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Original Research Article

Comparison of Tru-Cut Biopsy and Incisional Biopsy in Achieving Diagnosis of Maxillofacial Pathologies

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Abstract: ***Objectives:*** To determine the degree of agreement of TRU CUT vs Incisional biopsy with the result of Excisional biopsy in a patient suffering from oral and maxillofacial pathology. ***Study type:*** Descriptive, cross-sectional study. ***Settings:*** Oral and Maxillofacial Surgery department of Punjab Dental Hospital/de'Montmorency College of Dentistry, Lahore. Duration of study: 15 August 2025 to 30 November 2025. ***Methodology:*** We did a research on 25 individuals who came to our department. The Tru-cut biopsy was performed using 14-gauge disposable Tru-cut biopsy needles (Baxter, made in the USA) through two consecutive insertions at different angles into the lesion's core, followed by an incisional biopsy. ***Results:*** The diagnostic criteria that were looked at included sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy. Tru-cut biopsy had a sensitivity of 68.42%, a specificity of 83.33%, a positive predictive value (PPV) of 92.86%, a negative predictive value (NPV) of 45.45%, and an accuracy rate of 72%. ***Conclusion:*** The Tru-cut biopsy technique was evaluated as an effective method for the rapid diagnosis of maxillofacial pathology, as it is practical to use, inflicts minimal trauma to the tissue, reduces the metastatic risk of malignant lesions during the procedure, and is practically devoid of adverse effects.

Keywords: Biopsy, Core needle, Maxillofacial pathology, Tru-cut needle,

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INTRODUCTION

The word "biopsy" comes from Greek. Bios means "life," and opsis means "vision." This shows that the tissue was looked at after it was surgically removed. French dermatologist Earnest Besnier first introduced the word "biopsy" in 1879.1 A biopsy is the process of taking tissue from a living person so that it can be looked at with the naked eye, under a microscope, chemically analyzed, or a combination of these methods.2 A good clinician can usually make a clinical diagnosis of numerous lesions, although this diagnosis is usually only provisional and dependent on the pathologist's final report on the tissue material. Biopsy is not only used to find out if a tumor is cancerous, but it is also necessary to find out what kind of lesion it is. The best biopsy gets enough tissue for the right histological interpretation while causing as little harm as possible.3 An open biopsy can yield substantial tumor volumes for histological evaluation; nevertheless, it is more prone to complications such as hemorrhage, hematoma development, tumor cell dissemination, and infection.4

Tru-cut biopsy provides histological analysis of core tissue. It is a rather simple operation in which a needle with a gap near its tip is inserted into the lesion that needs to be biopsied. A sheath with a cutting point goes around the needle. The sheath cuts a sample that fits in the needle. The needle and sheath, which hold the specimen, are then taken out of the patient.5 The Tru-cut biopsy needle can get a core tissue sample, but FNAC just gets cells. This can definitely help with a more accurate and reliable diagnosis. Tru-cut biopsy is often suitable for the head and neck area when there are lesions in the salivary gland, thyroid, lymph node, or both benign and malignant soft tissue tumors.6 Tru-cut biopsies are quicker, easier, and more precise than incisional biopsies. Earlier studies show that needle biopsy is less accurate than open biopsy, with an accuracy rate of 61% to 96%.7

Because incisional biopsy and Tru-cut biopsy techniques have both benefits and drawbacks, it is necessary to examine, assess, and contrast the two methods, which is why this study was conducted. The goal of this study is to evaluate the two available biopsy procedures that are open biopsy and Tru-cut biopsy to assess the accuracy of both the techniques by keeping the Excisional biopsy as a standard.

