Various Morphological Patterns of Synovial Sarcoma, their biological behaviour & prognostic value – a retrospective study of 25 cases

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Abstract

Synovial sarcoma occurs at any age but peak age is between 10-35 years with slight male predominance. More than 60% occur in lower limb especially thigh, knee and ankle joints. Synovial sarcoma falls in to two main groups: Biphasic and Monophasic spindle cell type. The latter is more common depending on sampling. The other histological variants are the branching, hemangio pericytoma like pattern. Poorly differentiated with round cell morphology resembling Ewing's sarcoma. Immunohistochemically in addition to epithelial component, spindle cell component also show focal positivity for EMA and keratin. This helps in distinguishing monophasic synovial sarcoma from peripheral nerve Sheath tumor or fibrosarcoma. The aim of this retrospective study is to study the various morphologic patterns of clinically suspected synovial sarcomas, their biological behaviour and prognostic value by immunohistochemical study. A total of 25 cases of clinically suspected cases of synovial sarcoma were studied in the age group of 10 -50 yrs. The most commonest age group were in children & young adults between 10-25 yrs. Among 25 cases, 20 cases were in males & 5 in females indicating male dominance. The commonest site involved was knee and ankle joints & in very few cases showed lesions over the shoulder and hip, rare cases over the anterior abdominal wall & in blood vessels. Microscopically Monophasic synovial sarcoma was the common variant seen in 16 biopsies. Presence of short and plump spindle shaped cells arranged in fascicles, compact sheets with tapering nuclei and poorly defined cytoplasm was seen in 15 biopsies, these biopsies also showed cleft like spaces. Whereas four biopsies showed myxoid change. Four cases of monophasic synovial sarcoma showed atypical mitotic figures > 15/10hpf.Four cases of monophasic synovial sarcoma showed focal positivity for epithelial membrane antigen and keratin. One case of poorly differentiated synovial sarcoma was CK7 positive. Poorly differentiated synovial sarcoma showed cytogenetically positivity for SyT-SSx1 fusion gene indicating poorer prognosis. Study of various morphlogical variants is essential to know their prognostic value & biological behaviours. Monophasic synovial sarcomas have more tendency to recur compared to the biphasic variants. Although histopathological study of synovial biopsy is one of the most valuable means for diagnosis of synovial sarcoma, it has its own limitations. In many instances corroborative clinical, radiological, immunohistochemical studies becomes essential in making an accurate histopathological diagnosis.

Keywords: Monophasic synovial sarcoma, Biphasic variant, poorly differentiated, calcifying variant, Ck7, EMA, Spindle cells, glandular pattern.

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Introduction

Synovial sarcoma occurs at any age but peak age is between 10-35 years with slight male predominance. More than 60% occur in lower limb especially thigh, knee and ankle joints[1-6] a small but significant proportion arise on trunk, especially in the abdominal wall[7], in the neck[8,9], in the head (including the orbit) and in mediastinum[10]. Rare cases are reported in blood vessels[11, 12] nerves[13].

Synovial sarcoma falls in to two main groups: Biphasic and Monophasic spindle cell type. The latter is more common depending on sampling. Both variants share a spindle cell population arranged in fascicles with uniform, tapering nuclei and pale, poorly defined cytoplasm set in a variable collagenous stroma[14]. Biphasic lesions in classical form contain variably numerous glandular structures lined by well differentiated cuboidal to columnar epithelium[14,15].

The other histological variants are the branching, hemangio pericytoma like pattern[16]. Poorly differentiated with round cell morphology resembling Ewing's sarcoma.[14,17-19]

Immunohistochemically in addition to epithelial component, spindle cell component also show focal positivity for EMA and keratin. This helps in distinguishing monophasic synovial sarcoma from peripheral nerve Sheath tumor or fibrosarcoma[14,20,21].

The aim of this retrospective study is to study the various morphologic patterns of clinically suspected synovial sarcomas, their biological behaviour and prognostic value by immunohistochemical study.

Materials and Methods

This study comprises analysis of 25 cases of clinically suspected synovial sarcomas from the data collected from the Department of Pathology, J.J.M Medical College, Davangere.

