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Original Research Article

Histopathology of soft tissue tumors in association with immunohistochemistry**Sonal Jain*** and Kirit Jadav*Department of Pathology, Sir Sayaji General (SSG) Hospital, Jail road, Opp. Bharat Petrol Pump, Indira Avenue, Vadodara, Gujarat 390001 India*

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Indira Avenue, Vadodara, Gujarat 390001 India***Article History:****Received:** 23/08/2017**Revised:** 28/08/2017**Accepted:** 28/08/2017**DOI:** <https://doi.org/10.7439/ijbar.v8i8.4304>**Abstract****Aim:** To study the histopathological pattern for understanding the classification and type of soft tissue tumors. To find out the relative incidence of benign and malignant soft tissue tumors and to classify the soft tissue tumours on basis of age, sex, site, types and benign and malignant behaviour.**Material and Methods:** The test population comprised of patients with soft tissue lesions, between July 2014 to July 2016, evaluated by light microscopy and Immunohistochemistry.**Results:** Painless mass was the most common presenting symptom in our study. Benign soft tissue tumors (89.7%) outnumbered malignant tumors (9.2%) by a ratio of 9.7:1. In our study, Male: Female ratio-1.16:1.In benign soft tissue tumor, Male: Female ratio -1.1:1 and in malignant soft tissue tumor, Male: Female - 0.9:1 in our study. First most common soft tissue tumors are Lipomatous tumors among the all soft tissue tumor. Benign lipomatous tumors are the most common tumors in present study. Most common site soft tissue tumor found is upper limb with chest in present study. Most common age of soft tissue tumor is in 2nd and 3rd decade of life. Malignant tumors are 9.2% reported; most common tumors are skeletal muscle tumors 100% followed by stromal tumor (80%).

Second most common tumor is capillary lobular haemangioma which are of vascular origin. In the present study 3 cases of intermediate type of soft tissue tumor –2 of haemangiopericytoma and 1 of fibromatosis are found, which are rarely found. IHC markers were applied in 25 cases where microscopy was inconclusive to arrive at a definite diagnosis.

Conclusion: A good clinical acumen, through description and grossing of specimen, and microscopic evaluation of hematoxylin and eosin stained sections are fundamental aspects in diagnosis of soft tissue tumors. Majority of tumors diagnosed by hematoxylin and eosin stained sections. Immunohistochemistry was done wherever light microscopy was inconclusive.**Keywords:** Soft tissue tumors, hematoxylin, Immunohistochemistry.**1. Introduction**

Soft tissue can be defined as non-epithelial, extra skeletal tissues of the body exclusive of reticulo-endothelial system, glia and supporting tissues of various parenchymal organs. It is represented by voluntary muscles, fat and fibrous tissue, along with the vessels serving these tissues. By convention, it also includes peripheral nervous system [1]. Soft tissue tumors are defined as mesenchymal

proliferations which occur in the extraskeletal nonepithelial tissues of the body, excluding the viscera, coverings of brain and lymphoreticular system [2]. The annual incidence of soft tissue tumor is 1.4 per 100000 populations [3]. Soft tissue tumors are the fourth most common malignancy in children, after hematopoietic neoplasm, neural tumor and wilms tumor [2]. Soft tissue sarcomas account for 15% of

all childhood cancers [2]. Benign tumors outnumber malignant ones by margin of 100:11.

The degree of differentiation is a reliable indicator of future behaviour but sometimes differentiation is misleading, certain leiomyosarcomas may metastasize widely despite of their relative high degree of differentiation, fibrosarcomas on the other hand tends to pursue a less aggressive clinical course that one would expect from their immature histological appearance and sarcomas arising in DFSP has increased metastases risk [3,7]. Histologic grade represents the most important prognostic factor for all soft tissue sarcomas, strongly associated with the advent of metastasis and patients survival [2,4]. The use of ancillary techniques like immunohistochemistry, electron microscopy flow cytometry and cytogenetics, has increased insight into the tumor biology and has provided tools for greater diagnostic accuracy. Yet the foundation of these newer techniques rests upon the histologic diagnosis made on light microscopic evaluation of hematoxylin and eosin stained sections and use of special stains. It is critical to recognize immunohistochemistry as an adjunctive technique, which does not supercede or replace the traditional morphological diagnosis [6]. Soft tissue masses present a challenge to the pathologist because of their extremely varied morphology and biologic behaviour[5].

Fibrous connective tissue consists principally of fibroblasts and an extracellular matrix containing fibrillary structures (collagen, elastin) and nonfibrillary extracellular matrix, or ground substance. *Fibroblasts* are the predominant cells in fibrous connective tissue. These cells are spindle-shaped with pale-staining, smoothly contoured oval nuclei, one or two minute nucleoli, and eosinophilic to basophilic cytoplasm, depending on the state of synthetic activity. *Fibrocytes* represent the quiescent stage of fibroblasts. *Myofibroblasts* share morphologic features with both fibroblasts and smooth muscle cells.

Adipose tissue is divided into two major types: White fat and brown fat.

White fat:

Histologically, differentiated white fat consists of spherical or a polygonal cell in which most of the cytoplasm has been replaced by a single large lipid droplet, leaving only a narrow rim of cytoplasm at the periphery. The leaving only a narrow rim of cytoplasm at the periphery. The eccentrically placed nucleus is flattened and is crescent-shaped on cross-section; not infrequently it contains one small lipid invagination (Lochkern) [8].

Brown fat: The term brown fat refers to its gross appearance, which results from its abundant vascularity and numerous mitochondria. Its cells are smaller (25–40 µm in diameter), are round or polygonal, and contain a large

amount of cytoplasm that stains deeply eosinophilic with hematoxylin-eosin. The cells are mostly multivacuolated, with distinctly granular cytoplasm between the individual lipid droplets. Intermixed with these cells are nonvacuolated, purely granular cells and cells with a single large lipid vacuole, resembling lipocytes. The nuclei are rounded and situated in a central position. The cells are arranged in distinct lobular aggregates and are intimately associated with a prominent vascular network and numerous nerves.

