Clinicopathological study of benign soft tissue neoplasms: Experience at rural based tertiary teaching hospital

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Abstract

Background: Embryologically, soft tissue is derived principally from mesoderm, with some contribution from neuroectoderm. The large majority of soft tissue tumors are benign, with a very high cure rate after surgical excision.

Objectives:

1. To study the frequency of benign soft tissue neoplasms (STN) among all other neoplasms in population attending rural based hospital.
2. To find out the relative frequency of benign STN among all STN in hospital population over period of two and half years.
3. To note any variation regarding age, sex and histopathological features of these neoplasms.

Methods: Place of study: Dept. of Pathology.
Study Design: Descriptive study.
Period of study: Jan 2010 – July 2012.

In this study we collected clinical profile of the 154 patients & correlated with gross and histopathological features. For histopathological study samples were collected, processed to prepare paraffin embedded sections & stained by H & E stains.

Results:

- Benign STN contributed (138 cases) 14.09% of all types of neoplasms in the present study.
- Among all STN, benign STN 89.6% outnumbered malignant counterpart
- On detailed histomorphological examination, the single most common histological group was the adipocytic tumors.
- Benign STN in general showed male to female ratio 1.7:1 and the mean age was 40.4 years.

Conclusion: Benign STN contribute small percentage among all neoplastic lesions reported. Benign STN outnumber the malignant neoplasm by a marginal difference. The commonest benign tumor is lipoma. The mean age of benign STN is 40.4 years with slight male predominance.

Keywords: Benign soft tissue neoplasms, Histopathological

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Introduction

Soft tissue can be defined as non-epithelial extraskeletal tissue of the body exclusive of the reticuloendothelial system, glia and supporting tissue 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 the peripheral nervous system because tumors arising from nerves present as soft tissue masses and pose similar problems in differential diagnosis and therapy.

Embryologically, soft tissue is derived principally from mesoderm, with some contribution from neuroectoderm.[1] Neoplastic processes arise in tissues of mesenchymal origin far less frequently compared with those of ectodermal and endodermal origin.[2]

The large majority of soft tissue tumors are benign, with a very high cure rate after surgical excision.[3] Most of the benign soft tissue tumors occur commonly during the second, third and fourth decades of life.[4]

Histology is the most reliable guide for making an accurate diagnosis and for predicting the clinical behavior of the tumor.[5] An accurate diagnosis of soft tissue tumors is dependent on a thorough history and clinical examination, adequate organ imaging, and subsequent core needle biopsy under organ imaging control. Portions of the cores should be submitted for histology, cytogenetics, electron microscopy, microbiology, and any research requirements.[6]

Data regarding clinicopathological study of benign soft tissue neoplasms in rural set up are lacking in literature. Here an attempt has been made to collect and evaluate same in institution and compare available data is exercised.

Objectives

1. To study the frequency of benign soft tissue neoplasms (STN) among all other neoplasms in population attending rural based hospital.

2. To find out the relative frequency of benign STN among all STN in hospital population over period of two and half years.
3. To note any variation regarding age, sex and histopathological features of these neoplasms.

Materials and Methods

- **Place of study:** Department of Pathology.
- **Study Design:** Descriptive study.
- **Period of study:** January 2010 – July 2012.
- **Inclusion criteria:** Cases of Benign soft tissue neoplasms diagnosed on the basis of history and clinical examination and subjected to biopsy or surgery and subsequent histopathological examination were included in this study.
- **Exclusion criteria:** Patients who were treated conservatively or patients referred to other hospitals were excluded from this study. Soft tissue neoplasms of systemic organs (like leiomyoma of uterus) were excluded from this study.

In this study, we collected clinical profile of the patients according to the age, sex, anatomical location, clinical diagnosis, relevant investigations, histopathological features and immunohistochemistry wherever necessary. Anatomical sites were categorised as - upper extremity (including shoulder, arm, forearm, wrist and hand), lower extremity (including buttock, thigh, leg and foot), trunk (including abdomen, back and chest wall), head and neck.

The specimens were received in 10% formalin as a fixative. After fixation gross findings like size, shape, colour and consistency were recorded. Then sections of size 1 X 1.5 cm and 4 mm thick were taken from representative areas. Very tiny specimens received in the form of biopsy were wrapped in the filter paper. In selected cases, photographs of the specimen were taken.

