Case report

Retroperitoneal Desmoplastic Small Round Cell Tumor Associated with Horseshoe Kidney: A Pediatric Patient Treated with Surgery Combined with Chemotherapy

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ABSTRACT Desmoplastic small round cell tumor (DSRCT) is a rare, aggressive mesenchymal neoplasm with an extremely poor prognosis that most frequently affects the peritoneal cavity and presents in adolescent boys. We present an unusual case of DSRCT associated with horseshoe kidney presented in a 5-year-old girl. This is the first case with DSRCT accompanied with horseshoe kidney in the pediatric population, and it suggests that DSRCT may accompany with other abnormalities. Surgery combined with postoperative systemic multi-agent adjuvant chemotherapy may improve the outcome.

KeyWords: Desmoplastic small round cell tumor; Horseshoe kidney; Surgery; Chemotherapy

Introduction

A desmoplastic small round cell tumor (DSRCT) is a rare, aggressive mesenchymal neoplasm with an extremely poor prognosis. Gerald and Rosai [1] first described the disease in 1989 in terms of distinctive pathologic findings: a nesting pattern of cellular growth within dense desmoplastic stroma, and immunohistochemical co-expression of epithelial, muscle and neural markers [1, 2]. This rare, highly malignant tumor belongs to the primitive tumor family of small round cell tumors, such as lymphoma, neuroblastoma, alveolar rhabdomyosarcoma, Ewing's sarcoma, neuroectodermal tumor, and DSRCT. The tumors usually present in young male, as a single mass or multiple masses in the abdominal-pelvic cavity with or without metastases to peritoneum, liver and lymphoid tissue. Some cases with primary presented sites in the scrotum, pleural space and mediastenum were also reported. In addition, these tumors are associated with a specific reciprocal translocation t(11:22)(p13:q12) that leads to the fusion of the WT1 (Wilms' tumor gene)and EWS (Ewing's sarcoma gene). Patients with this tumor have a very poor prognosis, but multimodal treatment with surgery, chemotherapy and radiotherapy can improve survival[3].

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Here we describe a case of retroperitoneal DSRCT in a girl associated with horseshoe kidney, who was treated with complete resection of tumors and postoperative multi-agent adjuvant chemotherapy consisting of doxorubicin, vincristine, ifosfamide, cyclophosphamide, and etoposide).

Case report

A 5-year-old girl with no previous health problems was admitted to our hospital with a 3-months history of abdominal pain. The family history was non-contributory and there were no complaints except for abdominal pain. The physical examination revealed an approximately 5cm palpable abdominal mass predominantly on the right side of the abdomen, with mild tenderness. The laboratory tests showed no significant abnormalities, CA125 and urine VMA were in normal range. Computed tomography (CT) indicated a cystic solid mass(64mm× 67mm× 42mm) in the right adrenal area, behind the right side of the horseshoe kidney (Figure 1), with stray calcification in the parenchyma, and the right ureter was not revealed in the CT image. In addition, we arranged IVP radiography and the right ureter can not be observed either. Finally, retrograde pyelography was performed by an urologist and the right ureter was confirmed to be existed and normal. The radiologist suspected a diagnosis of neuroblastoma that originated from retroperitoneum. Surgery was planned for a definitive diagnosis and a proper management.

The operation revealed a mass of about 6cm, irregular in shape, with cystic and solid components. The horseshoe kidney was in front of the mass. No parenchyma or blood vessels of kidney were involved after exploration. A small portion was excised

for frozen sections. Examination of frozen sections revealed that the tumor was highly malignancy, and we excised the entire lesion. Grossly, there was no evidence of peritoneal seeding or hepatic metastasis. The mass was totally removed without significant problems. The microscopic examination confirmed a retroperitoneal DSRCT, with the typical appearance of well-defined nests or clusters of small undifferentiated round cells, surrounded by a prominent desmoplastic stroma (Figure 2). Upon immunohistochemical staining, there were focal weak positive responses to cytokeratin, vimentin, CD99, desmin and neuron-specifc enolase (NSE) (Figure 3).

