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Histopathologic Patterns of Soft Tissue Tumors in Hawassa University Comprehensive Specialized Hospital, Sidama Ethiopia: A 5 Year Retrospective Study

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Abstract

Soft tissue tumors are a diverse and complex group of neoplasms having a mesenchymal differentiation. Although they are histomorphologically diverse, a majority of the time exhibit overlapping radiological features and clinical presentations. And the annual clinical incidence of benign tumors of soft tissue has been estimated to be as high as 3,000 cases per 1 million populations, whereas the annual incidence of soft tissue sarcoma is about 50 cases per 1 million populations, i.e. <1% of all malignant tumors. According to the Addis Ababa Cancer Registry, soft tissue tumors constitute the 10th and 15th common tumors in males and females respectively.

Objective: This study was to assess the histomorphologic patterns of soft tissue tumors in the pathology department of Hawassa University Comprehensive Specialized Hospital (HUCSH).

Materials and Methods: A retrospective cross-sectional descriptive study was conducted on soft tissue tumors over the period from September 2008 to July 2012 E.C. All the soft tissues were received and diagnosed at the Department of Pathology in, Hawassa University Comprehensive Specialized Hospital, Sidama, Ethiopia. The Pathology reports were collected from the pathology data archives, and the variables of the study were extracted by using a data extraction sheet, and data analyses were done using SPSS version 20.

Results: A total of 239 soft tissues tumors biopsy specimens were received in the pathology laboratory with the age range of 1 to 80 years. The common age group for soft tissue tumors was 21 to 30 years 67 (28%). The male to female ratio was 1.008:1. The benign to malignant soft tissue tumor ratio was 1.57:1 and the commonest benign tumor was lipoma followed by hemangioma. Rhabdomyosarcoma was the leading malignant soft tissue tumor followed by synovial sarcoma and generally lower extremity was the primary site affected by sarcomas. Soft tissue sarcomas had an average size of 9.49 cm ± 7.14 and benign tumors had an average size of 4.96 cm ± 5.1. The swelling was the commonest clinical presentation which was complained by 80.3% (192) of patients.

Conclusion: Benign soft tissue tumors were relatively more common than sarcomas. Lipoma was the commonest benign soft tissue tumor followed by hemangioma. Rhabdomyosarcoma was the predominant soft tissue sarcoma that was common in the first two decades of life.

Keywords: Histopathologic pattern; Soft tissue tumor; Rhabdomyosarcoma

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Introduction

Soft tissue is loosely defined as the complex of non-epithelial extra skeletal structures of the body exclusive of the supportive tissue of the various organs and the hematopoietic/lymphoid tissue. It is composed of fibrous (connective) tissue, adipose tissue, skeletal muscle, blood and lymph vessels, and the peripheral nervous system [1]. It accounts for a substantial portion of the body, but tumors are relatively rare and are diagnostically challenging as they comprise a large spectrum of diagnostic entities.

Soft tissue tumors are a complex group of neoplasms having a mesenchymal differentiation occurring in all age groups. Although they are histomorphologically diverse, most of the time exhibit similar clinical presentations and overlapping radiological features. Therefore, correct histopathologic diagnosis is crucial.

Light microscopic evaluation of hematoxylin-eosin-stained sections remains the standard technique for the initial diagnostic approach to these tumors and is sufficient in the majority of the cases [1]. And a biopsy is mandatory to establish malignancy and assess the histological type, subtype, and grade and is recommended in clinical practice guidelines for all deep-seated tumors >5 cm [2].

The etiology of most benign and malignant tumors of soft tissue is unknown. In rare cases (<10%), genetic and environmental factors, irradiation, viral infections, and immunodeficiency are associated with the development of usually malignant soft tissue tumors [2].

Soft tissue tumors and tumor-like lesions have fascinated pathologists for many years because of their remarkably wide variety and the close histopathologic similarities between certain tumors with only subtle differences detectable on careful microscopic examination, thus posing a diagnostic challenge to a pathologist [1].