Smooth muscle cells:

Smooth muscle cells are fusiform in shape and have centrally located cylindrical nuclei with round ends that develop deep indentations during contraction. The cells are usually arranged in fascicles in which the nuclei are staggered so the tapered end of one cell lies in close association with the thick nuclear region of an adjacent cell. Typically, there are no connective tissue cells between individual muscle fibers, although a delicate basal lamina and small connective tissue fibers, presumably synthesized by the muscle cells [5], can be seen as a thin periodic acid-Schiff (PAS)-positive rim around individual cells in light microscopic preparations.

Skeletal muscle:

Mature striated muscle consists of parallel arrays of closely packed myofibrils embedded within sarcoplasm and enveloped by a thin sarcolemmal sheath. Each of the myofibrils shows distinct cross-banding, light and dark bands caused by the periodic arrangement and interdigitation of the thin and thick myofilaments.

Blood vessels are divided into arterial and venous compartments joined by a network of capillaries. The several types of cells present in blood vessels are divided into two major types: endothelial cell (located toward the lumen) and a closely related group composed of pericytes, smooth muscle cells, and glomus cells (located toward the outside). Endothelial cells are usually recognized with ease by their shape and location, but both of these can be greatly altered in neoplastic conditions

The cells of pericyte-smooth muscle-glomus family are characterized by cytoplasmic microfilaments exhibiting focal condensations, numerous pinocytotic vesicles, and a thick continuous basal lamina. Immunohistochemically they show reactivity for actin, vimentin, and myosin.

Peripheral nerves:

Each nerve fascicle is surrounded by perineurium, a structure continuous with the pia arachnoid of the central nervous system. Schwann's cells look somewhat similar to fibroblasts at the light microscopic level but are easily distinguished from them immunohistochemically because of their strong immunoreactivity for S-100 protein and ultra

structurally by an intimate relationship to axons (with the formation of mesoaxons) and the presence of a continuous basal lamina that coats the surface of the cell facing the endoneurium. Schwann's cells are of neuroectodermal derivation, whereas perineural cells apparently originate from fibroblasts.

Soft tissue tumors are a highly heterogeneous group of tumors that are classified on a histogenetic basis according to the adult tissue they resemble. Within the various histogenetic categories, soft tissue tumors are usually divided into benign, intermediate and malignant forms.

Incidence:

The incidence of soft tissue tumors, especially the frequency of benign tumors relative to malignant ones, is nearly impossible to determine accurately. Benign soft tissue tumors outnumber malignant tumors by a wide margin. The fact that many benign tumors, such as lipomas and hemangiomas, do not undergo biopsy makes direct application of data from most hospital series invalid for the general population.

Clinical presentation and assessment:

Most patients with suspected soft tissue neoplasms present with a painless mass, although pain is reported in one-third of cases. Delay in diagnosis is common; the most common misdiagnoses include post-traumatic or spontaneous hematoma and "lipoma."

Site: Benign tumors of soft tissue are more common than benign tumors of bone. They can occur at almost any site, both within and between muscles, ligaments, nerves, and blood vessels. These tumors vary widely in appearance and behaviour

2. Material and Methods

The present study was conducted at the Department of Pathology, Medical College Baroda and SSG hospital. The test population comprised of patients with soft tissue lesions, between July 2014 and July 2016.

2.1 Inclusion criteria

The material for the study consisted of all the biopsies, specimens and referred materials submitted to the Department of Pathology, SSG Hospital for histopathological and immunohistochemical study.

Data for study is obtained from departmental records (for retrospective study) and tissue specimens received in the histopathology section (for prospective study) in the specified period of study.

2.2 Tissue collection

The tissues of the test population submitted were evaluated by histopathological processing and examination (HPE). Performa designed to gather uniform necessary information was used for every case (annexure). There after

the most suitable tissue block was selected for IHC evaluation.

2.3 Tissue processing

Tissues were fixed in 10% Buffered formalin overnight, for an average period of 16-24 hrs. The tissue was grossed and representative blocks processed in the histokinete with a cycle of 24 hours, after which the processed tissue was embedded into paraffin wax blocks and then chucked onto wooden chucks. The wax blocks were trimmed using the rotary microtome. Sections were taken onto slides and stained by the routine H&E stain (annexure). During the HPE reporting, most of the cases were diagnosed by light microscopy and subsequently, ER, PR and Her2 were done on the best section representing the tumor. Only in certain cases where there was diagnostic dilemma, other Immunohistochemistry (IHC) markers were applied.

2.4 IHC procedure

The selected tissue block sections were taken up on poly-l-lysine coated slides for IHC procedure (annexure). The slides were deparaffinised in xylene, thereafter brought down to water after passing through increasing grades of alcohol. The Peroxidase antiperoxidase (PAP) method of IHC was followed. Biogenex reagents were used for the antigen retrieval and IHC staining process. The heating cycles followed in the Biogenex temperature controlled microwave were two cycles of 10 minutes and 5 minutes each at 95°C, with intermittent refilling of the antigen retrieval solution.

Thereafter the slides were brought down to room temperature and taken through the steps of wash with TRIS buffer, peroxide block, power block and monoclonal antibodies. After this, slides were again washed in TRIS buffer, the secondary antibody exhibited, thereafter DAB chromogen was added. The slides were then washed with water, counterstained with hematoxylin and blued. Then slides were serially dehydrated in alcohol, cleared in xylene and thereafter mounted using DPX. After drying, the test slides were examined along with the control sections stained simultaneously

3. Results and Discussions

Soft tissue can be defined as non-epithelial, extra-skeletal tissues of the body exclusive of the reticulo-endothelial system, glia and supporting tissues of various parenchymal organs. It is represented by the voluntary muscles, fat and fibrous tissue, along with the vessels serving these tissues. By convention, it also includes peripheral nervous system.