After confirmation of the diagnosis postoperatively, the patient received adjuvant chemotherapy (vincristine, ifosfamide, doxorubicin, etoposide and cyclophosphamide) for 6 courses. The patient is free of disease recurrence 18 months after resection and adjuvant chemotherapy.

Discussion

DSRCT is an aggressive malignant tumor with a poor prognosis. Abdominal pain or discomfort is the most common symptoms for this rare tumor. Generally, its primary location is the intra-abdominal peritoneal cavity, but many other sites also have been described [4]. This tumor is typically found in young adolescent men (male:female ratio = 5:1). Frequently, the cancer is widespread at the time of presentation. It typically consists of a main tumoral mass with numerous smaller tumors seeding the peritoneum, and is often unresectable at time of surgery[4]. There has been some successful reports in achieving a response to multimodal chemotherapy, but the disease continues to have a high mortality rate[4, 5].

Generally, there were no specific tumor makers of DSRCT. CA125 was reported as raised in up to 86% cases of intra-abdominal DSCRT, with a median value of 200U/ml (range 22-735)[6, 7]. However, high CA 125 levels associated with DSRCT may be related to ascites and not directly to the tumor itself [7], therefore, it cannot be used as diagnostic marker.

Although the findings are nonspecific, CT is the most widely used diagnostic methods for identifying this tumor. The CT features are frequently multiple bulky heterogeneous and necrotic soft tissue masses in the abdomen, usually without any obvious organ base. Sometimes, ascites or liver metastases can be found[8]. However, to our knowledge DSRCT associated with horseshoe kidney was not reported yet, this patient was the first case with DSRCT accompanied with horseshoe kidney.

Histologically, the tumor is characterized by small round or spindle cells with a high nuclear-to-cytoplasmic ratio surrounded by a desmoplastic stroma [4]. Immunohistochemistry can be positive for AE1/AE3 (87%-100%), desmin (dot pattern, 81%-84.6%), EMA (92.9%) or NSE (84%-92.9%)[4, 9].

This tumor is also associated with a specifc reciprocal translocation t (11:22) (p13:q12), which leads to fusion of the WT1 and EWS genes; this rearrangement is detected in almost all cases. The

