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Clinical and Histomorphological Analysis of Soft Tissue Tumors in A Tertiary Care Hospital – Two Years Period of Retrospective Study

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Abstract
Background: Soft tissue tumors composed of large and heterogeneous collections of neoplasms.In this study to findout the incidence of various soft tissue tumors and analyse the age factor,gender distributionand site and histomorphological features of soft tissue tumors.Two years retrospective study conducted in Government TheniMedical College and Hospital,Theni, Tamilnadu after getting approval from institutional ethical committee (IEC) on 23.02.2019.Totally 175 cases was recorded in two years of study period. Among this only 10 cases are malignant tumour (6%) and remaining 165 cases are benign soft tissue tumor (94%),most of thetumors are of adipocytic origin including one case of Hibernoma.Other tumors are Lipomatous tissues (56%),neural tissues (11%), vascular tissues (13%), fibrous tissues (10%) and fibrohistiocytic tissues (4%).Predominant malignant tumors are liposarcomasincludes 4 cases (Dedifferentiatedliposarcoma,Well differentiated liposarcoma, Grade-1 dedifferentiationliposarcoma and Atypical lipomatoustumor) and each one other malignant tumors such as Undifferentiated pleomorphicsarcoma,Low grade fibromyxoidsarcoma,Low grade fibrosarcoma,Alveolar soft tissue sarcoma,Epithelioidhemangioendothelioma and Malignant pheripheral nerve sheath tumor. Conclusion:With good clinical history in correlation with imaging findings and review of fine needle aspiration cytology slides are used for correlation with histopathologicalfindings. Grosspathological examination of all specimens and microscopic examination of H&E slides prepared from properly fixed specimens and adequate tissue sampling are helpful in the diagnosis of various soft tissue tumors in our study with available resources in our Institution.Inmunohistochemistry (IHC) technique is useful in the diagnosis of certain soft tissue tumors like round cell sarcomas, epithelioid sarcomas and pleomorphic sarcomas.It is used as substitute for certain molecular alterations with available resources we are able to diagnose all cases except one case,the Alveolar soft part sarcoma which is confirmed with IHC.

Keywords: *Benign soft tissue tumors, Malignant soft tissue tumors,Histomorphology, H&E, IHC*

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I. Introduction

Soft tissuetumors are tumors of connective tissues of the body. Embryologically soft tissues are derived mainly from mesoderm and some contribution from nueroectoderm.Though their clinical presentations are similar their histomorphological features are diverse.Line of differentiation oftumor phenotype is very important for targeted treatment. They are broadly divided into benign and malignant tumors.Incidences of Soft-tissue sarcomas are very rare, less than1% of all malignancies. They also include nonosseous sarcomas,benign mesenchymaltumors and tumor like proliferations.Intracranial nerve sheath tumors,brain and bone tumors,cutaneous melanomas and non-mesenchymaltumors of skin are excluded from this category. Soft tissues tumors arise everywhere in the body, most commonly on the extremities, trunk, abdominal cavity and head neck region (**Sagar*et al.*, 2020**).

They are classified asper WHO classification based on the cell of origin.In recent WHO classificationold terminology of well differentiated liposarcoma is changed as atypicallipomatoustumor (superficial part) and atypical lipomatoustumor(deeper location).Previously thought Hemangiopericytomas are now included in fibroblastic family known as Solitary fibrous tumor of intermediate malignancy with very rare secondary metastasis(**Fletcher*et al.*, 2002**). For primary level categorisation of tumors routine hematoxylin and eosin sections with light microcopy is adequate.For few cases IHC markers,molecular techniques like FISH and RT-PCR are used to find out chromosomal abnormalities and special stains are needed to confirm the

diagnosis.Frozen sections are used to find out neoplastic type,degree and margins to some extent grading system used for sarcoma is FNCLCC (French federation of cancer centers sarcoma groups) as per tumor differentiation,tumor necrosis and mitosis. Staging done by American join committee on cancer(AJCC) by using TNM system(**Hena*et al*., 2017**).