MATERIALS AND METHODS

Following ethical review committee permission, 25 patients participated in this descriptive cross-sectional study conducted at the Oral and Maxillofacial Surgery department of Punjab Dental Hospital/de'Montmorency College of Dentistry, Lahore, during 15 August 2025 to 30 November 2025. Patients older than ten years and any soft tissue pathology related to the craniofacial region that did not respond to local or systemic treatment were included. 1. Vascular lesion like: Hemangioma, Lymphangioma, and Angiosarcoma, risky areas, e.g., critical structures like region near the eye, main vessels and nerve and hard tissue pathology were excluded.
All demographic variables (age, gender) were obtained. Patients were briefed about the operation and their agreement will be acquired. No extra financial burden put on patients about this trial. A comprehensive history was gathered regarding any systemic ailment. To rule out the probability of significant vascular and nerve involvement, a clinical examination of the lesion was carried out. On day of presentation, patient was given prophylactic antibiotic and hospital clothes. After that biopsies were conducted one as incisional and one as tru-cut.

The Semi-Automatic Core Biopsy Instrument, which has an 18-gauge needle and an operating length of 16 cm, was used to do the tru-cut biopsy. The Tru-cut

biopsy was carried out using a 14-gauge disposable Tru-cut biopsy needle (Baxter, made in the USA) through two sequential insertions at different angles into the center of the lesion. After positioning the patient for disinfection, we used Savlon + Betadine to the skin and Betadine + normal saline irrigation to the intraoral mucosa. We gave a nerve block wherever we could, and we injected a local anesthetic (2% lignocaine + 1:80,000 adrenaline) not right next to the lesion. The fingers of the left hand were employed to fix the lesion. After that, they chose the spot where the implant would go. In our study, this will usually be in the middle of the area where the lesion is. The Tru-cut biopsy needle was held and inserted into the lesion together with the sheath. The Tru-cut biopsy needle is pulled out of the specimen after the sheath reaches the end of the needle and makes a click sound. The amount is then carefully checked. The procedure will be done again if the sample is not good enough. A gauze swab was put on the location to halt the bleeding after the Tru-cut biopsy needle was taken out. The stuff that was taken out of the Tru-cut biopsy needle was put in 10% formalin. After the specimen was put in the fixative solution, the amount and quality of the material that was retrieved were looked at right away. For instance, if the substance floats in the fixative, it is likely fat, which means a second biopsy is needed. If it sinks, it is likely a tumor.

The incisional biopsy was performed using a No. 15 BP (Bard Parker) blade and handle. The biopsy site was chosen in areas where the tissue has completely changed, as where the lesion goes into normal tissue at the base or margin (or both). The biopsy was taken as a deep, narrow sample instead of a wide, shallow one. This made it easier to close the wound following the treatment. The specimen obtained was preserved in 10% formalin.

Both the biopsies were sent to Oral pathology department de,Montmorency college of dentistry, Lahore. The agreement of Tru Cut and Incisional biopsies with that of Excisional biopsy was labelled (whether the findings of Tru Cut and Incisional biopsies agree with those of Excisional biopsy either benign or malignant).

For descriptive statistics, SPSS 22.0 (Statistical Package for Social Services) was used to examine the data. Quantitative factors including age, BMI, and size were provided as mean (±) S.D. Qualitative data including gender, site of lesion, diagnosis on Tru Cut, Incisional and Excisional biopsies, and agreement of Tru CUT, Incisional, Excisional biopsies were provided as frequency, and %.

RESULTS

There were 25 patients in the study, 16 of whom were men and 9 of them were women. The patients' ages were between 10 and 80, with an average age of 45 ± 19.47. There were 2 cases of lesions in the palate, 6 cases in the tongue and floor of the mouth, 4 cases in the upper gingivo-buccal sulcus, 9 cases in the lower gingivo-buccal sulcus, 2 cases in the buccal mucosa, and 2 cases in the lip. The lesions ranged in size from 0.5 to 35 cm2, with a mean of 10.90 ± 8.23 cm.

There were two cases when an excisional biopsy would usually give a diagnosis that matched, but both Tru-cut and incisional biopsy methods did not do this. The Tru-cut and incisional biopsies of the first case were classified as benign nerve sheath tumor and normal (No Malignancy), respectively, while the excisional biopsy was identified as low-grade fibromyxoid sarcoma. In the second case, an excisional biopsy showed Ewing's sarcoma, whereas a Tru-cut and an incisional biopsy showed a basaloid salivary gland tumor.