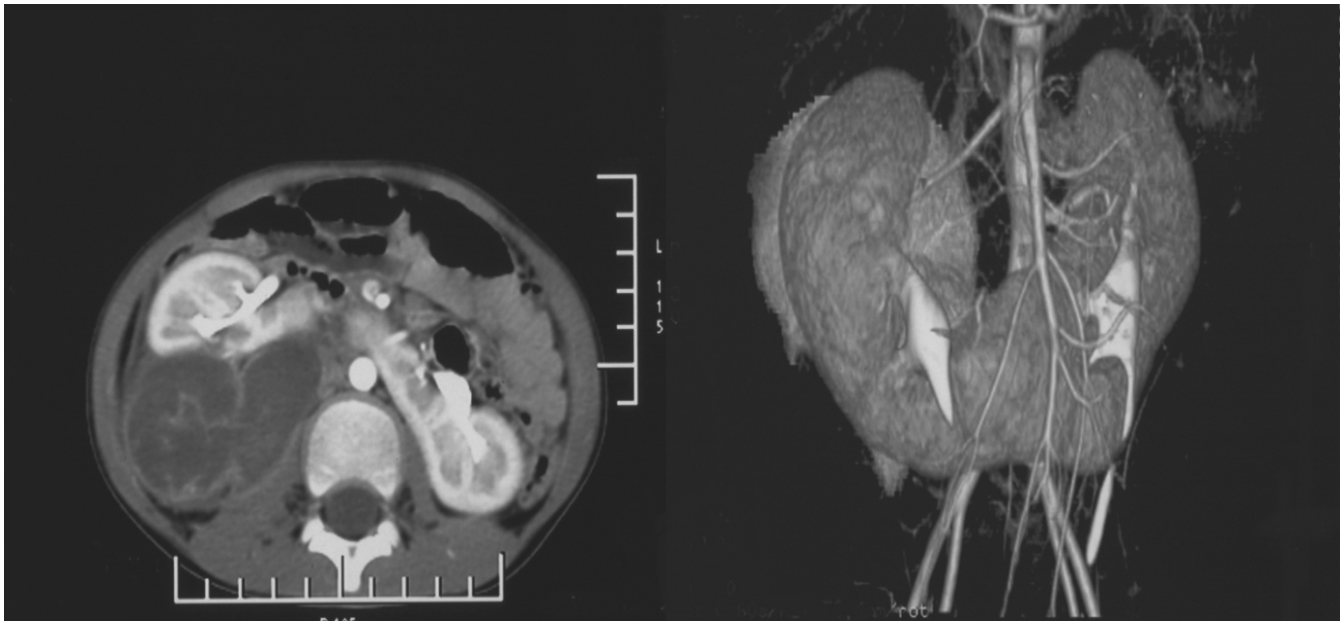

Fig.1 Pre-surgery 64 row of spiral Computed tomographic scan of abdomen showing large retroperitoneal mass associated with horseshoe kidney.

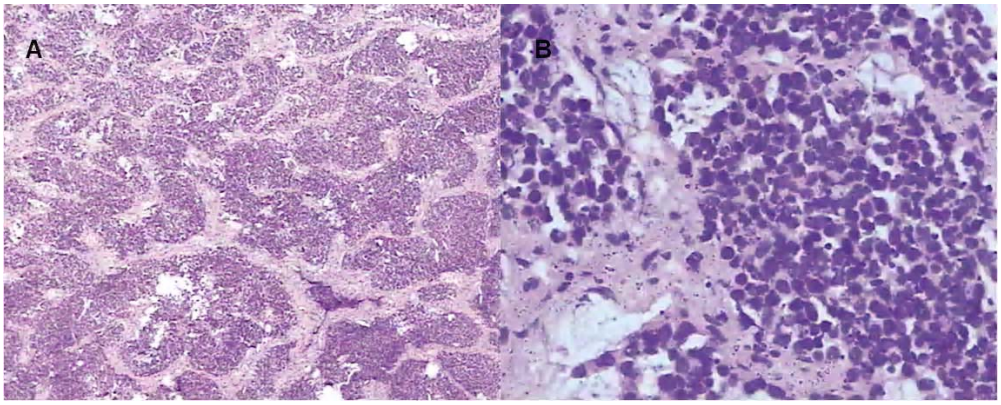

Fig.2 Photomicrography depicts nests or clusters of small tumor cells outlined by characteristic desmoplastic stroma bands (A:HE, 50×; B: HE, 400×)

