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Krukenberg's Tumor as an Incidental Finding in a Full-Term Pregnancy: A Case Report

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ABSTRACT

BACKGROUND

Krukenberg tumor is a rare metastatic tumor of the ovary with characteristic histopathological features known as signet-ring cells. It usually presents in women around 45 years of age, however, we present an uncommon case in a 38-year-old pregnant woman. We report this case because of the unusual findings, the uncommon presentation in this younger age bracket, its diagnostic challenge, and poor prognosis.

CASE PRESENTATION

We describe an unusual case of a young woman with a history of painful vaginal bleeding at 13 weeks of pregnancy and treated for *abruptio* placentae. In her routine prenatal visit at week 20 of pregnancy, she was found to have a uterine fundus greater than her gestational age and referred to the hospital to discard polyhydramnios. At her admission a pelvic ultrasound was performed with normal findings of a 25 weeks pregnancy, also showing bilateral enlarged ovaries with heterogeneous echogenicity. The MRI showed a left tumoral lesion with dimensions of 22.1 x 13.6 x 16.3 cm, with lobulated regular contours with displacement of peripheral structures and mild compression of the bladder, the left ureter, and the inferior vena cava. The lesion was heterogeneous with irregular borders. The patient was programmed for a cesarean section; during the operation, the abdominal cavity showed bilateral tumors compatible with MRI findings, the ovarian tumors were sent to pathology and the results showed poorly differentiated

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mucinous adenocarcinoma (WHO III) with extensive signet-ring cells, an indicative of Krukenberg tumor.

CONCLUSION:

The case presented is rare due to its presentation in a pregnant woman without identifiable risk factors for gastric cancer. The incidental finding suggests the pregnancy masked the clinical presentation of gastric cancer, and the rapid deterioration of the patient is consistent with the aggressiveness described in the literature. The limited descriptions of this neoplasm in our country and the torpid evolution of this case highlight the importance of further studies of this cancer in Mexico.

Keywords: Krukenberg Tumor; Neoplasm Metastasis; Ovarian Neoplasms; Female Urogenital Diseases and Pregnancy Complications; Case Report.

BACKGROUND:

Krukenberg tumor (KT´s) is a rare tumor of the ovary, characterized by its poor prognosis. This tumor is named after Friedrich Ernst Krukenberg who first described five cases of a new ovarian malignancy in 1896. Years later it was discovered that KT´s are ovarian metastases secondary to specific malignancies (signet-ring cell carcinomas), most of which derive from the gastrointestinal tract. The stomach was previously reported to be the most common primary site, followed by the colon, appendix, and breast. Recent literature reveals an increased incidence of tumors originating from the colon. Of all ovarian tumors diagnosed, KT´s make up about 1% to 2% of these tumors.[1]

They are often bilateral (over 80%) given its metastatic nature. The average age of diagnosis is 45 years. However, it can be seen in all age groups. They normally present symptoms due to ovarian involvement and mass effect which causes abdominal pain, bloating, nonspecific gastrointestinal symptoms, or ascites with malignant cells. The diagnosis of KT´s is currently based on the diagnostic criteria of the World Health Organization (WHO) based on the pathological description by Serov and Scully as ovarian tumors with the presence of mucus-filled signet-ring cells (SRCs) accompanied by a sarcoma-like proliferation of the stroma.[2]

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CASE PRESENTATION:

Chief complaints

A 38-year-old female who lived in a rural area of Yucatan attended the hospital with a pregnancy of 20 gestational weeks by last menstrual period for her routine prenatal visit. During the physical examination, she was found to have a uterine fundus greater than her gestational age, for which she was referred to our hospital for further assessment.

History of present illness

At 13 weeks of gestation, the patient was admitted to the hospital for vaginal bleeding and treated for abruptio placentae, with discharge at recovery. Then at her routine prenatal visit for her 20th week of pregnancy, she was found to have a uterine fundus greater than her gestational age, for which she was referred to our hospital to discard polyhydramnios. A pelvic ultrasound was performed finding a normal intrauterine pregnancy of 25 gestational weeks with cephalic diameter consistent with gestational age, normal cardiac activity, and an adequate amount of amniotic fluid. The ultrasound showed bilateral enlarged ovaries with heterogeneous echogenicity. Due to these findings, a pelvic MRI was performed, which showed occupation by an intrauterine pregnancy **(Figure 1)**, as well as a left tumoral lesion **(Figure 2)** with dimensions of 22.1 x 13.6 x 16.3 cm, with lobulated regular contours which caused right confinement of the uterus, as well as eccentric displacement of the small intestine, peripheral vascular structures and mild compression of the bladder, without infiltration. There was left ureteral compression with mild pyelo-ureteral dilation, as well as mild compression of the inferior vena cava. The lesion was heterogeneous, predominantly isointense to soft tissue in different sequences, with hypointense areas in T1, hyperintense in T2, with irregular borders. It presented extensive contact with the uterine corpus **(Figure 3)**. The ovaries were not easily visible.