Clinical information required for the study were obtained from the respective medical faculty and were recorded chronologically in the proforma and later categorized accordingly, which included complete clinical details, necessary investigations and procedures adapted to obtain the material.

Most of the specimens were obtained by whole tissue excision by oven synovectomy. After obtaining the specimens detailed gross examination was done and salient morphological features were recorded and the whole biopsy material was fixed in 10% formalin for 12-24 hours. Finally representative bits were given. Tissues were processed routinely and paraffin blocks were prepared and stained with haematoxylin and eosin. Special stains like PAS stain was used to demonstrate mucin in biphasic synovial sarcomas. Wherever necessary with the available clinical, radiological findings, immunohistochemical marker study was done using microwave tissue processing to demonstrate epitheilial membrane antigen, cytokeratin in synovial sarcomas and were taken in to consideration to categorize the lesions wherever necessary cytogenetic study was done.

Observations and Results

A total of 25 cases of clinically suspected cases of synovial sarcoma were studied in the age group of 10 - 50 yrs. The most commonest age group were in children & young adults between 10-25 yrs .Among 25 cases, 20 cases were in males & 5 in females indicating male dominance. The commonest site involved was knee and ankle joints & in very few cases showed lesions over the shoulder and hip, rare cases over the anterior abdominal wall & in blood vessels. (table -1).

Longstanding Pain preceeded palpable mass in most of the patients with only few patients showing restricted movements at joints.

A total of 25 synovectomy specimens of synovial sarcoma were studied among which the monophasic synovial sarcoma was the common type seen in 16 cases. Out of which 4 recurred after 1 year, five were biphasic and other variants like haemangiopericytoma pattern, calcifying, poorly differentiated & adenocarcinoma –like pattern were seen in one patient each. (Table -2)

Macroscopically All the 25 specimens of synovial sarcoma appeared as grey white to grey brown irregular masses altogether measuring about 5-8cms in diameter. 3 specimens had focal nodular surface at places. Cut section also appeared grey white to gey brown in all 25 patients. (Fig.1-2)

Microscopically Monophasic synovial sarcoma was the common variant seen in 16 biopsies. Presence of short and plump spindle shaped cells arranged in fascicles, compact sheets with tapering nuclei and poorly defined cytoplasm was seen in 15 biopsies, these biopsies also showed cleft like spaces. Whereas four biopsies showed myxoid change. Four cases of monophasic synovial sarcoma showed atypical mitotic figures > 15/10hpf. (Fig.3) In one biopsy significant calcification was noted. (Fig.4)

In one biopsy, sheets of round to oval cells separated by thin indistinct fibrocollagenous stroma and areas of necrosis with more than 2 mitotic figures /HPF mimicking Ewings sarcoma was seen and diagnosed as poorly differentiated synovial sarcoma.(Fig.5-6) The remaining 5 patients showed apart from sheets of spindle cells, features of gland like spaces lined by plump round to cuboidal cells and was diagnosed biphasic synovial sarcoma.(Fig.7) The glandular component showed PAS positivity for mucin.

Proliferation of blood vessels with haemangiopericytomatous pattern was seen in one patient of monophasic variant. Recurrent monophasic variants also showed infiltration into adjacent muscle and fibrofatty tissue. None of the biphasic synovial sarcoma recurred after surgical removal.

The patient with intravascular synovial sarcoma presented with deep vien thrombosis. Four cases of monophasic synovial sarcoma showed focal positivity for epithelial membrane antigen and keratin. One case of poorly differentiated synovial sarcoma was CK7 positive.(Fig.8) Poorly differentiated synovial sarcoma showed cytogenetically positivity for SyT-SSx1 fusion gene indicating poorer prognosis.