Methods and Materials

Study area and study design

Study area: The study was conducted in HUCSH, pathology department. Hawassa is the capital city of Sidama located 275 km south of Addis Ababa. One of the fast growing cities in Ethiopia with an estimated population count of 300,000. The city has two governmental and five private primary hospitals and several private clinics and pharmacies.

HUCSH was established in 2005 and gives service to more than 12 million people in the South part of the country. It is one of the referral hospitals in the region and pathology is one of the actively functioning departments found in the institution and gives hematology, cytopathology, and surgical pathology services. Diagnoses of lesions along with the process of teaching and learning are conducted by well-respected Pathologists.

Study design: This study was a hospital-based retrospective study. Soft tissue tumors diagnosed in the pathology department from September 1st, 2008, to July 2012 E.C were assessed.

Source population and study population

Source population: All biopsy specimens send to HUCSH, department of pathology during the study period.

Study population: The study population was a record of all biopsies confirmed soft tissue tumor cases during the study period at HUCSH, department of pathology.

Sample size and sampling

All available samples of soft tissue tumor cases within the study period (September 1st, 2008, to July 2012 E.C) which strictly met the inclusion criteria were included.

Data collection tools and procedures

All the pathologic diagnoses were made based on formalin-fixed, paraffin-embedded tissue sections stained with Hematoxylin and Eosin. Signed-out pathology reports were reviewed in the study period. All demographic data and their corresponding histopathology diagnoses were extracted from the reported hard copy and patient chart using a data extraction sheet.

Data quality assurance: The data was collected and extracted by the principal investigator. The quality was controlled, before, during, and after data extraction, as follows:

Before data extraction: the principal investigator designed the data extraction sheet with the study variables. The diagnosis reports were located from the archive of the Pathology department in HUSCH.

During data extraction: The principal investigator extracted the data using the designed data extraction sheet from the pathology archives chronologically from the year, 2008 to 2012.

After data extraction: the principal investigator checked the completeness of the extracted study variables in the extracted datasheet, cleaned and coded.

Data processing and analysis: The data were checked for completeness, cleaned, and coded for entry and analysis by the principal investigator. Data were analyzed using Statistical Package of Social Sciences (SPSS) version 20. Descriptive statistics (frequencies and percentages) was used to explain the study participant with study variables.

Ethical consideration

In conducting this study, ethical consideration was respected. Permission was obtained from the Ethics committee of the Department of Pathology, School of Medicine, and College of Health Sciences of Hawassa University. Names of patients or their chart numbers were not written on the data extraction sheet to respect the confidentiality of patients. Hence, the data was an anonymous link.

Result

Distribution of soft tissue tumors based on the biological behavior

The study was performed throughout 5 years from September 2008 to July 2012 E.C. During this period total of 5,348 surgical specimens were received for histopathological examination in the histopathology section of our hospital. Out of these, 291 (5.4%) specimens were soft tissue tumors, and 52 cases were excluded from the study because of incomplete sociodemographic data, missed variables, loss of chart, and nonspecific histopathologic reports. This study included 239 cases of soft tissue tumors with histopathologic diagnosis in the pathology department of Hawassa University. The neoplastic soft tissue lesions were further categorized as benign and malignant. Soft tissue tumors with intermediate grade were categorized as potentially malignant lesions. Various factors regarding distribution with age, sex, anatomical site, size, and histopathological characteristics were analyzed.

From the included 239 soft tissue biopsies, 146 (61.1%) were benign and 93 (38.9%) were malignant soft tissue tumors with a Benign to a malignant ratio of 1.57:1 (Figure 1).

Trends of soft tissue tumors

239 soft tissue tumors were studied between a period of 2008-

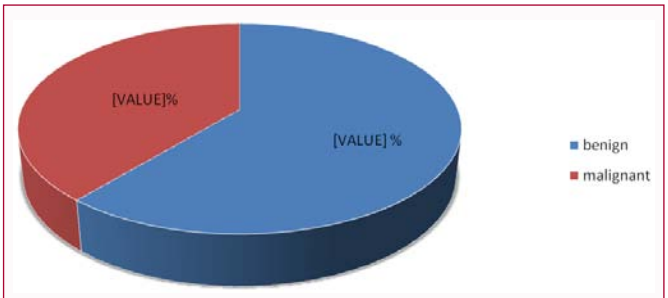

Figure 1: Histopathologic types of neoplastic soft tissue tumors.

