

DESMOPLASTIC SMALL ROUND CELL TUMOR – DSRCT – A CASE REPORT

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Summary

Desmoplastic small round cell tumor (DSRCT) is a rare malignant neoplasm of adolescent males with predilection for involvement of the peritoneum. It is an aggressive neoplasm with a poor prognosis. Herein we present a case of a 23-year-old man with DSRCT which, at the beginning, has been a diagnostic and clinical problem.

KEYWORDS: *DSRCT, Ewing's sarcoma, abdominal mass, CT*

Sažetak

Dezmoplastični okrugli malostanični tumor (DSRCT) je rijedak maligni tumor koji se pojavljuje u mlađih muškaraca i najčešće zahvaća peritonej. To je agresivan tumor s lošom prognozom. Ovdje ćemo prikazati slučaj 23-godišnjeg muškarca s dijagnosticiranim DSRCT, koji je u početku predstavljao dijagnostički i klinički problem.

KLJUČNE RIJEČI: *DSRCT, Ewingov sarkom, abdominalne mase, CT*

INTRODUCTION

DSRCT is an uncommon malignant neoplasm that usually diffusely involves the abdominal and/or pelvic peritoneum of children and young adults, especially males, and pursues an aggressive clinical course. It was first described by Gerald and Rosai in 1989. and since then has been known under different names like intraabdominal desmoplastic small round cell tumor, intraabdominal desmoplastic small cell tumor with divergent differentiation, polyphenotypic small round cell tumor, intraabdominal neuroectodermal tumor of childhood with divergent differentiation and desmoplastic small cell tumor with multiphenotypic differentiation (1- 3).

Histologically, the tumor is typically composed of solid, irregular, sharply demarcated nests of small, round, undifferentiated cells embedded in a dense fibrous or fibromyxoid stroma. The stromal desmoplasia is generally considered a key histologic feature suggesting diagnosis and the main diagnostic feature is polyphenotypic differentiation, with the coexpression of epithelial, mesenchymal and neural markers on immunohistochemical analysis. The histogenesis remains controversial (2, 4-8).

Computed tomography (CT) is an important imaging modality for diagnosis and follow-up of neoplastic or nonneoplastic conditions of the serosal membrane. Characteristic CT features in DSRCT

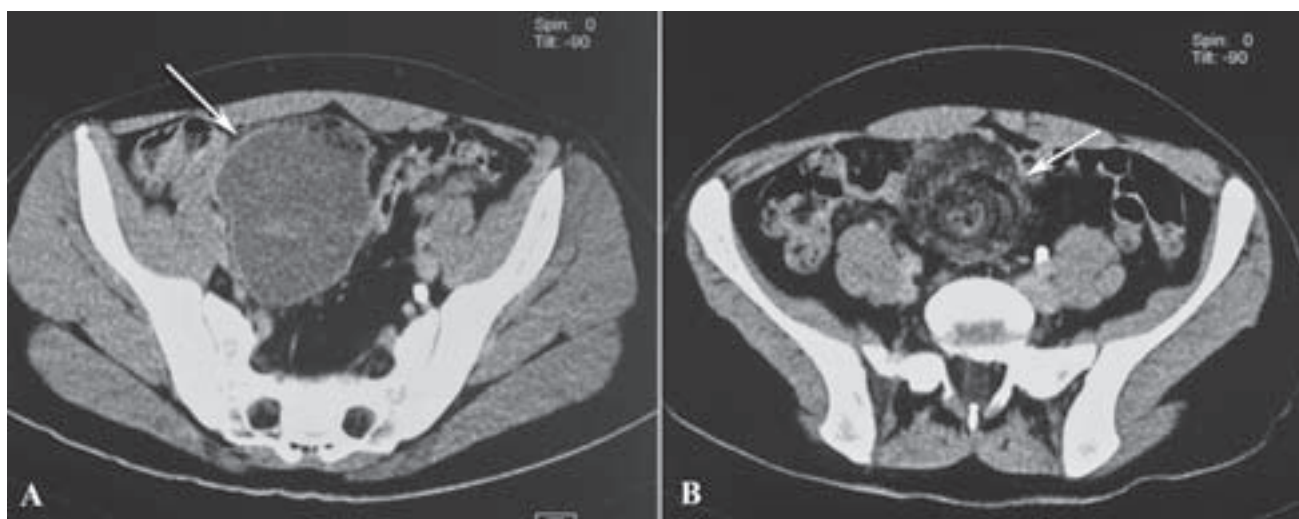


Figure 1. (A) CT scan shows large collections of solid mass above the urinary bladder Well –defined, low–attenuation mass measuring approximately 6 cm in diameter (arrow). (B) Contrast-enhanced CT scan shows heterogeneous mass looking like torsion of the part of the mesentery root (arrow).



