Renal cell carcinoma with sarcomatoid and rhabdoid feature

Wipawee Kittikowit*
Voranuch Thanakit*


A 49-year-old male patient presented with chest pain, back pain and pain in both flanks. Physical examination revealed a mass with smooth surface in the left side of the abdomen. Radiographic investigation revealed a left renal mass, 12.5x10 x 9.7cm with multiple bone destruction. Left radical nephrectomy was done. The renal mass was mainly composed of spindle cells of sarcomatoid part and discohesive cells with rhabdoid feature. Only a small conventional clear cell part was present. The tumor behaved aggressively by invading through the renal capsule and metastasized to multiple bones including the skull. Immunohistochemical studies confirmed the non-myogenic properties, negative for desmin and smooth muscle actin. The weak positivity for pancytokeratin together with strong expression of vimentin was compatible with renal cell carcinoma. The differential diagnoses include rhabdoid tumor that exclusively occurs among children and renal medullary carcinoma which also usually occurs in association with Sickle cell hemoglobinopathy. The renal cell carcinoma with either sarcomatoid or rhabdoid component almost always gives rise to the poor outcome and should be reported whenever it presents.

Keywords: Renal cell carcinoma, Rhabdoid, Sarcomatoid.

Reprint request: Kittikowit W. Department of Pathology, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand. E-mail: fmedwkt@md.chula.ac.th

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ผู้ป่วยชายไทยอายุ 49 ปีมีพยาธิพ่อยาวอาการเจ็บหน้าอก ปวดหลัง และปวดครัวเป็นน้อย
ทั้งส่งข่ามา 1 เดือน จากการตรวจร่างกายตลาดภภยในท้องทางด้านซ้าย มีอวัยวะ เมื่อตรวจทาง
ฟันสีพยาธิภภยในที่ใดส่งข่าขนาด 12.5 x 10 x 9.7 เซนติเมตร ร่วมกันไม่มีการทำลายของกระดูกสันหลัง
หลายแห่ง ผู้ป่วยได้รับการผ่าตัดทางภภยและไส้ตรงข้ามออก พบว่าส่วนใหญ่ของภภยประกอบด้วย
เซลล์รูปร่างสี่เหลี่ยม และเซลล์รูปลักษณะคล้ายเซลล์ย้อมของกล้าเนื้อเยื่อ บริเวณที่เป็นเซลล์ลีชช์พบอยู่
ในมะเร็งใต้มีเพียงบริเวณเล็ก ๆ เนื้อเยื่อที่แสดงฟันสีพยาธิภภยแข็งโดยลึกมาผ่านเปลือกหูมันได้ไป
ยังผิวกระชานเดี่ยว และยังกระจายไปที่กระดูกหลายแห่งรวมทั้งกระดูกศีรษะ การย้อมพีคิชค์คีนี
ทางย้อมมีปุ่มยานไม่ร่ายเซลล์รอบมะเร็งไม่มีคุณสมบัติของ เซลล์กล้าเนื้อ แต่มีคุณสมบัติที่เข้าได้กับมะเร็ง
ที่เกิดจากเซลล์บูทโอไล การวินิจฉัยแยกโรคคือแยกจากเนื้องอก Rhabdoid ซึ่งมักพบในเด็ก และ
มะเร็งทดสอบข้อต่ำด้าน (renal medullary carcinoma) ซึ่งมักเกิดในผู้ป่วยที่มีโรคหลอดเลือดจากชนิด
Sickle cell มะเร็งทดสอบข้อต่ำที่มีหลักเกณฑ์ Sarcomatoid และ Rhabdoid นี้ มักจะมีอาการมี
โรคที่อย่างมะเร็งทดสอบข้อต่ำทั่วไป และเนื้อพยาธิภภยตามกล้าต่ำควรจะต้องระมัดระวังในรายงานทาง
แพทย์วิทยาศาส

คำสำคัญ : มะเร็งไต
Rhabdoid tumor is a malignant neoplasm that has an aggressive behavior found predilectively in childhood. The tumor is characterized by cells morphologically resemble rhabdomyoblasts. These cells exhibit large eccentrically located vesicular nuclei with prominent nucleoli and a unique cytoplasmic globular inclusion body which does not express muscular molecules. The cells with similar cytologic features were found in many tumors of extrarenal sites. Not many cases of renal cell carcinoma with these rhabdoid cells have been reported. All the reported cases were of adulthood. Clear cell type is the major variant that the rhabdoid attribute was found associated with. The genetic analysis showed suggestive evidence of clonal evolution.