II. Aim and Objective

1. To findout the incidence of various soft tissue tumors.
2. To analyse the age factor,gender distribution,site and histomorphological features of soft tissue tumors.
3. To study the gross, microscopy and Immunohistochemistry analysis of soft tissue tumors to correlate them clinically

III. Materials and Methods

Two year retrospective study at Pathology Department,Govt.Theni Medical College and Hospital,Theni,Tamilnadu, India from January 2018 to December 2019.A total of 175 cases of soft tissue tumors fulfilled the inclusion and exclusion criteria.Soft tissue tumor specimens were fixed in 10% of formalin was preparedfor histological studies by standard procedures fromdehydration through paraffin infiltration in an automatictissue processor. After paraffin embedding, all sections werecut at 6mm thickness and routinely stained in hematoxylineosin (H&E) and Immunohistochemistry (IHC). Detailed gross features and microscopic features of H&E section slides and IHC were used for diagnosis,subtyping as per recent WHO classification and grading by FNCLCC grading system done.

IV. Results

Total surgical specimens received for two years are 3651 in Department of Pathology, Govt. Theni Medical College& Hospital,Theni, Tamilnadu, Indiain which soft tissue tumors are 175.Out of 175 specimens 165 are benign tissue tumors. Lipomas composed of 99 cases in which 3 are variants include angiolipoma (1) fibrolipoma (2) (Table.1) Sexwise females outnumbered males,common sites are back andupper extremity,most cases presented between 40-60 years,size from <2cm to>11cm,majority between 2cm and 5cm(Table. 2)

A case of hibernomapresented in male of 59 years in intramuscular plane of scapular region measured 11x6x2 cmwith tan to light brown cut surface,microcopically cells arranged in organoid pattern with cytoplasmic vacuoles and nucleus in centre

Neural tumors composed of 19 cases inwhich one case of ganglioneuroma in 18 years female,thinly encapsulated 10x7x5cmin the retroperitoneal area below the left kidney,cross section shows glistening whitish yellowareas,mucoid areas with cytic degeneration.Microscopically fascicles of spindledoutcells with foci of ganglion cells

10 cases of neurofibroma in which 3cases were diffuse neurofibroma.Sites of neurofibromas are mainly back,neck and upper extremities,varying age groups from 10 to 60 years with slight male preponderance,size from 1 cm to 8 cm. 7 cases of neurofibromas are solitary,well circumscribed without capsule

In 3 diffuse neurofibromasone found in occipital region in 14 year male,2nd case clinically diagnosed as liposarcoma presented as retroperitoneal mass measured 25x14x3cm, multiloculated cystic spaces and solid areas,myxoid and glistening areas and histologically found tobe neurofibroma.3rd one in 35 years female presented ingluteal region as papilloma clinically 9x7x2cm in size with gross and microcopy consistent with neurofibroma

In 8 schwannomas 7 in male and 1in female distribution.5 cases between 20-30 years,3 cases between 50-70 years.All are encapsulated except one, all measured less than 5cm.In a 50 years female patient left thigh globular encapsulated mass 9x8x6cm,cutsection showed grey tan solid area with intervening myxoid areas with microscopic findings of schwannoma

17 benign fibromatoustumors show equal sex distribution with wide range of age from 7 years to 50 years. 3 cases of desmoidfibromatosis in the extremities and one in the abdominal wall.One case of dermatomyofibroma in the back and a fibroma in leg presented with myxoid degeneration

Totally 23 benign vascular tumors such as Capillary hemangioma (19).Majority (13)present in face and upper limbs,3 were in the tongue.size of lesion less than 3 cm including one case of lobular capillary hemangioma.Cavernous hemangioma(4)sizes between 0.5 cm to 3 cm 3 were in forearm and one in face.Fibrohistiocytictumorsare 7 in which benign Fibrohistiocytomas (3) and localised Tenosynovial giant cell tumors (4) and malignant Tumors (10)

V. Discussion

In our study the most common soft tissue tumor isbenign lipomatoustumors that are 99 out of 175 cases, correlated well with Anitha*etal*., (2016)report showed 66 benignlipomatoustumors,66 out of 120 cases. Umarani*et al*., (2015) also revealed that thecommonest benign tumor is benign adipocytic origin.Our study

revealed 166 beningntumors in which adipocytic 99,vascular23,neural 19 and fibrous 17.Our findings are well correlated in distribution of tumors(Ramnani*et al*., 2014; Agravat*et al*., 2010).

Pujani*et al*(2017) study concordance withOne case of hybernoma in our study in 59 year male patient, 1 out of 99 benign adipocytictumor,presented as intramuscular scapular swelling of size 11x6x2cm with tan to brown cut surface and showed multivacuolated cells,cytoplasm is granular and eosinophilc and mixed with univacuolar cells.

In our study the 2nd most common soft tissue tumors are vascular origin, 23 out of 165cases inwhich 19 cases of capillary hemangioma and 4 cases of cavernous hemangioma.For capillary hemangioma the most common site are face and upperlimb.3cases of cavernous type are located in fore arm site and distribution are well correlated with (Obaseki*etal.*, 2013).