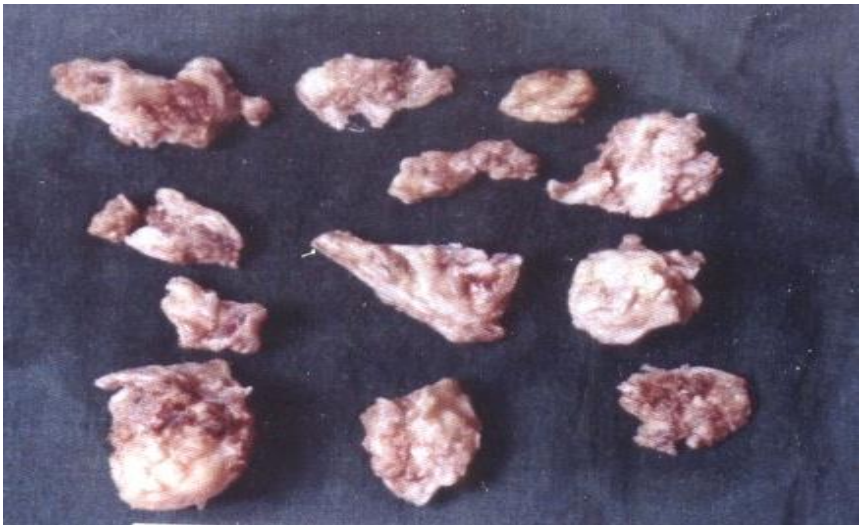

Fig. 1: Synovial sarcoma: Grey white to grey brown masses

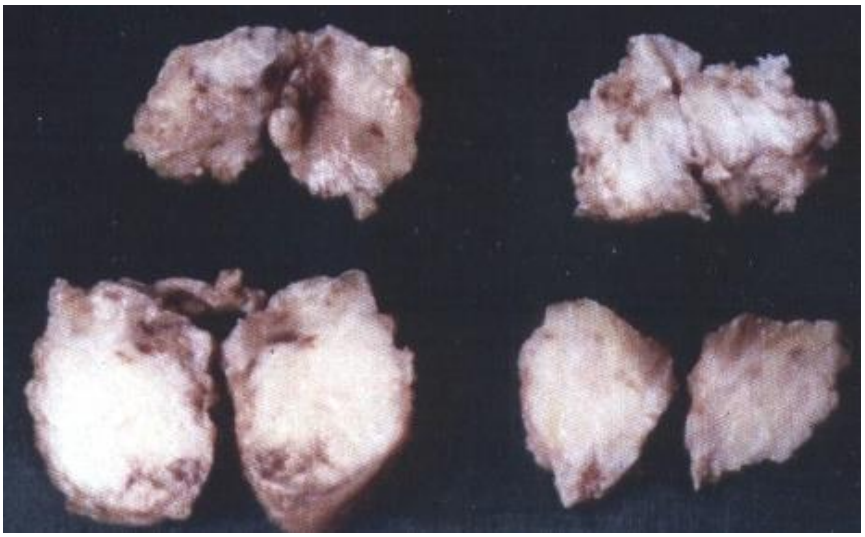

Fig. 2: Synovial sarcoma: Cut section - grey white to grey brown areas.

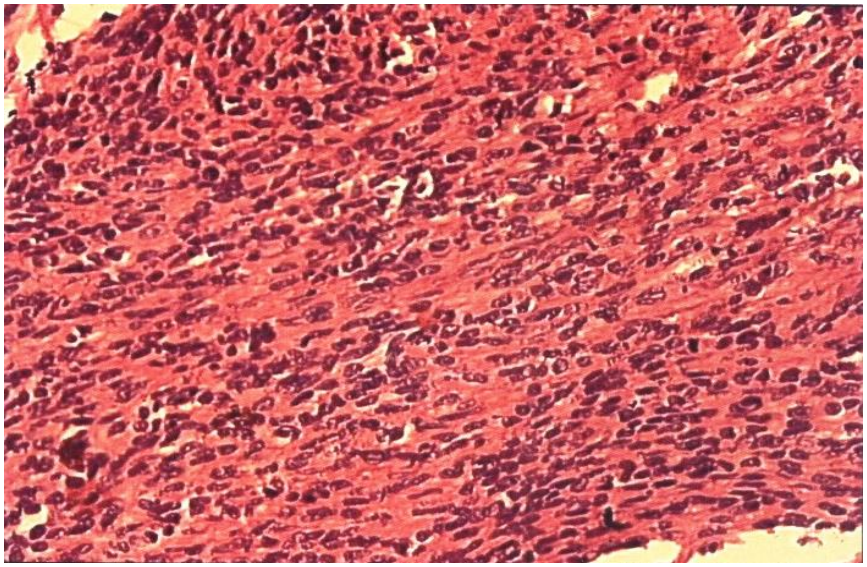

Fig. 3: Monophasic Synovial sarcoma: uniform spindle cells with cleft like spaces (H&E.40X)