Case Report

A 49-year-old male patient presented with the chief complaint of chest pain, back pain and pain in both flanks for one month. Physical examination revealed a mass with smooth surface in the left side of the abdomen. Abdominal computed tomography scan showed a left renal mass, 12.5 x 10 x 9.7 cm with multiple bone destruction at T12, L1, L2, L4, L5 and the left 5th rib. Computed tomography scan of the brain showed skull metastasis of the right parietal bone.

Left radical nephrectomy was performed and revealed an ill-defined mass at the upper pole measuring 10 x 8.5 x 8.0 cm. Cut surface of the tumor exhibited reddish yellow gelatinous and myxoid appearance with focal solid yellow white and hemorrhagic areas. The tumor extended beyond the renal capsule to the perinephric fat. The renal vein and pelvis were unable to be identified.

Microscopically, most of the tumor was composed of eosinophilic round to spindle cells scattered on a myxoid background. The tumor cells closely aggregated surrounding blood vessels. These eosinophilic cells with round to tadpole shape contained moderate to abundant cytoplasm which condensed and formed hyaline globule like structure, no striation was identified. The tumor nuclei were eccentrically placed and displayed high grade appearance, Fuhrman grade IV (Fig.1). A small area of neoplastic cells with clear cytoplasm of the classic clear cell variant was encountered. The clear cells in this area contained nuclei of the lower grade, grade II (Fig.2A). Foci of hemorrhage and tumor necrosis were profuse. Another area exhibited tumor cells with spindle shape and high grade nuclei of sarcomatoid variant which was incorporated to the rhabdoid area (Fig.2B). The clear cell zone and the eosinophilic cells were focally merged with intermingling of both cell variants that possessed high grade nuclei (Fig.3). The renal tubules adjacent to the mass displayed atypical pleomorphic nuclei while tumor cells were found in the intervening interstitium (Fig.4). Numerous blood vessels of capillary size were present in the myxoid area.

Histochemically, the myxoid stroma was stained positively with Alcian Blue. Some eosinophilic cells were partially periodic acid-Schiff (PAS)-positive and sensitive to diastase, but they were negative for intracytoplasmic mucin. Immunohistochemical studies revealed diffuse and strong reactivity with vimentin, weak and focal positivity with pan-cytokeratin (keratin bovine) in the cytoplasm of the rhabdoid cells (Fig.5), and negative reaction for CK7, S-100, desmin and smooth muscle actin.
The diagnosis of renal cell carcinoma with sarcomatoid and rhabdoid features was given to this patient.

**Figure 1A.** Round to oval shaped tumor cells that were discohesive and focally scattered on a myxoid background resemble Rhabdoid tumor (H&E original magnification x 200).

**Figure 1B.** Tumor cells exhibited eccentrically located high graded nuclei with prominent nucleoli and moderate to abundant cytoplasm which condensed and formed hyaline globule like structure (H&E original magnification x 1000).

**Figure 2A.** A focus of conventional clear cell renal cell carcinoma exhibited lower nuclear grade (H&E original magnification x 200).

**Figure 2B.** The sarcomatoid part comprised spindle shaped neoplastic cells with high nuclear grade (H&E original magnification x 400).
Figure 3. The rhabdoid tumor cells mingled with clear cell (H&E original magnification x 400).

Figure 4. Benign renal tubules were found admixed with the rhabdoid tumor cells (H&E original magnification x 200).

