The Journal of Obstetrics and Gynecology of India (September–October 2022) 72(5):460–462
https://doi.org/10.1007/s13224-020-01414-5

SHORT COMMENTARY

Krukenberg Tumour in Adolescents: Rare but Possible

Anjana Annal[1] · **Shameema Anvar Sadath**[1]

Received: 15 July 2020 / Accepted: 4 December 2020 / Published online: 24 February 2021

Abstract
Krukenberg tumour is a rare ovarian metastatic carcinoma arising from a primary malignancy elsewhere, classically the gastrointestinal tract and breast. They are bilateral solid ovarian tumour which most commonly occurs between 40–60 years, and its occurrence in the second decade of life is extremely rare. In this short commentary, we present an unusual case of Krukenberg tumour in a 16-year old in which diagnosis was made intraoperatively and managed systematically, thus emphasising the need to suspect Krukenberg in all age groups.

Keywords Krukenberg tumour · Ovarian malignancy · Paediatric ovarian cancer

Around 5–30% of ovarian malignancies are metastatic, of which 5% are adenocarcinoma containing signet ring cells called Krukenberg tumour. [1]. The average age of presentation of Krukenberg tumour is the fourth decade of life, which is lower when compared to other ovarian tumours (55–65 years) [2].

We report a case of a 16-year-old girl with bilateral ovarian neoplasm initially thought to be of germ cell origin due to the age of presentation, but intraoperatively diagnosed as Krukenberg tumour by frozen section biopsy and confirmed on table by upper gastrointestinal endoscopy and biopsy.

She presented with irregular periods and lower abdominal distension for two months to the gynaecology department. She had no history of weight loss or any other gastrointestinal symptoms. There was no history of malignancy in the family. Her previous medical and surgical history was unremarkable. Her general condition was good. Her per abdominal examination revealed large, nontender abdominopelvic mass reaching upto umbilicus, hard in consistency.

Her tumour markers revealed CA 125: 86U/ml, CA19-9: 261U/ml, serum lactate dehydrogenase: 221 U/L and Alpha-fetoprotein: 34.2 ng/ml. Computed tomography revealed a bilateral ovarian tumour of size $15 \times 12.4 \times 10$ cm on the right side and $10 \times 5.2 \times 6.2$ cm on the left side with para-aortic and left gastric lymphadenopathy and minimal ascites. Other organs were reported as normal (Fig. 1). Based on the age of the patient, laboratory and imaging diagnosis, the tumour was suspected to be primary ovarian malignancy with diagnostic considerations of germ cell tumours.

As per the decision taken in multidisciplinary tumour board, a diagnostic laparoscopy was done to assess the operability of tumour which was followed by exploratory laparotomy. Intraoperatively, minimal ascites with bilateral solid ovarian masses, right larger than left with intact capsule was seen. No obvious lesion was found on stomach, colon, liver surface and intestine. Right Salphingo ovariotomy with Infra colic omentectomy was done and two enlarged paraaortic lymph nodes were removed and sent for frozen section. Frozen section revealed signet ring cell carcinoma in the right ovarian mass, para-aortic lymph node and omentum consistent with Krukenberg tumour.

Intra operatively a decision was taken for upper GI-endoscopy which revealed 2×2 cm gastric lesion near the pyloric region from which biopsy was taken. Left-sided solid ovarian tumour with intact capsule was left behind given the frozen section finding of Krukenberg tumour. Histopathology

Anjana Annal is a M.B.B.S., M.S., D.N.B., Specialist in the Department of Obstetrics and Gynaecology, Aster Medicity, India; Shameema Anvar Sadath is a M.B.B.S, M.D, D.N.B, MRCOG, FICRS, MNAMS, FRCOG, Senior Consultant in the Department of Obstetrics and Gynaecology, Aster Medicity, India.

