

KRUKENBERG TUMORS

by

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Introduction

Krukenberg tumors originally described by Krukenberg in 1896 were interpreted by him as primary ovarian tumors. Subsequent authors believed that these tumors were metastatic. It is now generally believed that such tumors were usually metastatic from gastrointestinal tract, but Woodruff and Novak (1960) recorded 10 cases of primary Krukenberg tumors from the review of ovarian tumor registry.

Novak and Gray (1938) feel that the term should be restricted to those tumors, whether primary or secondary, which assume the characteristics first described by Krukenberg (1896). Krukenberg originally laid down the following criteria to call a tumor of the ovary as Krukenberg tumor—That the tumor should be in the ovary and there should be demonstrable evidence of intracellular mucin in the form of signetring cells and diffuse infiltration of the stroma giving the appearance of sarcoma-like, justifying the original name fibrosarcoma ovarii mucocellular carcinomatodes. The present

paper is collection of 5 cases of Krukenberg tumors with a rare form of primary type.

Material and Methods

The biopsy material received by the department of Pathology during the years 1963-1969 were reviewed and all the diagnosed material of Krukenberg tumors of ovary were studied and confirmed by special stains like mucicarmine and P.A.S. for mucin. In one case autopsy examination was done for the presence of any primary tumor in the G.I. tract which was not found.

Incidence

In the present series there were 5 cases of Krukenberg tumor out of 95 total malignant tumors of ovary and 265 total ovarian tumors received during the above 7 year period forming an incidence of 5.2% in malignant tumors and 1.8% in the total ovarian tumors, thus showing a high incidence of these tumors.

Hertig and Gore, (1961) reported 0.7% incidence of Krukenberg tumors. Woodruff and Novak (1960) in a study of 48 cases of Krukenberg tumors from the Ovarian Tumor Registry found primary Krukenberg tumors of the ovary with no primary tumor elsewhere in 10 cases confirmed by autopsy, and in the remaining 38 cases primary cancer was present in

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stomach 19 cases, colon 4 cases, gall bladder 1 case, breast 1 case, unknown in 13 cases.

Similarly, in the present series of 5 cases of Krukenberg tumors, 4 were secondary with primary cancer being present in caecum in one case, stomach one case, colon one case and rectum one case. In the 5th one there was no primary anywhere in the body as confirmed by autopsy examination. It was a unilateral lobulated mass in the right ovary. The histopathology was typical of Krukenberg tumor as originally described by Krukenberg.

Age incidence

It shows that most of these cases were seen between 3rd and 5th decades. In the present series the average age was 41 years. Minimum age was 30 years and the maximum age 55 years.

Clinical picture

The presenting symptoms in these 5 cases were pain in abdomen, loss of appetite, dyspepsia or metastatic tumors discovered incidentally in a routine castration operation for carcinoma breast.

In the present analysis, 3 cases showed pain in abdomen, and ascites, 2 cases presented with tumor in abdomen and amenorrhea in a 30 years woman.

In the series of Woodruff and Novak, (1960) in a few cases G.I. symptoms were the presenting symptoms and 4 out of 48 cases showed menstrual irregularities like amenorrhea. The occurrence of post-menopausal bleeding was due to cortical stromal activity of the tumor. The endometrium in such cases showed cystic-glandular hyperplasia or proliferation with high maturation index of oestrogenic smear in vaginal cytology (Fathalla, 1968).

Ascites was recorded in 3 out of 5 cases, 60%. In two instances it was haemorrhagic and associated with right pleural effusion similar to Meig's syndrome. The presence of ascites and pleural effusion were bad prognostic signs. None of them lived more than 6 months in our cases. Similarly 70% of them died in 6 months in Woodruff *et al*, (1960) series.

Gross Pathology

In the present series of 5, 4 were bilateral 80% and one was unilateral and primary 20%. In Karsh series, 62% were bilateral and the remaining cases were unilateral. Their capsules are usually free from adhesions. The tumors lobulated and usually solid. The consistency may vary from firm to soft to mucoid.