Christopher and Fletcher (2013) report correlated with our studyone case of angiolipoma in37 years female,presented in the most common site that is fore arm as painful mass measured 10x7x2cm, yellow with focal greybrown cutsurface, with microscopic features of mature adipocytes admixed with thin walled vessels having fibrin thrombi. Proportion of vessels about 40% located mainly in periphery of tumor.

In our study neural origin of benignsoft tissue are 3rd most common and fibrous type in the order of 4th.This is well correlated with Agravat*et al*., (2010). Most of the peripheral nerve sheath tumors are benign.

In our study a case of ganglioneuroma in 18 years female, retroperitoneal mass measured 10x7x5cm encapsulated greywhite yellow cut surface with glistening areas cystic degeneration and mucoid areas.Microscopic sections revealed fascicles of spindle shaped cells with wavy nuclei admixed with mature ganglion cells. On the basis of maturation neurogenic tumors are neuroblastoma (NB) most immature,ganglioneuroblastoma (GNB)both mature and immature and ganglioneuroma(GN)mostly mature. Ganglioneuromasaremostly benign in nature and good prognosis (Paolo *et al*., 2009).

Sunita and Chatura (2016) report well correlated to age and site of schwannoma is biphasic tumor composed of cellular Antoni A area and Verocobody contain Antoni B areas thickend vessels with hyalinised walls are present. Cellular scwannomas are mostly in retroperitoneal area and mediastinum composed of mainly of Antoni A areas with more cellularitycells show fascicular growth pattern.A very close conditions confused with this variant is MPNST low grade and leiomyosarcoma. IHC helpful in differentiationplexiform variant are small in size and superficial location with nodules composed of mostly Antoni A other variants are melonotic,epitheliod,microcystic and hybrid.

Malignant soft tissue tumors and soft tissue sarcomas tumors account for <1% of all adult tumors and 15% of pediatrictumors(Ramaswamy*et al*., 2016). Soft tissue sarcomas are heterogenoustumors with many different typescause difficulty in diagnosis. For categorization immunohistochemistry (IHC) is used in difficult cases in recent years. In our study sarcomas of adipocytic origin is most common out 10, 4 cases are adipocytic origin.Inadults 15% to 20% of all soft tissue sarcomas areLiposarcomas. Rhabdomyosarcoma occurs in younger age.Site and distribution of liposarcomas in all cases well correlated with Lee *et al*., (2018).

Nadar*et al*., (2016) reported that most common type of liposarcoma at around 40% is there in this group. Atypical lipomatoustumorarisesin the extremities, whereas well-differentiated liposarcomais in the retroperitoneum or mediastinum.Though no risk of metastasis in Atypicallipomatoustumor and well-differentiated liposarcoma (WDLS) but local aggressive nature is there.Dedifferentiated liposarcoma composed of 10% of liposarcomasoccursprimarly from well differentiated liposarcomasa sudden transition or during recurrence they are most commonly arise from retroperitoneum. 2nd most type is myxiodliposarcoma composed of 30 to 35%, 5% of all liposarcomasare high-grade Pleomorphic liposarcomas.

In our study theEpitheliodhemangioendothelioma a rare vascular tumor located in the tongue with 1x1 cm size presented as grey white nodule with grey brown centre microscopically uniform, bland epithelioidto slightly spindled small cells arranged in nests and cords in myxiod background admixes with vascular channels. Tonge is the very rare site for this tumor having intermediate malignancy. So far only nine cases are reported in this site according toBajpaiandPardhe(2019). Sometimes diagnostic dilemma between this and carcinoma,vascular markers CD31,CD34 and FactorVIII are used for differentiationundifferentiated pleomorphic sarcoma in our study presented as right thigh mass in 30 years female,which is the most common site for this tumor. Gross findings are yellowish tan soildtumor soft to firm and myxiod jelly like material on cutting it is sticky. Microscopically tumor composed of spindle to oval cells marked pleomorphism with extensive myxiod areas and reed Sternberg type of giant cells and extensive necrosis and admixed many inflammatory (John*et al*., 2017).

Low gradefibromyxiod sarcoma in our study presented as right mass of 30 years female, grey soft tissue mass measured 9x6x2.5 cm well circumscribed 90% of tumor is solid with multidularity and reaming cystic area.Microcopicallytumor of moderate cellularity bland spindle shaped cells with oval nuclei ina myxiodstroma and occasional giant collagen rosettes. Myxiod and collagenous stroma are vaiable. The above findings are same as that of Sunil *et al*., (2012).

