

## CASE REPORT

## Neck synovial sarcoma: case presentation

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### Abstract

Head and neck synovial sarcoma (HNSS) is a rare tumor with a few case reports or case series being published in the literature. We present the case of a 68-year-old patient admitted to our department for management of a palpable neck mass. After initial investigation and due to major problems of differential diagnosis, there was performed a wide excision of the tumor. Histopathology examination revealed an HNSS.

**Keywords:** synovial sarcoma, neck, SYT–SSX1 fusion gene, treatment.

### Introduction

Synovial sarcomas (SS) are soft tissue tumors derived from pluripotent mesenchymal cells that bear a similar microscopic resemblance to synovial cells [1]. They constitute about 10% of all sarcomas [2], being mainly discovered in the deep soft tissues of lower extremities, such as the knee and ankle. SS can rarely be detected in the head and neck region (HNSS – head and neck synovial sarcoma) [3]. HNSS possess a diagnostic challenge since the head and neck region is a site of multiple tumors. Moreover, little characteristic radiological features may be depicted on both computed tomography (CT) and magnetic resonance imaging (MRI) examination [4, 5]. A clear diagnosis must be histopathologically established. Due to the rarity of HNSS and lack of international treatment guidelines, its management also poses a challenge [1, 4–6]. Clear margins surgical resection represents the first step of the treatment [4]. Adjuvant therapy may also be applied, depending on each individual case.

### Aim

The present paper reports a new case of neck SS, emphasizing on the imaging examination and treatment options.

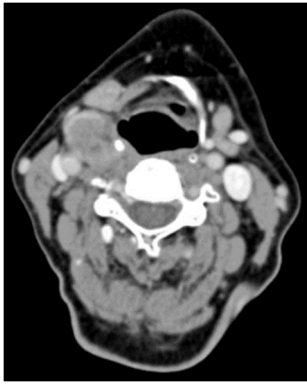
### Case presentation

A 68-year-old female visited our Outpatient Department two years post-thyroidectomy. She had noticed the presence of a right-sided mildly tender mass for two months. On examination, it was situated in the level II region of the neck. The mass was firm, smooth and regular. It was not fluctuant or pulsatile and was tethered to underlying tissues.

The lesion was initially thought to be a locoregional recurrence of thyroid cancer. However, on review of her medical record no evidence of thyroid malignancy was histologically observed. Ultrasonography (US) revealed a 3.98/2.21 cm irregular hypoechoic mass behind the right submandibular area without pathological neck lymphadenopathy (Figure 1), while CT showed a homogenous, well-defined mass up to 2.2/2.9/4.1 cm in right level II region (Figure 2).



Figure 1 – Preoperative cervical mapping picture.



**Figure 2 – CT image depicting the lesion in right level II area. CT: Computed tomography.**

Paraclinical investigations were within normal limits, while lung radiography showed no pathological changes.

Since definite diagnosis was not feasible, wide local excision was performed (Figure 3, a and b). Macroscopically, the tumor was a well-defined, nearly round, elastic, with a white nodule of 3.7 cm in its largest diameter (Figure 4).

Microscopic examination showed that the tumor was bounded by a thick connective capsule of collagen fibers with a concentric disposition, and fibroblast-type connective cells (Figure 5a). The tumor cells were arranged in bundles, with hardly visible intercellular boundaries, large, oval, and weakly colored nuclei, with delicate chromatin, without apparent presence of nucleoli, and poor, acidophilic cytoplasm (Figure 5b). Tumor cells showed moderate cellular and nuclear atypia and a reduced number of mitoses. Rare areas of tumor necrosis were observed (Figure 5c).

Examination with strong microscopic lenses revealed the existence of a network of small blood vessels (arterioles, capillaries, venules) with thin walls, microscopic appearance similar to a hemangiopericytoma (Figure 5d).

