

ORIGINAL ARTICLE

Results of Open Incisional Biopsy and Core Needle Biopsy of Bone TumorsSYED BAKHT SARDAR¹, ABBAS ALI², KAMRAN SAEED³, MANQOOSH UR REHMAN⁴, AMJAD MAQSOOD⁵, RAZA ASKARI⁶¹Registrar, Department of Orthopaedic, Khyber Teaching Hospital Peshawar²Assistant Professor, Department of Orthopaedic, Khyber Teaching Hospital Peshawar³Associate Professor Orthopedics, Sialkot Medical College Sialkot Pakistan⁴Associate Professor of Orthopaedic Surgery, Bakhtawar Amin Medical & Dental College Multan⁵Assistant Professor of Orthopaedic Surgery, Ibn e Siena Hospital / Multan Medical and Dental College, Multan⁶Assistant Professor Orthopaedic, Dow International Medical College, Dow University of Health SciencesCorresponding author: Abbas Ali, Email: abbasali.smc@gmail.com**ABSTRACT****Objective:** The goal of this research was to assess the diagnostic efficacy of open vs percutaneous core needle biopsy (CNB) for musculoskeletal malignancies.**Study Design:** Retrospective study**Place and Duration:** This retrospective study was conducted at Department of Orthopaedic, Khyber Teaching Hospital Peshawar during the period from April, 2022 to September, 2022.**Methods:** There were 96 patients were presented in this study. All patients with a primary bone or soft tissue tumour suspected of being malignant who receive a percutaneous CNB or open biopsy and subsequently develop a tumour were included. Patients were equally divided in two groups. Group I had 48 patients and received open incisional biopsy and group II received core needle biopsy in 48 cases. Fischer's test was used to compared outcomes among both groups. SPSS 23.0 was used to analyze all data.**Results:** We found that 28 patients in group I and 30 patients in group II were males. Mean age of the cases in group I was 51.6±7.48 years and in group II mean age was 54.7±10.34 years. As per anatomical distribution, lower extremity was the most common in both groups followed by trunk and upper extremity. In our study favorable outcomes were obtained by CNB in bone sarcoma in terms of diagnostic accuracy, NPV, PPV, sensitivity and specificity as compared to open biopsy but difference was insignificant and in soft tissue sarcoma open biopsy showed a significant good result with p value <0.005.**Conclusion:** Results from our study showed that the percutaneous biopsy approach was only slightly less effective than open biopsy for soft tissue tumours, whereas the open biopsy technique was more effective for bone tumours.**Keywords:** Soft tissue sarcoma, Bone sarcoma, Open Biopsy, Core Needle Biopsy**INTRODUCTION**

Bone sarcomas account for around 1% of all tumour diseases[1]. There is a wide variation in the yearly prevalence rate of soft tissue sarcoma in Germany, from 1.8% to 5.0%[2]. According to NICE, individuals who have symptoms consistent with bones or tissue sarcoma should be sent to clinical settings for a full diagnostic workup and integrated treatment strategy. The diagnostic approach should include taking a patient's medical history, doing a physical exam, using imaging technology, and maybe taking a tissue sample for analysis[3]. The biopsy is especially vital since it will form the basis of any future therapy strategy[4]. If a lesion is clinically and radiographically evident to be benign, a biopsy may not be necessary.

The advantages and disadvantages of several diagnostic approaches, such as fine-needle aspiration (FNA), core needle biopsy (CNB), and open biopsy, are discussed[5]. All of these biopsies aim to preserve as much of the patient's limb as feasible by collecting a representative sample of tissue with little disruption. As a result, the most crucial and difficult part is the preoperative planning, which must be accurate based on diagnostic findings[5].

Percutaneous core needle biopsy (CNB) and fine-needle aspiration biopsy are two options for diagnosing soft-tissue tumours outside invasive open surgery. Getting numbed up for these procedures in the waiting area of the doctor's office is quite acceptable. The apparent benefits of a faster diagnosis include less time spent in the hospital, less patient stress, and fewer problems. There is a greater risk of false-negative biopsies using percutaneous techniques due to a lack of visible discrimination between tumour and normal surrounding tissue. There are also technical issues inside anatomically tough areas and a paucity of tissue obtained. [6]