In the present study, a total 312 cases of soft tissue tumors are included, received in the Department of Pathology, Baroda from July 2014 to July 2016.

Table 1: Comparative analysis of benign and malignant soft tissue tumors in different studies

Characteristics	No of Cases		Incidence (%)		Ratio
	Benign	Malignant	Benign	Malignant	
Jain <i>et al</i> [9]	335	35	90.6%	9.4%	9.5
Agaravat <i>et al</i> [12]	86	06	86%	6%	14.3
Mirza <i>et al</i> [10]	113	24	83.7%	17.7%	4.7
Janaki <i>et al</i> [11]	193	09	92%	4.2%	21.4
Present Study	280	28	89.7%	9.2%	9.75

The present study with incidence rate of 89.7% of benign soft tissue tumors is similar to the study of Jain *et al* [9] and Agaravat *et al* [12] with the incidence rate of 90.6 % and 86% respectively. The incidence rate of malignant tumors is 9.2% in present study as compared to 9.4% and 6% in the study of Jain *et al* [9] and Agaravat *et al* [12].

The relative frequency of benign to malignant soft tissue tumors is difficult to estimate accurately since many of the benign tumors cannot cause much problems and patient do not report to the clinicians and also most benign lesions are not removed.

Table 2: Comparative analysis of benign and malignant soft tissue tumors in males and females

Characteristics	M:F Ratio	
	Benign	Malignant
Jain <i>et al</i> [9]	1.2	1.9
Agaravat <i>et al</i> [12]	1.1	1.4
Mirza <i>et al</i> [10]	1.1	1.0
Janaki <i>et al</i> [11]	1.2	2.0
Present Study	1.1	0.9

The ratio of M: F of benign soft tissue tumors is almost similar in all four studies. Almost all benign soft tumors had a male predominance. However, malignant soft tissue tumors show variation in all four studies. The ratio of M:F of malignant soft tissue tumors in present study is 0.9 compared to 1.9 ,1.4, 1 and 2 of Jain *et al* [9], Agaravat *et al* [12], Mirza *et al* [10] and Janaki *et al* [11] respectively.

Table 3: Comparative analysis of age wise distribution of soft tissue tumors

Age group	Jain <i>et al</i> [9]	Agaravat <i>et al</i> [12]	Present Study
0-10	7.2%	15%	5.1%
11-20	14.5%	14%	13.1%
21-30	11.0%	20%	22.1%
31-40	11.8%	22%	18.9%
41-50	15.9%	17%	18.2%
51-60	18.6%	8%	11.5%
61-70	20.5%	2%	8.3%
71-80		2%	2.2%
81-90		-	-
91-100		-	0.3%

In the present study maximum number of cases are seen in age group 21 to 30 years compared to Agaravat *et al*

[12] which showed maximum cases in 31 to 40 years. The study of Jain *et al* [9] showed increase in the incidence of cases as age advances and maximum numbers of cases are seen in 51-60 years of age. Also the incidence of malignant soft tissue tumors increases with increasing age in all the three studies. The maximum incidence is seen in 71 to 80 years of age in the present study

Table 4: Comparative analysis of site wise distribution of soft tissue tumors

Site	Jain <i>et al</i> [9]	Agaravat <i>et al</i> [12]	Present Study
Head and neck	30.8%	23%	29.1%
Perineum	-	-	1.9%
Extremities and chest	35.4%	55%	46.4%
Back	20.8%	15%	13.7%
GIT	-	-	4.1%
Abdomen	9.7%	-	4.4%
Others	1.0%	7%	-

The most common site of soft tissue tumors is extremities including chest in all the three studies followed by head and neck region. The incidence in extremities and chest in present study is 46.4% compared to 35.4% and 55% of Jain *et al* [9] and Agaravat *et al* [12] respectively. Least common site in the present study was perineum with incidence rate of 1.9%.

In the present study the malignant soft tissue tumors were observed to have a strong predilection for abdomen and GIT followed by lower extremities. The study correlated with Jain *et al* [9] and Kransdorf *et al* [2,13] which had strong predilection for lower extremities, abdomen and trunk

Table 5: Comparative analysis of type of soft tissue tumors

Type of Tumors	Jain <i>et al</i> [9]	Agaravat <i>et al</i> [12]	Present study
Lipomatous Tumors	50.27%	33%	47.4%
Smooth Muscle Tumors	1.62%	1%	1.2%
Peripheral Nerve Sheath Tumors	19.72%	19%	14.1%
Vascular Tumors	20%	22%	16.6%
Firboplastic Tumors	2.97%	9%	3.2%
Stromal Tumors	-	-	1.6%
Perivascular Tumors	-	-	0.6%
Skeletal Muscle Tumors	1.35%	1%	0.9%
Firbohistiocytic Tumors	3.24%	5%	5.8%
Miscellaneous Tumors	-	7%	5.8%
Unclassified Tumors	0.8%	-	2%
Tumor of uncertain differentiation	0.81%	3%	0.6%

Present study shows Lipomatous tumor as the most common type of tumor with incidence rate of 47.2% compared to 50.27% and 33% of Jain *et al* [9] and Agaravat *et al* [12] respectively. Least common tumor of present study is Tumor of uncertain differentiation with incidence rate of 0.6%. While in study of Jain *et al* [9] least common tumors are unclassified tumors and Tumor of uncertain differentiation. Skeletal muscle tumor is least common tumor of Agaravat *et al* [12].