Figure 2. Pelvis sonogram shows a well-defined, 7 x 5-cm, hypoechoic mass above the bladder.

include bulky intraabdominal soft-tissue masses that involve omental and serosal surfaces, without distinct organ of origin; solid, heterogenous pelvic masses in the retrovesical or rectouterine spaces; and eventual concurrent metastases. It is sometimes associated with ascites, adenopathies and liver metastases (8, 9, 11, 13). These CT features are not specific for DSRCT since they could be seen in many tumors that produce bulky mesenteric masses such as rhabdomyosarcoma, lymphoma, neuroblastoma, PNET, mesothelioma, peritoneal leiomyosarcomatosis and intraabdominal desmoid tumor (9, 10).

The behavior of DSRCT is extremely aggressive, with most patients dead of the disease within

2 years of their initial diagnosis. Current treatment protocols include multiagent chemotherapy and adjuvant surgery and radiotherapy. Surgical resection combined with chemotherapy and radiation may prolong survival in some patients (5, 11, 15).

CASE REPORT

A 23-year-old male patient presented with symptoms of abdominal discomfort and pain within the last year. They started with severe, intermittent epigastric pain spreading towards the back. With time symptoms intensified, the pain spread not only towards the back but also towards the caudal parts of the body with temperature highly suggestive of appendicitis. The patient was referred to urgent surgical admission, and then to an urologist.

Antibiotic therapy was given but the temperature persisted. The patient was hospitalized and during the hospitalization CT of the abdomen was done. CT scan showed the accumulation of dense content above the urinary bladder (Fig.1A), with torsion of the part of the mesentery root (Fig.1B). Initially, the patient was treated symptomatically. The temperature persisted as well as a slight pain and after 2 months, appendectomy was performed. The pathohistological report did not show the signs of appendicitis, only some fibrin on the serosal surface of the appendix.

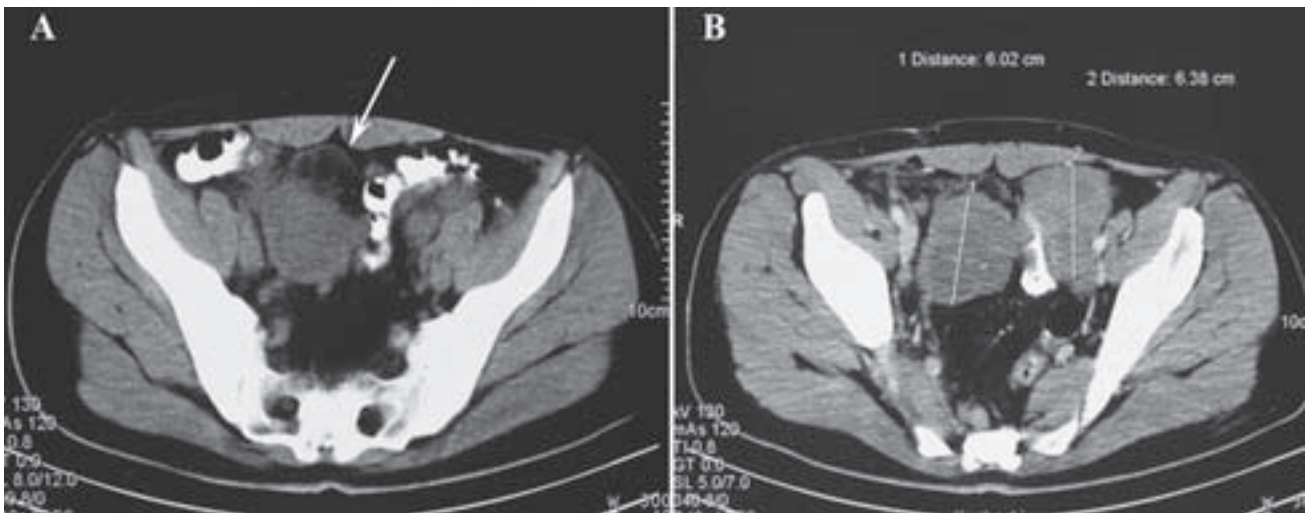


Figure 3. (A) Contrast material- enhanced axial CT scans show two bulky masses, on the right the mass is of lower density (+ 30 HU) with same gas bubbles, whereas on the left (B) there is a mass more solid and of higher density (+ 60 HU) Several punctate calcifications are noted.