We looked at the following diagnostic criteria: sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy. The sensitivity of tru-cut biopsy was 68.42% (95% CI 43.46%–87.35%), the specificity was 83.33% (95% CI 36.10%–97.24%), the PPV was 92.86% (95% CI 66.06%–98.81%), the NPV was 45.45% (95% CI 16.62%–76.50%), and the accuracy rate was 72% (Table I).

Only 2 out of 25 (8%) people had mild bleeding problems that required the use of cautery and sutures to stop the bleeding. The final diagnosis for these two separate cases was Chronic Nonspecific Inflammatory Lesion and Ewing's Sarcoma.

Table I: Diagnostic results (n=25)

Table I: Diagnostic results (n=25) **Diagnostic criteria**	**Percent**	**95% CI**
Sensitivity	**68.42%**	**43.46%–87.35%**
Specificity	**83.33%**	**36.10%–97.24%**

Positive predictive value	**92.86%**	**66.06%–98.81%**
Negative predictive value	**45.45%**	**16.62%–76.50%**
Accuracy	**72%**	

DISCUSSION

The most reliable way to determine the kind, characteristics, and prognosis of a pathologic lesion is by histopathological exams.1 The best method for getting diagnostic tissue is open biopsy. But open biopsy might be hard to execute when it's not easy to get to and could hurt the patient. Open biopsy can also have bad effects, such spreading the tumor, causing an infection, bleeding, or the wound breaking down.5 Additionally, research has demonstrated that improperly designed biopsy incisions might jeopardize later definitive surgical techniques, frequently resulting in less suitable treatment options and unfavorable patient outcomes.6 A biopsy is only considered effective if it gets the right tissue for diagnosis. A lot of pathologists think that utilizing a Tru-cut biopsy needle to get core tissue is better for histologic research.6

Needle biopsy has recently been the preferred method in many medical institutions, mostly due to its ease, safety, and cost-effectiveness. Tru-cut needle biopsy provides a specimen with preserved architecture, facilitating comprehensive histological analysis, including immunohistochemistry.7 It can be done easily as an outpatient procedure.2 The patient does not need any special preparation other than a thorough description of the planned surgery.

Published research shows that tru-cut biopsy is less painful and has fewer difficulties than open biopsy. Tru-cut biopsy is an important tool for diagnosing and treating individuals with head and neck diseases. But needle biopsy has been shown to be 61–96% accurate, which is lower than open biopsy.8 Theoretically, the diminished precision is anticipated owing to the restricted volume of tissue that can be obtained using this procedure and the lowered probability of accurately targeting the specific diseased site with a needle. Joshi et al.5 said that Tru-cut biopsy can be done at centers that aren't as specialized.

Yamashita et al.6 said that they got diagnostic target tissues in 15 out of 16 instances and that the accuracy rate was 88%. Ayhan et al.1 found that 37 of the 40 samples were good enough for diagnosis and 3 were not. The success rates for open biopsy, Tru-cut biopsy, and tiny needle biopsy were 92.5%, 55%, and 42.5%, respectively.

There is not much research on Tru-cut biopsy in the maxillofacial area.9-14 There are, however, many Tru-cut biopsy tests that may be done on lesions of the breast, liver, prostate, abdominal and pelvic malignancies, tumors of the long bone, soft tissue tumors, and more.15-23

Concordance between biopsy and excision for all lesions was reported at 27%, 49%, 50%, and 89% across four investigations.9-12 Additionally, one study indicated a concordance rate of 79% when classified within the same dysplasia group or a one-category difference. Three studies reported under-diagnosis rates of 35%, 36%, and 73%, while the same studies reported over-diagnosis rates of 17%, 13%, and 0%.10,24,25 When only dysplastic or malignant lesions were considered, the concordance between biopsy and excision was 72% and 81% in two studies, with under-diagnosis rates of 24% and 17% and over-diagnosis rates of 4% and 1.4%.9,26

