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Sensitvity of core needle biopsy in soft tissue and bone tumors at clear mediradiant hospital, Mysore

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Abstract

Background and objectives:
The objectives of the study is assessment of sensitivity and specificity of core needle biopsy in soft tissue and bone tumors, to study the complications arising after core needle biopsy, and study the limitations of core needle biopsy in soft tissue and bone tumors.
Methods:
During the period from November 2015 to April 2017, 79 patients with soft tissue and bone tumors underwent core needle biopsy and surgery after giving their consent at our institute. The comparison of core needle biopsy result was done with the final histopathology report after definitive surgery and sensitivity and specificity was determined.
Results:
A total of 79 patients (47 patients with soft tissue tumors and 32 patients with bone tumors) underwent core needle biopsy followed by definitive surgery in this study. The comparison of core needle biopsy report was done with the final histopathology report. Among 47 cases of soft tissue tumors, which were analysed for diagnostic accuracy, accuracy rate was 91.49%. 80.85 % had a true positive result, 4.25% had a true negative, and 4.25% had false negative report. The sensitivity and specificity of CNB in the series was 91.11% and 100% respectively. The negative predictive value was 33.33% with positive predictive value of 100%. tissue tumors.
Among 32 patients with bone tumors, which were analysed for diagnostic accuracy, accuracy rate was 96.88%, amongst which 81.25 % had a true positive result, 6.25% had a true negative, 3.12% had false positive and 9.38% had false negative report. The sensitivity and specificity of CNB in the series was 92.85% and 75% respectively. The negative predictive value was 60% with positive predictive value of 96.29%.Among 79 patients with soft tissue and bone tumors which were analysed for diagnostic accuracy, accuracy rate was 92.11%, amongst which 81.01 % had a true positive result, 5.06% had a true negative, 1.26% had false positive and 8.86% had false negative report. The sensitivity and specificity of CNB in the series was 90.14% and 80% respectively. The negative predictive value was 36.36% with positive predictive value of 98.46%.

Keywords: Core needle biopsy, soft tissue and bone tumors

Introduction

Rare cancers account for less than one percent of newly diagnosed cancers. Mesenchymal tumors are 100 times more common than soft tissue sarcomas. Osteosarcoma is only one third as common as soft tissue sarcoma1. The anatomical location of the primary sarcoma affects treatment and outcome. Soft tissue sarcomas can be treated when diagnosed early. As with other malignancies, soft tissue sarcomas and osteosarcomas need to be diagnosed before appropriate treatment can be initiated. An important part of the diagnostic test is a biopsy. Biopsy is often the most accurate and least invasive method to confirm the histological diagnosis. Communication between surgeons, oncologists, cytologists, and physicians can increase the success of an accurate diagnosis. A biopsy is best performed by a person who specializes in sarcoma treatment2. Reported advantages of needle injection include less pain, cost, and time3. It also has the advantage of providing tissue-inspecting samples compared to FNAB. The obvious disadvantage is misdiagnosis. This study aimed to evaluate the sensitivity and specificity of core needle biopsy in diagnosing soft tissue and bone tumors.

Materials and methods

Source: 47 patients with soft tissue and bone cancer 32 patients aged 15 to 85 years attending Kidwai Memorial Cancer The institute selected the patients studied.

Inclusion Criteria:
a. Patients between the age of 15 to 85 years of age and presenting with history of soft tissue or bone swelling or those soft tissue or bone swelling detected by ultrasonography or radiological means.

Exclusion Criteria:

a. Patients presenting with inflammatory swellings.

b. Patients with coagulation disorders

c. Patients with cystic swellings.

d. Patients with vascular malformations detected by Doppler or CT/MRI scans.

e. Patients receiving non-surgical treatment at Kidwai Memorial Cancer Institute.

Data collection method:
With the approval of the Ethics Committee, a prospective study was conducted on 79 patients with pain in our hospital between November 2015 and April 2017. After obtaining consent, soft tissues and after local treatment, 2% lycain infiltration with Jamshidi needle for bone cancer, biopsy was performed on the childless patient. If the swelling cannot be felt by hand, ultrasound or computed tomography help is used. The number of attempts to obtain a suitable sample and the number of failures to obtain the sample required for diagnosis were recorded. Key syringes were placed in 10% formalin, processed, embedded in paraffin, sectioned, and stained for routine histopathological examination by a pathologist. Clinical records, pathology reports (biopsies and surgical procedures), and results of radiological examinations and tests. The biopsy report was compared with the histopathology report of the last surgery, and the sensitivity and specificity of the core needle were evaluated.

Observations

During the period of November 2015 to April 2017, a study of the sensitivity of core needle biopsy in soft tissue and bone tumors was made on a series of 79 patients admitted to Department of surgical oncology, Kidwai Memorial Institute of Oncology, Bangalore, India, presenting with history of soft tissue or bony swelling or those soft tissue or bone swelling detected by ultrasonography and other radiological means.

Age and sex incidence: TABLE 1: Soft tissue

Age group	Males		Females		Total	
	No.	%	No.	%	No.	%
15-25	6	12.765	1	2.1	7	14.89
25-35	9	19.1	2	4.25	11	23.42
35-45	6	12.76	7	14.89	13	27.66
45-55	1	2.1	3	6.38	4	8.51
55-65	2	4.25	1	2.1	3	6.38
>65	7	14.89	2	4.25	9	19.14
Total	**31**	65.95	**16**	34.05	**47**	100

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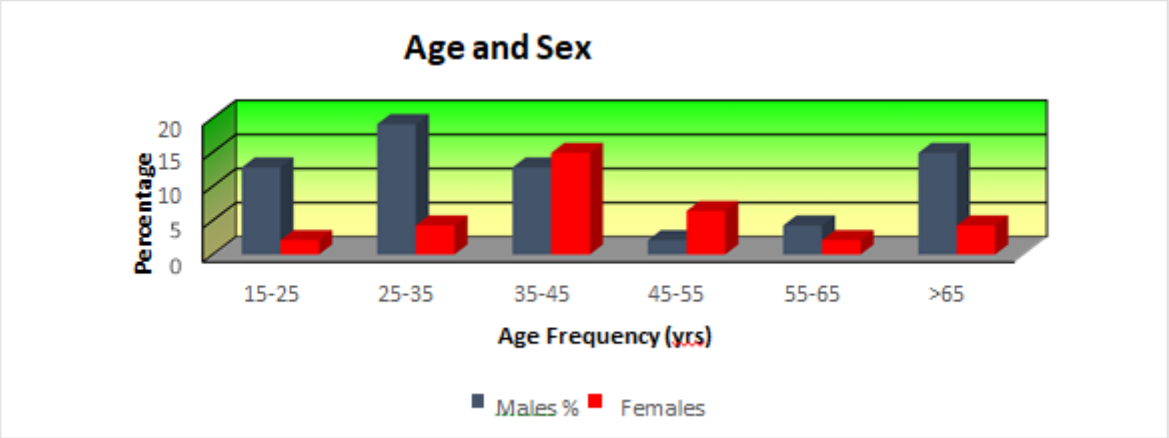
Figure 1:



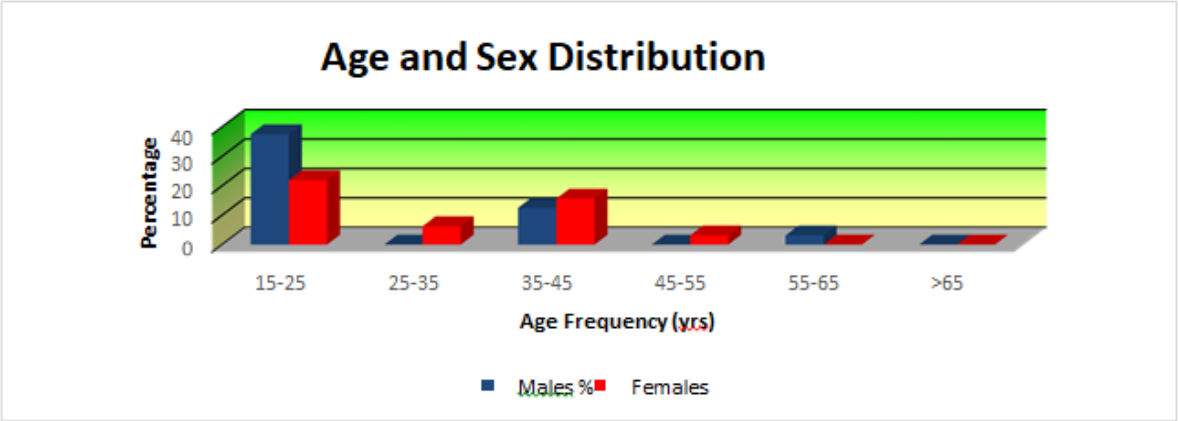
Soft tissue

In this study, Soft tissue tumors were more common in males than in females (1.93:1). The ratio of females to males was more in the age group 35-55 years in this study. The commonest age group for soft tissue tumors was 35-45 years with 13 cases (27.66%) followed by 25-35 years with 11 cases (23.42%). The youngest patient was 17 years old and the oldest patient was 76 years old.

TABLE 2: Bone

Age group	Males		Females		Total	
	No.	%	No.	%	No.	%
15-25	12	37.5	7	21.88	19	59.4
25-35	0	0	2	6.25	2	6.24
35-45	4	12.5	5	15.63	9	28.12
45-55	0	0	1	3.12	1	3.12
55-65	1	3.12	0	0	1	3.12
>65	0	0	0	0	0	0
Total	**17**	53.13	**15**	46.87	**32**	100

Figure 2:



Bone

Bone tumors were more common in males than in females (1.13:1). The commonest age group for bone tumors was 15-25 years with 19 cases (59.4%) followed by 35-45 years with 9 cases (28.12%). The youngest patient was 15 years old and the oldest patient was 60 years old.

Symptoms TABLE 3: Soft Tissue

Symptoms	No. of patients	%
Swelling	35	74.47
Pain	12	25.53

The most common symptom in soft tissue tumors was Swelling (74.4%) followed by Pain (25.53%).

TABLE 4: Bone

Symptoms	No. of patients	%
Swelling	22	68.75
Pain	10	31.25

The most common symptom in bone tumors was Swelling (58.75%) followed by Pain (31.25%).

Duration of symptoms: TABLE 5 Soft tissue

Duration in months	No. of patients	%
0-2	6	12.77
3-5	13	27.67
6-11	16	34.01
≥12	12	25.55

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Total	47	100

TABLE 6 Bone

Duration in months	**No. of patients**	**%**
0-2	3	9.37
3-5	11	34.38
6-11	11	34.38
≥12	7	21.8
Total	32	100

A majority of patients with soft tissue and bone tumors presented within a year of the start of their symptoms. The duration of symptoms varied from 1 month to 20 years

Distribution of tumor according to anatomical site: TABLE 7 Soft Tissue

Site of lesion	**No. of Patients**	**%**
Neck	1	2.13
Chest	3	6.38
Abdomen	9	19.15
Back	2	4.26
Shoulder	1	2.13
Arm	2	4.26
Forearm	4	8.52
Groin	2	4.26
Gluteus	1	2.13
Thigh	8	17.02
Knee	5	10.61
Lower leg	9	19.15
Total	47	100

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TABLE 8 Bone

Site of lesion	No. of Patients	%
Humerus	3	9.38
Radius	2	6.26
Rib	2	6.26
Scapula	1	3.12
Ileum	1	3.12
Femur	11	34.37
Tibia	10	31.25
Fibula	1	3.12
Cuboid	1	3.12
Total	32	100

The lower extremity was the most common site of soft tissue tumor (46.7%) followed by the abdomen (19.15%). The femur was the most common bone involved by bone tumor (34.37%) followed by tibia (31.25%).

Size TABLE 9 Soft Tissue

Size in cm	No. of patients	%
0-5cm	5	10.64
6-10cm	29	61.7
11-15cm	12	25.53
>15cm	1	2.13
Total	47	100