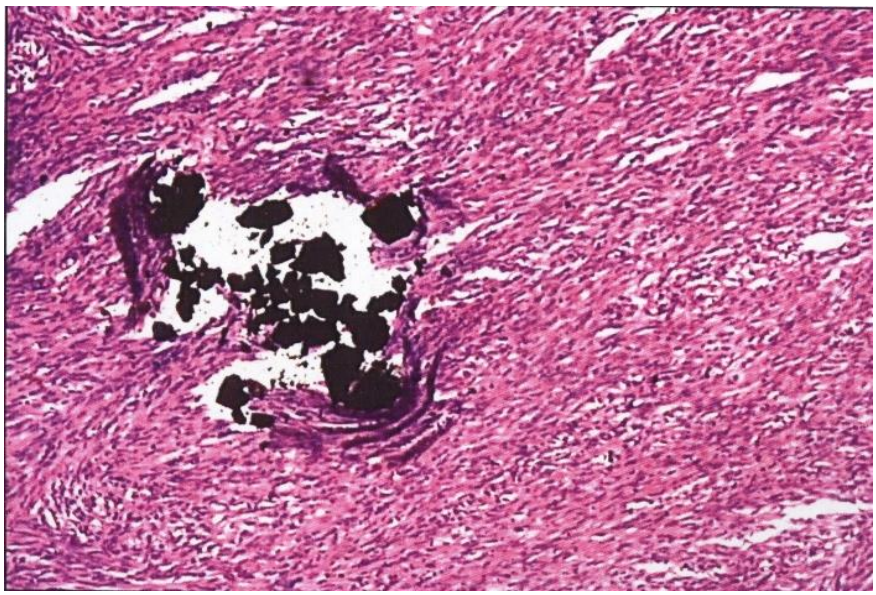

Fig. 4: Monophasic Synovial sarcoma: foci of calcification amidst spindle cells(H&E.10X)

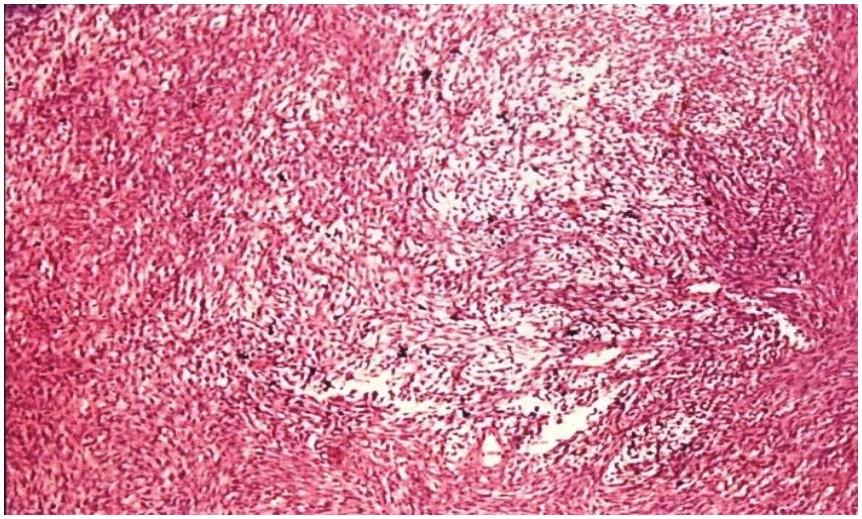

Fig. 5: Monophasic Synovial sarcoma: Myxoid change (H&E.10x)