The patient was given fetal lung maturation therapy with dexamethasone and scheduled to a cesarean section at 26 weeks of gestation. During surgery, the uterus was open using a median incision and the neonate was obtained without complications. The abdominal cavity showed

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bilateral tumors compatible with the MRI findings. A hysterectomy with right oophorectomy was performed; the patient was discharged 2 weeks later without complications.

The ovarian tumors were sent to pathology and the results showed poorly differentiated mucinous adenocarcinoma (WHO III) with extensive SRC.

Two days after the discharge she presented nausea and vomit of gastric content accompanied by abdominal pain. She was admitted to the hospital due to the symptoms described and ascites findings, an abdominal paracentesis was performed. The ascites fluid analysis showed glucose of 20 mg/dL, proteins 1.28 g/dL, LDH 1551 U/L, with the presence of gram-positive cocci. Due to the physical and analytical findings, we initiated management with IV fluids and antibiotic therapy.

History of past illness

There were no relevant risk factors or a family history of cancer.

Physical examination

On admission, she was cachectic, with abdominal distention due to ascites fluid, bulging flanks, and abdominal pain at profound palpation. On the pelvic examination, a 1 cm dehiscence on the vaginal vault was found, with drainage of fecal material. On admission, her blood pressure was 100/70 mmHg.

Laboratory testing

The laboratory tests showed decreased hemoglobin levels (8.0 g/dL), hematocrit (25.8 %) albumin (2.04 g/dL), proteins (4.60 g/dL), globulin (2.56 g/dl), sodium (132 mEq/L) and chloride (96 mEq/L). Additional laboratory tests showed platelet count levels mildly elevated (400.0 10^3 u/L), as well as leukocytes (10.0 10^3 u/L), neutrophils (87%) and potassium (5.30 mEq/L).

Imaging examination

Panendoscopy showed an irregular shape of the gastric *antrum*, fundus, and body due to a neoplastic lesion located in the greater curvature. The histopathological diagnosis of the biopsied specimen was invasive SRC carcinoma. Colonoscopy showed hemorrhoids in the anal canal and sigmoid colon with an extrinsic compression suggestive of adhesions.

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The CT examination of thorax, abdomen, and pelvis with oral contrast **(Figure 4)** showed bilateral pleural effusions, morphologic changes in the stomach in association with the diagnosis of gastric cancer, free air and fluid levels in the peritoneal cavity with contrast enhancement suggestive of perforation at the anterior wall of the rectum; inflammatory and ischemic changes in the left kidney were also reported.

FINAL DIAGNOSIS

According to the symptoms, physical examination, imaging, and histopathology findings, this patient was diagnosed with gastric mucinous adenocarcinoma with metastases to the ovary, commonly known as Krukenberg Tumor.

TREATMENT

The patient was intervened with exploratory laparotomy with the following findings: abdominal sepsis, intestinal perforation, and peritoneal carcinomatosis.

OUTCOME AND FOLLOW-UP

After the surgical findings, oncology deferred treatment due to peritoneal involvement, intestinal carcinomatosis, and non-resectable gastric cancer. The patient was given palliative therapy and died 2 months later.

DISCUSSION:

Ovarian cancers occur in nearly 2.8–11 per 100,000 pregnancies. KTs represent only 1-2% of these cancers. Approximately 76% of KTs originate from the stomach, 11% from the intestine, 4% from the breast, 3% from the appendix, with the remaining from miscellaneous sites.[1,3,4]

Sex hormones during pregnancy, promote the development and diffusion of gastric cancer by stimulating the underlying precancerous lesions. Placental growth factor levels are high in gastric cancer tissue and are also associated with serosal invasion, lymph node metastasis, cancer stage, and survival rates.[5]

In the case described the diagnosis of KT represented a challenge. The patient didn´t have risk factors for gastric cancer: she was young, didn`t smoke, with no known H pylori infection. She also

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was asymptomatic before the pregnancy. It has been reported that persistent gastrointestinal symptoms and the physiologic and hormonal changes during pregnancy usually mask the presentation of KTs.[6]

As recommended in the Guidelines for Diagnostic Imaging During Pregnancy and Lactation from the American College of Obstetricians and Gynecologists (ACOG), once the incidental ultrasound findings were inconclusive, we performed an MRI to further study the suggestive images while avoiding the teratogenic threshold radiation dose (5 to 15 rad).