FIGURE 2

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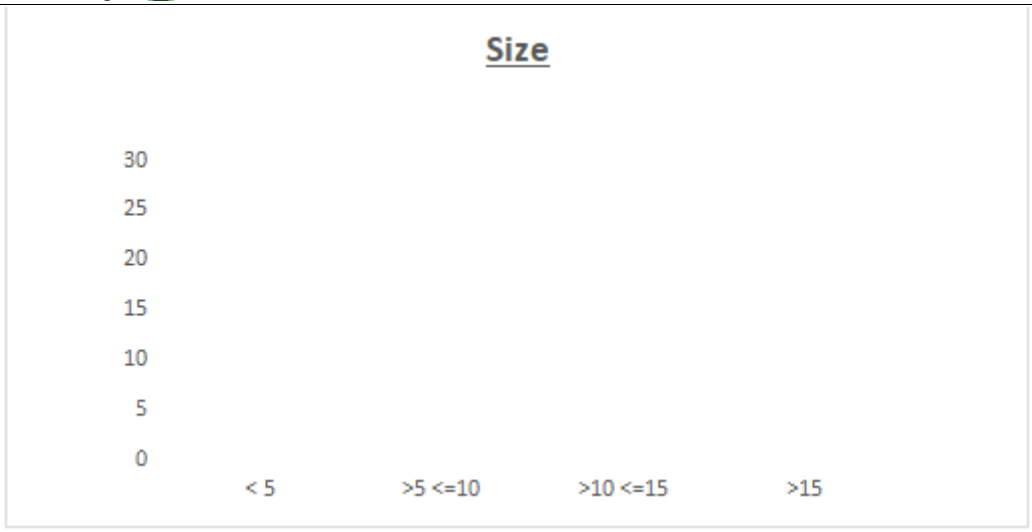
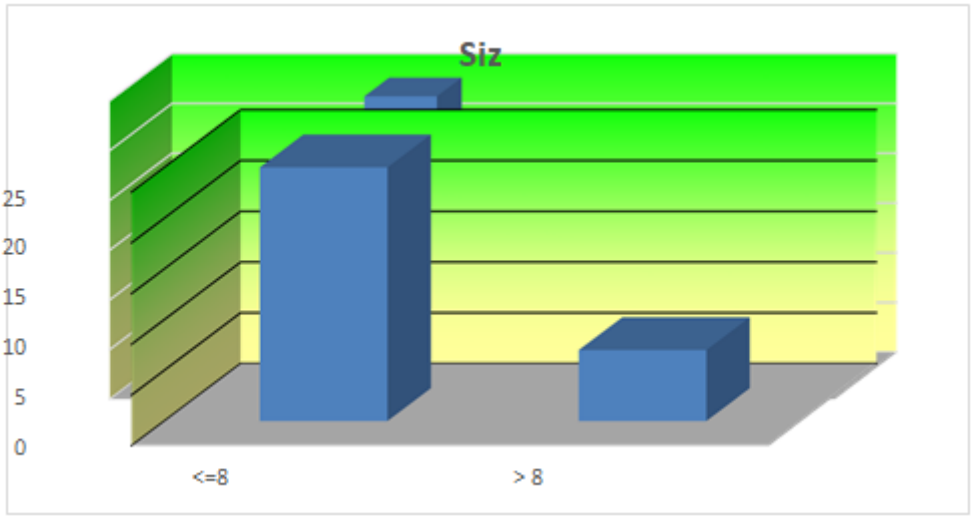


TABLE10Bone

Size in cm	No. of patients	%
0-8cm	24	75
>8cm	8	25

FIGURE 3



61.7% of soft tissue tumors were between 6-10cm size and 75% of bone tumors were less than or equal to 8cm.

Depth TABLE 11 Soft Tissue

Depth	No. of patients	%
Superficial	10	21.28
Deep	37	78.72

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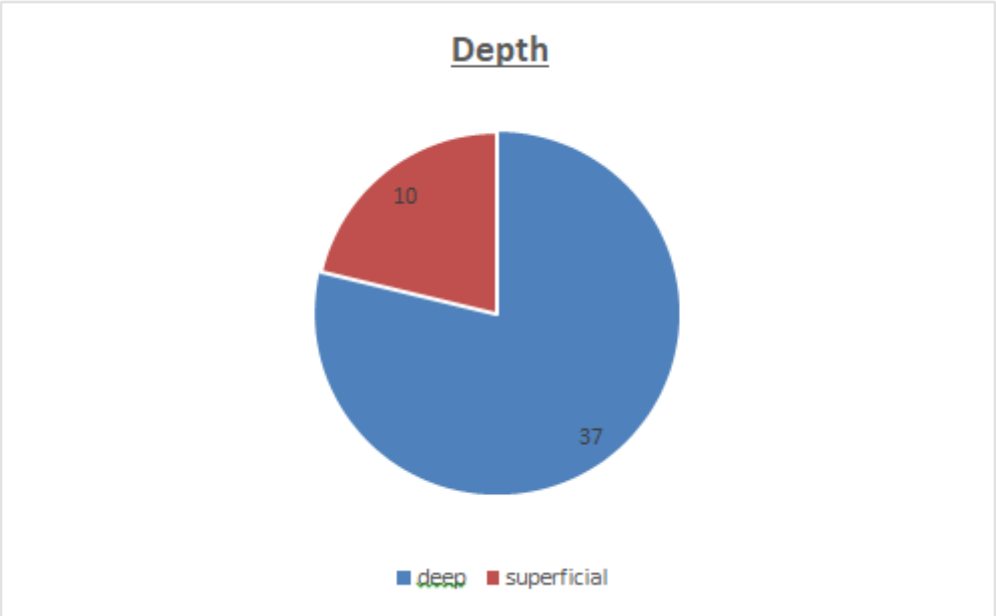
FIGURE 4



78% of the soft tissue were deep seated tumors.

CNB Diagnosis TABLE 12 Soft Tissue

CNB diagnosis	Count	CNB diagnosis	Count
Spindle cell tumor	15	Leimyosarcoma	1
UPS	6	Epitheloid sarcoma	1
Synovial cell sarcoma	4	Neurofibroma	1
MPNST	3	De differenciated	1
Fibromatosis	3	Indeterminate	1
Desmoid tumor	2	Well Differenciated	1
Atypical lipoma	2	Low grade liposarcoma1	1
Poorly differentiated neoplasm	1	Sarcoma NOS	1
Schwannoma	1	Clear cell sarcoma	1
Fibrolipoma	1		