Table 6: Comparative analysis of type and behaviour of soft tissue tumors

Type of tumors	Jain <i>et al</i> [9]		Agaravat <i>et al</i> [12]		Present study	
	B	M	B	M	B	M
Lipomatous Tumors	94.0%	5.9 %	96.9%	3.1%	99.3%	0.6%
Smooth Muscle Tumors	33.3%	66.6%	-	100%	50%	50%
Peripheral Nerve Sheath Tumors	94.5%	5.4%	94.7%	5.3%	86.3%	13.7%
Vascular Tumors	94.5%	5.4%	95.4%	4.6%	100%	-
Fibroblastic Tumors	100%	-	100%	-	70%	-
Stromal Tumors	-	-	-	-	20%	80%
Perivascular Tumors	-	-	-	-	100%	-
Skeletal Muscle Tumors	-	100%	-	100%	-	100%
Fibrohistiocytic Tumors	58.3%	41.6%	100%	-	61.1%	38.8%
Miscellaneous Tumors	-	-	100%	-	66.6%	33.3%
Unclassified Tumors	-	-	-	-	100%	-
Tumor of uncertain differentiation	33.3%	66.6%	-	100%	-	100%

Lipomatous tumors:

99.3% of the Lipomatous tumors are benign in nature in present study compared to 94% and 96.9% of Jain *et al* [9] and Agaravat *et al* [12] respectively. Only malignant lipomatous tumor in present study was round cell liposarcoma (Figure 1) reported in a 26 year male similar to Agaravat *et al* [12] which also had a single case of pleomorphic liposarcoma. The study of Jain *et al* [9] showed 11 cases of malignant Lipomatous tumors.

Fibroblastic tumors:

70% of fibroblastic tumors are benign in the present study compared to 100% in the study of Jain *et al* [9] and Agaravat *et al* [12]. In the present study three cases (2 cases of haemangiopericytoma (Figure 2) and a single case of fibromatosis (Figure 3) were intermediate in nature.

Skeletal Muscle tumors:

In the three studies, all skeletal muscle tumors were malignant. In the present study, of the 3 cases reported, 2 were of alveolar rhabdomyosarcoma (Figure 4) and 1 was of embryonal rhabdomyosarcoma.

Peripheral nerve sheath tumors:

In the present study, 14.1% (44 cases) were of nerve tissue origin compared to Agaravat *et al* [12] which had 19% (19 cases). Out of 44 cases 18 were of neurofibroma (Figure 5), 17 of schwannoma (Figure 6), and 6 of MPNST, 1 of neurolipofibroma (Figure 7), 1 of soft tissue perineuroma and 1 of traumatic neuroma. It was similar to Agaravat *et al* [12] study which had 10 cases of neurofibroma, 8 of schwannoma and 1 of MPNST.

Vascular tumors:

Out of 53 cases, 48 were of blood vessel origin and 5 of lymph vessels origin. Out of these 48 cases, 41 cases were of capillary lobular haemangioma (77.3%)

(Figure 8), 3 of cavernous haemangioma and 4 of pyogenic granuloma (Figure 9). Contrary to this, the study of Agaravat *et al* [12] had 22 cases of which 18 were of blood vessel origin 4 of lymph vessel. It had 8 cases of capillary lobular haemangioma, 8 of cavernous haemangioma, 1 of pyogenic granuloma, 1 of intravascular papillary endothelial hyperplasia and 1 case of haemangiopericytoma.

Fibrohistiocytic tumors:

Out of 18 cases 9 were of giant cell tumor (Figure 10), 1 of reticular histiocytoma and 1 of dermatofibroma. Among 7 malignant cases, 4 were of pleomorphic sarcoma (Figure 11) and 3 of DFSP (Figure 12). It was dissimilar with Agaravat *et al* [12] study which had 12 cases, 5 of benign fibrohistiocytoma and 7 of giant cell tumor.

Pericytic tumors:

Single benign case of glomus tumor is included which correlated with the study of Janaki *et al* [11] which also had a single case of pericytic tumor.

Stromal tumors:

They formed the second common bulge of malignant tumors. 80% of stromal tumors (4 cases) were of malignant GIST (Figure 13) and 20 % (1 case) was of benign GIST tumor. In study of Janaki *et al* [11] 100% (2 cases) of stromal tumors were malignant.

Tumors of uncertain differentiation:

2 cases were reported, one of synovial sarcoma (Figure 14) and the other of ewings sarcoma (Figure 15) similar to the study of Janaki *et al* [11] which had 3 cases of malignant tumors of uncertain differentiation.

Smooth muscle tumors:

4 cases were reported, 2 of benign leiomyoma (Figure 16) and 2 of malignant leiomyosarcoma (Figure 17). The study of Agaravat *et al* [12] had a similar incidence with a single case.

In present study IHC was applied in 25 cases. 3 cases of MPNST with vimentin and S100, 4 cases of GIST with CD117, 3 cases of schwannoma with S100 and 2 cases of rhabdomyosarcoma with desmin and myogenin were diagnosed. Based on the morphology and characteristic immunoprofile the following soft tissue tumors were also diagnosed: myoepithelioma, soft tissue perineuroma, leiomyoma, angiofibroma, synovial sarcoma, fibromatosis, ewings sarcoma, haemangiopericytoma, leiomyosarcoma and capillary lobular haemangioma. They are discussed below-

- 1) A 35 year old female presented with right parotid swelling. On microscopy differential diagnosis of two benign tumors-leiomyoma and myoepithelioma was considered. On applying IHC markers, S100 and Smooth muscle actin were positive which confirmed leiomyoma. Myoepithelioma was ruled out as