Tissue processing was done according to the procedure given below to prepare paraffin embedded sections and there after stained by H and E stains. Slides were studied under light microscopy. Correlation of gross and histopathological examination will be carried out. Special staining like immunohistochemistry was done wherever necessary.

All soft tissue neoplasms were classified according to WHO classification of soft tissue tumors (2002)[3] and histologic classification of soft tissue tumors [1] (in cases of PNST related lesion group).

Here, an attempt was made to correlate clinical presentation and histopathological diagnosis.

Results

The present study includes 154 cases of soft tissue neoplasms**.** Total number of benign soft tissue neoplasms was 138. Total number of all types of neoplasms was 979 during two and half year study period from January 2010 to July 2012. Benign soft tissue neoplasms contribute 138 (14.09%) of all types of neoplasms in the present study. (Table 1)

The present study includes 138 cases of benign soft tissue neoplasms out of 154 soft tissue neoplasms**.** Benign soft tissue neoplasms contributed 89.6% amongst all soft tissue neoplasms. (Table 2)

The majority of benign soft tissue neoplasms were from adipocytic group (51.9%) followed by vascular group (18.2%) and PNST related group (13.7%). Benign neoplasms of smooth muscle and skeletal muscle group were not accounted. (Table 3)

Males [86 cases (62.4%)] outnumbered females [52 cases (37.6%)] with M: F ratio of 1.7:1 among benign soft tissue neoplasms. (Table 4)

Benign soft tissue neoplasms occurred in all age groups with mean age of 40.4 years (SD: ±18.44) and peak distribution in the age group of 21-40 years. The youngest patient was 4 year old while oldest was 80 year old. (Table 5) The largest number of benign soft tissue neoplasms were accounted in extremities (Upper > Lower), followed by head neck region and trunk. (Table 6)

Adipocytic tumors

Adipocytic tumors [80 cases (57.9%)] were the most common among all benign soft tissue neoplasms. Among all benign soft tissue neoplasms, the commonest benign adipocytic tumor was lipoma 70 (50.7%) followed by angiolipoma, fibrolipoma, myolipoma & spindle cell lipoma. Benign adipocytic tumors occurred in all age group ranging from 4-80 years with M: F ratio 2.8:1. The commonest site of occurrence was trunk. Grossly, lipomas varied from 1 cm to 10 cm, well circumscribed with yellow cut surface. Microscopy revealed groups of mature fat cells separated by thin fibrous septa.

Spindle cell lipomas encountered in adult male with predilection for lower extremity. Grossly, well circumscribed, grey white cut surface. Microscopy revealed abundant benign spindle cells admixed with mature fat cells. Stroma showed infiltration by plasma cells, mast cells, lymphocytes with focal myxoid change.

Fibroblastic tumor group

There were two cases (1.4%) of fibroma encountered in older adult involving trunk and shoulder with equal sex predilection. Grossly, tumor was 3 cm, nodular grey white on cut surface. Microscopy showed bland spindle cells like fibroblasts arranged in eosinophilic collagenous stoma. Only one case of fibromatosis was observed in 32 years old female.

Fibrohistiocytic tumor group

Age range for this group was from 21-68 years with male predominance. Only two cases of giant cell tumor of tendon sheath involving upper extremity commonly fingers with male predilection. Grossly,

tumor was of size 1-2 cm, well circumscribed, firm grey white on cut surface. Microscopy revealed spindle cells admixed with mononuclear histiocyte-like cells, vacuolated cells and osteoclast type giant cells and stroma hyalinised.

Single case of plexiform fibrohistiocytic tumor involving thumb of adult male, grossly showed, well circumscription with tumor of size 3 cm with grey white cut surface. Microscopy showed small nodules and cellular clusters interconnected in a characteristic plexiform arrangement. Benign fibrous histiocytoma – Grossly, well circumscribed, firm grey white on cut surface. Microscopy revealed uniform spindle cells arranged in vague storiform and fascicular pattern admixed with few histiocytes.

Vascular tumors

Vascular tumors [28 cases (20.2%)] were second common tumor group followed by adipocytic tumor. They showed predilection to head and neck region with M: F ratio 1:1.5. Hemangiomas encountered in early age group mostly in first and second decades of life thus accounting the most common soft tissue tumor of childhood. Capillary hemangiomas [19 cases (13.7%)] were the most common type followed by cavernous hemangiomas [6 cases (4.4%)] and venous hemangiomas [2 cases (1.4%)].

