

Clinical diagnosis and treatment of retroperitoneal primitive neuroectodermal tumors

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Abstract: To investigate characteristics of diagnosis and treatment of retroperitoneal primitive neuroectodermal tumors. The clinical data of 8 patients with retroperitoneal primitive neuroectodermal tumors admitted to the Affiliated Hospital of Qingdao University from May 2011 to September 2017 were retrospectively analyzed. All patients were confirmed by pathology as primitive neuroectodermal tumors. 2 cases underwent needle biopsy before surgery, 3 cases were given palliative resection, 5 cases accepted complete resection of the tumor, and 4 cases were combined organ resection. The retroperitoneal primitive neuroectodermal tumor is a highly malignancy and is difficult to diagnose before operation. The main treatment is surgery-based comprehensive treatment, and the prognosis of this disease is poor.

Keywords: Primitive neuroectodermal tumor; Retroperitoneal tumor; Diagnosis; Treatment

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1. Introduction

Retroperitoneal primitive neuroectodermal tumor (rPNET) is a malignant tumor that originates from the retroperitoneal, originates from the neuroectoderm and consists of primitive undifferentiated small round cells[1]. The location of the retroperitoneal space has its particularity. The tumors in this site are often different from other tumors. rPNET is rare in clinical practice and has a high degree of malignancy. Many cases were reported. The disease characteristics are unclear. The diagnosis and treatment are difficult. This study retrospectively analyzed the clinical data of 8 patients with rPNET confirmed by pathology in order to improve the diagnosis and treatment of rPNET.

2. Materials and methods

The clinical data of 8 patients with rPNET tumors admitted to the Affiliated Hospital of Qingdao University from May 2011 to September 2017 were retrospectively analyzed. The general data, clinical manifestations, auxiliary examination, treatment and prognosis were recorded. The characteristics of its diagnosis and treatment were summarized. There were 4 males and 4 females in this group, aged range from 19 to 63 years old, with an average of 32.8 years old. 7 patients were admitted to the hospital with abdominal pain. One patient was the touching abdominal mass. One patient underwent laparoscopic retroperitoneal mass exploration in the other hospital 1 year ago. Except for one patient who had previously history of surgical resection of left renal lipoma, other patients had no special medical history (Table 1).

Except for one patient with serum CA125 62.81 U/mL, no abnormalities were found in other laboratory tests. All patients were given computed tomography

(CT) before surgery. CT showed the density of soft tissue in the retroperitoneum. The diameter of tumors was up to 20 cm and average was 12.6 cm. The tumors were located in 5 cases of left upper abdomen, 2 cases of right lower abdomen, and 1 case of right upper abdomen. The tumor is lobulated and unclear with the surrounding tissue.

3. Results

In this research, 2 patients underwent needle biopsy before surgery, 5 patients were provided complete tumor resection, and the tumor boundary was unclear. Among them, 4 patients underwent combined organ resection due to tumor invasion or metastasis to surrounding organs. Three patients had palliative resection because of invasion of large blood vessels or extensive abdominal metastasis. All patients were confirmed by postoperative pathology as rPNET. Immunohistochemistry showed all cases were positive CD99, 4 cases of Syn positive, 3 cases of CD56, 2 cases of NSE positive, 2 cases of Vim positive, 2 cases of FLI-1 positive, 1 case of INI-1 positive, Ki-67 positive cases in 5 case. The range Ki-67 labeling index was 20-80%, and the average was 40%. One patient was accepted genetic testing and the results showed positive EWSR1.

Except for one patient with postoperative complications of lower extremity dyskinesia, other patients had no postoperative complications. Five patients were followed up for 1 to 13 months, of whom 4 died. Among the dead patients, one received VAC (vincristine, doxorubicin, cyclophosphamide), GT (gemcitabine, paclitaxel) chemotherapy after surgery, and bone marrow suppression died 13 months later. One case was obtained CTX (cyclophosphamide) Chemotherapy, whose death due to extensive

metastasis of chest and abdominal 7 months later. One of a preoperative abdominal metastasis, after complete tumor resection, 4 months for following up and died for brain metastasis. 1 case was extensive metastasis

death after 1 month of palliative surgery. One patient with lower extremity dysfunction had no recurrence after 4 months of follow-up. See Table 1.