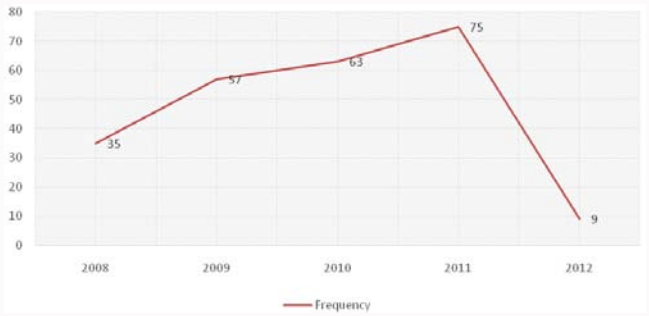

Figure 2: Trends of soft tissue tumors between 2008-2012.

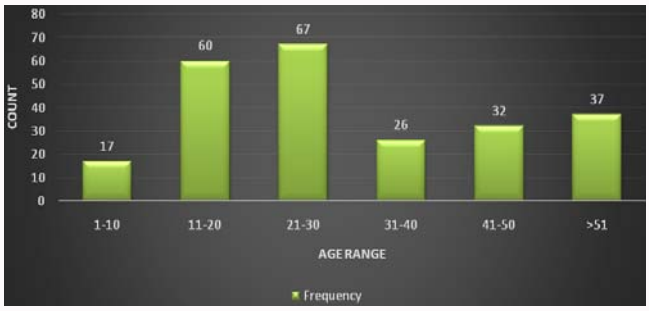

Figure 3: Distribution of soft tissue tumor by age group.

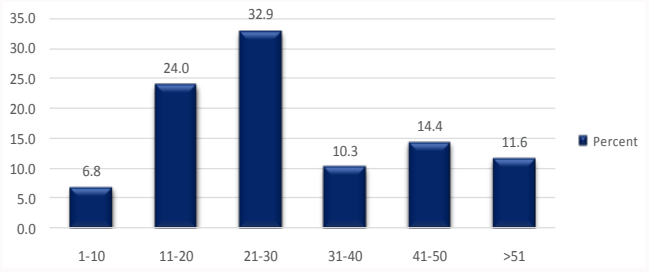

Figure 4: Distribution of benign soft tissue tumor by age group.

2012 and the highest number of the case was recorded in the year 2011 (31.4%, 75) followed by the year 2010 (26.4%, 63), 2009 (23.8%, 57), and 2008 (14.6%, 35). The lowest case record was in the year 2012 (3.8%, 9) and during this COVID pandemic year, the total biopsy sent to our department was markedly decreased too (Figure 2). There were 48 soft tissue tumor cases seen on average every year.

Age distribution of soft tissue tumors

The age at which soft tissue tumors commonly occur were between age 21 to 30 years 28% (67), the second common age group was 11 to 20 years 25.1% (60), the third common was age group greater than 51. The minimum age was 1 and the maximum age was 80 years with a mean age of 31.98 ± 17.68 (Figure 3).

Benign soft tissue tumors were diagnosed between the ages of 4 to 78 the youngest patient was diagnosed with hemangioma and the oldest was diagnosed with Lipoma and the mean age was 30.55 ± 15.67 (Figure 4). The age group between 21 to 30 was the commonest affected by the tumor accounting for 32.9% (48) followed by age groups 11-20 (24.1%) and 41-50 (14.4%).