✉ Anjana Annal
anjuchennai@gmail.com

Shameema Anvar Sadath
shameemadr@yahoo.com

[1] Department of Obstetrics and Gynaecology, Aster Medicity, Kochi, Kerala 682027, India

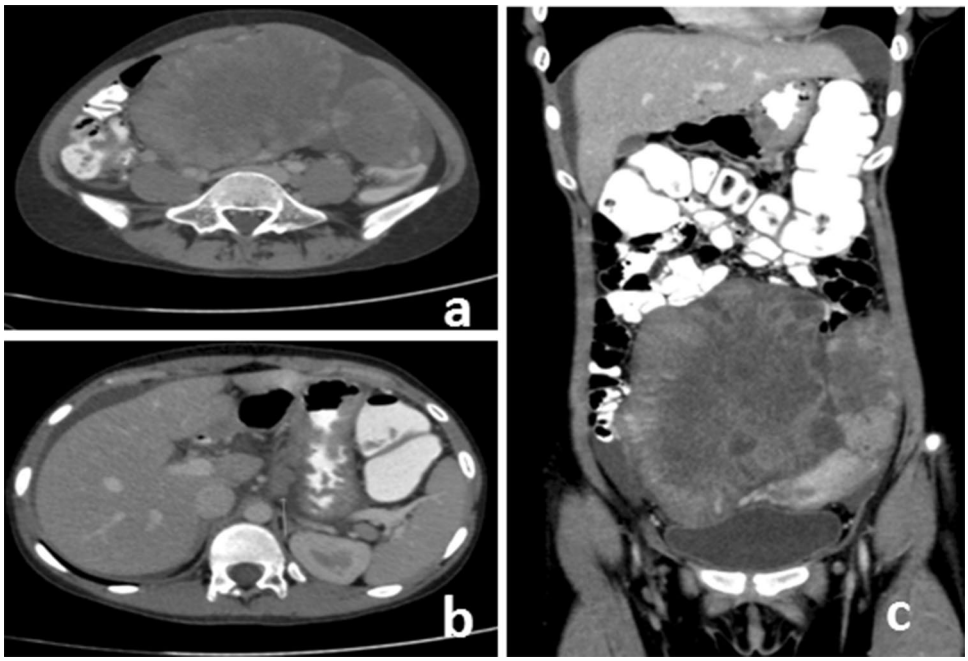

Fig. 1 **a** Axial contrast-enhanced CT demonstrates two large abdominopelvic solid masses filling nearly half of the abdominal cavity, **b** Contrast-enhanced axial CT images demonstrate left gastric nodes. Gastric wall thickening in a suboptimally distended stomach was difficult to identify on CT, **c** Coronal contrast-enhanced CT demonstrates two large abdominopelvic solid masses filling nearly half of the abdominal cavity

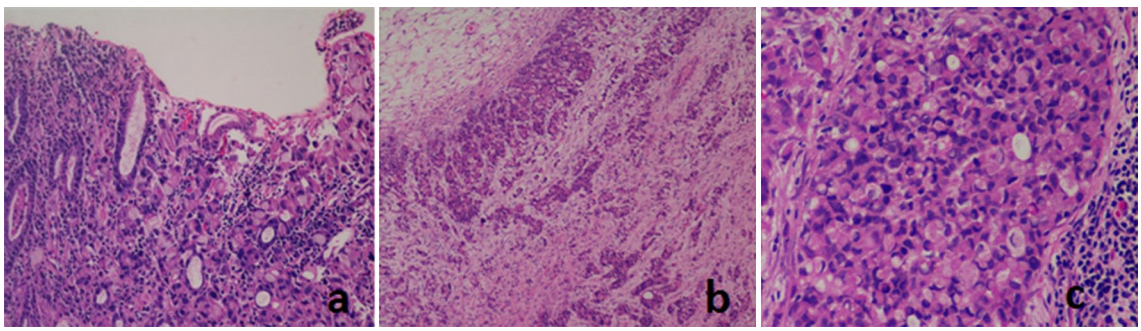

Fig. 2 **a** Haematoxyllin and eosin section of gastric biopsy showing presence of signet ring cells with intracellular mucin, **b** Frozen section of ovary showing cords and trabeculae of signet ring cells, **c** Haematoxyllin and eosin section of paraaortic lymph nodes showed presence of metastasis

of the gastric lesion was suggestive of poorly differentiated adenocarcinoma suggestive of signet ring cell carcinoma (Fig. 2).