Grossly, hemangiomas varied from 1 cm to 4 cm, with an irregular external surface and red - brown cut surface. Microscopically capillary type composed of proliferation of capillary sized vessels lined by single layer of endothelium and cavernous type composed of cavernous blood spaces separated by thin fibrous septa.

We reported single case of epithelioid hemangioma in a 60 years old male near right ear. Grossly, well circumscribed, red cut surface. Microscopy revealed prominent proliferation of small, capillary-sized vessels lined by plump, epithelioid endothelial cells. These cells had eosinophilic cytoplasm and single large nucleus with central nucleoli.

Chondro-osseous and uncertain differentiation tumor group

There was single case in chondro-osseous group of extraskeletal chondroma encountered in 48 years old man at right index finger. Grossly, well circumscribed tumor of size 2 cm grey white on cut surface. Microscopy revealed nodular arrangement of tumor and mature hyaline cartilage with nests of benign-appearing cells in lacunae in chondromyxoid background.

Single case of intramuscular myxoma encountered in neoplasms of uncertain differentiation group in 70 years female over thigh region. Grossly, well circumscribed tumor of size 5 cm glistening on cut surface. Microscopy revealed uniform bland spindle and stellate shaped cells with tapering eosinophilic cytoplasm and small nuclei. The cells were separated by abundant myxoid extracellular stroma and contained very sparse capillary sized blood vessels.

PNST & related tumor group

PNST & related neoplasms [21 cases (15.2%)] were third most common tumor group followed by adipocytic and vascular neoplasms. These were found in adults of age from 21-70 years with predilection to extremities and M:F ratio was 1.1:1.

In PNST group, majority neoplasms were neurofibromas and schwannomas accounted in all age groups. Upper extremity was the commonest site of occurrence. Neurofibroma – Grossly, tumor varied from 2 – 4 cm irregular and grey white on cut surface. Microscopy revealed mixture of interlacing bundles of elongated cells having wavy nuclei, collagen and myxoid material. Schwannoma – Grossly, tumor varied from 1 – 3 cm well circumscribed glistening on cut surface. Microscopy revealed antoni A areas composed of compact spindle cells in short bundles with nuclear palisiding and verocay body formation and antoni B areas composed of cells in loose matrix.

There was a single case of intraneural perineurioma encountered in a 36 years old female on lower extremity. Grossly, tumor was 2 cm, irregular and grey white on cut surface. Microscopy revealed spindle wavy cells with elongated cytoplasmic processes forming concentric layers around nerve fibers, creating an onion bulb–like effect. Stroma hyalinised and myxoid at places, infiltrated by chronic inflammatory cells.

We reported a case of nerve sheath myxoma in a 45 years old male over back. Grossly, tumor was 3 cm, well circumscribed glistening on cut surface. Microscopy revealed myxoid lobules of varying sizes, separated by fibrous septa. Within this myxoid stroma showed stellate, spindle tumor cells with eosinophilic cytoplasmic processes and small, darkly stained nuclei.

In the present study, no single case belonged to benign smooth muscle, skeletal muscle group.

Discussion

In the present study, soft tissue neoplasms comprised 154 of all types of neoplasms received over a period of two and half years in the department of pathology. Out of which, benign soft tissue neoplasms contributed 14.1% of all neoplasms.

A total of 154 soft tissue neoplasms were studied in the present study. Benign soft tissue neoplasms contributed [138 cases (89.6%)] and malignant tumors contributed [16 cases (10.4%)].

Benign soft tissue neoplasms outnumbered malignant counterparts by a considerable margin in all the studies. Percentage of benign soft tissue neoplasms (89.6%) was comparable with majority of all the studies.

The percentage of malignant neoplasms (10.4%) was relatively more than the study of Myhre-Jensen O

1981[9] (5.4%) and Agravat AH et al 2010[4] (6.5%) which can be explained by the inherent bias in a referral population. Relatively increased percentage of malignant neoplasms in the study of Kransdorf 1995[7,8] (39.8%) from AFIP records and Bashar AH et al 2010[10] (24.8%) may be due to the case material referred to a highly specialized center. (Table 7)

The relative frequency of benign to malignant soft tissue neoplasms is difficult to estimate accurately since many of the benign neoplasms cause a few problems and thus the patients do not report to the clinician.