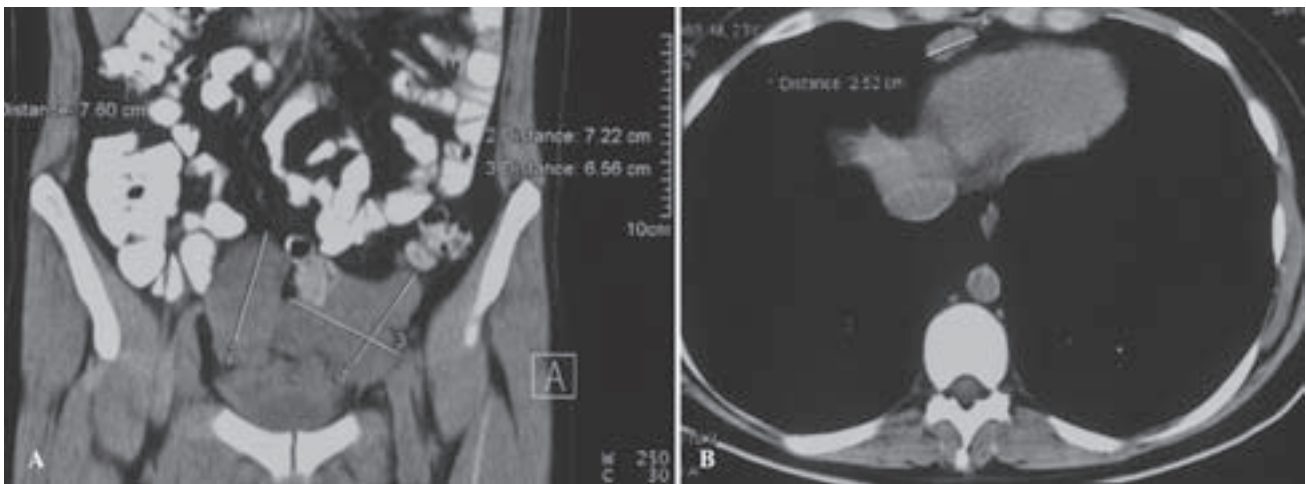


Figure 4. (A) Contrast enhanced CT scan through the pelvis, obtained 3 months after, shows bulky, lobulated soft- tissue peritoneum masses with areas of low attenuation and foci of punctate calcification. (B) It also shows enlargement of one lymph node in cardiophrenic angle. Desmoplastic small round cell tumor was diagnosed after biopsy operation.

The post-operative course turned out well with a short period without temperature and other symptoms. Slight pain in the pelvic area reappeared after 1 month.

Sonogram of the abdomen and pelvis showed hypoechoic, indistinctive fluid accumulations (Fig. 2). Since it was suggestive of a post-appendectomy abscess, the patient was hospitalized again and an urgent CT was done. It showed dense fluid accumulation. The fluid accumulation on the right had density measuring +30 HU and within it there were some gas bubbles (Fig. 3A). In caudal

direction, it looked more solid, like the accumulation on the left, measuring +60 HU (Fig. 3B). The finding was not clear and it was still suggestive of a post-operative abscess and hematoma. The patient was treated symptomatically. The symptoms persisted. Three months later, follow-up abdominal CT showed large solid masses with spotty calcifications in the pelvis (Fig. 4). CT scan also showed enlargement of one lymph node in cardiophrenic angle. The liver was not involved. Ultrasound-guided needle biopsy was done and the cytological report indicated the possibility of a

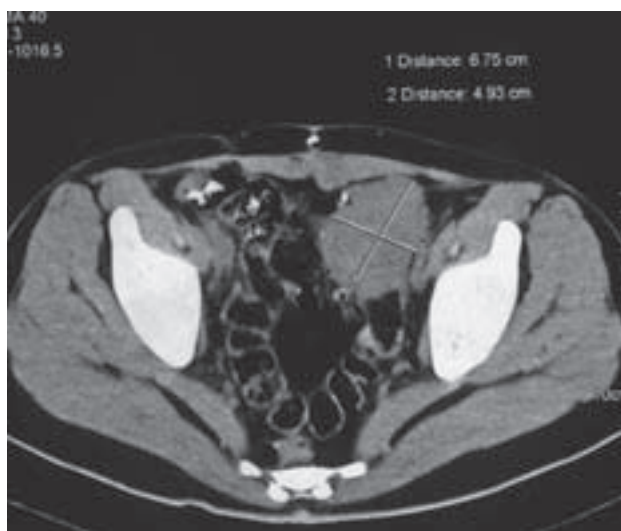


Figure 5. Contrast-enhanced CT scan 7 months after the initial diagnosis shows the reduction of the masses.