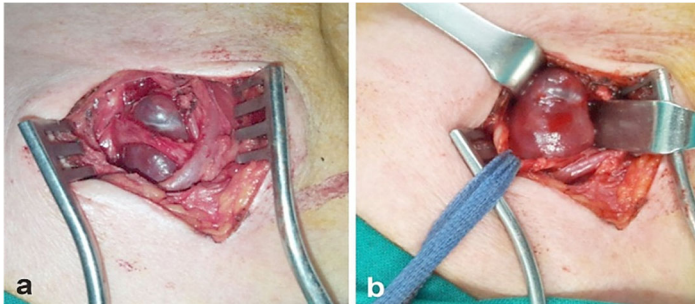
To establish a more precise positive and differential diagnosis, the pathologists decided to perform an immunohistochemical (IHC) study in which the following markers were used: anti-vimentin, anti-cluster of differentiation (CD) 99, anti-CD56, anti-CD34, anti-cytokeratin (CK) AE1/AE3, anti-epithelial membrane antigen (EMA), anti-S100, anti-desmin and anti-alpha-smooth muscle actin ( $\alpha$ -SMA). IHC staining showed that the neoplastic cells were intensely positive for vimentin and CD56 (Figure 6, a and b), moderately positive for CD99 and EMA (Figure 6, c and d), and intensely positive for CK AE1/AE3 (Figure 6e).

Tumor cells were negative for S100 (Figure 6f), desmin (Figure 6g),  $\alpha$ -SMA (Figure 6h), and CD34. In contrast, CD34 immunolabeling showed the presence of intense vascularization in the tumor (Figure 6i).

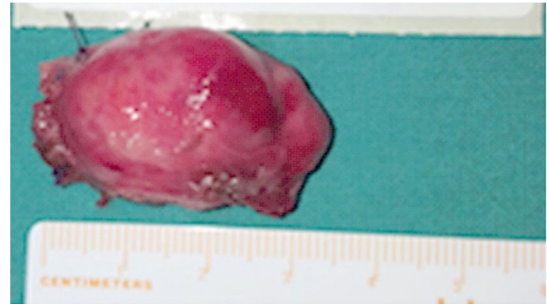
Performing the real-time polymerase chain reaction (RT-PCR) showed that in the genome of tumor cells there is a fusion of synaptotagmin (*SYT*)–SSX family member 1 (*SSX1*) genes (Figure 7, a and b).

Clinical, pathological and IHC findings indicated that the tumor was a typical encapsulated monophasic SS.

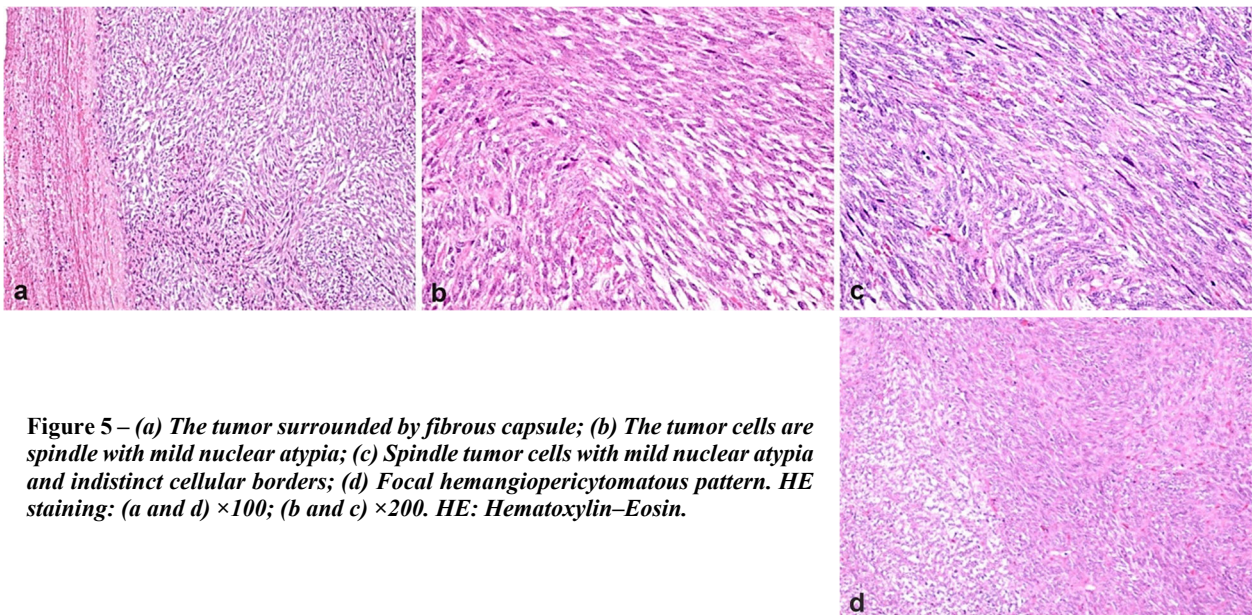
Due to the aggressive nature of the neoplasm, a positron-emission tomography (PET)/CT scan was recommended, revealing no hypermetabolic masses though (Figure 8, a and b). Currently, the patient is under oncological surveillance.