The adipocytic tumors were commonest benign soft tissue neoplasm in all study groups. In the present study, adipocytic tumors contributed 57.9% which was comparable to the study of Myhre-Jensen O 1981[9] (48.1%) and more than Agravat AH et al 2010[4] (37.2%), Bashar AH et al 2010[10] (28.6%) and Kransdorf MJ 1995[7] (16.1%) may be due to inherent bias in a referral population.

The second most common benign tumor group was the vascular tumors, which constituted 20.3% and comparable to the studies of Agravat AH et al 2010[4] (22.1%). The next common group was PNST and related lesions contributed (15.2%) which is comparable with Kransdorf MJ 1995[7] (13.5%), Agravat AH et al 2010[4] (20.9%) and Bashar AH et al 2010[10] (11.4%). (Table 8)

In present study, benign neoplasms presented with 86 males and 52 females with a male to female ratio of 1.7:1 while in the study of Myhre-Jensen O 1981[9], it was 1: 1.2. This difference may be due to inherent bias in a referral population. (Table 9)

In the present study, the mean age in benign soft tissue neoplasm was 40.4 years comparable with studies of Myhre-Jensen O 1981[9] (44.5) and more than Kransdorf MJ 1995[7] (35) and Bashar AH et al 2010[10] (27.5) may be due to inherent bias in a referral population.. Benign neoplasms occurred in all age groups with peak distribution in the age group of 21-40. The age range was 4 years to 80 years. (Table 10)

In our study, the upper extremity (29.7%) was the commonest involved site which is comparable with the study of Kransdorf MJ 1995[7] (31.8%). (Table 11)

Table 1: Frequency of occurrence of benign soft tissue neoplasms

1	Total number of all types of neoplasms	979
2	Total number of benign soft tissue neoplasms	138
3	Percentage of benign soft tissue neoplasms	14.09%

Table 2: Relative frequency of occurrence of benign soft tissue neoplasms among all soft tissue neoplasms

1	Total number of benign soft tissue neoplasms	138
2	Total number of all soft tissue neoplasms	154
3	Percentage of benign soft tissue neoplasms	89.6%

Table 3: Group wise distribution of various benign soft tissue neoplasms

Sr. No.	Group of neoplasms	Benign soft tissue neoplasms	Frequency (%)
1.	Adipocytic	80	51.9
2.	Fibroblastic	3	1.9
3.	Fibrohistiocytic	4	2.6
4.	Smooth & skeletal muscle	0	0
5.	Vascular	28	18.2
6.	Chondro-osseous	1	0.6
7.	Uncertain differentiation	1	0.6
8.	PNST & related lesion	21	13.7
	Total	138	89.6

Table 4: Sex wise distribution of benign soft tissue neoplasms

	Neoplasms	Male	Frequency (%)	Female	Frequency (%)	Total
1.	Adipocytic	59	42.8	21	15.2	80
2.	Fibroblastic	1	0.7	2	1.5	3
3.	Fibrohistiocytic	3	2.2	1	0.7	4
4.	Smooth & skeletal muscle	0	0	0	0	0
5.	Vascular	11	8	17	12.3	28
6.	Chondro-osseous	1	0.7	0	0	1
7.	Uncertain differentiation	0	0	1	0.7	1
8.	PNST & related lesion	11	8	10	7.2	21
	Total	86	62.4	52	37.6	138

Table 5: Age distribution (in years) of benign soft tissue neoplasms

	Neoplasms	0-20	21-40	41-60	61-80	Total
1.	Adipocytic	10	36	23	11	80
2.	Fibroblastic	0	1	0	2	3
3.	Fibrohistiocytic	0	2	2	0	4
4.	Smooth & skeletal muscle	0	0	0	0	0
5.	Vascular	13	5	3	7	28
6.	Chondro-osseous	0	0	1	0	1
7.	Uncertain differentiation	0	0	0	1	1
8.	PNST & related lesion	0	8	10	3	21
	Total	23 (16.7%)	52 (37.7%)	39 (28.3%)	24 (17.3%)	138 (100%)