The cut surface may be myxomatous with areas of cystic degeneration. In the present series the sizes were:

	Rt. ovary	Left ovary
1.	10 cm x 7 cm	8 cm x 6 cm.
2.	10 cm x 11 cm	10 cm x 12 cm.
3.	15 cm x 18 cm	15 cm x 12 cm.
4.	5 cm x 4 cm	5cm x 6 cm.
5.	18 cm x 20 cm	
	unilateral	
	(primary)	

The only one which was unilateral and primary was large one of 18 cm x 20 cm, solid, firm and lobulated. The cut section of the primary tumor showed mucoid to cystic degenerated areas. It was the primary Krukenberg tumor. The rest of the 4 cases were bilateral and secondary, the primary site of tumor being present in the G.I. tract and both the tumors were maintaining the shape of the ovary.

Histopathology

The metastatic secondary type of tumors resemble in all respects to the primary type. Histologically the tumor consists of large rounded or polyhedral

cells with vacuolated cytoplasm or typical signet-ring cells in which the mucin compresses the nucleus to one side of the cell. These cells may be scattered individually in the stroma or may form acini. Glandular areas are also seen. Occasionally the mucin content of the acini may rupture into the stroma. The stroma is of fibrous type and may form dense or loose areolar type. Frequently, one may see hypercellular areas. The cell proliferation due to presence of deposits, may produce functional effects on the patient in the form of hyperoestrinism or virilism.

Treatment

In the present series in all cases total abdominal hysterectomy with bilateral salpingo-oophorectomy was done. In 2 cases postoperative radiotherapy was given. Two cases died within ten days after operation. In one case complete autopsy examination was done, which proved to be a primary Krukenberg tumor. In one case laparotomy was done for bilateral ovarian tumors.

Prognosis

Prognosis was very poor in all. Novak *et al* reported 70-80% mortality. In the present series 4 cases died out of 5. The case of primary Krukenberg also died within 10th postoperative period.

In Leffel *et al*, (1942) series of 44 cases, 41 proved to be metastatic tumors, 35 were bilateral and in 17 ascites was present. In 30 of these cases the primary was first diagnosed, and in 14 cases the Krukenberg tumor of the ovary was first noted. They postulated 4 methods of spread.

1. Spread by peritoneal sedimentation.

2. By retrograde lymphatic channels.
3. Extension by serosal spread by continuity.
4. By blood stream.

Summary

1. Five cases of Krukenberg tumors of ovary are being presented with a rare case of primary Krukenberg tumor.
2. Review of these tumors with literature is discussed.

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References

1. Fathalla, M. F.: *J. Obst. & Gynec. Brit. Cwth.*, 75: 78, 1968.
2. Hertig, A. T. and Gore, H.: *Tumors of the Female Sex Organs. Part 3, IX, 33, A.F.I.P. Co. Washington D.C. 146,148, 1961.*
3. Karsh, J.: *Amer. J. Obst. & Gynec.*, 61: 154, 1951.
4. Krukenberg, F.: *Veberdas fibrosarcoma ovarii muco cellulare (Carcinoma body, Arch. Gynec. Munch.*, 50: 287-321, 1896.
5. Leffel, J. M., Masson, J. C. and Dockerty, M. B.: *Annals of surgery*, 115: 102, 1942.
6. Novak, E. and Gray, L. A.: *Krukenberg tumors of ovary. Clinico. Path. study of 21 cases. Surg. Gynec. & Obst.*, 66: 157, 1938.
7. Woodruff, J. D. and Novak, E. R.: *The Krukenberg Tumors, study of 48 cases from the ovarian tumor registry. Amer. J. Obst. & Gynec.*, 95: 3, 351-356, 1960.

See Figs. on Art Paper III