FIGURE 5

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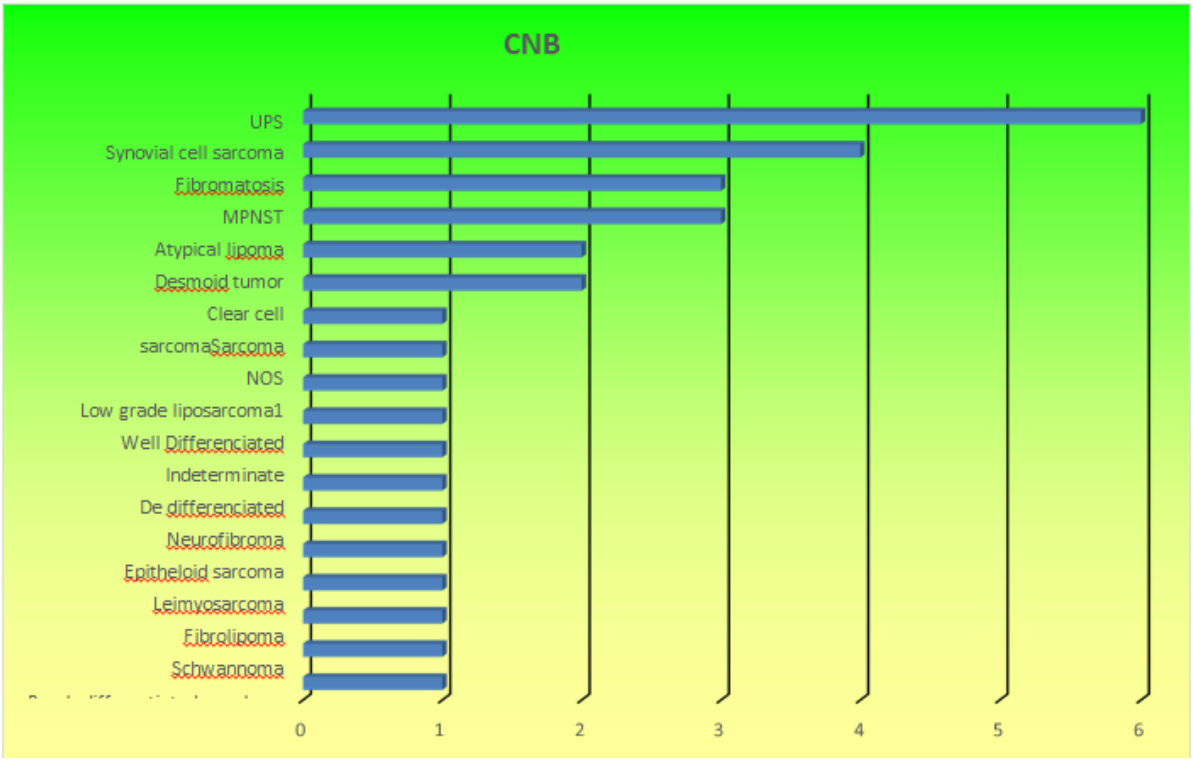
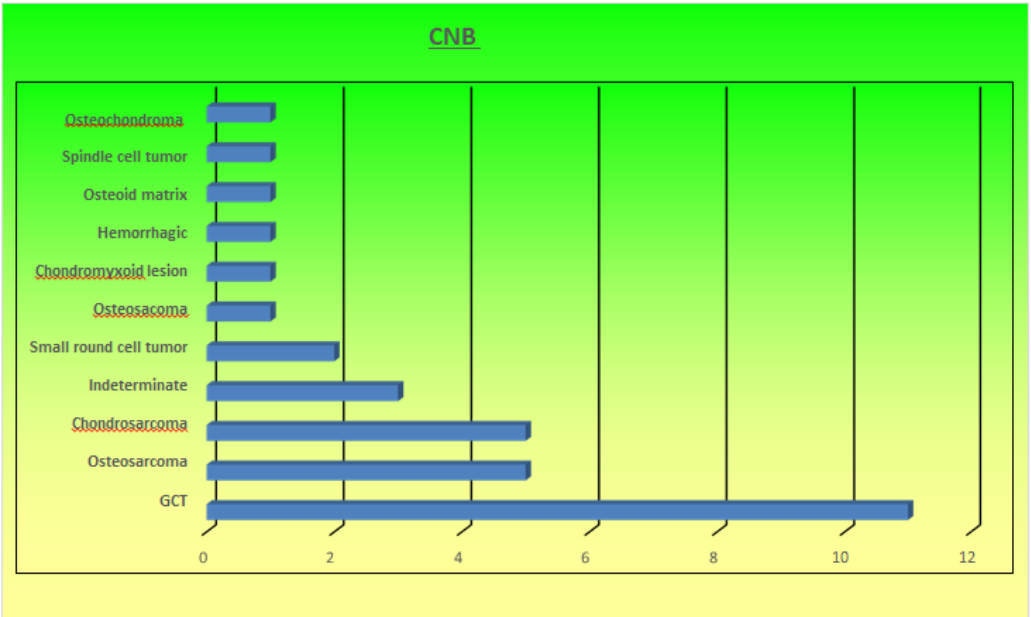


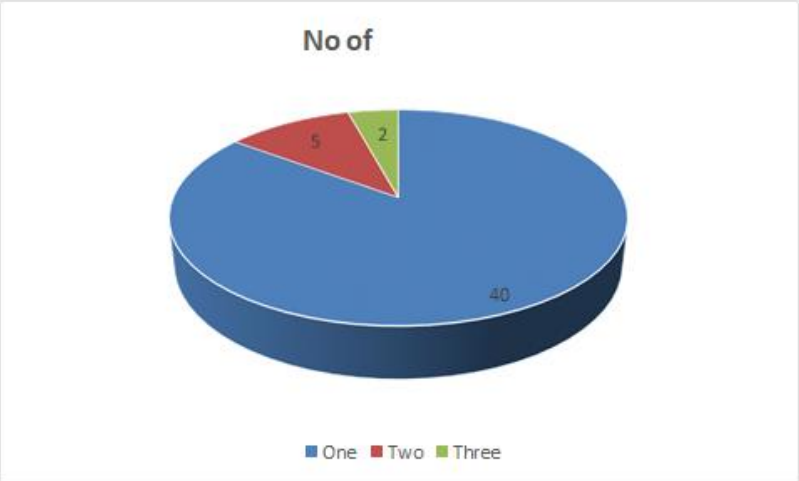
TABLE 13 Bone

CNB DAIGNOSIS	Number
GCT	11
Osteosarcoma	5
Chondrosarcoma	5
Indeterminate	3
Small round cell tumor	2
Osteosarcoma	1
Chondromyxoid lesion	1
Hemorrhagic	1
Osteoid matrix	1
Spindle cell tumor	1
Osteochondroma	1

