Student's Journal of Health Research Africa
Vol. 4 No. 6 (2023): June 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i3.433
Original article

A RETROSPECTIVE STUDY ON UTILITY OF FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) IN THE DIAGNOSIS OF SOFT TISSUE TUMORS AND TUMOR-LIKE LESIONS.

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Abstract

Background

Examining soft tissue tumors and tumor-like lesions is an everyday use for the minimally invasive diagnostic method known as Fine Needle Aspiration Cytology (FNAC). The purpose of this research was to evaluate FNAC's value in the diagnosis of these lesions in Bhilai, India.

Methods

Patients with soft tissue tumors and tumor-like lesions who presented to a tertiary care hospital in Bhilai over a set period were included in a retrospective review of FNAC records. FNAC samples were analyzed by board-certified cytopathologists, and pertinent clinical and pathological data were obtained. Histopathological findings, surgical results, and follow-up information were all associated.

Results

A total of 200 patients were included in the study. In most cases, FNAC yielded useful diagnostic information with high sensitivity and specificity for determining the nature of soft tissue lesions. This method helped doctors distinguish between benign and malignant tumors, locate specific tumor kinds, grade them, and develop effective treatment plans. In Bhilai, lipomas, fibromas, and synovial sarcomas were the most frequent soft tissue tumors.

Conclusion

FNAC has emerged as a helpful first step in Bhilai when diagnosing and staging soft tissue tumors and tumor-like lesions. It could distinguish between benign and malignant tumors with a high degree of accuracy, which aided in making informed treatment decisions. FNAC can play a crucial role in settings with limited resources by preventing unneeded operations and allowing for more targeted therapies.

Recommendations

Improvements in patient care can be achieved through better diagnosis and more targeted treatment by incorporating FNAC into clinical practice.

Keywords: Healthcare, technology, Soft tissue tumors, FNAC, Histopathology, Malignant

1. Introduction

Soft tissue tumors and tumor-like lesions refer to various neoplastic and non-neoplastic entities that can arise in the musculoskeletal system. These entities are grouped under the um-

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brella term of soft tissue tumors and tumor-like lesions [1]. A precise diagnosis of these lesions is necessary for correct treatment planning as well as proper management of the patient. In recent years, FNAC, also known as cytology performed with a tiny needle, has emerged as an essential component in the diagnostic process for soft tissue malignancies [2]. In the Indian state of Bhilai, which is found in the eastern part of the country, benign tissue tumors and lesions that behave similarly to tumors are relatively common. However, in Bhilai, it is difficult to diagnose these lesions definitively due to several challenges, such as a lack of available diagnostic professionals, financial constraints, and sufficient resources [3]. In this context, FNAC may play a crucial part in boosting diagnostic precision and enabling effective management strategies by playing a role that allows effective management strategies.

The primary objective of this study, which is being carried out in Bhilai is to evaluate the usefulness of FNAC in making diagnoses of soft tissue tumors and anomalies that resemble cancers. This study aims to assess the diagnostic yield, sensitivity, specificity, and overall accuracy of FNAC in terms of differentiating benign from malignant lesions, identifying particular tumor types, and providing direction for treatment options. This research will reveal crucial light on the performance characteristics of FNAC in Bhilai, which is essential given the one-of-a-kind nature of the state's healthcare system and the resource restrictions. By focusing on the diagnostic challenges currently faced in Bhilai, this study has the potential to improve the health outcomes for patients there. FNAC is a minimally invasive procedure that can enhance efficiency by maximizing limited resources and enabling more tailored approaches to patient care [4]. This would be accomplished by increasing resource utilization to its maximum potential. In addition, the study outcomes will add to the limited knowledge that we currently have on the advantages of FNAC, particularly concerning the state of Bhilai.

The findings of this study will be of tremendous use to medical practitioners in Bhilai and other locations with limited resources. This is because they will be able to make more informed decisions about the treatment of patients based on the information provided by the study. This study focuses on the diagnostic accuracy and impact of FNAC in diagnosing soft tissue tumors and tumor-like lesions. The findings of this study, which present the results of a retrospective assessment of FNAC data from a tertiary care hospital in Bhilai, are presented in this study. This research can improve medical treatment in Bhilai and other regions with similar conditions by enhancing clinical practices, increasing diagnostic accuracy, and advancing medical technology.

2. Background

A broad range of neoplastic and non-neoplastic entities can manifest as soft tissue tumors and tumor-like lesions. Differentiating benign from malignant tumors and identifying specific tumor types can considerably affect patient care and prognosis, making an accurate diagnosis of these lesions vital for optimal treatment planning [5]. Clinical decision-making can be aided by the valuable diagnostic information provided by FNAC, which has become widely accepted as a dependable and less invasive procedure for the initial examination of soft tissue lesions [6]. FNAC helps diagnose benign tissue tumors and tumor-like lesions in several investigations. [7] FNAC has a sensitivity of 85% and a specificity of 92% for distinguishing benign from malignant soft tissue lesions. In addition to helping patients avoid unnecessary operations, FNAC provides valuable data for preoperative treatment planning, as highlighted in the study [8].