Fewer problems, lower expenses, and shorter recovery times are all benefits of core needle biopsy. The procedure requires no general anaesthesia and may be done in an outpatient clinic. A range of 76–99% for its reliability has been documented. [7] The test is highly sensitive and specific for primary, recurring, and metastatic lesions in a wide range of anatomic sites. In spite of

this, it has not broken out of its niche. The American College of Surgeons conducted a survey on the patterns of treatment for patients with sarcomas who were treated between 1983 and 1984, and they found that only 9% of those individuals had a needle biopsy. The use of needle biopsy in the diagnosis of mesenchymal tumours was not widespread among surgeons 15 years ago, according to an informal study conducted in 1999 [8]. 14 Patients with suspected sarcomas, 88% of whom received a single-needle biopsy prior to final treatment, attest to the efficacy and safety of percutaneous needle biopsy for this purpose. [9]

For many years, open biopsy has been the method of choice for diagnosing malignant and indeterminate tumours of the musculoskeletal system[10]. Improved histopathological techniques have led to similar diagnosis accuracy for CNB, according to recent studies[11,12]. This study set out to evaluate the relative efficacy of percutaneous CNB versus open biopsy in the diagnosis of musculoskeletal primary tumours with suspicious histology's.

MATERIAL AND METHODS

This retrospective study was conducted at Department of Orthopaedic, Khyber Teaching Hospital Peshawar during the period from April, 2022 to September, 2022 and comprised of 96 patients. Patients who required an excisional biopsy, those who developed secondary tumours, or those who were treated non-surgically after their biopsies were ineligible for participation in this research.

An experienced orthopaedic tumour surgeon would always decide on the best method for obtaining a biopsy in light of any planned resection. Percutaneous biopsies, performed with a 14-gauge core needle, were radiographically guided by sonography for soft-tissue masses or by CT for bone tumours. Multiple samples from all around the tumour were obtained over the course of three to five passes to avoid damaging the distant wall. In addition, a tiny cutaneous incision was made to identify the biopsy canal before the next resection. An experienced orthopaedic tumour surgeon conducted the open biopsy consistent with the anticipated

resection and in accordance with sarcoma standards. Due to the prevalence of core necrosis, samples were collected from the tumor's outside edge.

The collected tissue was put on ice and sent to our pathology research facility for additional examination. H & E staining was performed on all specimens per standard procedure. When necessary, additional specific immunohistochemistry stains were also added to the tissue sections.

Results from biopsies and subsequent tumour removal surgeries were compared histologically. Diagnostic accuracy, false positive rate, false negative rate, sensitivity, and specificity were all determined. SPSS version 23.0 was used for additional analysis, which included the use of the Fisher's exact test and a 95% confidence interval.

RESULTS

We found that 28 patients in group I and 30 patients in group II were males. Mean age of the cases in group I was 51.6±7.48 years and in group II mean age was 54.7±10.34 years. As per anatomical distribution, lower extremity was the most common in both groups followed by trunk and upper extremity.(Table 1)

Table-1: Characteristics of the Patients Who Enrolled

Variables	Group I	Group II
Gender		
Male	28 (58.3%)	30 (62.5%)
Female	20 (41.7%)	18 (37.5%)
Mean age (years)	51.6±7.48	54.7±10.34
Anatomical distribution		
lower extremity	32 (66.7%)	33 (68.8%)
trunk	7 (14.6%)	8 (16.7%)
upper extremity	6 (12.5%)	5 (10.4%)
Head and neck	3 (6.3%)	2 (4.2%)

Table-2: Bone sarcoma diagnostic accuracy was evaluated using core needle biopsy (CNB) and open biopsy

Variables	Open Biopsy	Core needle biopsy
Results of bone sarcoma		
Diagnostic accuracy	100%	100%
NPV	92%	100%
PPV	100%	100%
Sensitivity	96%	100%
Specificity	100%	100%

Table-3: Soft tissue sarcoma diagnostic accuracy was evaluated using core needle biopsy (CNB) and open biopsy

Variables	Open Biopsy	Core needle biopsy
Results of Soft tissue sarcoma		
Diagnostic accuracy	82%	100%
NPV	48%	100%
PPV	100%	100%
Sensitivity	82%	100%
Specificity	100%	100%