Mean age: 40.4 years SD: ± 18.44 Range: 4 – 80 years

Table 6: Anatomical site wise distribution of benign soft tissue neoplasms

SN	Neoplasms	Upper extremities	Lower extremities	Trunk	Head & neck	Total
1.	Adipocytic	20	16	25	19	80
2.	Fibroblastic	1	0	2	0	3
3.	Fibrohistiocytic	3	0	1	0	4
4.	Smooth & skeletal muscle	0	0	0	0	0
5.	Vascular	8	6	1	13	28
6.	Chondro-osseous	1	0	0	0	1
7.	Uncertain differentiation	0	1	0	0	1
8.	PNST & related lesion	8	6	2	5	21
	Total	41 (29.7%)	29 (21%)	31 (22.5%)	37 (26.8%)	138 (100%)

Table 7: Comparative frequency of benign and malignant soft tissue neoplasms

Sr. No	Authors	No. of cases	Benign (B)	Frequency (%)	Malignant (M)	Frequency (%)	B:M Ratio
1.	Myhre-Jensen O (1981)[9]	1403	1331	94.6%	72	5.4%	18.5:1
2.	Kransdorf MJ (1995)[7,8]	31047	18677	60.2%	12370	39.8%	1.5:1
3.	Agravat AH et al (2010)[4]	92	86	93.5%	6	6.5%	14.4:1
4.	Bashar AH et al (2010)[10]	93	70	75.2%	23	24.8%	3:1
5.	Present study (2012)	154	138	89.6%	16	10.4%	8.6:1

Table 8: Comparative analysis of distribution of various benign soft tissue neoplasms

Study / Tumor Type	Myhre-Jensen O (1981)[9]	Kransdorf MJ (1995)[7]	Agravat AH et al (2010)[4]	Bashar AH et al (2010)[10]	Present study (2012)
Adipocytic	48.1%	16.1%	37.2%	28.6%	57.9%
Fibroblastic	10.5%	20.6%	5.8%	-	2.2%
Fibrohistiocytic	15.8%	12.8%	13.9%	2.9%	2.9%
Smooth & skeletal muscle	3.8%	1.7%	0	2.9%	0
Vascular	11.7%	7.6%	22.1%	31.4%	20.3%

Chondro-osseous	-	1.5%	0	-	0.7%
Uncertain differentiation	-	3.2%	0	0	0.7%
PNST & related lesion	-	13.5%	20.9%	11.4%	15.2%

Table 9: Comparative analysis of the sex wise distribution of benign soft tissue neoplasms

Soft tissue neoplasm	Myhre-Jensen O (1981)[9]			Present study (2012)		
	Males	Females	M:F Ratio	Male	Female	M:F Ratio
Benign	630	731	1:1.2	86	52	1.7:1

Table 10: Comparative analysis of age (Mean age) wise distribution of benign soft tissue neoplasms

Studies	Mean age in years
Myhre-Jensen O (1981)[9]	44.5 years
Kransdorf MJ (1995) [7,8]	35 years
Bashar AH et al (2010)[10]	27.5 years
Present study (2012)	40.4 years

Table 11: Comparative analysis of anatomical site wise distribution of benign soft tissue neoplasms

Site / Studies	Upper extremity	Lower extremity	Trunk	Head and neck
Kransdorf MJ (1995) [7]	31.8%	28.8%	20.1%	13.8%
Present study (2012)	29.7%	21%	22.5%	26.8%

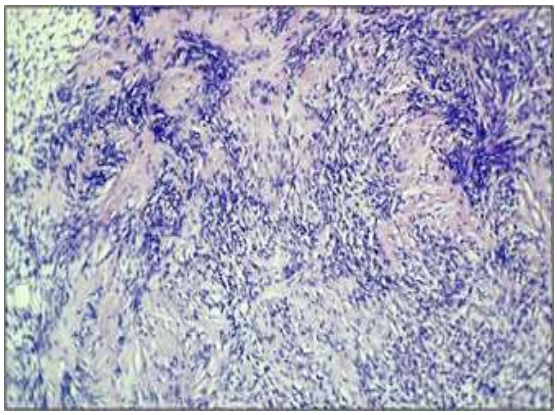

Fig. 1: Myolipoma - Microphotograph showing mature fat cells admixed with bundles of mature smooth muscle (H & E stain 40X)