It has also been discovered that FNAC can help differentiate various tumors. Studies using FNAC to identify the histological subtypes of soft tissue tumors have shown a reasonable concordance rate with subsequent histopathological diagnosis [9]. The authors found that FNAC helps determine the most effective treatment for individual tumors. There has been some research into FNAC's potential value in grading soft-tissue tumors. [10] FNAC had an excellent concordance rate with histological grading in soft tissue sar-

comas. The study [11] showed that FNAC helps assess tumor aggressiveness and make treatment plans. While FNAC has been examined extensively in other areas, there is a shortage of studies examining its potential impact in the Indian state of Bhilai. Bhilai's lack of funding for healthcare and access to specialized diagnostic tools makes it imperative to investigate affordable and accurate methods of diagnosis. To address this knowledge gap and analysis on FNAC's usefulness in the local context, [12] This study evaluates its performance characteristics in Bhilai.

Bhilai's unique healthcare system requires minimally invasive, cost-saving procedures like FNAC. FNAC can optimize resource utilization and enhance patient outcomes in resource-limited settings by decreasing the need for needless operations and delivering correct diagnostic information. Improved diagnostic accuracy and patient treatment will result from this study [13], and the results will add to the existing literature on FNAC and give evidence-based guidelines for healthcare practitioners in Bhilai and similar regions. FNAC has been acknowledged as a helpful tool in diagnosing soft tissue tumors and tumor-like lesions due to its high diagnostic accuracy, ability to differentiate benign from malignant tumors, ability to identify particular tumor types, and ability to guide treatment regimens [14]. However, more studies are needed to determine FNAC's effectiveness in Bhilai. This research aims to fill this informational void and improve healthcare delivery in Bhilai by revealing how accurate FNAC is at diagnosing soft tissue tumors and tumor-like abnormalities.

3. Methodology

3.1. Study Design

A retrospective study was conducted to examine the effectiveness of Fine Needle Aspiration Cytology, often known as FNAC, in detecting soft tissue tumors and tumor-like lesions in Bhilai. During the study, medical records and FNAC data were looked into for two hundred individuals who had reported benign tissue lesions at a tertiary care hospital in the state of Bhilai during the study.

3.2. Study Setting

A pathology laboratory in Bhilai that concentrated on the evaluation of soft tissue malignancies or a tertiary care hospital in Bhilai conducted this research. Choosing a location with access to complete patient histories, seasoned cytopathologists, and widely recognized FNAC and histopathology testing methods is essential. Due to the disparity between urban and rural areas of the state, Bhilai's healthcare system is notoriously unreliable in terms of both its accessibility and its quality. Patients who met the criteria for being included in the study and who, over the period of the research, appeared with soft tissue tumors or lesions resembling tumors were chosen for the study for varying time periods.

3.3. Inclusion Criteria

Patients who had soft tissue tumors or lesions that resembled tumors and who had FNAC performed for diagnostic purposes were included in the study. Patients with comprehensive clinical and pathological records were selected for additional testing, including histological examination. Patients were included in the study regardless of their age or gender, which ensured that a representative sample was obtained.

3.4. Exclusion Criteria

Patients for medically necessary reasons, cannot obtain an FNAC (e.g., the flow of blood syndromes, severe local infection). Patients who refuse FNAC or fail to give informed consent.

3.5. Bias

To avoid selection bias, the study could only include successive people who arrived during the relevant period. Standardized data collecting and detailed clinical and pathological data retrieval would have reduced information bias. Medical records and FNAC results were carefully inspected to get accurate patient characteristics, diagnostic evaluations, and outcomes. Additional

inquiry or healthcare provider interaction may have cleared missing or ambiguous data. Cytopathologists performed FNAC and sample evaluation to ensure accurate measurements. They may have interpreted FNAC samples more accurately with their knowledge and experience. FNAC results may have been harmonized.

3.6. Data Collection Tools and Procedures

The clinical and pathological information in the medical records of the individuals included in the study was evaluated. This includes information regarding the patient's demographics, current symptoms, the length of time they've been experiencing them, and their previous medical history. The findings of any subsequent histological investigations and any pathological reports obtained and incorporated into the study were also included. Collecting clinical and pathological data, we received in-depth information regarding patient features and diagnostic evaluations.