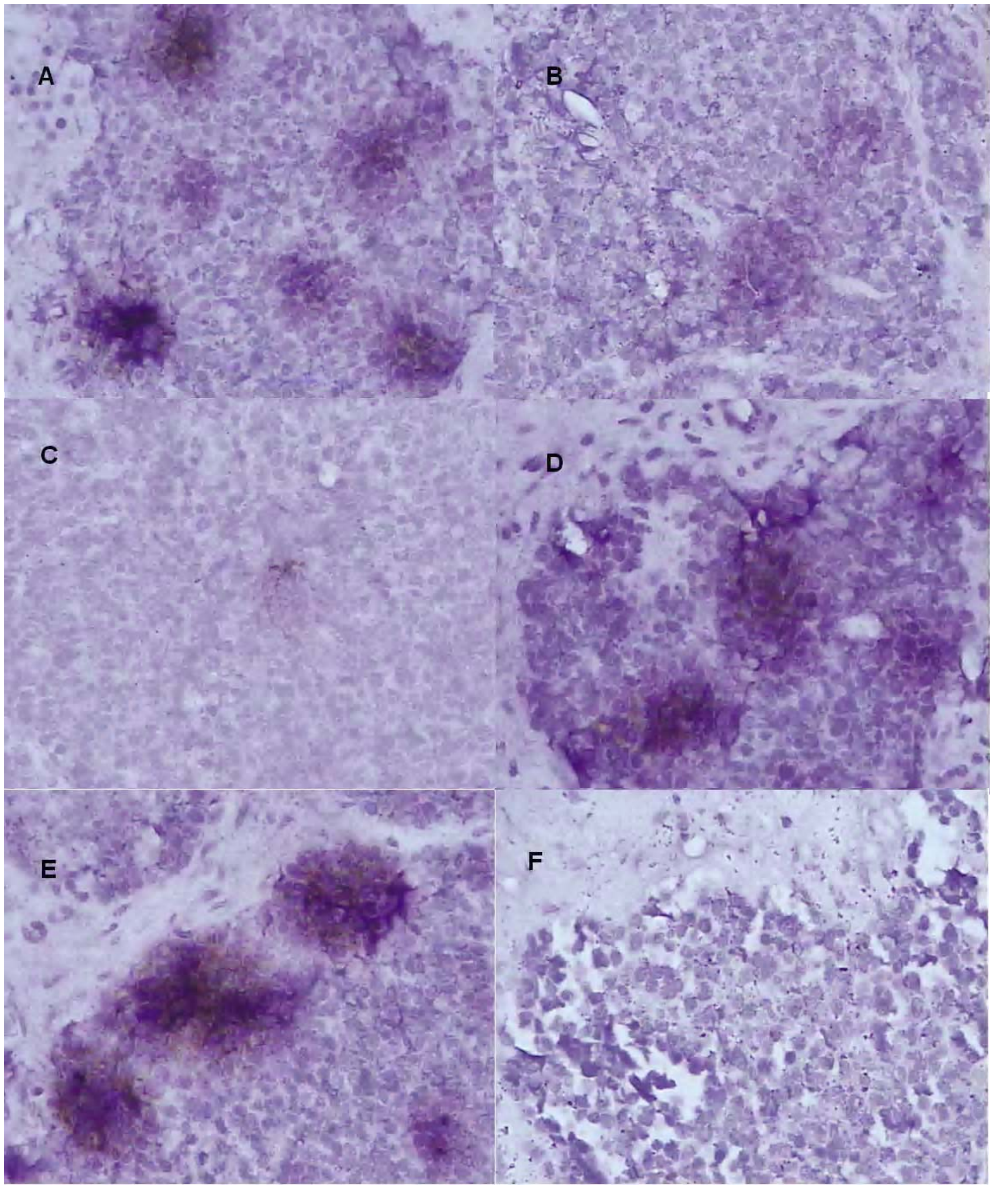

Fig.3 The immunohistochemical staining of tumor cells is positive for desmin(A), cytokeratin(B), vimentin(C), neuron–specifc enolase (NSE)(D) and CD99(E), negative for S–100(F) (400×).

resulting chimeric protein is thought to be a transcriptional activator that fails to suppress tumor cell growth[10].

In general, the prognosis of DSRCT patients is poor. The study of Ordonez[11] indicated that 71%(25/35) of patients died in 8 to 50 months (mean25.2 months) because of the widespread metastasis of tumors after the diagnosis of DSRCT. Although the prognosis is very poor, gross tumor resection is the major determinant of patient survival. Lal DR [3] found gross tumor resection to be highly significant in prolonging overall survival. The 3-year survival was 58% in patients who had undergone surgical resection, as compared to a 0% of 3-year survival rate in non-resectable patients. They recommended surgical resection of >90% of the tumor burden, with the P6 protocol postsurgery including cyclophosphamide, doxorubicin, vincristine, ifosfamide and etoposide. Compared with other chemotherapies, the P6 proposal provides a much better curative effect [3, 12]. We used a similar strategy for the treatment of our patient who is free of disease recurrence 1 year after surgery and adjuvant chemotherapy. The most current novel therapy is the use of continuous hyperthermic peritoneal perfusion (CHPP). As part of an ongoing phase I study into the use of hyperthermic cisplatin in the treatment of refractory solid childhood tumors, and the platelet-derived growth factor receptor pathway inhibitor SU101 (lefunomide) is being studied in a pediatric phase I trial. The possibility of improved future treatments might help to prolong the survival of patients with DSRCT[13, 14].

In summary, DSRCT might mimic clinically and laboratorial neuroblastoma or adrenal tumors, DSRCT should be considered as a potential cause of retroperitoneal tumors in children and should be included in the differential diagnosis. Desmoplastic small round cell tumors are rare tumors with poor prognosis even when treated aggressively. Surgery combined with postoperative systemic multi-agent adjuvant chemotherapy was justified not only to relieve the symptoms but also to try to improve the outcome.

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