**Figure 3 – (a and b) SS dissection. The blue tape holds the internal carotid artery. SS: Synovial sarcoma.**

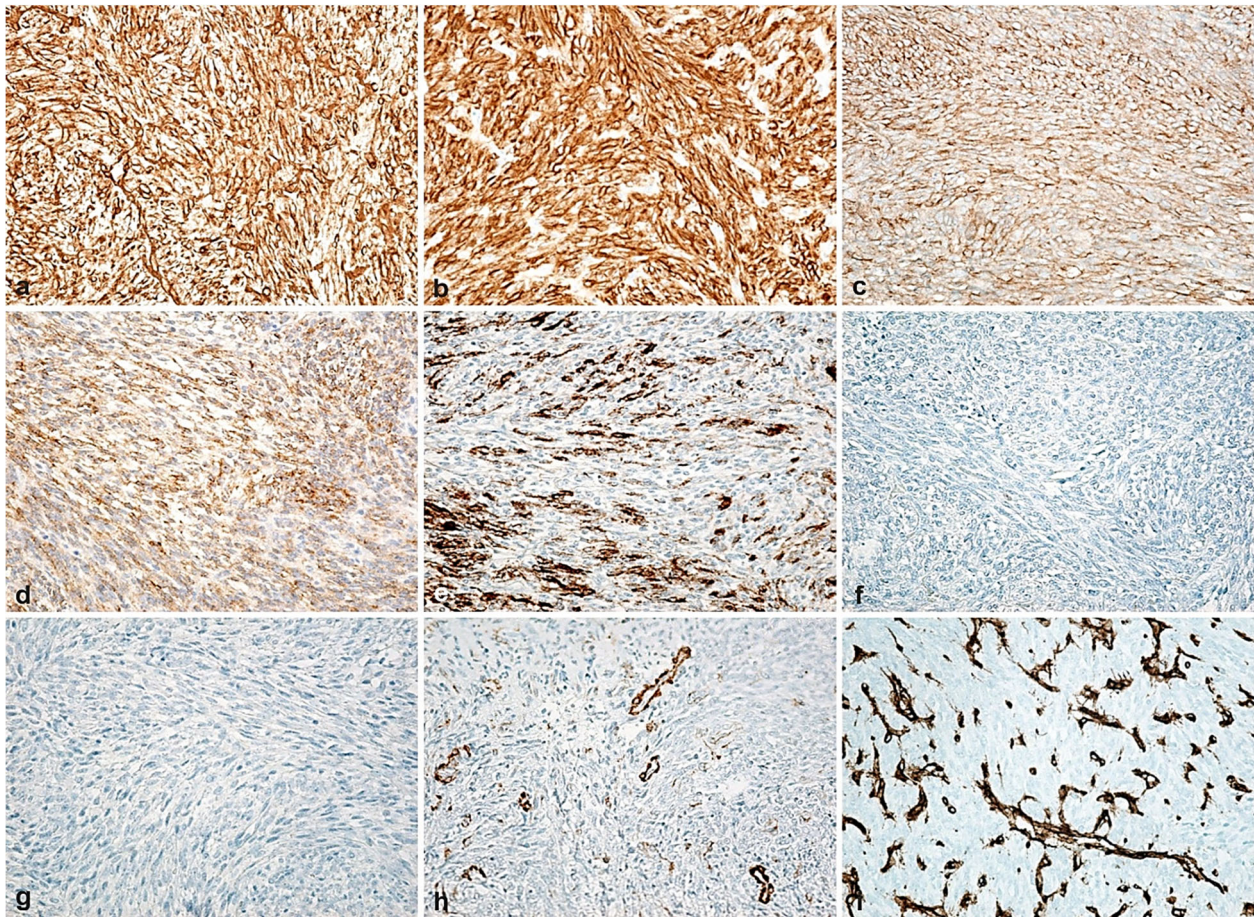


**Figure 4 – Macroscopic image of the SS: nodular tumor, encapsulated, well delimited, about 3.7 cm in diameter. SS: Synovial sarcoma.**