Soft tissue sarcomas were diagnosed between the age of 1 to 80 the youngest patient was diagnosed to have Rhabdomyosarcoma and the oldest patient was diagnosed with Kaposi sarcoma. The mean age

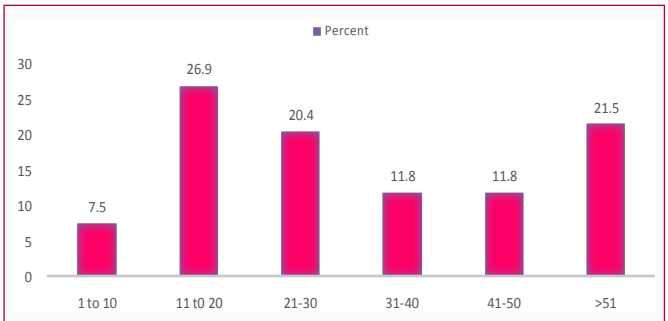

Figure 5: Distribution of soft tissue sarcoma by age group.

Table 1: Distribution of benign and malignant soft tissue tumors by gender.

Sex	Behavior of tumor	Behavior of tumor	Total
	Benign	Malignant	
Male	70 (48.3%)	51 (54.3%)	121
Female	76 (51.7%)	42 (45.7%)	118
Total	146 (100%)	93 (100%)	239

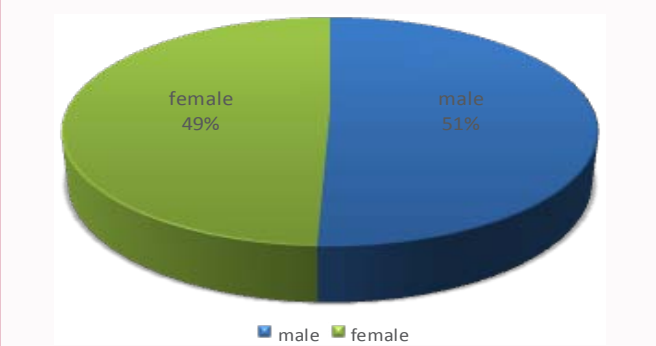

Figure 6: Distribution of soft tissue tumors by gender.

was 34.22 ± 20.32 (Figure 5). The age group between 11-20 was the commonest affected by sarcoma accounting for 26.9% (25) followed by an age group greater than 51 (21.5%) and age group 21-30 (20.4%).

Gender distribution of soft tissue tumor

Male 121 (50.6%) predominance was seen compared to female 118 (49.4%) with a ratio of 1.008:1 (Figure 6). Benign soft tissue tumor was slightly common in females 51.7% (76) with female to male ratio of 1.09:1 but the opposite was true in the case of soft tissue sarcoma which was more common in males 54.3% (51) with male to female ratio of 1.2:1 (Table 1 and Figure 6).

Distribution in the site of soft tissue tumors

The Head and neck was the commonest primary site affected by soft tissue tumors which were found in 29.7% (71) of the patients (Figure 7). The lower extremity was the second most common site and was noted in 21.8% (52) patients, followed by upper extremity 11.7% (28) and abdominal region in 10% (24) patients.

The lower extremities were the commonest primary site of soft tissue sarcoma which was found in 28 (30.1%) of the patients. The head/neck and abdomen were the second most common site of involvement and were noted in 13 (14%) patients each, then followed by the upper extremity 12 (12.9%) (Figure 8).

Like total soft tissue tumors, the head and neck were the commonest primary site for benign soft tissue tumor which was present in 39.7% (58) of patients. The lower extremity was the second

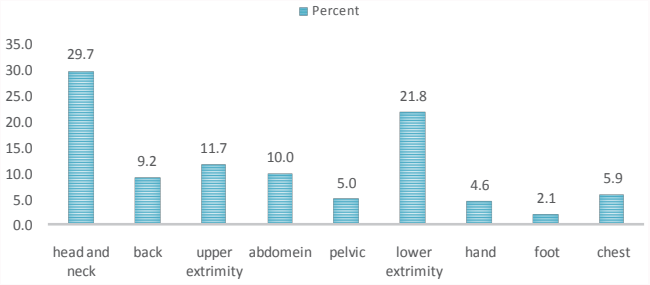

Figure 7: Anatomic site distribution of soft tissue tumors.