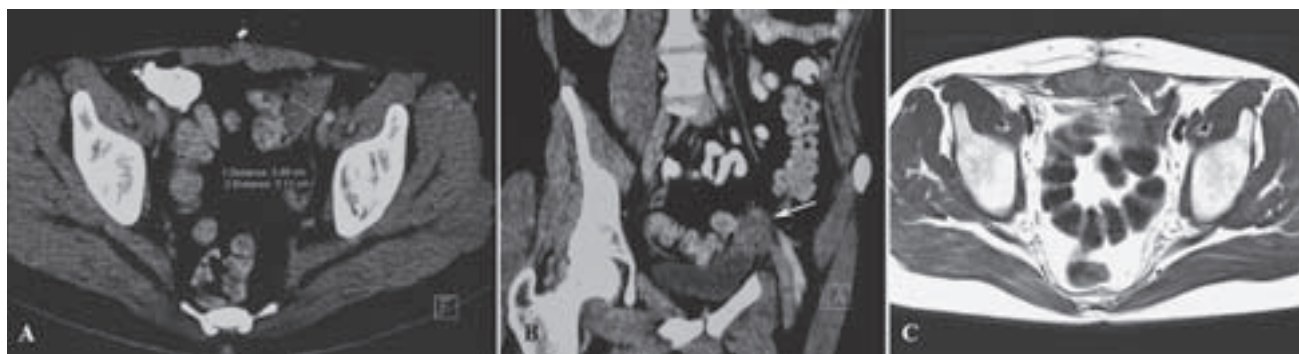


Figure 6. (A) 19 months later, CT scan shows further reduction of solid masses. (B) CT coronal reconstruction. (C) The solid component of the mass was hypointense on MRI T1-weighted images (arrow).



Figure 7. CT scan shows after the second operation slight further reduction of solid masses.

neuroectodermal tumor of small round cells. An operation followed but since the tumor was inoperable (09/19/2006), only a biopsy of the tumor mass on the left was undertaken. Pathohistological diagnosis was DSRCT.

The patient underwent chemotherapy. With no standard protocol established for this tumor (13), our patient first received eight (8) cycles of MAID protocol (Doxorubicin, Dacarbazine, Ifosfamid) with noticeable regression of the tumor, but because of toxicity (low platelet count with retroocular bleeding) the MAID protocol was stopped and treatment continued with PE protocol (Cisplatinum, Etoposid). He received seventeen (17) cycles of PE protocol.

On follow-up CT scan (7 months after initial diagnosis) mild and gradual regression of tumor masses in the pelvis was noticed (Fig. 5). Follow-up CT after 1 year (19 months after initial diagno-

sis) showed significant regression of tumor masses (Fig. 6).

Twenty months after initial diagnosis the patient underwent PET scan with no pathological FDG-uptake in the abdomen or thoracic region.

After that, the patient underwent the second surgical procedure in order to reduce tumor masses. Pathohistological report confirmed the initial diagnosis of DSRCT, with viable tumor tissue.

Follow-up CT scan after the second operation showed a slight reduction of solid masses (Fig. 7).

The patient was subsequently started on further chemotherapy, which maintained the disease in a stable stage.

At the time of writing this article (24 months after the initial diagnosis), the patient is alive and in good general condition.

DISCUSSION AND CONCLUSION

Desmoplastic small round cell tumor is an uncommon tumor with approximately 200 cases of DSRCT reported in the literature (9, 13, 15).

It is a relatively rare, highly malignant neoplasm that characteristically occurs within the abdominal cavity and pelvis in adolescents and young adults (peak incidence in the third decade of life, with a wide range from the 1st to 5th decade), usually male (male to female ratio 4:1) (13, 15).

It presents as a single mass or multiple nodules, with definite predilection for the pelvic region, sometimes with extension to the entire peritoneal cavity, scrotum or retroperitoneum. Invasion of intraabdominal organs is usually limited to the serosa but there are cases with prominent involvement of liver, pancreas or ovary. Accompanying ascites is the rule. Lymph node metastases are rare but they occur, sometimes they represent the first manifestation of the disease.