- Pankeratin and p63 were negative.
- 2) An 8 year old male child presented with right nasal cavity mass. On microscopy two differentials of Malignant round cell tumors-Rhabdomyosarcoma and Ewings sarcoma were considered. Rhabdomyosarcoma was the final diagnosis on the basis of desmin and myogenin positivity. Ewings Sarcoma was ruled on the basis of pankeratin, synaptophysin and chromogranin negativity.
 - 3) A 65 year old female presented with vaginal mass. Diagnosis on microscopy was? angiofibroma. On IHC, vimentin (Figure 18), CD99 and ER (Figure 19) positivity supported the diagnosis of angiofibroma.
 - 4) A 30 year old female presented with retroperitoneal mass. Microscopic diagnosis was benign soft tissue tumor. To further classify, IHC markers were applied. Smooth muscle actin (Figure 20) and Desmin were positive. S100, HMB45, Melan A and CD 117 were negative. Diagnosis of leiomyoma was made.
 - 5) A 24 year female presented with left popliteal fossa mass. On the basis of light microscopy possibility of Synovial Sarcoma and MPNST was considered. Final diagnosis was Synovial Sarcoma on IHC which showed vimentin, EMA, Pankeratin, CD99, S100, CK7 & 19 positivity.
 - 6) A 28 year old female presented with left foot growth. Three differentials of rhabdomyosarcoma, ewings sarcoma and malignant melanoma were considered. S100 and HMB 45 negativity ruled out malignant melanoma. Ewings sarcoma was ruled out by CD99, chomogranin and synaptophysin negativity. Positive vimentin and desmin gave the final diagnosis of rhabdomyosarcoma.
 - 7) An 18 year old male presented with right upper leg swelling. Microscopic diagnosis was? schwannoma. On IHC, S100 was positive and the diagnosis of schwannoma was made.
 - 8) A 35 year old female presented with anterior abdominal wall swelling. Microscopic diagnosis was? fibromatosis. On IHC Beta catenin (Figure 21) positivity supported the diagnosis of fibromatosis.
 - 9) A 17 year old female presented with right gluteal swelling. Microscopic diagnosis was? Ewings sarcoma. IHC supported the diagnosis with CD99 and vimentin positivity.
 - 10) A 40 year old male presented with nasal cavity mass. Microscopic diagnosis was low grade spindle cell sarcoma. To further categorise, IHC markers were applied. SMA, Bcl2 and S100 were positive and Ki was 2%. CD34, desmin, pankeratin, EMA, CK7, CD99 and synaptophysin were negative. On this basis diagnosis of hemangiopericytoma was made.
 - 11) A 28 year old female presented with right arm swelling. Microscopic diagnosis was? Soft tissue Perineuroma. IHC supported the diagnosis with EMA positivity.
 - 12) A 30 year old female presented with intestinal tumor. Microscopic differentials were leiomyosarcoma and GIST. On IHC H-caldesmon was positive and CD 117 and desmin were negative. Diagnosis of leiomyosarcoma was given.
 - 13) A 25 year old female present presented with right trapezius muscle mass. On microscopy small round cell tumor unclassifiable was given. On IHC HMB45, desmin, vimentin, pankeratin, synaptophysin, chromogranin, CD99, CD20, CK20, S100 and CD45 markers were negative. Diagnosis of small round cell tumor unclassifiable was given.
 - 14) A 32 year male presented with back swelling. On microscopy, diagnosis was? capillary lobular haemangioma. IHC supported the diagnosis with CD34 positivity and CD31, desmin and S100 negativity.
 - 15) A 50 year male presented with testicular mass. Differentials of leiomyosarcoma and MPNST were considered on microscopy. On IHC, desmin was positive and S100 was negative. Diagnosis of leiomyosarcoma was given.
 - 16) A 45 year old male presented with posterior pharyngeal mass. On microscopy diagnosis was spindle cell sarcoma. On IHC, vimentin, CD68 and Ki67 were positive and CK5/6, p63, ALK, desmin, calponin, SMA, S100, HMB45, pankeratin, CD21 and CD23 were negative. Final diagnosis of spindle cell sarcoma over sarcomatoid carcinoma was given.
 - 17) In 3 cases of peripheral nerve sheath tumors, diagnosis of MPNST (Figure 22) was confirmed with S100 and vimentin positivity.
 - 18) In 4 cases of stromal tumors, CD 117 (Figure 23) was positive and the final diagnosis of GIST tumor was given.
 - 19) In 2 cases, schwannoma was confirmed with S100 positivity
- In a similar study of Zur Erlangung [8] IHC markers were applied in 59 out of 108 soft tissue tumors .12 neurofibroma with neurogenic markers, 9 Ewings sarcoma with CD99 and FLi-1 and absence of LCA, 7 embryonal and 1 alveolar rhabdomyosarcoma with desmin and myogenin were diagnosed. Based on the morphology and characteristic immunoprofile the following soft tissue tumors were also diagnosed: 5 cases of granular cell tumor, 3 cases of biphasic synovial sarcoma, 2 cases of malignant nerve sheet tumor, 2 cases of kaposiformangiosarcoma, 2 cases of leiomyosarcoma, 1 case of alveolar soft part sarcoma, 1 case of malignant rhabdoid tumor, 1 case of

clear cell sarcoma and 1 case of dermatofibrosarcomaprotuberans.

Similarly in the study of Agaravat *et al* [12] and Gudehi [14], cases were further analyzed using IHC and confirmed by IHC.

This analyzes the fact that benign soft tissue tumors out number their malignant counter parts. Soft tissue sarcoma is extremely rare and accounts for less than 1% of all cancers [8].

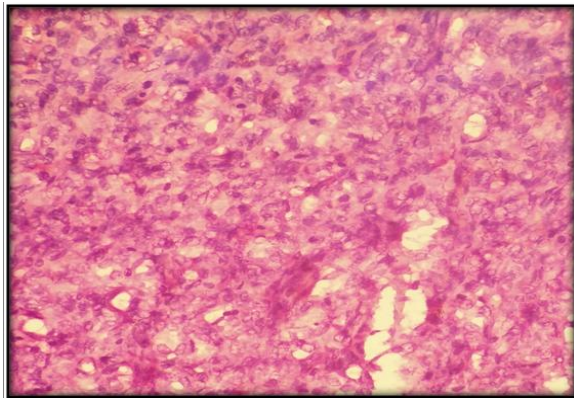


Figure 1: Round cell liposarcoma showing lipoblasts (H & E 40X)