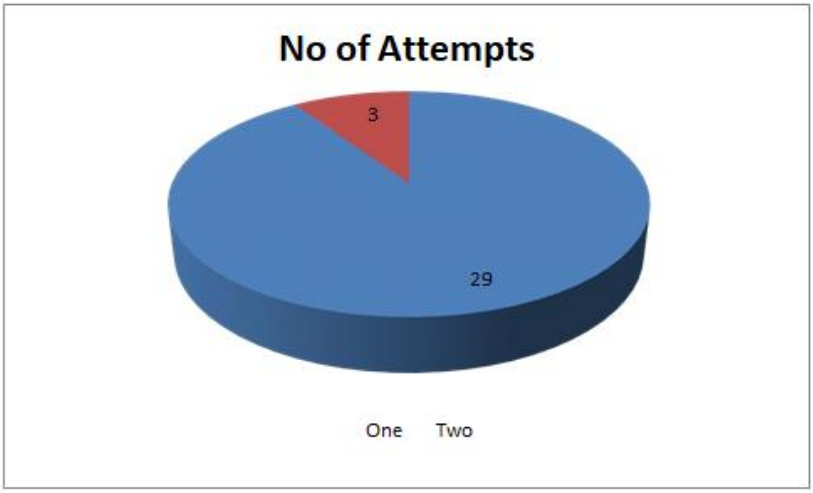
FIGURE 6



Number of attempts FIGURE 7 Soft Tissue



Bone



Adequacy FIGURE 8 Soft Tissue

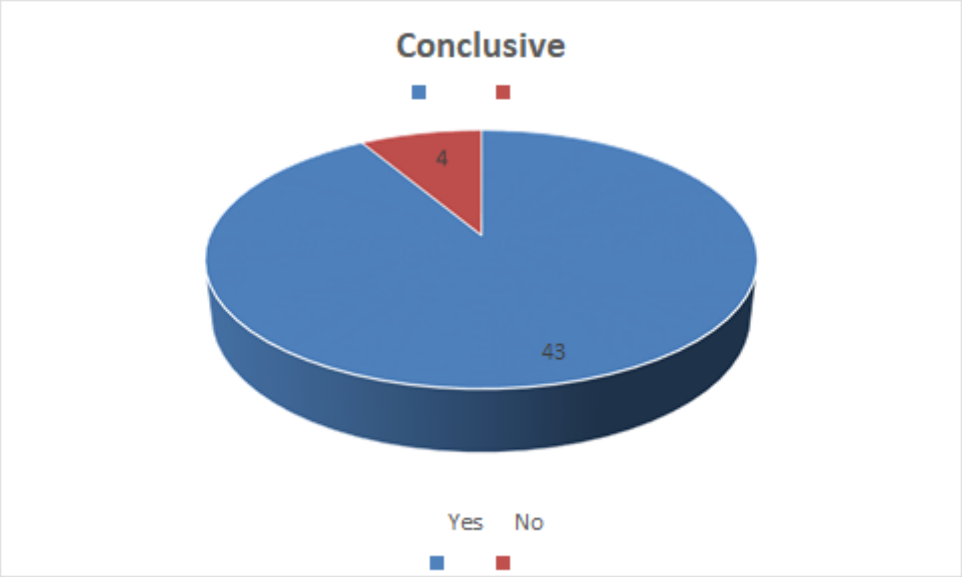
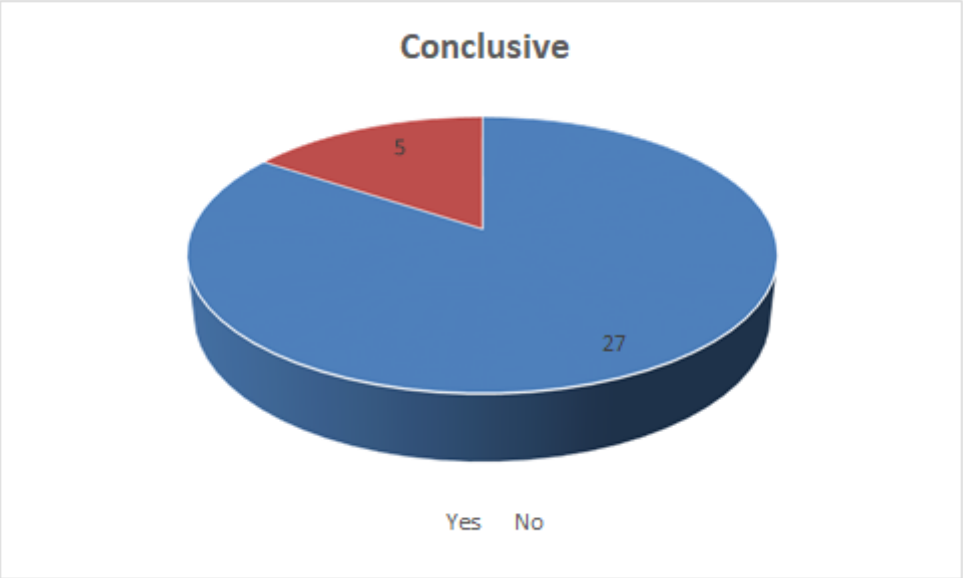


FIGURE 9 Bone



Treatment TABLE 14 Soft Tissue

TREATMENT	Number	TREATMENT	Number
WLE	22	L A/K amputation	1
WLE+ reconstruction	7	Thoracotomy+ excision	1
En block excision	4	L hemipelvectomy	1
R A/K amputation	2	R B/K amputation	1
R A/E amputation	2	R FQ amputation	2
L B/K amputation	2	Excision	2

FIGURE 8

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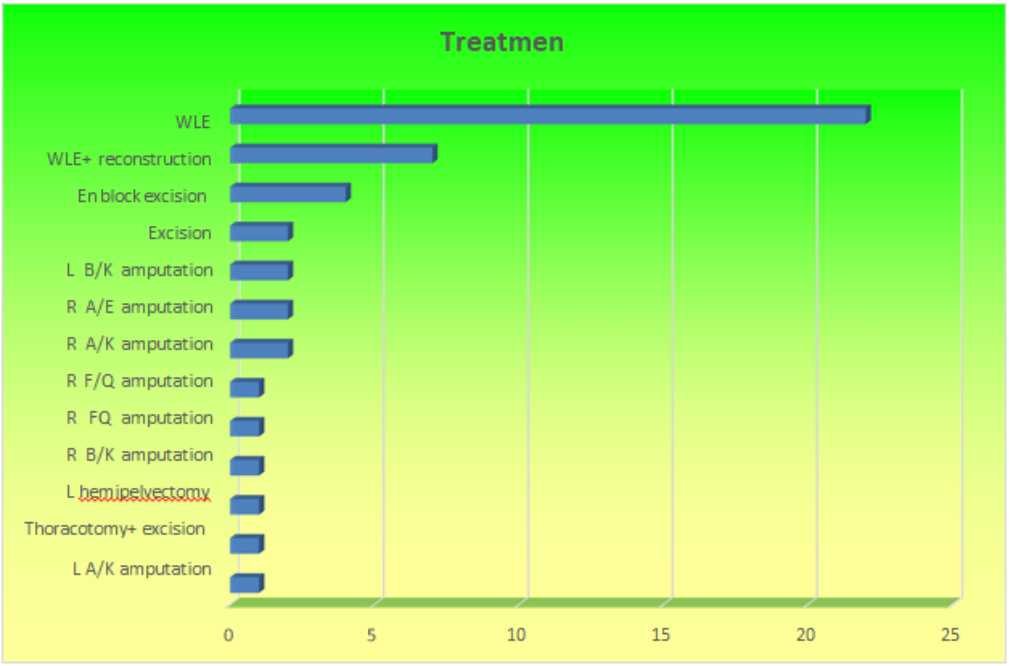
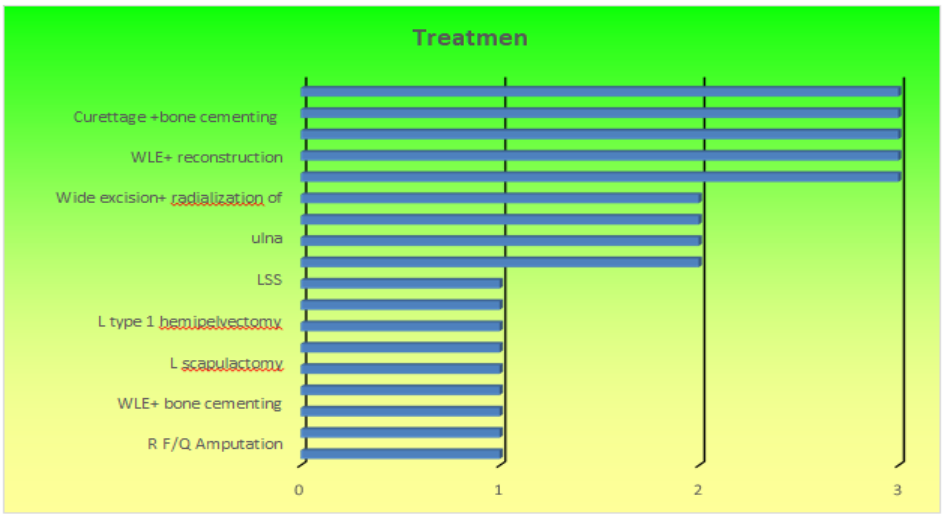