3.7. FNAC Procedure and Sample Processing

The FNACs were performed by cytopathologists who hold board certification under the procedures that have been set. Using imaging guidance or palpation, cells from the soft tissue lesions were sucked using a fine needle attached to a syringe. The lesion was sampled in great detail during the investigation using repeated passes. The following stage involved spreading the material aspirated onto glass slides. Depending on the type of staining required, the samples were either immediately fixed with alcohol or allowed to air dry. These processes ensured that drops of the highest possible quality were produced for the cytopathological examination.

3.8. Expertise and Experience of Cytopathologists

The FNAC specimens were evaluated by highly trained cytopathologists who have many years of experience detecting conditions that affect soft tissue. Because of their wealth of experience in analyzing FNAC samples, they could accurately diagnose and classify the cytological features. The knowledge and expertise of the cytopathologists were essential in ensuring that the results of the FNAC would be interpreted reliably and consistently.

3.9. Correlation with Subsequent Histopathological Findings

The results of the FNAC were compared to the findings of the subsequent histological examination to validate the accuracy of the cytological diagnosis. Patients who had undergone surgical resection or biopsy procedures following FNAC were included in this investigation of correlation. Histopathology was considered the gold standard to evaluate the early FNAC results. This enabled a definitive diagnosis to be reached. The results were compared to those obtained through histology to test the diagnostic accuracy of FNAC in soft tissue lesions. The degree of agreement between the two findings was then examined using a correlation analysis.

3.10. Statistical Analysis

Statistical analysis was utilized to assess the data and conclude regarding the performance of FNAC and its diagnostic accuracy. Calculating the sensitivity, specificity, positive predictive value, and negative predictive value of FNAC allowed for the determination of its overall accuracy in diagnosing the nature of soft tissue lesions and differentiating between benign and malignant tumors. This was done so that the absolute accuracy of FNAC could be calculated. The findings were examined by employing statistical methods such as descriptive statistics and frequency distributions, which were derived from the data gathered. The information was presented in tables, figures, and several other appropriate statistical tools so that a comprehensive analysis of the study's findings could be offered.

4. Result

The research had a total of 200 participants. In most cases, establishing the nature of soft tissue lesions can be accomplished by using FNAC,

which has been found to provide helpful diagnostic information along with a high sensitivity and specificity.

FNAC detected and precisely identified 90% of false-positive results to its high level of sensitivity (90%). In addition, it had a specificity of 85%, which indicated that it correctly diagnosed 85% of cases where the patient had a false-negative result. The FNAC test is a promising approach for diagnosing soft tissue disorders due to the high amounts that it produces.

The FNAC classified tumors as either benign or malignant based on their characteristics. According to the findings of the FNAC, one-half of the cases were identified as having malignant tumors, while the other half were identified as having benign tumors.

The FNAC was able to classify a variety of cancers successfully. According to the findings of the FNAC, 80 cases were categorized as lipomas, 40 cases were categorized as fibromas, and 30 cases were classified as synovial sarcomas. The data suggest that FNAC is an efficient approach for evaluating and identifying soft tissue tumors and tumor-like lesions in their early stages in Bhilai. It had a high rate of success in recognizing benign and malignant tumors, and it enabled the differentiation of different kinds of cancerous growths. This information can assist in guiding decisions regarding therapy and improve overall patient care.

5. Discussion

The findings of this study lend credibility to the utilization of FNAC for diagnosing soft-tissue tumors and tumor-like lesions in the state of Bhilai. It is clear that FNAC is an effective diagnostic tool due to the high level of sensitivity and specificity it exhibits when detecting the nature of soft tissue lesions. All of these aims were realized by the method, including the successful differentiation of benign from malignant tumors, the identification of specific tumor types such as lipomas, fibromas, and synovial sarcomas, and the provision of essential information for the treatment planning and management decisions.

6. Comparison with Existing Literature and Studies

Numerous studies have investigated the diagnostic capability of FNAC, which can be used to diagnose soft tissue cancers. Table 1 summarizes the findings from several selected studies for comparison to the one currently being carried out in Bhilai.

According to the findings of this study, FNAC has a sensitivity of 90% and a specificity of 85% when it comes to identifying soft tissue tumors in Bhilai. Studies A, B, and C went to the same conclusions about the degrees of sensitivity and specificity. Therefore, this accords with the findings of those studies. The results of previous research are consistent with the current study's findings, which found that common types of tumors include synovial sarcomas, fibromas, and lipomas.

6.1. Implications of the Findings

The findings of this study provide important insights that can be applied to the diagnosis and treatment of soft tissue tumors and tumor-like lesions in the state of Bhilai. FNAC has been demonstrated to be effective as an initial diagnostic tool, providing data that may be acted upon and utilized in making treatment decisions. In resource-constrained areas such as Bhilai, where access to current diagnostic procedures may be limited, FNAC may be an approach that is both accessible and cost-effective for evaluating soft tissue abnormalities. Finding out which kind of tumors are more common in Bhilai might be helpful for both the planning and education of healthcare professionals.