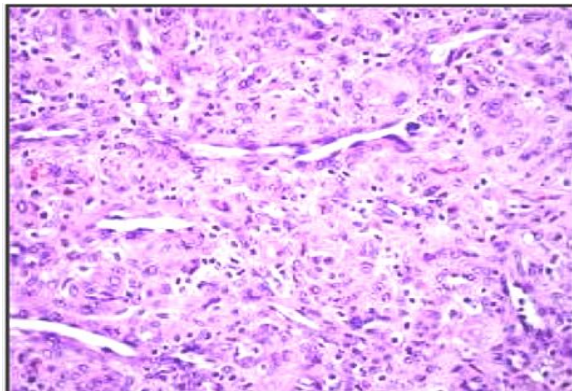


Figure 2: Haemangiopericytoma showing staghorn vessels (H&E 10X)

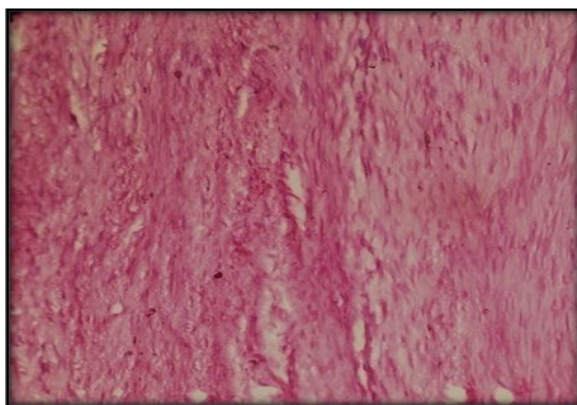


Figure 3: Fibromatosis showing fibroblasts with wavy nuclei and minimal cytoplasm (H&E 10X)

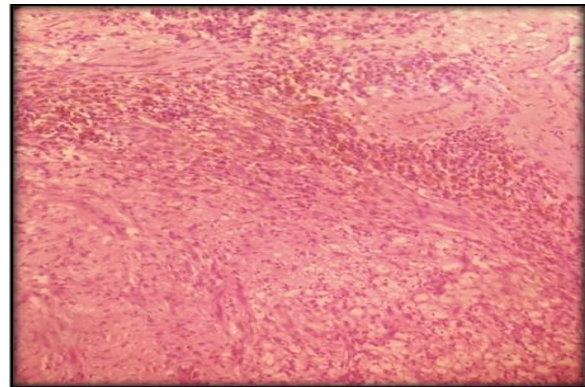


Figure 4: Rhabdomyosarcoma showing small round blue cells (H&E 10X)

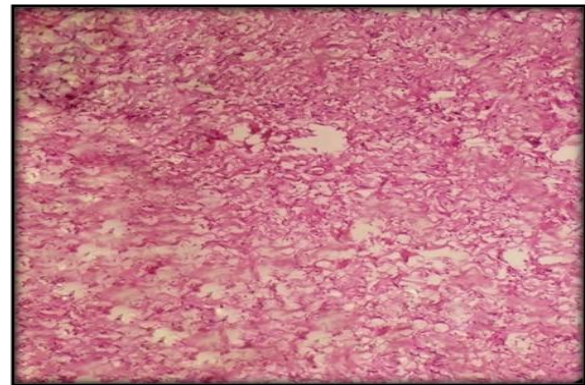


Figure 5: Neurofibroma showing wavy nuclei (H&E)

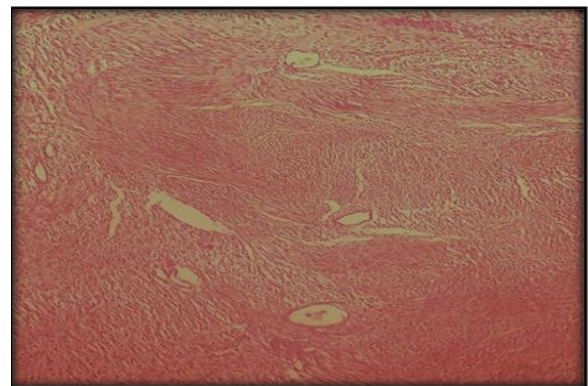


Figure 6: Schwannoma showing verrucay body and hyalinised vessels (H&E 10X)

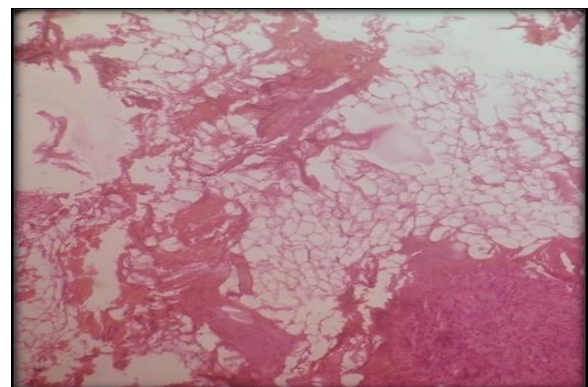


Figure 7: Neurofibrolipoma showing lipomatous, neural and fibrous elements (H&E 10X)

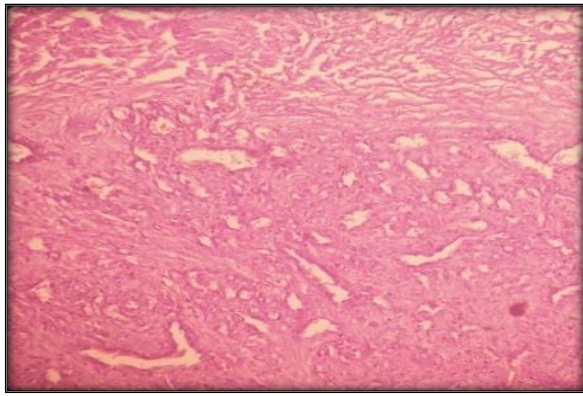


Figure 8: Capillary lobular haemangioma showing vascular proliferation and haemorrhage (H&E 10X)