TABLE 15 Bone

TREATMENT	Number	TREATMENT	Number
NACT+ LSS	3	NACT+ L A/K amputation	1
WLE+ reconstruction	3	WLE	1
R A/K amputation	3	R F/Q Amputation	1
Curettage +bone cementing	3	Excision+ bone cement	1
L A/K amputation	3	WLE+ bone cementing	1
Curettage+cryotherapy+bone cement	2	curettage+ fibular grafting	1
LSS	2	L scapulactomy	1
Curettage+ bone cement	2	L Fibulectomy	1
Wide excision+ radialization of ulna	2	L type 1 hemipelvectomy	1

FIGURE 9



Final HPE TABLE 16 Soft Tissue

FINAL HPE	Number	FINAL HPE	Number
UPS	7	Spindle cell sarcoma	1
Schwannoma	5	Myxofibrosarcoma	1
Spindle cell sarcoma	4	Benign peripheral nerve sheath tumor	1
Synovial cell sarcoma	4	Fibrolipoma	1
MPNST	3	Myofibroblastic sarcoma	1
fibromatosis	3	Leimyosarcoma	1
Neurofibroma	2	Epitheloid sarcoma	1
Well differentiated Liposarcoma	2	Myxoid Liposarcoma	1
Dedifferentiated liposarcoma	2	Desmoid tumor	1
Endometriosis abdominal wall	1	Round cell liposarcoma	1
Fibrosarcomatous variant of DFSP	1	Fibrosarcoma	1
Solitary fibrous tumor R pleura	1	Clear cell sarcoma	1

FIGURE 10

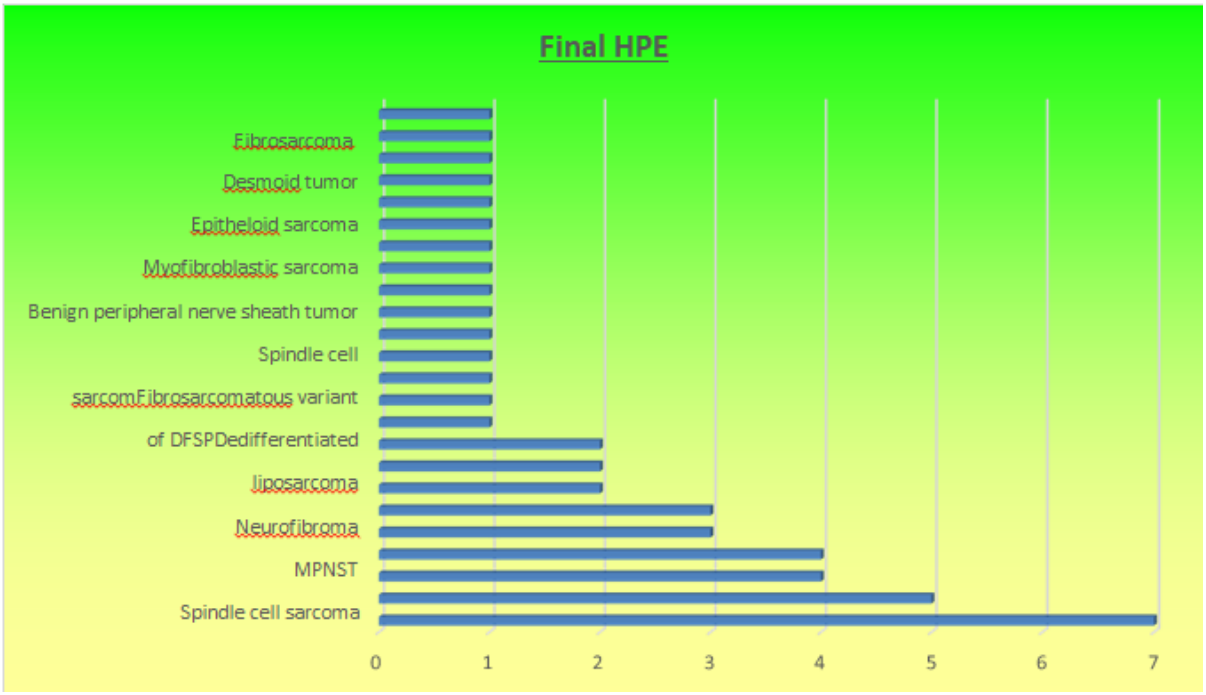


TABLE 17 Bone

FINAL HPE	Number	FINAL HPE	Number
GCT	11	Small cell osteosarcoma tibia	1
Osteosarcoma	5	Chondrosarcoma with de differentiation	1
Chondrosarcoma	4	Cellular enchondroma	1
Chondroblastic osteosarcoma	2	Osteoma	1
Parosteal osteosarcoma	2	GCT tendon sheath	1
Ewings sarcoma	2	Osteochondroma	1