Low grade fibromyxiod sarcoma tumor is mostly confused with low grade myxofibrosarcoma.Myxofibrosarcomashows nuclear pleomophism, curvilinear blood vessels and myxiod areas are more uniform and it is present in older age group. IHC marker for low grade fibromyxiod sarcoma is MUC4, strong cytoplasmic positivity in almost 100%and the gene involved is FUS oncogenetranslocation (John*et al*., 2013).

Alveolar soft part sarcomais a very rare soft tissue of younger age group. In our study this occurred in 21 years female as thigh mass being the mostcommon site5x5x3cm in size. Grosslywell circumscribed grey tan to yellow tumor. Nests of polygonal cells are arranged in alveolar pattern cells have abundant granular cytoplasm and the round eccentrically placed prominent nucleoli (Priyanka*et al*., (2013).Rodriguez *et al*., (2012) study well correlated with the one malignant peripheral nerve sheath tumor(MPNST) in our study presented in 60 year old male as fusiform leg swelling. Cells are arranged in fascicular pattern.Spindle cells havepoorly defined cytoplasm withhyperchromaticnuclei with tapering and focal myxiod areas.

VI. Conclusion

1.Incidence of soft tissue tumors in our study is 4.8%.
2.Most common beingn soft tissue tumors are of adipocytic origin and most common malignant soft tissue tumors are also of adipocytic origin.
3.94% of soft tissue tumors are benign tissues.
4.With good clinical history in correlation with imaging findings,FNAC studies and proper techniques of histopathology most of the soft tissue tumors can be diagnosed.

Table. 1. Distribution of Soft Tissue Tumors

Soft tissue tumours	Number of Cases	Percentage (%)
Benign Tumors		
1. Lipomatous tissues	99	56%
2. Neural tissues	19	11%
3. Vascular tissues	23	13%
4. Fibrous tissues	17	10%
5. Fibrohistiocytic tissues	7	04%
Total	165	94%
Malignant tumors	10	06%
Total	175	100%

Fig.1.

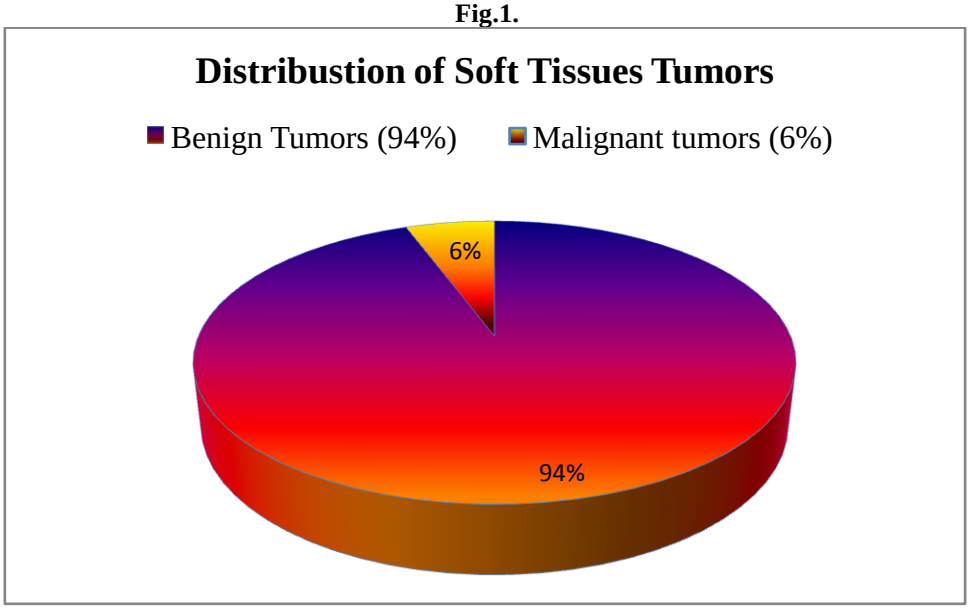

Table. 2. Microscopic diagnosis of malignant soft tissue tumors

S.No	Age / Sex	Site/Size	Gross	Microscopic diagnosis
1	26/M	Tongue 1x1cm	Grey white nodule grey brown centre	Epithelioidhemangioendothelioma
2	55/M	Retroperitoneum 19x8x6cm	Yellow and Grey white	Well differentiated liposarcoma
3	65/M	Leg	Yellow and Grey white,	Liposarcoma with Grade 1