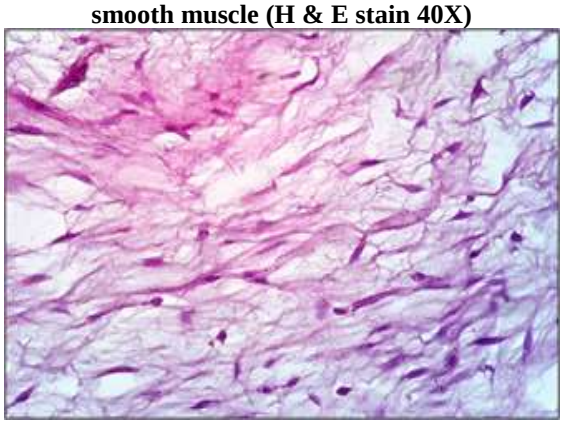

Fig. 2: Spindle cell lipoma - Microphotograph showing admixture of mature fat cells with spindle cells infiltrated by lymphocytes and mast cells (H & E stain 40X)

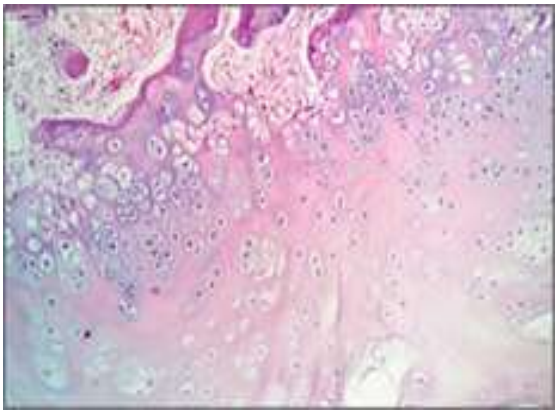

Fig. 3: Giant cell tumor of tendon sheath - Microphotograph showing admixture of histiocytes, foamy cells, lymphocytes and osteoclastic giant cells with hyalinised stroma (H & E stain 10X)

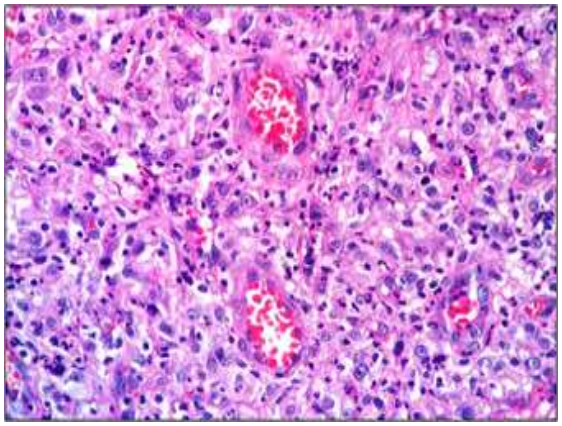

Fig. 4: Plexiform fibrohistiocytic tumor - Microphotograph showing nodules of histiocyte like cells, giant cells separated by fibroblastic cells arranged in plexiform pattern (H & E stain 10X)

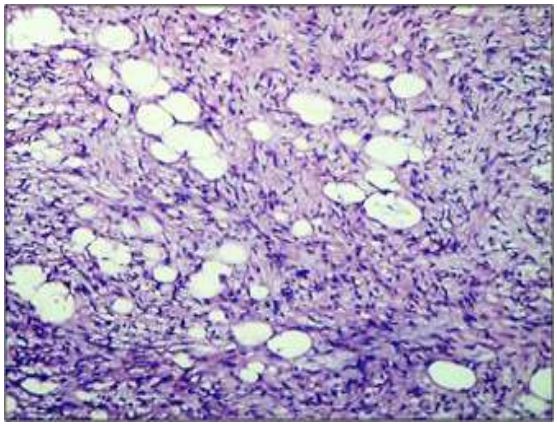

Fig. 7: Intramuscular myxoma – Microphotograph reveals bland spindle cells with tapering eosinophilic cytoplasm separated by abundant myxoid stroma (H & E stain 40X)