FIGURE 11

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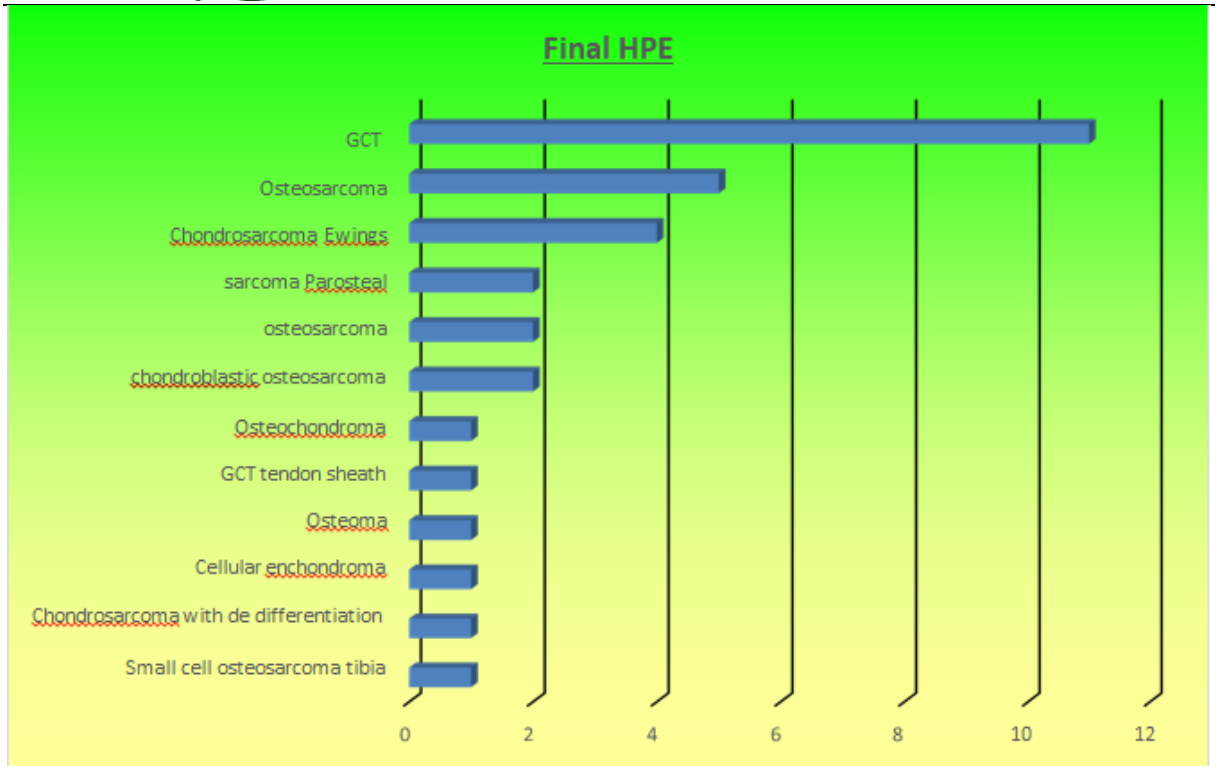


Concordance FIGURE 12 Soft Tissue

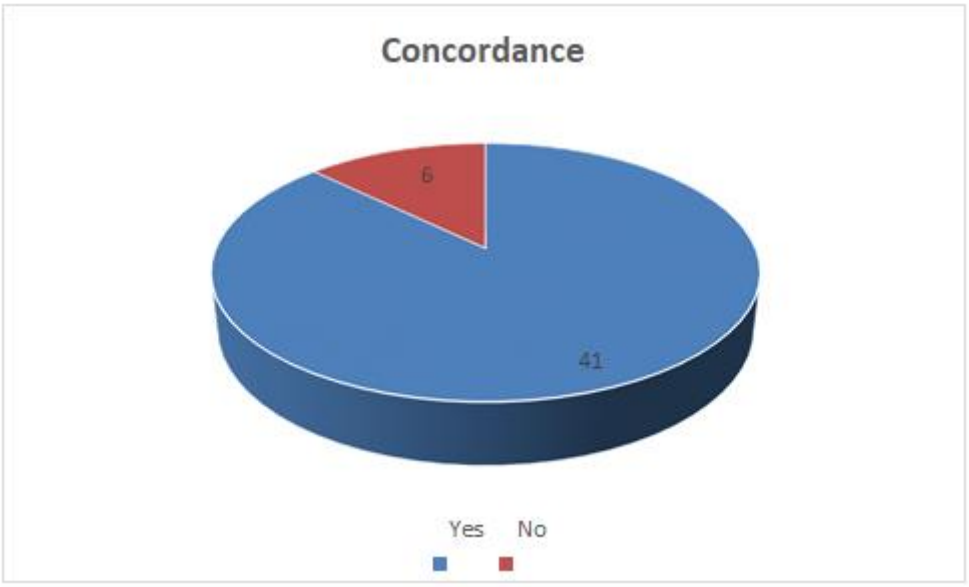
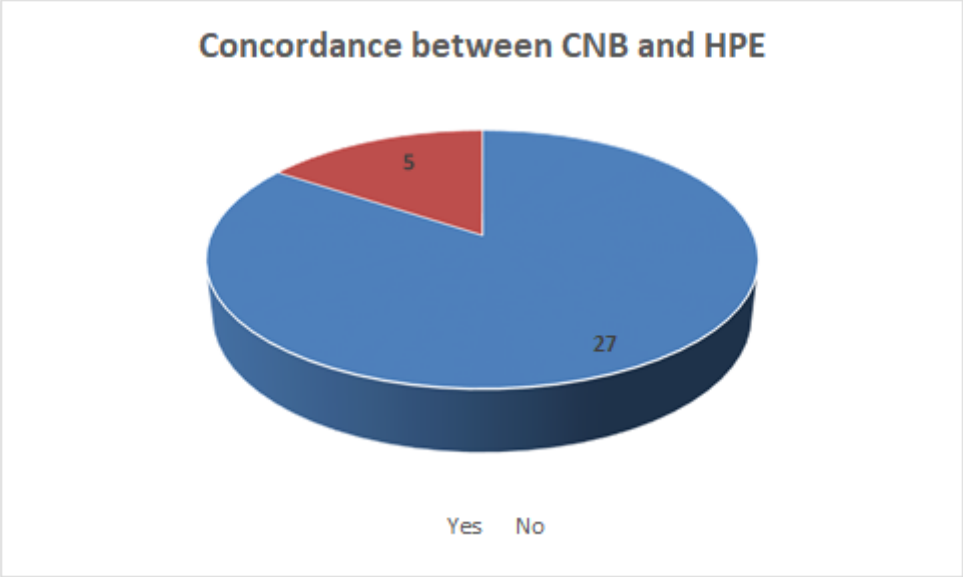


FIGURE 13 Bone



RESULTS TABLE 18

	Soft Tissue (%)	Bone (%)	ST&B (%)
True positive	80.85	81.25	81.01
False Negative	8.5	9.38	8.86
False positive	0	3.12	1.26
True Negative	4.25	6.25	5.06

	Soft Tissue (%)	Bone (%)	ST&B (%)
Sensitivity	91.11	92.85	90.14
Specificity	100	75	80
Positive predictive	100	96.29	98.46
Negative predictive	33.33	60	36.36
Accuracy	91.49	96.88	92.11

Soft Tissue

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Among 47 cases, which were analyzed for diagnostic accuracy, the accuracy rate was 91.49%, among the 47 cases, 80.85 % had a true positive result, 4.25% had a true negative, and 4.25% had false negative report. The sensitivity and specificity of CNB in the series was 91.11% and 100% respectively. The negative predictive value was 33.33% with positive predictive value of 100%. The conclusion of the study was that CNB is an accurate tool to diagnose soft tissue tumors.

