CIC Rearrangement Sarcoma: A Case Report and Literature Review

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Abstract: Background: CIC-rearranged sarcoma (capicua transcriptional repressor- rearranged sarcoma, CRS) is a rare type of undifferentiated small round-cell sarcoma. There are few reported cases of CRS; in 2017, 115 cases were reported abroad and 10 cases were reported in China. Case summary: The patient is a 41-year-old male who presented with a mass in the left lumbar region for more than 1 month. Tumor excision was performed at another hospital. Pathology results indicated CRS. PET-CT indicated changes in the left lumbar region, and postoperative tissue repair changes were considered. However, combined with the medical history and imaging features, the clinical diagnosis was considered recurrence of tumor in the left lumbar region. Postoperatively, the patient was transferred to the burn department for pedicled skin-flap repair. Conclusion: CRS is rare, and the prognosis of these patients is poor. Surgical resection of the lesion is the first choice for patients without metastasis.

Keywords: Undifferentiated Sarcoma; CIC; Diagnosis; Differential Diagnosis; Treatment; Unplanned Surgery

Introduction

Undifferentiated small round-cell sarcomas, including Ewing sarcoma, round-cell sarcoma with EWSR1-non-ETS fusion, CIC-rearranged sarcoma (capicua transcriptional repressor-rearranged sarcoma, CRS), and sarcoma with BCOR genetic alteration, occur mainly in children and adolescents.[1-3] CIC-rearranged sarcomas have similar clinical manifestations, histological morphology, and immunophenotype, but there are differences in molecular genetics.[4] CIC-rearranged sarcoma is a rare type of undifferentiated small round-cell sarcoma.

Case presentation

Chief complaints

A 41-year-old man was admitted to hospital in April 2022 for 1-week recurrence of a tumor in the lower back.

History of present illness

One month prior to presentation, the patient noticed a mass with mild tenderness in the left lumbar region while taking a bath. The mass was excised at another hospital. The size of the lesion was approximately 2.8×2.5×1cm.

History of past illness

The patient underwent tumor resection in other hospital 1 month ago, and the tumor size was approximately 2.8×2.5×1cm. Pathological examination and immunohistochemistry indicated CIC-rearranged sarcoma.

Personal and family history

There was no significant personal or family history.

Physical examination

Orthopedic examination revealed a 5-cm scar on the left back, slightly hard, not easily depressed, no skin redness, no ulceration or fistula formation, and mild tenderness.

Laboratory examinations

The laboratory examinations were all within the normal range.

Imaging examinations

On April 14, 2022, spiral-enhanced CT of the lumbar spine was performed, which indicated that several slightly high-density lesions remained after left lumbar surgery. Considering the postoperative changes, local scar evaluation was performed, and the maximum layer was 31×16 mm. On April 14, 2022, MRI of the lumbosacral vertebrae was performed, and there was an abnormal subcutaneous signal in the left posterior lumbar region. We considered postoperative changes and noted fascia changes. PET-CT was performed on April 14, 2022; changes were noted in the left lumbar region, and postoperative tissue repair changes were considered.

Final diagnosis

The final diagnosis is CIC-rearranged sarcoma recurrence.

Treatment

On April 14, 2022, extended resection of the lumbar tumor was performed. After the pathological results confirmed that the incision margins were negative, the patient was transferred to the burn department, and pedicled skin-flap transplantation was performed on April 29, 2022. After the operation, the blood supply of the skin flap was good, and the recovery was good. On August 27, 2022, infusion port implantation was performed in our department, and the postoperative chemotherapy was administered.

Outcome and follow-up

The wound healed well There was no complaint of discomfort during the 4-month follow-up. The patient's wound healed well, the flap survived, and there was no complaint of discomfort. MR re-examination revealed abnormal signal shadows in the subcutaneous tissue of the posterior lumbar region. Considering the changes in the repair period of the surgical incision.

Discussion

Antonescu *et al* reported that CIC-DUX4 gene fusions resulting from t(4;19) or t(10;19) translocations are the most common genetic abnormalities detected in EWSR1-negative small round cell tumors.[5] The CIC-DUX4 fusion is caused by a t(4;19) (q35; q13) or t(10;19) (q26; q13) translocation, and the gene involved in the fusion is the transcriptional repressor CIC located on chromosome 19q13.1.[6, 7] Specht *et al* used fluorescent *in-situ* hybridization (FISH) to detect EWSR1-negative small round-cell sarcoma, and the results showed that about 64% (21/33) of the cases had CIC gene translocations.[8]

CRS is more common in young and middle-aged people; the average age of onset is 32 years old. Males are slightly more affected than females, and about 90% of tumors are located in the deep soft tissues of the limbs or trunk (trunk > lower limbs > upper limbs > head and neck > retroperitoneum). About 10% of CRS are found in internal organs (e.g., gastrointestinal tract, kidney, prostate), and it is extremely rare in bone. CRS can also occur in superficial soft tissues. [4, 5, 9-15]

Histologically, CRS generally shows diffuse, patchy distribution with fibrous septa, and necrosis is common. Although most tumors contain small, blue round cells, 10% may have spindle cell components;[5] the cytoplasm is generally rich, the nuclei have different degrees of pleomorphism and are irregular, the nucleoli are visible, the mitotic figures are visible, and myxoid degeneration may be present. When myxoid degeneration is obvious, it can resemble a myoepithelial tumor or extraosseous myxoid chondrosarcoma.[15] Regarding immunophenotype, CRS is characterized by the expression of CD99 to varying degrees, usually mottled positive, and a small number are diffuse strong positive.[13] Tumor cells are positive for WT-1 and are generally diffusely positive in the nucleus and cytoplasm.[15] Some cases are positive for ERGFli1, and most are negative for S-100, Syn, and CgA. For CIC-DUX4 round-cell sarcoma, Siegele *et al* reported that the immunohistochemical marker DUX4 has high sensitivity and specificity in CRS.[16]

CRS is highly invasive, with about 16% of cases presenting with distant organ or lymph node metastasis at the time of diagnosis. Initially, chemotherapy and radiotherapy have a local control effect. *In vitro* studies by Oyama *et al* found that molecular targeted drugs (such as crizotinib) could control tumor growth to a certain extent in CRS.[17] After healing, CAV/IE chemotherapy was administered. Extended resection requires adequate resection margins; in practice, many surgeons often determine resection margins based on their personal experience rather than objective studies.

Conclusion

In conclusion, CRS is a new classification of undifferentiated small round-cell sarcoma. The main recommendation is extended resection and wound coverage, and CAV/IE chemotherapy is preferred after wound healing.

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