Patients typically present with abdominal pain, abdominal distension, palpable mass, acute abdomen, ascites and organ obstruction.

Characteristic CT features of DSRCT include a large intra-abdominal mass with numerous smaller peritoneal implants, without a distinct organ of origin, but has been reported in other body sites including the paratesicular region, the pleural serosa, the posterior cranial fossa, soft tissues and bone, the ovary, the parotid gland and the lung (15)

On CT, masses may show variable enhancement due to the degree of vascularity and necrosis. Heterogeneity due to tumor hemorrhage may also be a feature of some lesions. As with CT, the MRI appearance of DSRCT is nonspecific. Relatively low signal intensity on T2-weighted imaging, due to the densely packed cellularity of small cell neoplasms in addition to a variable desmoplastic response within lesions, may suggest the diagnosis. On ultrasound, lesions are usually well defined and they may be hypo- or anechoic mass (14).

Although imaging of this tumor is somewhat nonspecific, this rare entity should be taken into consideration in the differential diagnosis of a young male patient presenting with features of widespread peritoneal malignant disease without obvious solid organ involvement. Imaging is useful for staging and also for guided biopsies (13, 15).

The radiologic differential diagnosis for multiple solid peritoneal masses is broad and includes various neoplastic, inflammatory and miscellaneous processes (10). The differential diagnosis for an abdominal malignancy in children or adolescent includes rhabdomyosarcoma, non-Hodgkin lymphoma, Ewing's sarcoma/PNET, Wilms' tumor and neuroblastoma, but when the lesion does not present typical features, a variety of other neoplastic conditions, such as mesothelioma, metastatic adenocarcinoma, sarcomatoid carcinoma and some sarcomas could enter into the differential diagnosis (10).

Histologically, DSRCT is characterized by variably sized and shaped, sharply outlined nests of small neoplastic cells surrounded by a prominent desmoplastic stroma, with common central necrosis. The tumor cells are typically uniform with small hyperchromatic nuclei, scant cytoplasm and indistinct cytoplasmic borders. Sometimes DSRCT has unusual morphologic features such as very little desmoplasia, papillary areas, spindle, clear or signet-ring cells, «indian file» infiltration pattern, tubules or pseudorosette formation.

The diagnosis is based on immunohistochemical and molecular analysis. DSRCT is a distinctive neoplastic condition with characteristic histological, immunohistochemical and cytogenetic features. The typical immunohistochemical profile is characterized by coexpression of epithelial (Cystokeratin, EMA), mesenchymal (Vimentin, Desmin), myogenic and neural /NSE/ markers (1, 4, 5, 13). In our case, the immunohistochemical results showed positive tumor cells for EMA, Vimentin, Desmin, Neuron Specific Enolase (NSE).

The histopathogenesis of DSRCT remains unknown. Because of its peculiar topographic distribution there are theories of relationship with the mesothelial lining, with the possibility that it may represent a «mesothelioblastoma» but it seems more likely that it is related to other small round cell tumors of infancy, particularly Ewing's sarcoma/PNET.

Cytogenetically, DSRCT is associated with a unique karyotypic aberration involving the reciprocal translocation t (11, 22) (p13; q12), with the involved genes EWS (Ewing's sarcoma gene) in 22q12 and WT1 (Wilms' tumor gene 1) in 11p13.

This finding is of practical importance in the differential diagnosis with other small round cell tumors of childhood (2, 4, 5, 8, 11, 13).

It has an extremely aggressive clinical course with multiple local recurrences and rare distant metastases. Prognosis is poor, with average survival less than 2-3 years.

No standard treatment protocol has been established. Intensive chemotherapy and complete excision of the tumor would be required to achieve long-term disease-free survival. Surgery is often not feasible, especially in the abdominal-pelvic tumors due to the extensive involvement (11, 12). The impact of complete resection of disseminated tumors on survival is still unknown because of the rarity of achieving complete resection at surgery (13). Chemotherapeutic agents are only temporarily effective in treating DSRCT. Since DRSCT is a highly aggressive and progressive malignancy, post-operative adjuvant chemotherapy should be initiated as soon as possible.

Radiotherapy and transplantation of autologous stem cells have been proposed as part of the multimodality therapy of this aggressive malignancy (3).

Neoadjuvant chemotherapy, greater than 90% tumor debulking, and radiotherapy have been shown to prolong survival. Future efforts must focus on cell-specific treatment protocols. Current treatment prolongs life and rarely achieves cure.

More studies are necessary to develop treatment schedules.

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