Bone

Among 32 cases, who were analyzed for diagnostic accuracy, Accuracy rate was 96.88%, among which 81.25 % had a true positive result, 6.25% had a true negative, 3.12% had false positive and 9.38% had report which was false negative. The sensitivity and specificity of CNB in the series was 92.85% and 75% respectively. The negative predictive value was 60% with positive predictive value of 96.29%. In concluding the study was that CNB is an accurate tool to diagnose bone tumors.

Soft tissue and Bone

Among 79 cases, which were analyzed for diagnostic accuracy, Accuracy rate was 92.11%. Among which 81.01 % had a true positive result, 5.06% had a true negative, 1.26% had false positive and 8.86% had false negative report. The sensitivity and specificity of CNB in the series was 90.14% and 80% respectively. The negative predictive value was 36.36% with positive predictive value of 98.46%. The conclusion of the study was that CNB is an accurate tool to diagnose bone tumors.

The core needle biopsies were performed by the same surgeon who would be directly involved in the definitive surgical procedure. Therefore, the principles of biopsy were followed accurately. The assistance of ultrasound and CT were taken for deep seated lesions and retroperitoneal lesions as and when required. The morbidity encountered in this study was negligible.

Statistical Analysis

1) ACCURACY OF CNB IN TESTING TUMOURS

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	62.790	1	.000

$X2(1) = 62.7, p < .000$

The data was analyzed using a chi square goodness of fit test. The null hypothesis was rejected as $X2(1) = 62.7$, $p < .000$. Hence, the alternative hypothesis proving accuracy of CNB in testing tumors is accepted.

2)ACCURACY OF CNB IN TESTING SOFT TISSUE TUMOURS

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.876	1	.000

$X2(1) = 29.8, p < .000$

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The data was analyzed using a chi square goodness of fit test. The null hypothesis was rejected as X2(1) = 29.8, p < .000. Hence, the alternative hypothesis proving accuracy of CNB in testing Soft tissue tumors is accepted.

3)ACCURACY OF CNB IN TESTING BONE TUMOURS

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.686(b)	1	.000

X2(1) = 24.6.7, p < .000

The data was analyzed using a chi square goodness of fit test. The null hypothesis was rejected as X2(1) = 24.6, p < .000. Hence, the alternative hypothesis proving accuracy of CNB in testing
bone tumors is accepted.

Discussion

Biopsy is the most important aid to evaluate soft tissue and bone tumors. Before starting treatment, histological examination determines whether the tumor is individual or not. Biopsy should be considered as the final diagnostic method rather than a shortcut to diagnosis.

In 1982, Mankin and colleagues evaluated 329 patients who underwent bone or soft tissue biopsies. The error rate in the evaluation is 18.2% and the problem is 17.3%. Inappropriate termination occurred in 4.5% of patients4. Since then, the treatment of malignant bone and soft tissue tumors has changed a lot. The aim of radical surgeries such as amputation is now to save the limb. The advent of new chemotherapy drugs and better diagnostic tools has allowed amputations and surgeries to decrease, morbidity to decrease, and patients to live better lives as usual.

Our organization is a State medical institution and has the latest technology in the diagnosis and treatment of soft tissues and bones, qualified medical personnel and quality medical service with world-class oncology facilities.

This study was carried out between November and April 2015. In 2017, the actual diagnosis of 47 patients with soft tissue tumors was analyzed, and the actual diagnosis was 91.49%, of which 80.85% were truly positive results and 4.25% were negative results. and 4.25% are negative data. The sensitivity and specificity of this key series are 91.11% and 100%, respectively. The negative predictive value is 33.33% and the positive predictive value is 100%.

This is compared to a study by Ball et al.5 examining 52 patients who received soft tissue injections. The accuracy is 0, while the accuracy of malignant tumors is 98%.

According to the research of Jonathan W.S and his friends6, 31 patients underwent soft tissue injection. Compared to our study, which had a sensitivity of 91.1%, a specificity of 100%, and an accuracy of 91.49%, the accuracy was 84%, the sensitivity was 94%, and the specificity was 100%.

In the study conducted by Heslin et al.7, 60 patients received critical injections before surgery. Satisfaction was 93%, negative rate was 5%, and negative rate was 0%. In comparison, the false negative rate in our study was 8.5% and the false positive rate was 0%.

In a study conducted by Madhavan VP et al.8, 41 soft tissue tumor patients were examined. The sensitivity of the value of the series is 90%, the specificity is 100%, the positive predictive value is 100%, the negative predictive value is 88.23%, and the accuracy is 94.28%. This information is relevant to our research.

The diagnostic accuracy of 32 bone cancer patients who received critical injections before surgery was analyzed and the accuracy was 96.88%. Among them, 81.25% of the results are correct, 6.25% are negative, 3.12% are

negative, and 9.38% are negative reports. The sensitivity and specificity of this line of the CND segment are 92.85% and 75%, respectively. The negative predictive value is 60% and the positive predictive value is 96.29%.

In a study by Pramesh et al.9, 136 patients with bone cancer sought primary care before surgery, and sensitivity was found to be 96.9% and adequacy 89%. This information has some implications for our research.

The identification accuracy of 79 cartilage patients was determined, and the accuracy is 92.11%, correct quality is 81.01%, 5.06% is negative, 1.26% is false positive and 8.86%. These are false negative reports. The sensitivity and specificity of this line of the CND segment are 90.14% and 80%, respectively. The negative predictive value is 36.36% and the positive predictive value is 98.46%.

In the study conducted by Joshi A et al.10, sensitivity was found to be 92.8% and specificity was 100%. The true positive result was 84.7% and the negative result was 8.69%. The negative rate is 92.8%.
While the accuracy rate in Akira et al.11 study was 80.3%, this rate was 92% in our study.

Conclusion

CNB is a reliable method with high histological consistency in the evaluation of soft tissue and bone tumors. Core biopsy avoids the pitfalls of open biopsy and allows for multimodal treatment planning when used in conjunction with appropriate imaging.

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