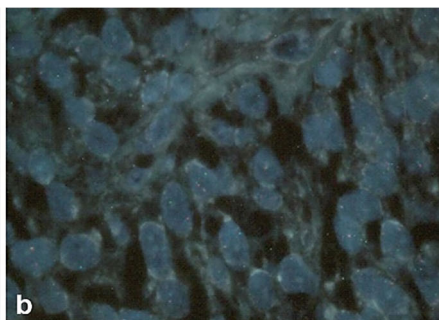
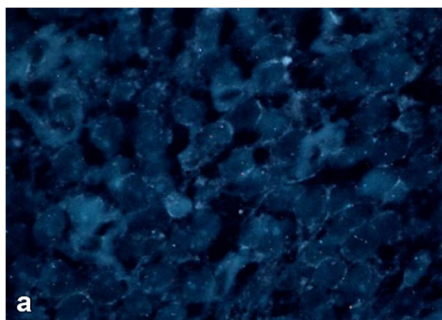


**Figure 5 – (a) The tumor surrounded by fibrous capsule; (b) The tumor cells are spindle with mild nuclear atypia; (c) Spindle tumor cells with mild nuclear atypia and indistinct cellular borders; (d) Focal hemangiopericytoma-like pattern. HE staining: (a and d)  $\times 100$ ; (b and c)  $\times 200$ . HE: Hematoxylin–Eosin.**

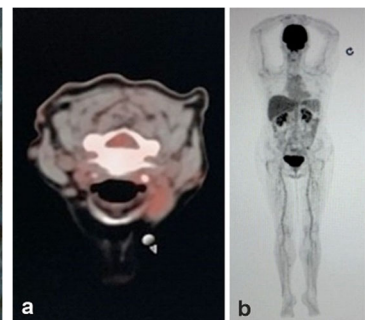




**Figure 6 –** (a) The tumor cells are positive for vimentin; (b) The tumor cells are positive for CD56; (c) The tumor cells are positive for CD99; (d) Tumor cells with a moderately positive immunoreaction to EMA; (e) Several tumor cells are positive for CK AE1/AE3; (f) Negative immunoreaction of tumor cells to S100 protein; (g) Negative immunoreaction of tumor cells to desmin; (h) Negative immunoreaction of tumor cells to  $\alpha$ -SMA, except for muscle cells in the blood vessels' wall; (i) Negative immunoreaction of tumor cells to CD34, except for endothelial cells in the blood vessels' wall. Immunolabeling with anti-vimentin antibody: (a)  $\times 200$ . Immunolabeling with anti-CD56 antibody: (b)  $\times 200$ . Immunolabeling with anti-CD99 antibody: (c)  $\times 200$ . Immunolabeling with anti-EMA antibody: (d)  $\times 200$ . Immunolabeling with anti-CK AE1/AE3 antibody: (e)  $\times 200$ . Immunolabeling with anti-S100 antibody: (f)  $\times 200$ . Immunolabeling with anti-desmin antibody: (g)  $\times 200$ . Immunolabeling with anti- $\alpha$ -SMA antibody: (h)  $\times 200$ . Immunolabeling with anti-CD34 antibody: (i)  $\times 200$ .  $\alpha$ -SMA: Alpha-smooth muscle actin; CD: Cluster of differentiation; CK: Cytokeratin; EMA: Epithelial membrane antigen.



**Figure 7 –** (a and b) Presence of break apart and rearrangement of SSX1/4 genes. SSX: SSX family member 1/4.



**Figure 8 –** PET/CT examination shows no hypermetabolic masses: (a) Cross section at the neck; (b) Longitudinal section of the body. PET/CT: Positron emission tomography/computed tomography.