Optimal treatment for synchronous pregnancy with KTs of gastric origin is yet to be established. The available options for treating this neoplasm are cytoreductive surgery (CRS), adjuvant chemotherapy (CTx), neoadjuvant CTx and hyperthermic intraperitoneal chemotherapy (HIPEC), these treatments may be used alone or in combination.[7]

In this patient, CRS was performed, which is the treatment option most associated with an increase in overall survival (OS). In 2019 Lionetti et al conducted a systemic review of the literature in which it was concluded that CRS, and in particular CRS in the absence of residuals, are the treatments that show the clearest results in improving OS in KT patients.[7]

Our patient was not treated with CTx. Even though its use is still controversial, some authors recommend CRS + HIPEC as a therapeutic combination with survival benefit with more than acceptable morbidity and mortality rates.[4,8]

Despite the CRS being performed, oncology deferred further treatment due to peritoneal involvement, intestinal carcinomatosis, and non-resectable gastric cancer. We identify ascites, carcinomatosis at the exploratory laparotomy and the lack of radical surgery for primary cancer as unfavorable prognostic factors that have been associated with poor maternal 2-year survival rate.[9,11]

Kodama et al conducted a study of pregnant women with KTs treated with radical surgery (57.1 %), or no surgery/palliative surgery (42.9 %); in which the overall maternal survival rate was very poor in both groups; demonstrating 1, 2, and 5-year rates of 45.6%, 45.6 %, and none surviving after 5 years.[9]

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To the best of our knowledge, this is the first case report of a KT diagnosed during pregnancy in this region of Mexico. More descriptive studies are needed to build up an epidemiological characterization of this cancer in Yucatán and offer effective therapeutic interventions. The limitation of our study lies in the description of an isolated case of KT, thus we cannot draw significant conclusions in regard to the standard of care and prognosis of this condition.

CONCLUSION:

The case presented in this study is rare due to the presentation of the KT in a pregnant woman without identifiable risk factors for gastric cancer. The incidental finding of the neoplasm suggests the pregnancy masked the clinical presentation of gastric cancer, and the rapid deterioration of the patient is consistent with the aggressiveness of KTs. The limited descriptions of this neoplasm in our country and the torpid evolution in this case highlight the importance of further studies of this cancer in Mexico, with special focus on the development and implementation of therapeutic interventions to increase the overall survival.

LIST OF ABBREVIATIONS:

KT: Krukenberg tumor

WHO: World Health Organization

SRC: Signet-Ring Cells

MRI: Magnetic Resonance Imaging

CT: Computed Tomography

ACOG: American College of Obstetricians and Gynecologists

CRS: Cytoreductive Surgery

CTx: Adjuvant Chemotherapy

HIPEC: Hyperthermic Intraperitoneal Chemotherapy

OS: Overall Survival

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DECLARATIONS:

Ethics approval and consent to participate: Hospital Regional #1 IMSS Lic. Ignacio García Tellez exempted this case report from ethical approval.

Consent for publication: Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: ONI and FMR are joint first authors. ONI, KLA, FDM, FMR and AEM wrote the manuscript. KLA designed the research. All authors read and approved the final manuscript.

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FIGURES, TABLES, AND ADDITIONAL FILES:

Figure 1: Abdominal-Pelvic MRI, T1 sequence. Pregnancy findings.

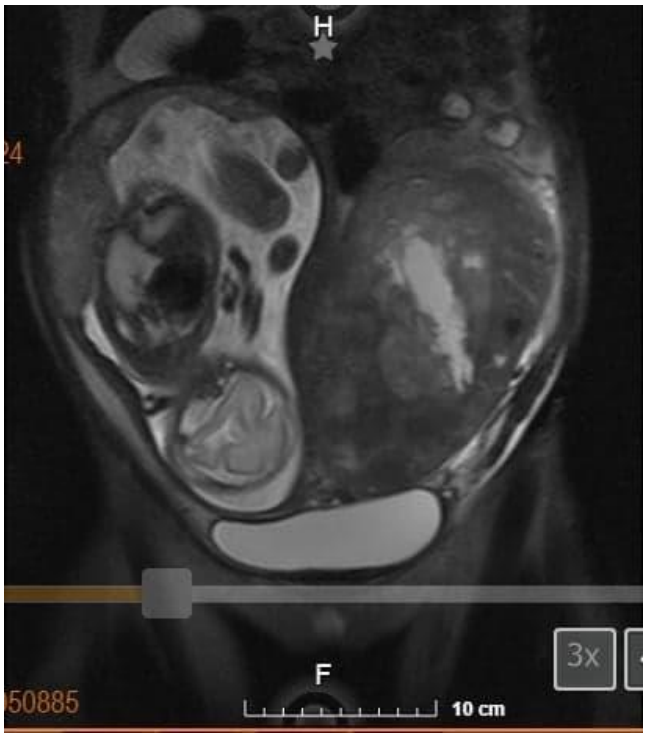
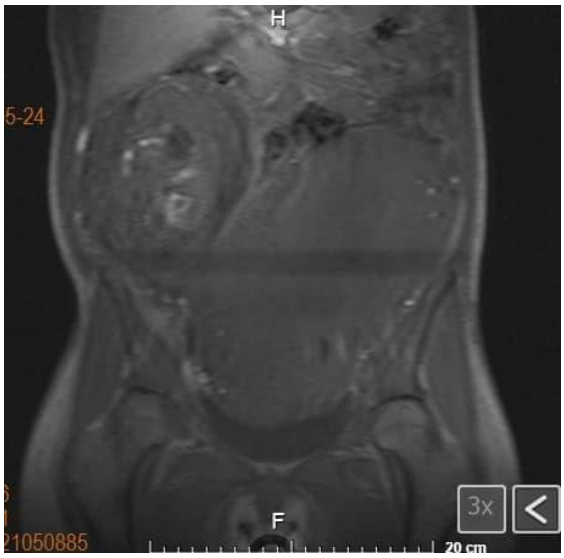