Figure 5A. The rhabdoid tumor cells exhibited strong vimentin reactivity in the cytoplasm.

Figure 5B. The tumor cells weakly expressed cytokeratin.

Discussion

The term renal cell carcinoma with rhabdoid feature was first cited by Gökden et al. in 2000.\(^1\) Prior to this study, the same feature was described in 1991 by Sano and Weeks et al.\(^1,4\) Up to now a few cases were in the literature.\(^1,5\) The 3 to 5 % incidence of the total cases of renal cell carcinoma were proclaimed.\(^1,3\)

This is the first case of renal cell carcinoma with rhabdoid feature found in our institute. The patient presented with an advanced stage tumor which the primary mass was large with invasion to the adjacent
organs and remote bone metastases, despite the localized symptoms of only flank pain and pain at metastatic sites. The tumor exhibited rhabdoid together with sarcomatoid attributes in majority. Only a small part of clear cell component is observed. The diagnosis of renal cell carcinoma would have been more difficult if the clear cell part was missed. The differential diagnoses for those sarcomatoid and rhabdoid part with extensive myxoid background include adult malignant rhabdoid tumor, pleomorphic rhabdomyosarcoma, and renal medullary carcinoma. The malignant rhabdoid tumor must not contain any part of renal cell carcinoma of any variant. To differentiate from the rhabdomyosarcoma, immunohistochemical staining plays an important role. While the rhabdoid cells in renal cell carcinoma show immunoreaction for both cytokeratin and vimentin, pleomorphic rhabdomyosarcoma would express vimentin, desmin, myogenin, myoD1, and no cytokeratin.

Renal medullary carcinoma is also a recent entity of renal tumor that was first described by Davis et al. in 1995. The tumor is characterized by rhabdoid or plasmacytoid cells growing in diffuse and glandular patterns with inflammatory infiltrate. The tumor has a high incidence among children to young adults with Sickle cell hemoglobinopathy. The histochemical characteristic of the tumor is negative with Hale’s colloidal iron, PAS, and d-PAS (PAS with diastase). Immunohistochemically, the tumor cells are strongly positive for low and high molecular weight cytokeratins, whereas vimentin, and desmin are negative.

Cytogenetic studies of the tumor in the literature suggested that the clear cell and rhabdoid parts were clonal in origin by presence of similar cytogenetic alteration in both areas.

To our case, the presence of the clear cell part together with histochemical and immunohistochemical studies supported the diagnosis of renal cell carcinoma of which the rhabdoid and sarcomatoid parts are different phenotypes. Cytogenetic study was not performed in our case; therefore clonality of the different phenotypes could not be disclosed.

According to the series of Kuroiwa et al., two and five of eight patients with this tumor presented with stage III and IV (TNM staging), respectively. Four of the five cases with stage IV tumor that had lymph node and lung metastases at presentation died of disease within eight months after surgery. One patient with stage III tumor developed bone metastasis during follow-up. One of three patients with the same disease called composite tumor in the series of Shannon et al. also had lymph node metastasis at time of presentation. The high incidence of metastasis and extrarenal extension of the tumor was also documented by Gökden et al., 10 and 12 of 23 cases (44 % and 52 %), respectively. Although it was not as aggressive as pure renal rhabdoid tumor exclusively found in young children that had up to 73 % of extrarenal extension, it was more aggressive compared with the contemporary renal cell carcinoma without rhabdoid component, 26 % of extrarenal extension.

Conclusion

In addition to the sarcomatoid pattern, the rhabdoid pattern also represents an aggressive phenotype of renal cell carcinoma. It can be found in coexistence with any variants of the contemporary
renal cell carcinoma that was claimed to be clonal in origin, except the chromophobe variant. The rhabdoid phenotype itself is cytologically high-grade. More than half of the patients those had this kind of tumor came with advance stage that gave rise to the unpleasant prognosis. The finding of this rhabdoid phenotype and its extent should always be stated in the pathological report.

References