		22x18x13cm	myxiod area	Dedifferentiation
4	30/F	Thigh 9x6x2.5cm	Soild (90%) Cytic areas Capsulated	Fibromyxoid sarcoma –low Grade
5	30/F	Thigh 10x9x6cm	Yellow, tan, Myxoid Solid	Undifferentiated Pleomorphic sarcoma with Prominent Inflammation, Myxoid change
6	40/F	Retro Peritoneum 18x14x13cm	Pale yellow Areas, cartilagenous, myxoid Osseous areas	Dedifferentiated lipo sarcoma
7	21/F	Thigh 5x5x3cm	Circumscribed, grey yellow, firm,	Alveolarsoft part Sarcoma
8	65/M	Leg 5x5x3cm	Grey, white	Malignant peripheral nerve sheath tumor
9	60/M	Foot 4x3x1cm	Ulcero Proliferative	Fibrosarcoma Low grade
10	57/M	Thigh 12x9x5cm	Multilobated, dark yellow	Atypical lipomatoustumor

Fig. 2. Low power view of capillary hemangioma

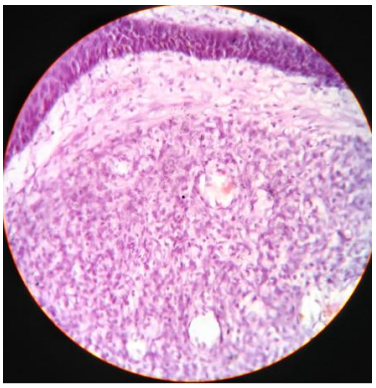

Fig. 3. High power view of lobular capillary hemangioma

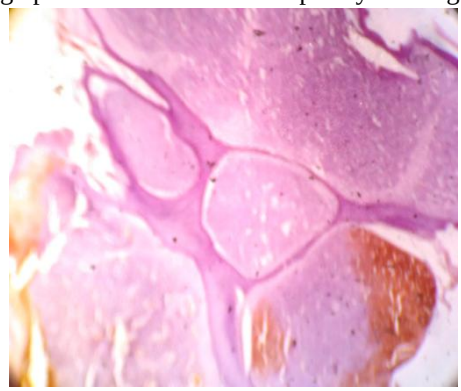

Fig. 4. Low power view of angiolipoma

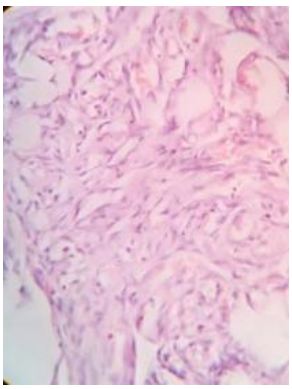