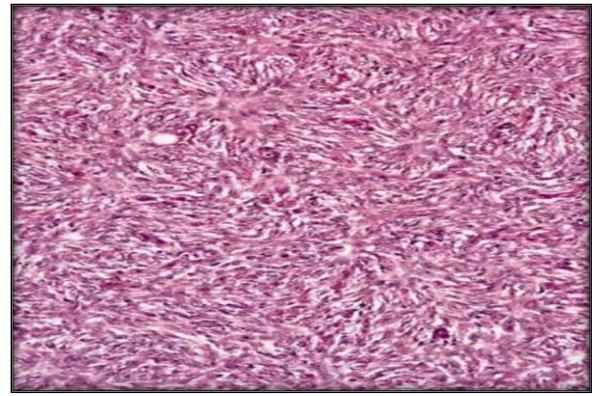


Figure 12: DFSP showing storiform pattern (H&E 10X)

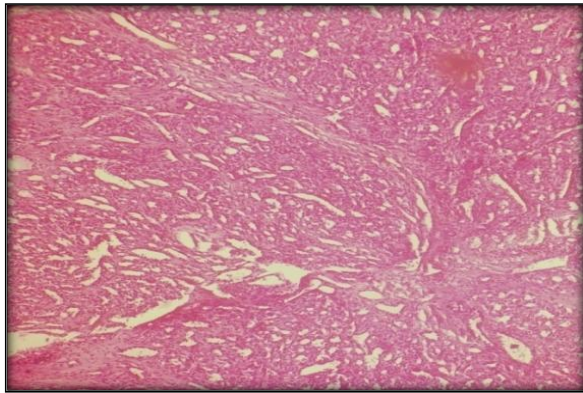


Figure 9: Pyogenic granuloma showing vascular proliferation and inflammation (H&E 10X)

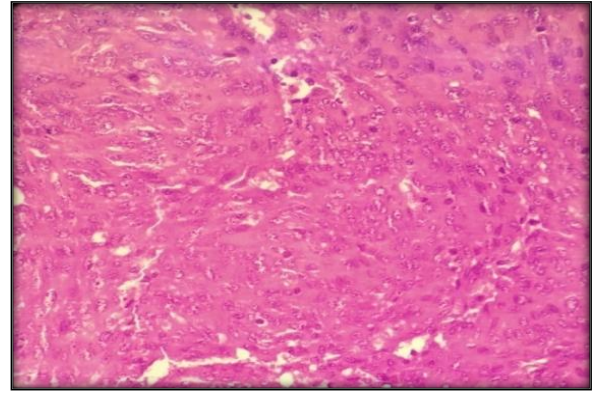


Figure 13: Malignant GIST showing large hyper chromatic nuclei (H&E 40X)

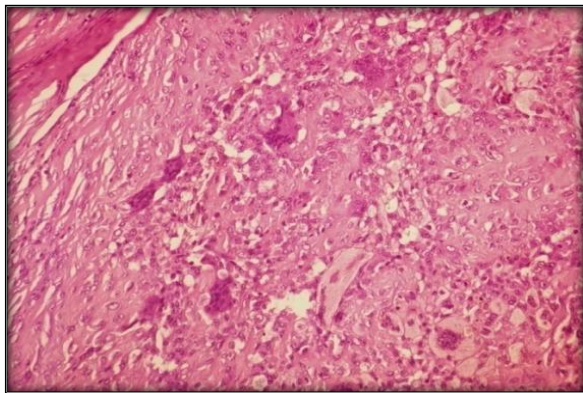


Figure 10: Giant cell tumor showing giant cells (H&E 40X)

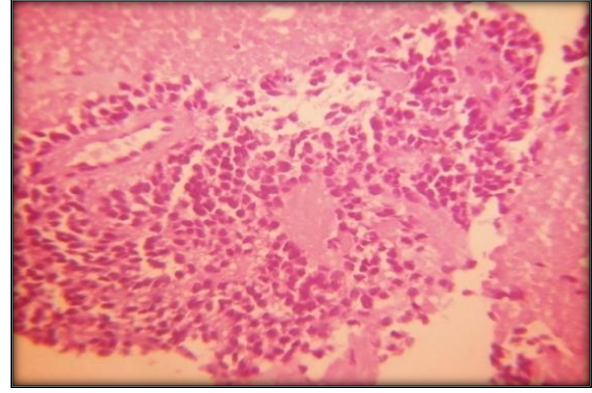


Figure 14: Ewings sarcoma showing homer Wright rosettes (H&E 40X)

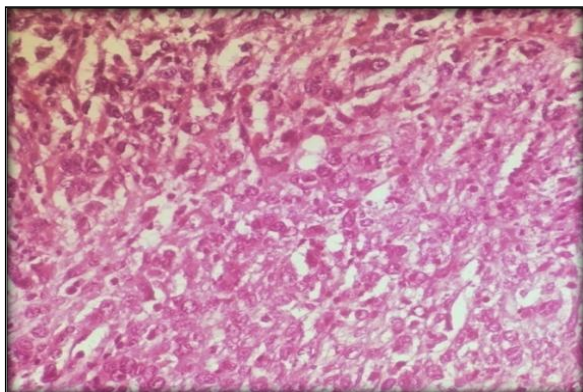


Figure 11: Pleomoprphic sarcoma showing pleomorphic tumor cells with marked atypia (H&E 40X)