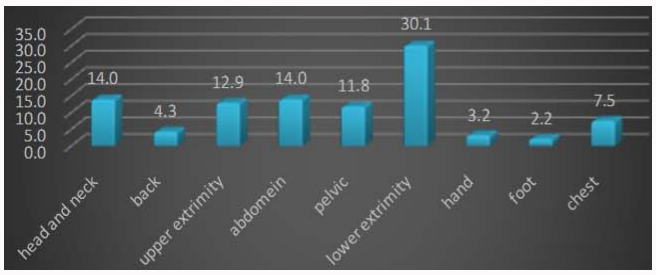

Figure 8: Distribution of soft tissue sarcoma by site.

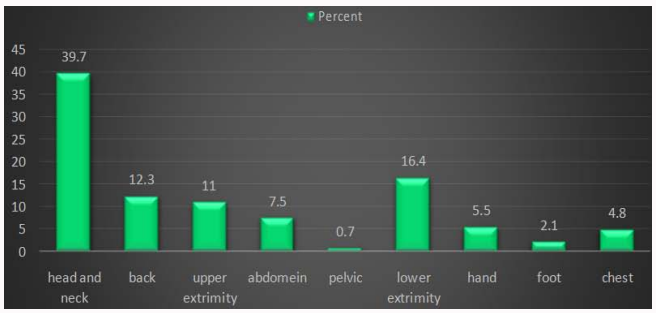

Figure 9: Anatomic site distribution of benign soft tissue tumors.

most common site 16.4% (24) followed by back 12.3% and upper extremity 11% (Figure 9).

Clinical presentation of soft tissue tumors

The swelling was the commonest clinical presentation which was complained by 80.3% (192) of patients and pain was the second common complaint accounting for 16.3% (39). The list common complaint at presentation was a loss of function 3.3% (8) (Figure 10).

Histological patterns of benign soft tissue tumor

As it was explained above from the total biopsies reviewed benign soft tumors were diagnosed in 146 cases. From these total benign soft tissue tumors, the top five common histological types were Lipoma 30 (20.7%) followed by hemangioma 19 (13.1%), pyogenic granuloma 18 (12.4%), neurofibroma 16 (11%), and schwannoma 12 (8.3%) respectively (Table 2).

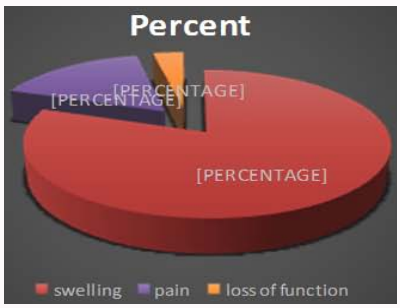

Figure 10: Distribution of soft tissue sarcoma by clinical presentation.

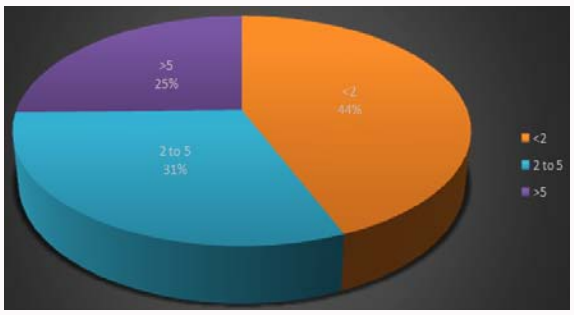

Figure 11: Distribution of benign soft tissue tumors by size.

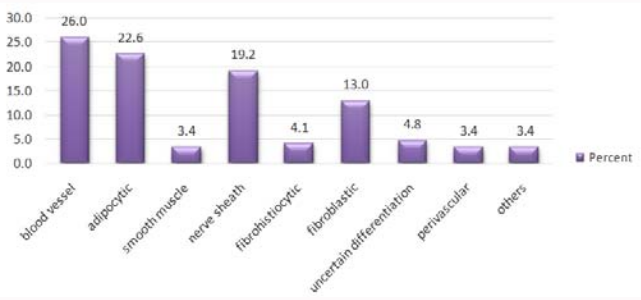

Figure 12: Distribution of benign soft tissue tumors by origin.