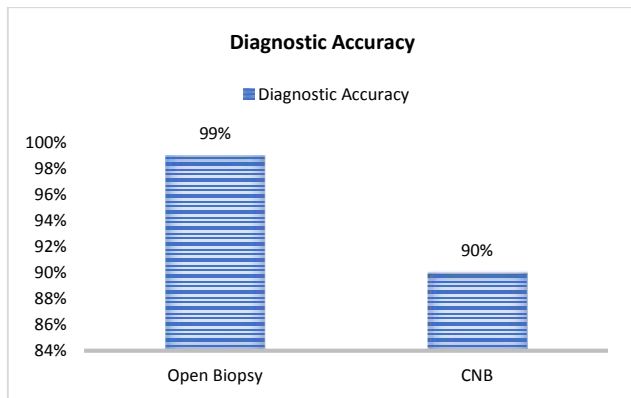


Figure-2: Overall diagnostic accuracy among both groups

In our study favorable outcomes were obtained by CNB in bone sarcoma in terms of diagnostic accuracy, NPV, PPV, sensitivity and specificity as compared to open biopsy but difference was insignificant. (table 2)

We found in soft tissue sarcoma open biopsy showed a significant good result with p value <0.005.(table 3)

We concluded overall diagnostic accuracy in open biopsy was 99% and for CNB resulted 90%.(figure 1)

DISCUSSION

Biopsy is the first step in diagnosing bone cancer. This phase is optional and can be avoided in situations when it is clinically and radiographically evident that the lesion is a chondroma, osteochondroma, osteoid osteoma, simple bones cyst, fibrous plasia, or nonossifying fibroma. Good aspiration, cores needle, and incisional biopsies are all utilised to get a tissue sample typical of the whole with minimal harm [13]. The shortest path may not necessarily be the best one [14]. Benign soft tissue tumours include lipoma, hemangioma, and neurofibroma; pseudotumors include ganglions but popliteal cysts, asthenia ossificans, and PVNS; and in certain instances, a biopsy may not be necessary due to the clarity of the clinical and imaging findings. When a mass exhibits evidence of biological activity, a biopsy should be performed, and the results should be used to inform further surgical or pharmaceutical treatment. Biopsies should be taken of virtually all lesions and soft tissue masses larger than 3 centimetres in diameter [16].

In our study 96 patients were presented and divided in two groups. In current study 28 patients in group I and 30 patients in group II were males. Mean age of the cases in group I was 51.6±7.48 years and in group II mean age was 54.7±10.34 years. These results were comparable to the previous study.[17] Recent studies have shown that CNB of bone and soft tissue tumours has a diagnosis accuracy ranging from 74% to 98%. [18,19] Regardless of the fact that many researchers even included distant tumours, which frequently yield greater accuracy than more diversified sarcomas, we observed similar results in our analysis, with a 91% diagnostic accuracy in soft tissue tumours and a 99% diagnosis accuracy in bone lesions. When comparing the diagnosis accuracy of CNB for heterogeneous and homogeneous bone tumours, however, Sung et al.[20] found no significant differences. Our findings corroborate those of a recent study[21], which found that when resection specimens were compared to those of soft tissue masses or bone lesions, the histological diagnosis was accurate 84.2% of the time and 93.9% of the time, respectively.

With patients suspected of having malignant bone tumours, we discovered that CNB had slightly better results than open biopsy. Given the limited number of cases in our series, it is reasonable to assume that the findings might not be replicated exactly in a larger patient sample. This analysis revealed that CNB of tissue tumours was inferior to open biopsy. These findings are consistent with the emerging consensus that CNB may struggle to accurately diagnose highly heterogeneous tumours like sarcomas, osteosarcoma, and synovial sarcoma. [22,23]

Another drawback of CNB is that tissue is fixed in formalin rather than frozen, which limits pathologic examination to histology and immunohistochemistry but precludes the use of more modern molecular diagnostic methods like real-time polymerase chain reaction (PCR) or microarray analysis[24]. Additional tissue collection for a cryobank or research reasons is also constrained with CNB. Positive outcomes were found for both biopsy methods. There are, however, a few caveats to our study that are mostly attributable to its retrospective nature. First, because grading was not conducted in all cases (mostly due to ethical concerns), we were unable to compare pathological grading of biopsy samples to resection tissues. To complicate matters, sampling a low-grade region inside these highly diverse tumours might lead to erroneous negative results.

CONCLUSION

Results from our study showed that the percutaneous biopsy approach was only slightly less effective than open biopsy for soft tissue tumours, whereas the open biopsy technique was more effective for bone tumours.

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