The case was discussed in the tumour board and decision for palliative chemotherapy was taken. Genetic testing was offered to the patient, but the patient declined due to financial constraint. The patient succumbed to death after 6 months due to the fatal outcome of Krukenberg tumour.

Discussion

Krukenberg tumour is a metastatic adenocarcinoma, most commonly arising from the stomach in 70% cases. Other common primary sites may be appendix, colon and breast and rarely from gallbladder, biliary tract, small intestine, cervix and urinary bladder.

Countries like Japan have the highest incidence of krukenberg tumour due to high prevalence of gastric carcinoma in the region. This tumour rarely presents below 40 years of age as they typically occur in the fifth decade of life, with an average age of presentation being 45 years. Very few cases have been reported in young patients as only 0.5% of gastric cancers occur in women less than 30 years of age [3].

Ascites is present in about half the cases and usually shows malignant cells as shown in our case. In many cases, the primary tumour lesion is small which might be missed during imaging as it happened in our case. So, a careful radiographic and endoscopic examination of the gastrointestinal tract is required to detect the primary carcinoma.

Tumour markers such as CA125 can be elevated in krukenberg tumour reinforcing its carcinomatous nature.

Grossly Krukenberg tumours are solid bilateral tumours in 80% of the cases. When compared to other metastatic tumours of the ovary, Krukenberg tumours are smooth, free of adhesions and do not have peritoneal deposits. Surface implants are usually suggestive of other metastatic ovarian tumours.

Microscopically, the tumour has stromal and epithelial components. The epithelial component has characteristic signet ring cells which are histochemically identified with Mayer mucicarmine stain, periodic acid Schiff stain and Alcian blue stain. Also, they are immunoreactive to cytokeratins (AE1/AE3) and to epithelial membrane antigen. They are not immunoreactive to vimentin and inhibin [4].

Krukenberg tumour generally has a poor prognosis with a median survival time of 14 months [2]. Optimal management strategy of Krukenberg tumour from the gastric origin is not well established. In the past, chemotherapy was used as the mainstay of treatment of gastric tumour with ovarian metastasis. It proved to be disappointing in terms of both efficacy and survival time. The role of ovarian metastasectomy in improving the prognosis of these patients is still under debate. The overall management of Krukenberg tumour is palliative care. In our case, aggressive tumour resection was avoided, and palliative chemotherapy was opted to prevent morbidities associated with intraoperative complications.

Conclusion

Krukenberg tumour in young patients is exceedingly rare but should be kept within diagnostic considerations of bilateral solid ovarian neoplasms of any age group. Routine use of gastrointestinal endoscopy in ovarian tumours should be considered to aid in diagnosis.

Funding No external funding was received for this article from any source.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from patient's parents (as patient is not alive) for using patient's personal health information in this case report.

References

1. Wu F, Zhao X, Mi B, Feng LU, Yuan NA, Lei F, Li M, Zhao X. Clinical characteristics and prognostic analysis of Krukenberg tumor. Mol Clin Oncol. 2015; 3(6): 1323–8.
2. Al-Agha OM, Nicastri AD. An in-depth look at Krukenberg tumor: an overview. Arch Pathol Lab Med. 2006; 130(11): 1725–30.
3. Sandemeier D, Lobrunus JA, Vial Y, Delaloy JF, Genton CY. Bilateral Krukenberg tumor of the ovary during pregnancy. Eur J Gynaecol Oncol. 1999; 21:58–60.
4. Wauters CC, Smedts F, Gerrits LG, Bosman FT, Ramaekers FC. Keratins 7 and 20 as diagnostic markers of carcinomas metastatic to the ovary. Hum Pathol. 1995; 26(8):852–5.

About the Author

Anjana Annal is a Gynecologist with 3 years of experience Dr. Anjana Annal has training in all major and minor obstetric and gynaecologic procedures and surgeries. Her area of special interest is laparoscopic surgery. She did her MBBS from Chengalpattu medical college, Tamil Nadu and MS in Obstetrics and Gynaecology from Jawaharlal Institute of postgraduate Medical Education and Research (JIPMER), Pondicherry. Currently, she is doing her fellowship in 'Minimal access surgery and reproductive medicine' at Paul's Hospital, Kochi.