**Discussions**

SS are scarce soft tissue malignancies more often seen in males with a 3:2 ratio compared to females [3, 5].

Age at presentation varies between the 3<sup>rd</sup> and 5<sup>th</sup> decade of life. Such tumors are frequently present in lower extremities. Only 3% of SS appear in the area of head and neck with the most usual site being the hypopharynx and

larynx the least frequent location [1, 7]. Gopalakrishnan *et al.* report that patients may have primary tumors at several sites in the head and neck. SS are considered to originate from pluripotent mesenchymal cells that can differentiate into epithelial and mesenchymal lineages [1, 7]. However, as observed with synovial cell sarcomas (SCS) occurring in parapharyngeal, hypopharyngeal or laryngeal regions, SCS can arise from cells outside the synovium. An asymptomatic lesion may be the first manifestation of the disease. When symptomatic, the clinical presentation is atypical and depends on location. Dysphagia, dyspnea, dysphonia, discomfort, and a palpable mass are the most commonly reported symptoms [4, 7, 8].

CT and MRI examinations may help in diagnosis. CT examination typically shows a multi localized tumor with smooth margins and heterogeneous enhancement after injection of contrast agent. Tumors may contain calcifications. MRI examination reveals a lesion of intermediate intensity on T1-weighted sequences and of variable intensity on T2-weighted sequences, with heterogeneous enhancement after injection of contrast substance. Ouansafi *et al.* also propose fine-needle aspiration (FNA) biopsy for diagnosing this kind of sarcoma [9]. In the head and neck region, the parapharyngeal space is the place most frequently involved in the appearance of SS [10, 11]. These findings, however, may be similar to other head and neck tumors, either benign or malignant [12–14]. Benign lesions include inflammatory lymphadenopathy, branchial, dermoid, and thyroglossal duct cysts, and also benign mesenchymal tumors, such as schwannoma, neurofibroma, lipoma, or even tumors of ectopic minor salivary glands. Malignancies such as squamous cell carcinoma, sarcomas of the head and neck like rhabdomyosarcomas, leiomyosarcomas, fibrosarcomas, and liposarcomas and non-Hodgkin's lymphoma could be also found.

The SS treatment of choice is clear margins surgical resection [1, 8]. Prophylactic neck dissection is not known to have a benefit for the survival rate since SS rarely shows lymphatic spread. Chemotherapy as adjuvant or neoadjuvant treatment remains controversial [8], being performed in patients with high risk of metastatic disease [6]. Adjuvant radiotherapy can be applied in the presence of risk factors, especially for tumors over 5 cm in diameter [11, 15]. SS, although characterized by its slow development, has poor prognosis due to local recurrences and distant metastases, particularly in the lungs [8, 16]. Follow-up should be of lifelong duration. For metastatic disease, palliation seems to be justified.

No distinctive features are found on gross appearance for SCS. Tumors may have an ivory gray-white appearance and an oleaginous texture on palpation. The two major histological subtypes of SCS are the monophasic and biphasic subtypes [7, 8].

Histopathologically, both subgroups have spindle cells proliferating and branching, dilated, thin-walled blood vessels (hemangiopericytomatous pattern) within a heterogeneous collagenous stroma [1, 7]. A histological subtype, however, is not known to influence survival in HNSS patients. Other features observed in SCS include tumor necrosis, cystic modifications, and calcification. SS are CK, EMA, vimentin and pankeratin (CK AE1/AE3) positive [7, 10]. Molecular testing *via* fluorescent *in situ* hybridization

(FISH) and RT-PCR can easily detect the t(X;18) (p11.2;q11.2) translocation which is typical in SS (99%) [7]. Possible combinations of fusion genes are *SYT-SSX1*, *SYT-SSX2*, *SYT-SSX4*, which can be used to confirm the diagnosis.

## ✉ Conclusions

To ensure adequate and patient-centered care for HNSS cases, a multidisciplinary team including a head and neck surgeon, a radiation oncologist and a medical oncologist is required. Due to the challenging management and rarity of this malignancy, reporting such cases may lead to its better understanding.

## Conflict of interests

The authors declare that they have no conflict of interests.

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