The mean age of presentation for lipoma was 39.93 ± 17.02. The maximum age presentation was 78 and the minimum age was 9. The mean age for schwannoma was 38.42 ± 19.4 and maximum age of diagnosis was 65 and the minimum was 18. The mean age for neurofibroma was 27. 69 ± 15 and the maximum age of diagnosis was 55 and the minimum age was 5.

The Mean size of benign soft tissue tumors was 4.96 cm ± 5.1. And the minimum size at which a benign soft tissue tumor was diagnosed was 1cm and the largest one was 24 cm which was presented in the neck of 30 years old male and diagnosed to have neurofibroma.

43.8% (64) of benign soft tissue tumors had a size less than 2 cm, 30.8% (45) had a size between 2 cm to 5 cm, and the remaining 25.3%

Table 2: Distribution of benign soft tissue tumors.

	Lipoma	Hemangioma	Schwannoma	Hamartoma	Neurofibroma	Pyogenic granuloma	Fibromatosis	Glomus tumor	Giant cell tumor of tendon sheath	Lipoblastoma	Myxoma	Solitary fibrous tumor
Frequency	30	19	12	5	16	18	9	5	4	3	2	1
Percent	20.5	13	8.2	3.4	11	12.3	6.2	3.4	27	21	1.4	0.7
	myxofibroma	BFH	leiomyoma	Angiofibroma	nodular fasciitis	sclerotic fibroma	encondroma	IMT	AV malformation	irritation fibroma		
Frequency	1	6	5	3	1	2	1	1	1	1		
Percent	0.7	4.1	3.4	2.1	0.7	1.4	0.7	0.7	0.7	0.7		

Table 3: Distribution of malignant soft tissue tumors.

Tumor type	Frequency	Percent
Rhabdomyosarcoma	23	24.70%
Synovial sarcoma	12	12.90%
DFSP	11	11.80%
High-grade sarcoma NOS	10	10.80%
Leiomyosarcoma	10	10.70%
Liposarcoma	7	7.50%
MFH	6	6.40%
MPNST	4	4.30%
Chondrosarcoma	3	3.20%
Fibrosarcoma	3	3.20%
Kaposi sarcoma	2	2.20%
Alveolar soft part sarcoma	1	1.10%
Angiosarcoma	1	1.10%
Total	93	100.00%

Table 4: Distribution of soft tissue sarcoma by various age group.

	1-10	11-20	21-30	31-40	41-50	>51	Total
High-grade sarcoma NOS	0	3	0	1	3	3	10
Rhabdomyosarcoma	7	7	8	0	1	0	23
Synovial sarcoma	0	8	4	0	0	0	12
DFSP	0	2	3	2	2	2	11
Chondrosarcoma	0	0	0	1	0	2	3
Fibrosarcoma	0	1	0	1	1	0	3
Leiomyosarcoma	0	1	1	2	3	3	10
MPNST	0	2	0	1	0	1	4
Liposarcoma	0	1	1	2	1	2	7
MFH	0	0	1	1	0	4	6
Alveolar soft part sarcoma	0	0	1	0	0	0	1
Kaposi sarcoma	0	0	0	0	0	2	2
Angiosarcoma	0	0	0	0	0	1	1

(37) cases had a size greater than 5 cm (Figure 11).

Benign soft tissue tumors with vascular (blood vessel) origin account for 26% (38) of total benign tumors followed by adipocytic 22% (33), nerve sheath 19.2% (28), and fibroblastic 19 (13%) origins respectively (Figure 12).

Histological patterns of malignant soft tissue tumor

From the total of 93 soft tissue sarcomas reviewed in the period of five-year rhabdomyosarcoma was the commonest soft tissue sarcoma accounting 23 (24.7%) followed by synovial sarcoma 12 (12.9%), DFSP 11 (11.8%), leiomyosarcoma 10 (10.8%), high-grade sarcoma NOS 10 (10.8%), Liposarcoma 7 (7.5%), MFH 6 (6.5%), MPNST 4 (4.3%) respectively in decreasing order (Table 3).