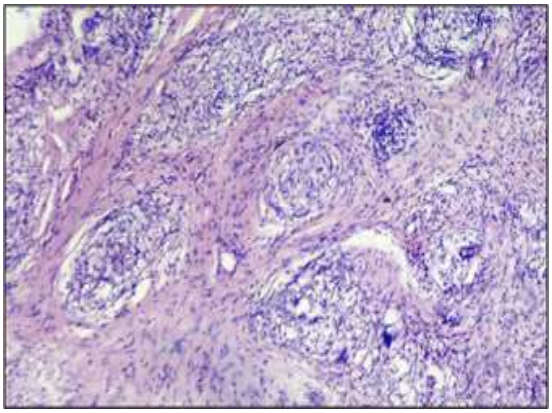

Fig. 5: Epithelioid hemangioma - Microphotograph showing proliferation of capillary sized blood vessels lined by plump epithelioid cells with dense inflammation (H & E stain 40X)

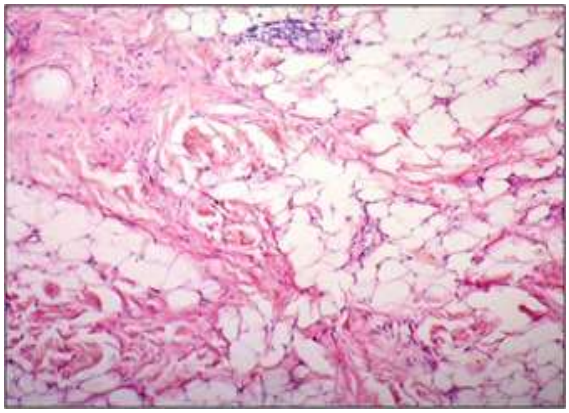

Fig. 8: Schwanoma – Microphotograph reveals alternating hypercellular Antoni A and hypocellular Antoni B area with verocay body formation (H & E stain 40X)

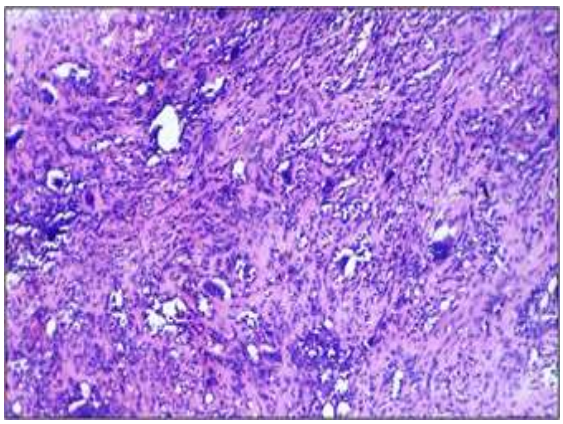

Fig. 6: Extraskeletal chondroma – Microphotograph showing lobules of mature hyaline cartilage. Chondrocytic cells are identified in lacunae in clusters (H & E stain 40X)

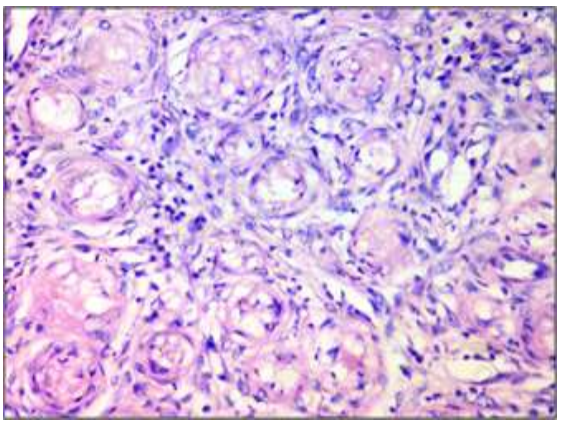

Fig. 9: Intraneural perineurioma – Microphotograph showing formation of onion bulbs consisting of concentric layers of perineurial cells ensheathing a central axon and schwann cell (H & E stain 40X)

Conclusion

Benign soft tissue neoplasms contribute small percentage among all neoplastic lesions reported. Benign soft tissue neoplasms outnumber the malignant neoplasm by a marginal difference. The commonest involved group is adipocytic and benign tumor is lipoma fallowed by hemangiomas of vascular group. Hemangiomas encountered in early age group mostly in first and second decades of life thus accounting the most common soft tissue tumor of childhood. The mean age of benign soft tissue neoplasms is 40.4 years with slight male predominance. Commonest involved site for benign soft tissue neoplasms is upper extremity.

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