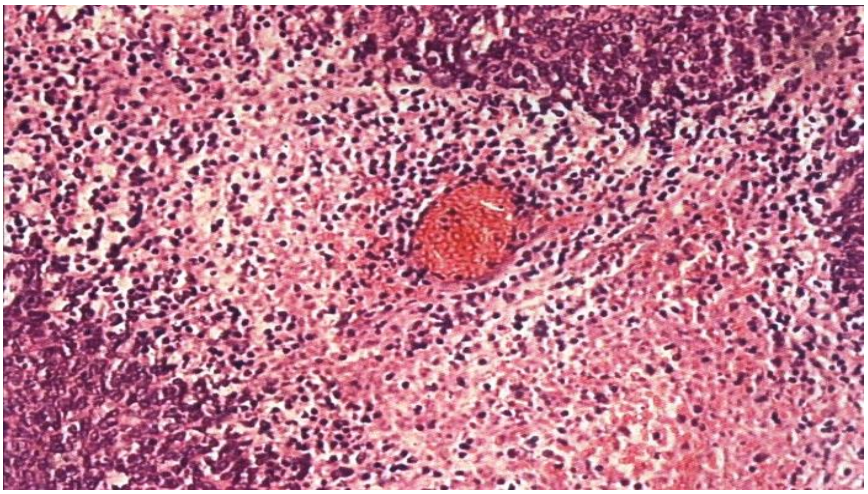

Fig. 6: Poorly differentiated synovial sarcoma: Focal areas of necrosis around blood vessel (H&E.40X)

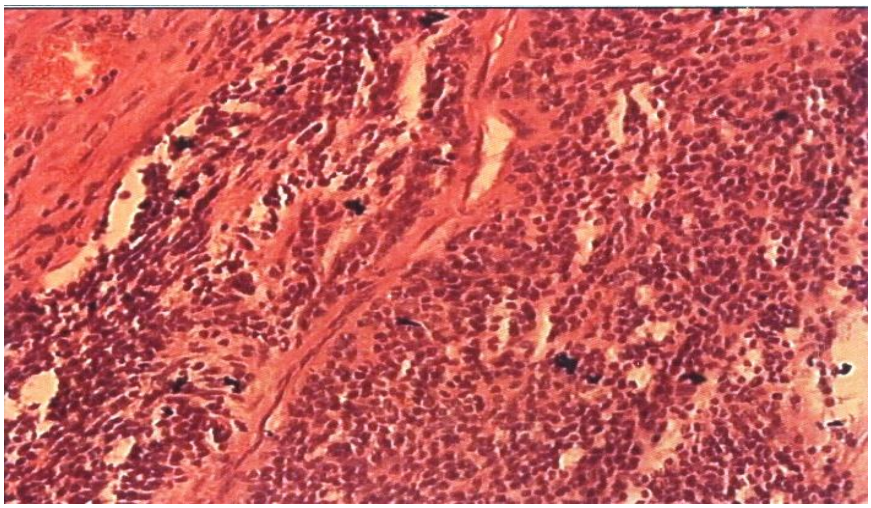

Fig. 7: Biphasic synovial sarcoma: Slit like spaces resembling vascular Channels lined by round to cuboidal cells (H&E.10X)