The distribution of soft tissue sarcoma concerning age and sex was variable. The mean age of presentation for rhabdomyosarcoma was 17.52 ± 11.13, the maximum age of diagnosis was 45 year with the diagnosis of pleomorphic rhabdomyosarcoma and the minimum age was 1 year which was diagnosed as embryonal rhabdomyosarcoma (Table 4). There was slight male predominance with a male to female ratio of 1.8:1. It was commonly present in the genitourinary region

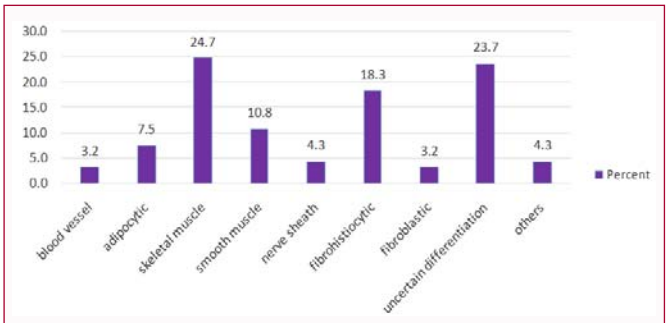

Figure 13: Distribution of soft tissue sarcoma.

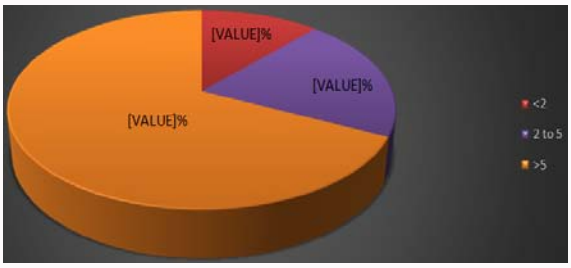

Figure 14: Distribution of soft tissue sarcoma by size.

34.8% (8) followed by head/neck (21.7%) and lower extremity.

The mean age of presentation of synovial sarcoma was 20.58 ± 3.7. The maximum age of diagnosis was 30 and the minimum age was 26. The lower extremity especially the knee region was the predominant site affected accounting for 83.3% (10) with slight male predominance.

The mean age for DFSP was 37 ± 16. The maximum age of diagnosis was 65 and the minimum age was 17 with slight female predominance. The mean age of presentation for leiomyosarcoma was 44.2 ± 16.7. The maximum age at diagnosis was 67 and the minimum was 14 with slight female predominance and nearly 40% of the tumor present in the extremities.

High-grade sarcoma NOS is one of the common histologic diagnoses of sarcoma in 10.8% of cases and immunohistochemistry is advised for all of them.

Skeletal muscle was the commonest origin for soft tissue sarcoma accounting 23 (24.7 %). And 22 (23.7%) of tumors like synovial sarcoma had uncertain origin for differentiation. Fibrohistiocytic tumors were the 3rd common origin accounting for 17 (18.3%) followed by smooth muscle 10 (10.8%) (Figure 13).

Soft tissue sarcomas had an average size of 9.49 cm ± 7.14. The minimum size at which soft tissue sarcomas were diagnosed was 1cm and the maximum size was 45 cm was a 40-year-old female presented with retroperitoneal mass was diagnosed to have liposarcoma. 67.7% (63) of soft tissue sarcomas had a size greater than 5 cm, 20.4% (19) of sarcomas had a size between 2 cm to 5 cm and the rest 11.8% (11) had a size of less than 2 cm (Figure 14).

Discussion

Soft tissue tumors and tumor-like lesions have fascinated pathologists for many years because of their remarkably wide variety and the close histopathologic similarities between certain tumors with only subtle differences detectable on careful microscopic examination, thus posing a diagnostic challenge to a pathologist [3].

There might be global differences in sarcoma incidence, according to data from different cancer registries. For example, the incidence per 100,000 was only 0.8 in Osaka, Japan; 1.4 in Bombay, India; and 2.4 in Shanghai, China. These figures are less than those reported for the United States and Europe, where the incidence is between 3 and 4 per 100,000 [4].

In the present study, the age of presentation showed a wide range from 1 to 80 years. Maximum cases distribution was noted in the age group of 21 to 30 years (28%) with a mean age of 31.98. This is in agreement with studies done in Pakistan and Jima, Ethiopia where a majority of patients were in age groups 21 to 30 with a mean age of 31 and 30.68 respectively [5,6].