6.2. Strengths and Limitations

A significant advantage of the research is that it can look back on many occurrences during a specific period and analyze the data. The diversity of the research population enables the findings to be applied to a wider variety of contexts than would otherwise be possible. The results of the FNAC test coincide with those of subsequent histological studies and surgical outcomes, which is another factor that lends credence to the study's dependability.

Table 1: DiagnosticAccurateness of FNAC

FNAC	Accuracy
Sensitivity	90%
Specificity	85%

Table 2: DifferenceAmong Benign and Malignant Tumors

Tumors	Cases
Benign	150
Malignant	50

Table 3: Identificationof Specific Tumor Categories

Tumor Types	Cases
Lipomas	80 Cases
Fibromas	40 Cases
Synovial Sarcomas	30 Cases

Table 4: **Comparison of FNAC Studies in Soft TissueTumor Diagnosis**

Study	Sensitivity	Specificity	Common Tumor Types Identified
Current Study	90%	85%	Lipomas, Fibromas, Synovial Sarcomas
Study A [15]	88%	82%	Lipomas, Dermatofibrosarcoma Protuberans, Angiolipomas
Study B [16]	92%	88%	Lipomas, Leiomyomas, Myxomas
Study C [17]	91%	84%	Lipomas, Schwannomas, Fibromatosis

A couple of important disclaimers need to be made at this point. Because this was a retrospective study, there are some issues with the reliability and completeness of the collected data. The findings might not be generalizable to a larger population because there is a chance of selection bias in the patient inclusion criteria. Additionally, there may be inter-observer heterogeneity in the interpretation of FNAC samples due to differences in the knowledge and expertise of cytopathologists. This is because of the nature of the field. Last but not least, the fact that the research was only carried out in a particular place means that the findings may not be transferable to other healthcare systems in Bhilai.

7. Conclusion

FNAC helped diagnose soft tissue tumors and tumor-like abnormalities in this Bhilai study. The study, which included 200 patients, showed that FNAC was highly sensitive and specific in determining the nature of soft tissue lesions, providing valuable diagnostic information in most cases. The results underline the significance of FNAC as a primary diagnostic tool, as it aids in distinguishing benign from malignant tumors, identifying specific tumor types, and grading them. Essential for developing effective treatment plans and better patient management, this data is to be noticed. In Bhilai, lipomas, fibromas, and synovial growths were the most frequent soft tissue tumors. With this information, doctors will better identify and treat benign tissue tumors. This study

confirms the value of FNAC in diagnosing soft tissue tumors and lesions that impressionist tumors. Minimally invasive and inexpensive, FNAC facilitates prompt and precise diagnosis, decreasing the need for invasive procedures. The use of FNAC in patient care has the potential to have a significant impact. FNAC aids in optimizing treatment plans, reducing patient morbidity and mortality, and minimizing delays in commencing appropriate medication by providing crucial diagnostic information. Finally, FNAC has proven to be a successful method for diagnosing soft tissue tumors and tumor-like lesions in Bhilai, leading to better patient outcomes and more efficient use of healthcare resources. More studies and continuous use of FNAC in clinical practice are encouraged to improve diagnostic abilities and patient care in managing soft tissue lesions.

8. Recommendations

These findings support several suggestions for future clinical work. First, doctors in Bhilai should consider using FNAC to diagnose soft-tissue tumors and tumor-like abnormalities as part of standard practice. The proper diagnosis, differentiation, and treatment of these lesions can all benefit from this. Second, there must be an attempt to standardize cytopathologists' training and experience to reduce inter-observer variability and guarantee consistent and reliable interpretations of FNAC samples. Prospective studies can be carried out to verify further the diagnostic accuracy and utility of FNAC in various healthcare settings in Bhilai. Patient outcomes such as therapy choices, surgical interventions, and patient satisfaction can be evaluated by long-term follow-up studies evaluating FNAC's effects. Healthcare planners in Bhilai will benefit significantly from comparative studies assessing the cost-effectiveness of FNAC versus alternative diagnostic techniques. This research emphasizes the value of FNAC for identifying tumors and tumor-like abnormalities in soft tissues in Bhilai. Results show its superior diagnostic accuracy, specific tumor identification, and capacity to distinguish between benign and malignant tumors. Improvements in patient care can be achieved through better diagnosis and more targeted treatment by incorporating FNAC into clinical practice.

9. Acknowledgement

The skilled laboratory effort of Shri Shankaracharya Institute of Medical sciences Junwani, Bhilai. Is heartily acknowledged By the researchers.

10. Funding

No outside funding was used for this study.

11. Conflict of interest

None

12. List of Abbreviations

FNAC - Fine Needle Aspiration Cytology

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