Image showing one fetus in cephalic presentation, longitudinal lie, fetal dorsum to the left, with normal morphologic findings, Fundal-lateral placenta of regular margins, and homogeneous parenchyma. Left adnexal mass described in figure 2.

Figure 2: Abdominal-Pelvic MRI, fat-saturated T2 weighted sequence. Findings of the adnexal mass.



Coronal view that shows a heterogeneous left adnexal lesion, of regular lobulated contours, predominantly isointense to soft tissue, with approximate dimensions of 22.1 x 13.6 x 16.3 cm in its largest diameters.

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Figure 3: Abdominal-Pelvic MRI, T1 and T2 weighted sequences. Mass effect findings.

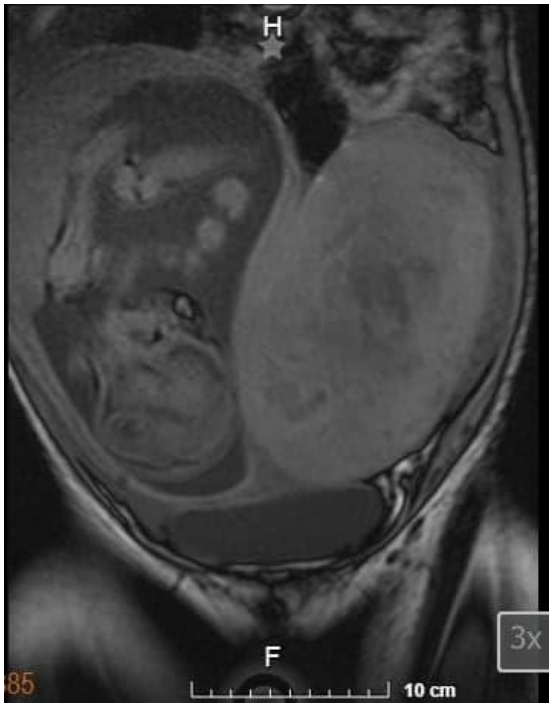

Image shows left adnexal mass in extensive contact with the uterine corpus that conditions right confinement of the uterus, eccentric displacement of the small intestine, mild compression of the bladder without infiltration and left ureteral compression.

Figure 4: Contrast CT of the thorax, abdomen, and pelvis. Post-surgical findings.

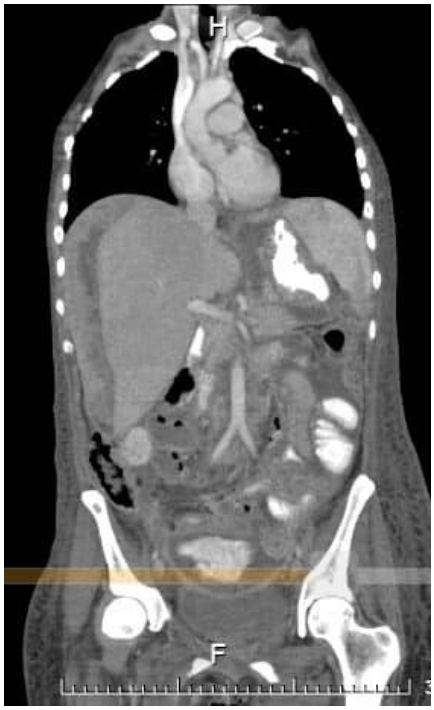

Image showing bilateral pleural effusion with passive atelectasis of adjacent segments in the left lung, absent uterus due to surgical intervention, and the presence of hydro pneumoperitoneum with air bubbles in the right subphrenic space. An engrossment of the gastric fundus is apparent.

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