colorectal carcinoma and ruptured Krukenberg tumor such as our case report in the literature until now. Histologically, 19 cases were classified as pseudoendometrioid type, two as mucinous type, and one as mixed pseudoendometrioid-mucinous type. The most characteristic microscopic features of the ovarian metastases were garland and cribriform growth patterns, intraluminal "dirty" necrosis, segmental destruction of glands, and absence of squamous metaplasia. Immunohistochemical staining

for carcinoembryonic antigen (CEA) was strongly positive. According to this study, inappropriate treatment as primary ovarian carcinomas thereby is avoided because of the recognition of these distinctive histologic features of the intestinal origin of these ovarian tumors.<sup>17</sup>

Spontaneous rupture of the spleen is another reason of acute abdomen. It commonly occurs in hematologic disorders. Spontaneous rupture of the spleen is rare and important in differential diagnosis of acute abdomen.<sup>18</sup>

Surgical treatment consisted of bilateral and unilateral salpingo-oophorectomy or pelvic exenteration and additional hysterectomy. Ruptures of ovarian tumors are one of the significant etiological factors for women with acute abdominal pain. However Krukenberg tumor rupture related to colon cancer metastases is very rare. As a result, doctors must always pay attention to intraabdominal bleeding from a possible ovarian tumor rupture in patients who present with anemia, peritonitis and ileus symptoms.

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