Table 1. Clinical data and treatment of 8 patients with rPNET

	sex	age	clinical manifestation	tumor location	therapy regimen	Immunohistochemical	shift	Lifetime (months)
1	male	26	abdominal pain	right upper quadrant	enlarged resection of tumor	CD99(+),Syn(+),CD56(+),NSE(+),Vim(+)	zero	6
2	female	19	abdominal pain	left upper quadrant	enlarged resection of tumor	CD99(+),CD56(+),NSE(+),	splanchnocoele	7
3	male	36	abdominal pain	left upper quadrant	+chemotherapy palliative operation	the positive rate of Ki-67 is 20% CD99(+),Syn(+),Vim(+)	abdominal cavity	1.5
4	male	46	abdominal pain	left upper quadrant	palliative operation+chemotherapy	CD99(+),Syn(+),Vim(+)	abdominal cavity	3
5	male	63	abdominal mass	left upper quadrant	palliative operation	CD99(+),CD56(+),NSE(+),the positive rate of Ki-67 is 80%	whole body	1
6	female	23	abdominal pain	Pelvic extraperitoneal	Simple tumor resection+chemotherapy	CD99(+),Syn(+),CD56(+), the positive rate of Ki-67 is 40%	zero	13
7	female	28	abdominal pain	Pelvic extraperitoneal	enlarged resection of tumor	CD99(+),Syn(+),Vim(+),INI-1(+), the positive rate of Ki-67 is 40%	brain	4
8	female	21	abdominal pain		enlarged resection of tumor +chemotherapy	CD99(+),Vim(+),CD56(+),Flt-1(+), the positive rate of Ki-67 is 60%	zero	4

4. Discussion

rPNET is a peripheral type of primitive neuroectodermal tumor, which is homologous with Ewing's sarcoma. It is extremely rare in the retroperitoneum[2]. Although there are many reports of Ewing's sarcoma or peripheral primitive neuroectodermal tumor research[3], the research on rPNET is scarce. So the characteristics of rPNET are not clear. rPNET originates from the retroperitoneal nerve and could grow widely along the retroperitoneal space without obvious symptoms, which result in huge tumors and invasion of vital organs and tissues. The disease could progress rapidly and the treatment is difficult.

The biological characteristics of rPNET are different from other types of retroperitoneal tumors. rPNET is mostly invasive and is prone to recurrence and distant metastasis. The disease can occur in all ages, but it is more common in adolescents, and gender differences are not clear[4]. In this research, there were 4 males and 4 females, aged 19-63 years old, with an average of 32.8 years old. The disease lacks specific performance in clinical manifestations and auxiliary

examinations. The main clinical manifestations are local lumps, and some patients may cause pain and other compression symptoms. Abdominal CT especially enhances CT as the main diagnostic method for retroperitoneal tumors. It not only accurately displays the location, size, shape, density and other characteristics of the tumor, but also clarifies the adjacent and metastatic tumors[5]. The CT findings of rPNET are mostly masses with uneven density. The degree of enhancement may be related to the hemorrhagic necrosis of the tumor, but CT cannot determine its nature.

The diagnosis of rPNET relies on histopathological examination. The immunohistochemical staining test for this disease is positive for CD99 expression, and there are more than two kinds of neurogenic markers such as NSE, Syn, Vim, CD56[6]. The immunohistochemistry of this research is basically consistent with the literature. As an indicator of tumor proliferative activity, Ki-67 is significant for studying the prognosis of tumors[7]. The Ki-67 labeling index detected by this research was 20-80%, and the median index was 40%. It proved that rPNET is a highly malignant tumor with active proliferation. Studies

show that[8], some tumors can occur t (11; 22) (q24; q12) chromosomal translocation, forming EWS/FLI-1 fusion gene, which can result in FLI-1 protein over-expression, positive FLI-1. In this study, one of 2 cases had a genetic test indicating positive EWSR1, which was consistent with the research works.

Comprehensive treatment of surgery is the main treatment of rPNET[9]. Due to the invasion of this disease, complete resection of the tumor often requires combined organ resection, including the important vascular and nerves. 5 patients were gotten complete tumor resection in this study, 4 patients underwent combined organ resection. Because of the rapid progression of the tumor, the rate of radical resection is still low. In our work, 3 cases of tumors were not completely resected, because of extensive tumor metastasis, large tumors, invasion of important organs or blood vessels, and inability to radical resection. rPNET is relatively sensitive to chemoradiotherapy. Commonly used chemotherapy regimens are VAC, IE (ifosfamide, etoposide)[10]. The chemotherapy results of this study were poor, and the chemotherapy regimen needs further study. Since some patients had EWS/FLI-1 fusion gene, targeted therapy by detecting related genes-related targets is expected to become a new approach to rPNET treatment. rPNET has a poor prognosis and is prone to distant metastasis and death. Most patients have a survival period of less than 3 years[11]. One of the 3 death patients in this study had extensive chest and abdominal metastases, 1 case had brain metastasis, and 1 case had extensive systemic metastases with a longest survival of 13 months.

5. Conclusion

rPNET is a highly malignancy, and the main treatment is a comprehensive treatment basis on surgery. The disease progresses are rapidly and the prognosis is poor. More treatment is needed. rPNET is rare, more samples of research are needed for finding better therapeutic results.

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