The observed male to female ratio in this study was 1.008:1 which was in concordance with most literature done in Black lion Ethiopia, Pakistan, India, Nigeria, and Mosul Iraq [5,7-10]. A study conducted in Jima, Ethiopia showed slight female preponderance with a ratio of 1.01:1 [6].

Soft tissue sarcomas have a slight male predominance and this was evident in our study with a male to female ratio of 1.21:1. And this is following WHO 2020 soft tissue and also multiple pieces of research done in Nigeria, Jamaica, India, and Jima, Ethiopia having a 1.9:1, 1.02:1, 1.2:1 and 1.8:1 male to female ratio respectively [6,8,11,12].

Benign soft tissue tumors were more common than sarcoma with a ratio of 1.57:1 which was similar to most studies done in referral and tertiary hospitals in Pakistan, Ethiopia, and Mosul, Iraq having a benign to a malignant ratio of 1.8:1, 2.6:1 and 3:1 respectively [5-7]. However, according to WHO 2020, Fletcher and Ackerman 2018, the ratio of benign to malignant is nearly 100:1 which is much higher than our study finding [1,2,13]. This huge variation can have multiple reasons and one of the reasons could be most benign tumors like lipoma are not operated and if at all operated the surgeons hesitate to send for biopsy since the diagnosis is less doubtful. The other reason could be since our hospital is a referral hospital most of the benign tumors could be operated on in other primary and general hospitals.

Head and neck followed by lower extremity were common sites affected by benign soft tissue tumors according to our study. This finding was in concordance with literature published in Pradesh India, Jima& Black lion Ethiopia, Kadapa India [3,6,9,14].

Based on our review lower extremities were the most common site for sarcoma and this result is supported by WHO 2020 soft tissue tumor [2] and different researches done in Nigeria, Jamaica, the USA, India, and Ethiopia [3,6,11,15,16].

Except for one study done in Assam medical college, India where leiomyoma was the commonest benign tumor all other series of studies were conducted in India, Pakistan, the USA, and Ethiopia reported that lipoma [5,6,10,15] and hemangioma were the first and second common benign soft tissue tumor.

Rhabdomyosarcoma, synovial sarcoma, DFSP, High-grade sarcoma NOS and leiomyosarcoma in descending order were the most common malignant soft tissue tumors based on our review. Rhabdomyosarcoma was again the most common soft tissue sarcoma especially in the first two decades according to reports from Northwest Nigeria, Pakistan, Mosul Iraq, Jima Ethiopia, and the USA [5-8,15].

A nonspecific diagnosis of high-grade sarcoma NOS was also one of the common diagnoses in our study. Similar was true in resource-limited countries like Jamaica and Nigeria where Immunohistochemistry is unavailable [11,16].

A non-painful swelling followed by pain was the commonest clinical presentation and complained by 81%, 16% of our patients respectively. And similar reports were analyzed in the study conducted in Northwest Nigeria and Pradesh India [8,17].

Conclusion

The diagnosis and management of soft tissue tumors require a team perspective. Though soft tissue tumors especially sarcomas are rare and usually present just as painless mass, a high degree of suspicion and early diagnosis is needed for early intervention and better prognosis of the patient.

Benign soft tissue tumors were relatively more common than sarcomas. Head and neck followed by lower extremity is the predominant site affected. Lipoma and hemangioma are the two most common benign tumors.

Soft tissue sarcomas have a bimodal age distribution and are slightly more common in males than females. Sarcomas have increased average tumor mass size at presentation compared to benign soft tissue tumors. The lower extremity is the predominant site affected by sarcomas.

Rhabdomyosarcoma followed by synovial sarcoma is the two most common malignant soft tissue tumors.

Immunohistochemistry requirement is higher in the case of soft tissue sarcomas and their presence is very much required to give a specific diagnosis in some difficult sarcoma cases. Yet clinicomorphological evaluation is still the gold standard for the proper diagnosis.

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