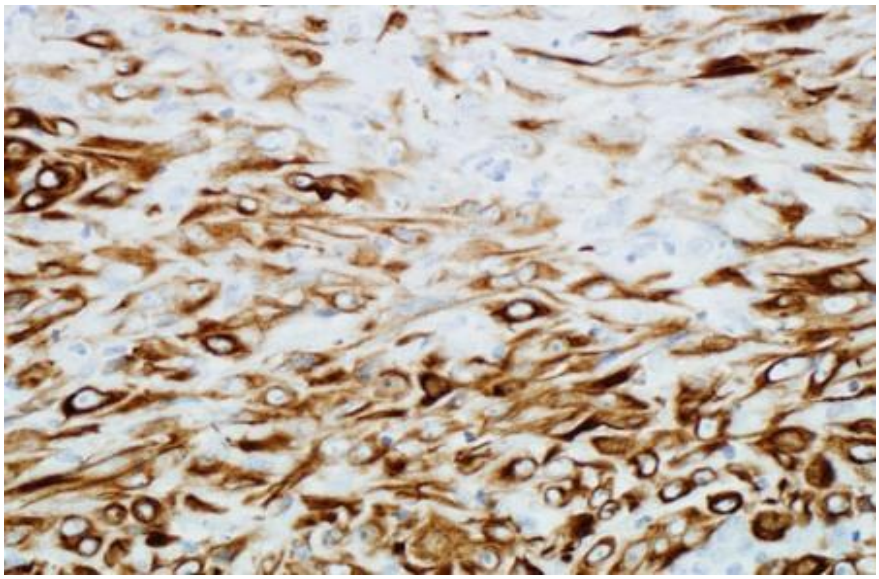

Fig. 8: Ck7 positive spindle cells in monophasic synovial sarcoma

Table 1: Sites involved

Knee Joint	Ankle joint	Hip joint	Anterior Abdominal wall	Blood vessels	Total
15	6	2	1	1	25

Table – 2: Various Morphological Patterns of Synovial Sarcoma

Histological variants	No. of Patients
1. Monophasic spindle cell variant	16
2. Biphasic variant	05
3. Haemangiopericytoma like pattern	01
4. Calcifying synovial sarcoma	01
5. Poorly differentiated form	01
6. Adenocarcinoma like pattern	01
Total	**25**

Discussion

Exploratory arthrotomy and synovial biopsy are recognized procedures for early diagnosis of joint diseases particularly when clinical and radiological findings are inconclusive.[22] Synovial Sarcoma is the 4th most common sarcoma. Commonly occurs in the early adulthood, majority develop in the vicinity of large joints of lower extermities[1]. In our study knee & ankle were the most common sites involved like in the study of Fisher C[1] & others[2-6,23,24] with only one case involving anterior abdominal wall like in Fetsch JF ,Meis JM sudy[7,25-30] & blood vessel involvement in one case as observed by Miettinen M etal[11,31] and others.[12] In monophasic synovial sarcoma the commonest age group affected was between 10-25 years and showed male dominance compared to females and the biphasic variants were seen in age group of 20-40yrs, whereas in Harry L. Evans[32] study in 1980 both biphasic and monophasic synovial sarcoma were common in young adulthood and the teenage years. The sex distribution was close to 1:1 in both categories.

Local recurrence of monophasic synovial sarcoma was noted in four patients. Whereas in Harry L Evans[32] study 10 were recurrent out of 17 cases of monophasic synovial sarcoma.

All the 4 patients showed a similar histopathological picture with a very high cellularity being composed of small to medium sized spindle cells with round to oval nuclei arranged in interlacing fascicles. Similar observations were noted in the study of Alvarez Fernandiz, Emilio and Julio Scalona Zapata in 1981[33]. Frequent mitotic figures were encountered in their study whereas in our study occasional mitotic figures were seen. Similar observation were noted in the study of Hary L. Evans in 1980[34] with additional feature of haemangio pericytomatous pattern which was seen in the present study also.[16]

In our study biphasic synovial sarcoma was characterized by the presence of short spindle cells seperated by myxoid stroma and focal areas of intermingled and occult round to cuboidal cells. The round to cuboidal cells were arranged in occult pseudoglandular pattern where as in Harry L. Evans[34] study apart from regular features observed, sharply contrasting intermingled epitheloid and spindle cell components, typical glandular arrangement around a central lumen were seen.[15]

Four cases of monophasic synovial sarcoma showed focal positivity for epithelial membrane antigen and keratin. One case of poorly differentiated synovial sarcoma was CK7 positive like in the studies of Abenoza P et al[35-40]

Poorly differentiated synovial sarcoma showed cytogenetically positive for SYT-SSX1 fusion gene indicating poorer prognosis, in which Antonescu CR et al[41] & others[42-45] showed strong association of SYT-SSX fusion type & morphological epithelial differentiation.

Conclusion

Study of various morphlogical variants is essential to know their prognostic value & biological behaviours. Monophasic synovial sarcomas have more tendency to recur compared to the biphasic variants. Although histopathological study of synovial biopsy is one of the most valuable means for diagnosis of synovial sarcoma, it has its own limitations. In many instances corroborative clinical, radiological, immunohistochemical studies becomes essential in making an accurate histopathological diagnosis.

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