The USA study9 identified the causes of discordance: among the 30 discordant cases, 18 (60%) resulted from sampling error, where the biopsy tissue did not accurately represent the entire lesion; 7 (23%) were attributed to pathologist discordance; 4 (13%) were due to inadequate tissue in the biopsy specimen; and 1 (3%) was caused by obscuring inflammation. The study additionally revealed that concordant individuals exhibited a higher average biopsy volume compared to discordant instances (1.53 vs. 0.42 cm^3, $p=0.063$). Also, for the 12 lesions that had more than one biopsy, the overall agreement rate was 83%, and the rates of underdiagnosis and overdiagnosis were both 0%. The other 17% of instances had diagnoses of equivalent severity, but we don't know what they were. The South Korean study also found similar reasons for disagreement.25 These encompassed superficial biopsy, frequently associated with punch biopsy; sampling error where biopsy tissue was unrepresentative (for extensive lesions); and inaccuracies in pathology specimen preparation due to diminutive specimen size (leading to tangential cutting that impacts the assessment of the submucosal area). This study did not say how many cases were different for each concern.

A localized tumor or extensive enlargement of a salivary gland may present a significant diagnostic and therapeutic challenge. It is almost impossible to do surgery with local anesthetic because the facial nerve can't be found, even though many salivary gland lesions, especially those in the parotid glands, are small and close to the surface. There is a very high

danger of tumor seeding, injury to the facial nerve, scarring, and fistula formation, hence an open biopsy is no longer necessary.9 Tru-cut biopsy is a very useful tool for these kinds of lesions, however we didn't find any in our study.

Other writers have used ultrasound, CT scans, fluoroscopy, and even MRIs to help the needle find the right spot for a Tru-cut biopsy, but there isn't much proof that these methods work better.5 The main concern about Tru-cut biopsy is that technique only gets a little sample and small tissue cores, which may not show the histologic morphology well.19 Another problem is that the Tru-cut biopsy may not be good enough for other procedures including electron microscopy, cytogenetics, and tissue banking.8

The literature does not identify any significant issues following a Tru-cut biopsy. Schmidt RL et al. discovered a total hematoma rate of 1.7% (7 out of 403 patients).14 Tru-cut biopsies also carry the risk of infections, and malignant tumor seeding has been documented. Recent studies have indicated the occurrence of vascular injury during core needle biopsy, with larger needle sizes correlating to an increased risk of nerve injury.13 Bearcroft et al. conducted cutting needle biopsies of the neck utilizing 16- and 18-gauge needles, concluding that while seeding was a potential risk, the precise incidence remained indeterminate. Bearcroft also said that seeding is still an uncommon incidence and didn't think it was a reason not to get the therapy.6

The studies included in this paper make a number of suggestions for improving the accuracy of biopsies. These include making sure that the biopsy depth is the same for all samples, taking multiple biopsies of large lesions, taking samples of the whole lesion in the case of encapsulated lesions, and working with pathologists to make sure that the samples are taken correctly, the block thickness is right, and the tissue is oriented correctly.6,7 Other authors have emphasized the necessity of obtaining deeper levels of sections throughout the specimen, in addition to the challenge of pathologist concordance.11 It is also suggested that patients have regular follow-up of the lesion after biopsy (e.g., every 3-6 months), regardless of the presence of dysplasia.4

CONCLUSION:

The Tru-cut biopsy method was found to be very useful for quickly diagnosing maxillofacial disease since it is easy to do, does less damage to the tissue, lowers the danger of malignant lesions spreading during the procedure, and has few side effects. If a clinician and a qualified pathologist work together to do it, it is a safe and effective procedure that can handle the little samples. The place and procedure of the biopsy are the major things that determine how appropriate and accurate Tru-cut biopsy is. New studies on this process, especially with guided Tru-cut biopsy and biopsy with automated core needle, would make the approach better, leading to higher success rates and making it the method of choice in routine practice.

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