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Case report

# Monosomy 22 and partial loss of INI1 expression in a biphasic synovial sarcoma with an Ewing sarcoma-like poorly differentiated component: Report of a case

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ABSTRACT

Poorly differentiated synovial sarcoma (PDSS) is a less common subtype of synovial sarcoma (SS) associated with a poor prognosis. We present a case of a SS with a poorly differentiated component that resembles Ewing sarcoma (ES). Initial immunohistochemical staining revealed a characteristic and strong expression of transducin-like enhancer of split 1 (TLE1) and weak to absent expression of integrase integrator 1 (INI1) staining. Stainings for keratin and epithelial membrane antigen (EMA) were negative in the tumoral lesion. Fluorescence In Situ Hybridization (FISH) analysis showed a rearrangement of the *synaptotagmin* (*SYT*) gene, confirming the diagnosis of SS.

FISH analysis for the *EWS RNA-binding protein 1* (*EWSR1*) gene revealed monoallelic loss of *EWSR1*. This finding was confirmed by an array comparative genomic hybridization (aCGH), showing complete loss of chromosome 22.

Based on literature review, showing only a handful of cases of cytogenetically studied SS with loss of chromosome 22, this is probably a rare event in SS. Therefore, we assume that monoallelic loss of chromosome 22 cannot fully elaborate the underlying mechanism of the INI1 staining pattern in all SS, but it could account for the weak to absent INI1 staining in at least some cases.



## 1. Introduction

Synovial sarcoma (SS) is a relatively common translocation-associated mesenchymal neoplasm that represents 5–10% of all primary soft tissue sarcomas in adolescents and young adults [1–3]. It is defined as a mesenchymal neoplasm that exhibits variable epithelial differentiation [4].

SS are generally deep-seated tumors that most often occur around large joints of adolescents and young adults [5]. The 5-year survival rate for SS varies from 25.2 to 62.5% [6]. In contrast to most other sarcomas, SS are reported to be chemosensitive [6].

SS is a morphologically heterogenous neoplasm that can be classified into 3 histologic subtypes: monophasic spindle cell type SS (MSS) which exclusively consists of spindle cells, biphasic type SS (BSS) that is characterized by both spindle cells and epithelial cells arranged in glandular structures, and poorly differentiated type SS (PDSS) which is the less common subtype with poor prognostic outcome [1,6]. The PDSS group is further subdivided into 3 separate categories: a large cell epithelioid variant, a small cell variant and a high-grade spindle cell variant [6].

The diagnosis of PDSS can therefore be challenging for pathologists because of the morphological resemblance with other round cell or spindle cell sarcomas, including Ewing sarcoma (ES)/peripheral neuroectodermal tumor (PNET), rhabdomyosarcoma, small cell osteosarcoma, high-grade malignant peripheral nerve sheath tumor (MPNST) and desmoplastic small round cell tumor [7].

Moreover, round cell sarcomas are a heterogenous group of tumors of which a subset lacks specific clinical, morphological, immunophenotypic and molecular features and cannot be classified according to current criteria. It should be noted that

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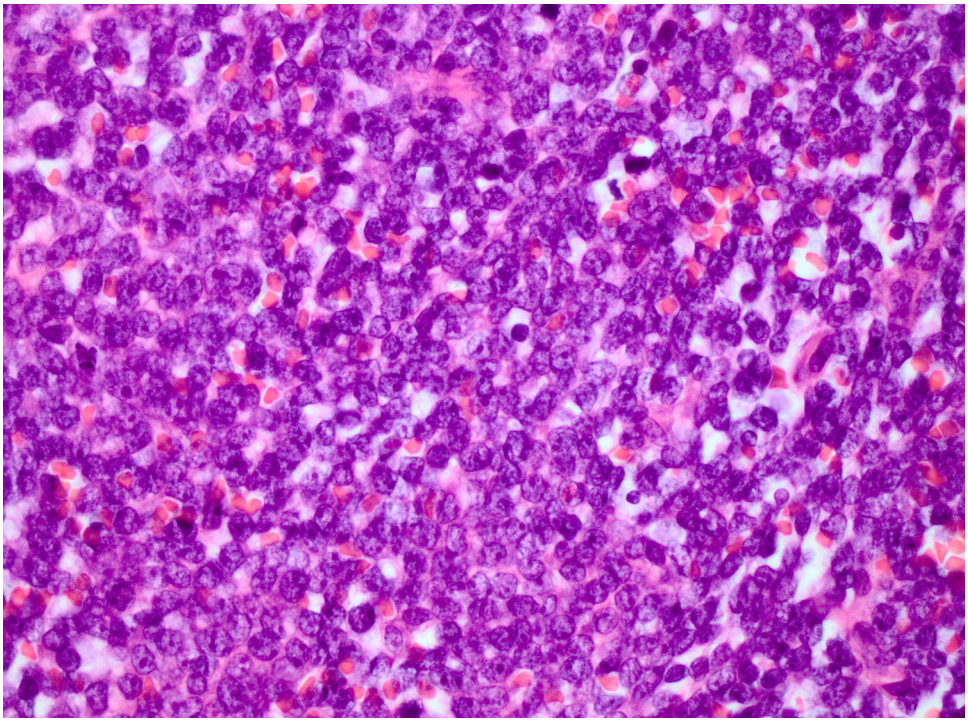