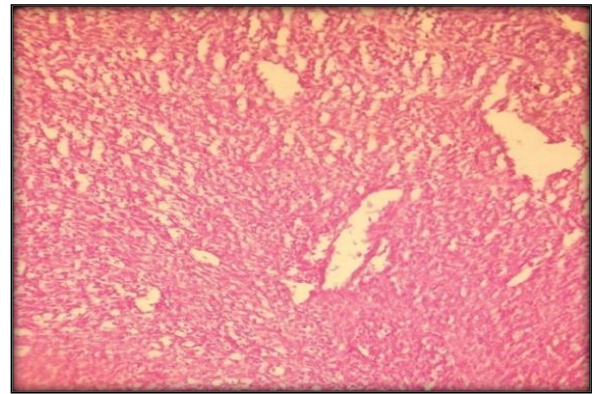


Figure 15: Synovial sarcoma showing spindle cells and vascular pattern (H&E 10X)

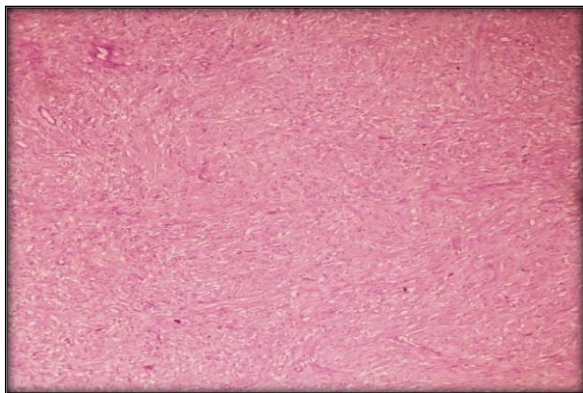


Figure 16: Leiomyoma showing fascicular pattern (H&E 10X)

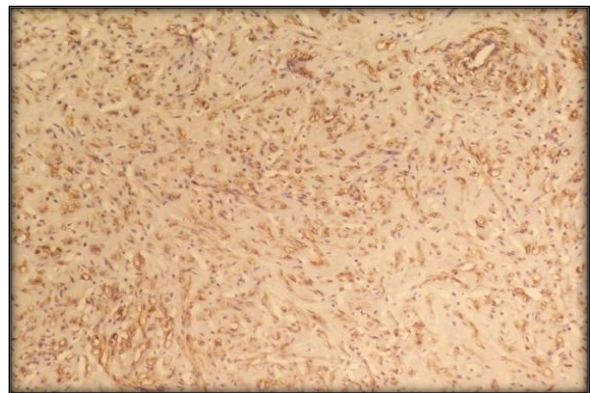


Figure 20: Leiomyoma SMA positive (IHC 10X)

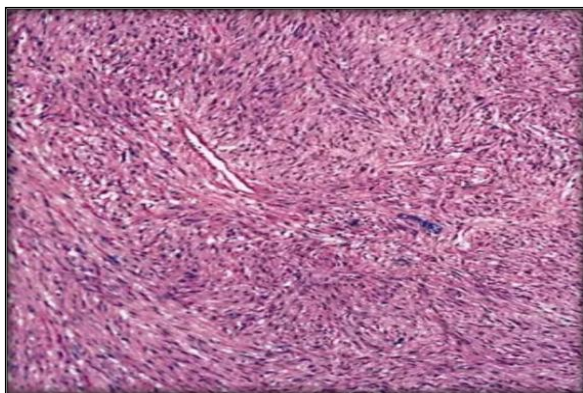


Figure 17: Leiomyosarcoma showing large tumor cells with blood vessels (H&E 10X)



Figure 21: Fibromatosis Beta Catenin positive (IHC 10X)

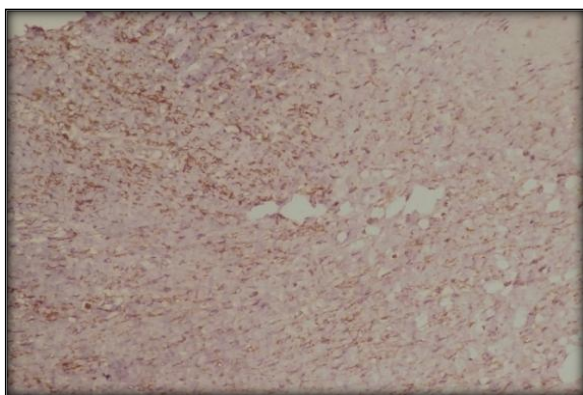


Figure 18: Angiofibroma (IHC vimentin positive)

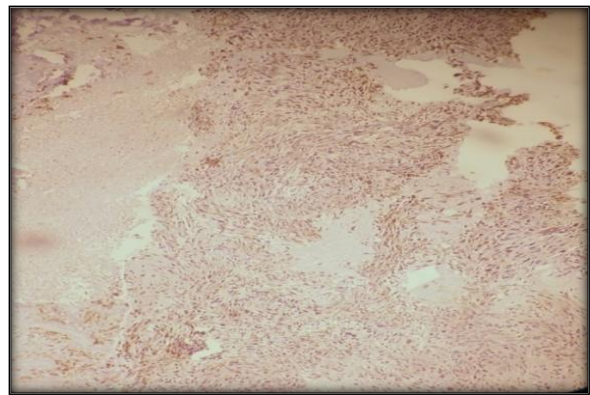


Figure 22: MPNST Vimentin Positive (IHC 10X)

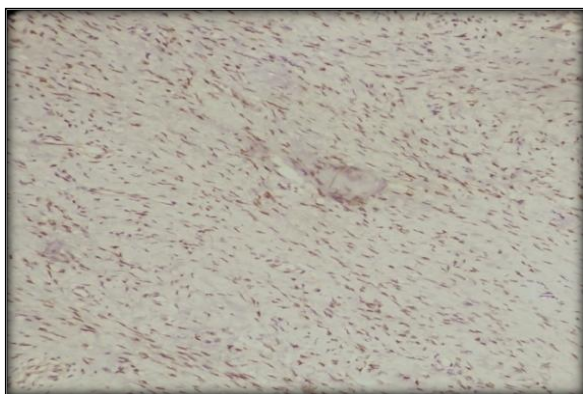


Figure 19: Angiofibroma (IHC ER Positive)



Figure 23: GIST CD117 Positive (IHC 40X)

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