Fig. 5. High power of angiolipoma

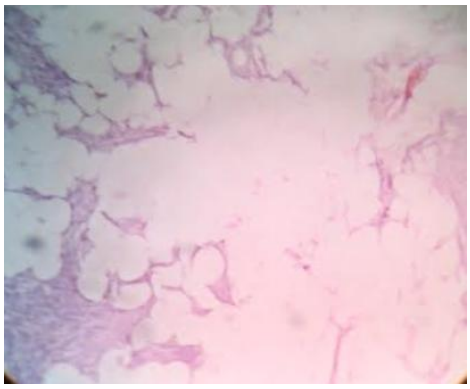

Fig. 6. Gross appearance of neurofibroma

Fig. 7. Cut surface of neurofibroma

Fig. 8.High power view of neurofibroma

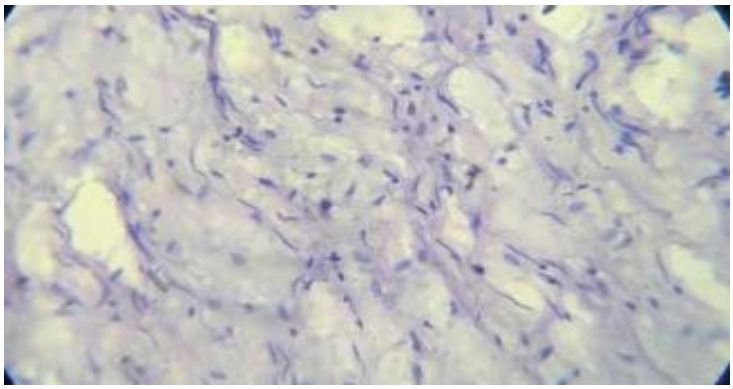

Fig. 9. Gross picture of low grade fibromyxoid sarcoma

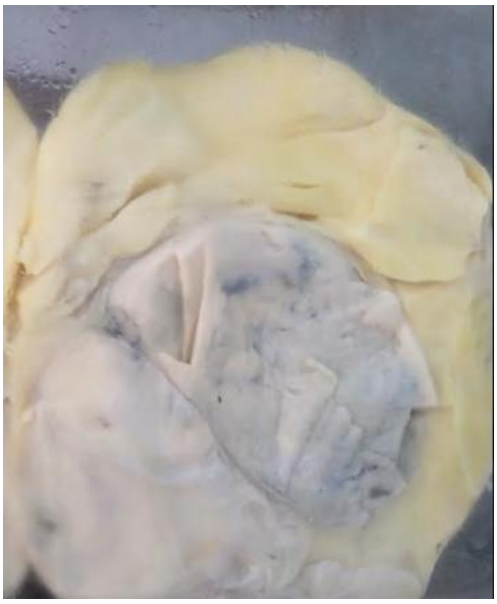

Fig. 10.Low power - low grade fibromyxoid sarcoma

Fig. 11. High power- low grade fibromyxoid sarcoma

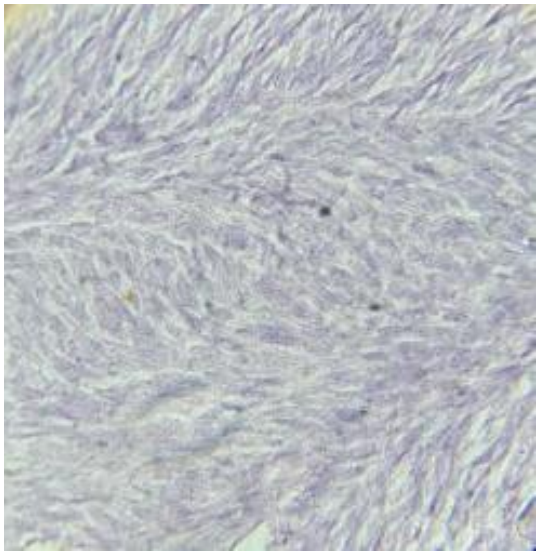

Fig. 12. Gross picture of Atypicallipomatoustumor

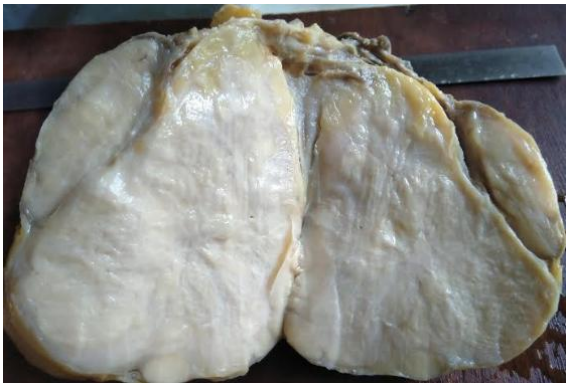

Fig. 13. Microscopic picture of Atypical lipomatous

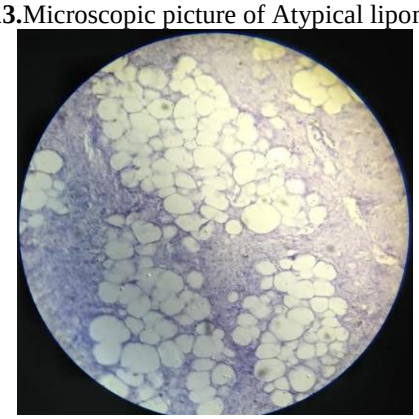

Fig. 14. Undifferentiated pleomorphic sarcoma ---gross appearance.

Fig. 15. High power view of Undifferentiated pleomorphic sarcoma

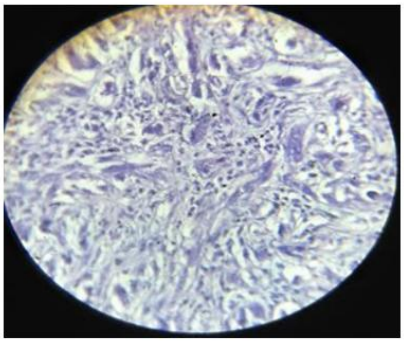

Fig. 16. Gross appeance of dedifferentiated liposacoma

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