**Fig. 1.** Histologic features. The atypical cell population consists exclusively of small cells with a high nuclear-cytoplasmatic ratio and scant cytoplasm. The nuclei are round to oval with a fine chromatin pattern and indistinct nucleoli. Note the high mitotic rate (hematotoxylin and eosin, original magnification 400×).

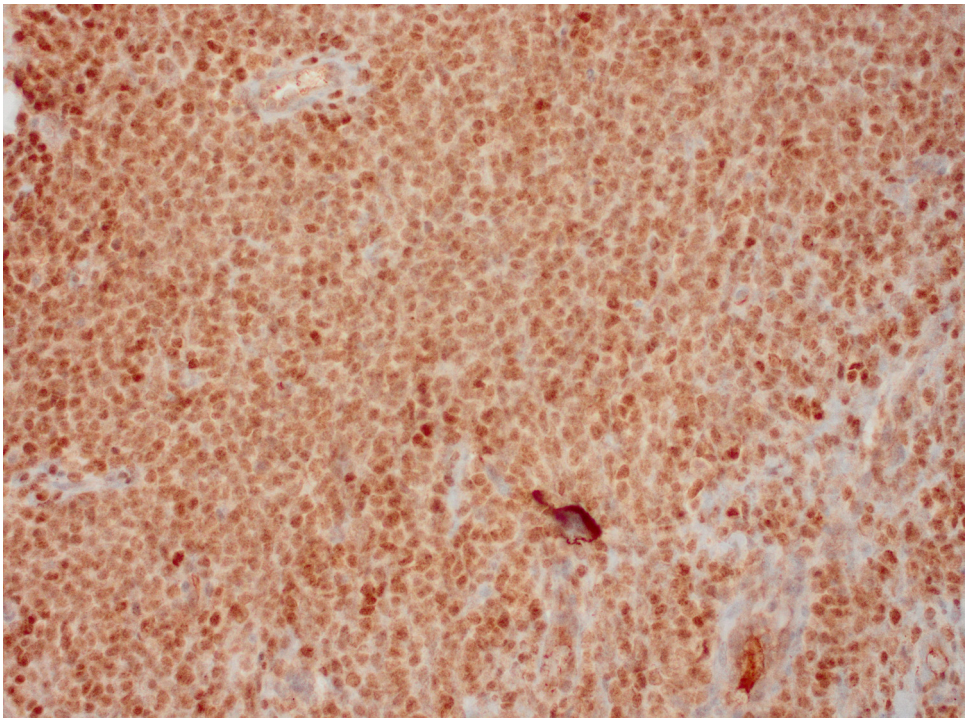

**Fig. 2.** Diffuse nuclear immunoreactivity for TLE1 was observed in the tumor cells (original magnification 200×).

undifferentiated round cell sarcoma should be a diagnosis of exclusion [8].

In most cases, a panel of antibodies (including pancytokeratine (CKAE1/AE3), cytokeratin 7 (CK7), epithelial membrane antigen (EMA), cluster of differentiation (CD)34, CD99, desmin, S100, transducin-like enhancer of split 1 (TLE1), integrase integrator 1 (INI1)) is helpful in the differential diagnosis of poorly differentiated spindle cell and round cell sarcomas [4]. The presence of a distinctive translocation between the *synaptotagmin* (*SYT*) gene on chromosome 18 and one of the *synovial sarcoma X* (*SSX*) genes (*SSX1*, *SSX2* or *SSX4*) on chromosome X is considered specific for synovial sarcoma and is one of the most reliable diagnostic criteria [5].