Abstract

Preoperative pathologic diagnosis of pelvic tumors is mandatory for proper management of patients like neoadjuvant chemotherapy and interval debulking. Currently there are many minimally invasive methods available which include fine-needle aspiration cytology (FNAC) and trucut biopsy, mostly complimentary to each other. FNAC is a cheap, rapid and sensitive method for diagnosis of pelvic tumors. It can be done as an outpatient procedure without complications. But with it, the tissue architecture cannot be seen. Trucut biopsy on the other hand reveals tissue architecture and can help in grading and subtyping of malignant tumors. Trucut biopsy has to be done under image guidance like ultrasound and computed tomography. Patient is administered local anaesthetic and can be discharged safely after 2 hours. Pathologists familiar with histomorphology can give a correct diagnosis easily. But many times sampling errors may occur; especially in large tumors, resulting only in necrosis, hemorrhage and degenerated tissue bits. Also differentiation of borderline from malignant ovarian tumors is very difficult. In case of mixed tumors one component may be missed. Hard tumors like fibromas and leiomyomas yield scanty material and result in inadequate reporting. With FNAC, the overall accuracy rate is estimated to be around 96.3%. With trucut biopsy, adequacy is from 91 to 95% and accuracy is approximately 98% in different studies. When both methods are combined, the adequacy is 100%, diagnostic accuracy 95.5%, sensitivity 94.9% and specificity 100%. Therefore depending on the clinical diagnosis and the location of tumors, either FNAC and/or trucut biopsy can be chosen.

Keywords: Fine-needle aspiration cytology, pelvic tumors, trucut biopsy

Introduction

Pelvic tumors are swellings or enlargements that occur in pelvic region. Finding of a pelvic mass usually causes great concern to patients. Major categories of them arise commonly from gynecologic organs or from other organs like intestine, bladder, ureters and renal origin. Out of them, worldwide, ovarian cancer is the sixth most common female cancer and the seventh most common cause of cancer deaths. Approximately, 204,000 new cases and 125,000 deaths occur annually.[1] Due to the anatomic location of the ovaries making it inaccessible for testing, lack of a proper screening method and the non-specific symptoms of its tumors, the majority of the patients present in advanced stage; leading to increased morbidity and mortality.[2] Preoperative histologic confirmation of malignant ovarian tumors is mandatory before chemotherapy. Biopsy is advised in patients with either primarily inoperable pelvic tumor, advanced tumor with compromised performance status or recurrent tumors. In these advanced cases, neoadjuvant chemotherapy followed by interval debulking can improve the cytoreduction and reduce surgery-related morbidity. For diagnosis of epithelial ovarian tumors prior to neoadjuvant chemotherapy histology and/or cytology are considered superior to clinical factors (CA125 and radiology).[3] In a considerable proportion of the patients (25–29%) with advanced abdominal and pelvic tumors or patients with uncertain origin of the tumor the management of the disease do not require primary surgery.[4] However, histological verification of the origin of the tumor is an essential prerequisite for further management. This highlighted the need for preoperative pathological diagnosis of ovarian tumors.[5] Nowadays, three commonly used techniques for preoperative evaluation of pelvic masses are fine-needle aspiration cytology (FNAC), fine-needle aspiration biopsy and trucut biopsy. This article puts forth a comparative review of both techniques with emphasis on accuracy, sensitivity and specificity regarding each one.

Keywords: Fine-needle aspiration cytology, pelvic tumors, trucut biopsy

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Promise
Aspiration cytology is a less expensive, simple and quick method of diagnosis, and is reliable in terms of accuracy, sensitivity, specificity and positive predictive value. It does not affect the utility of the specimen for histopathology. Trucut biopsy is considered superior to FNAC because of preservation of tissue architecture, which can help in typing and subtyping with grading of tumors and can be used for different histochemical and immunohistochemical stains relatively easily. There have been studies that were conducted on trucut biopsy alone either in ovarian tumors or in pelvic masses. Zikan et al.\(^\text{[6]}\) in their study on trucut biopsy of abdominal and pelvic tumors got high adequacy (91.3%) and accuracy (98.3%). Faulkner et al.\(^\text{[7]}\) conducted a study on transvaginal approach to pelvic masses and got definitive diagnosis in 7/12 cases. Fischereova et al.\(^\text{[8]}\) analyzed advanced abdomino-pelvic tumors by trucut biopsy and got 93.02% adequacy, Yarram et al.\(^\text{[9]}\) analyzed imaging guided core biopsy in pelvic masses, Spencer\(^\text{[10]}\) and Hewitt et al.\(^\text{[11]}\) in peritoneal carcinomatosis. Yarram et al. and Spencer got adequacy of 95.2% and 92%, respectively. Contrary to common belief, trucut biopsy can be practiced as a safe procedure. Usually no major complications like bleeding, shock or intestinal injury are encountered from this technique. Only minor complications like pain and discomfort during the technique may be seen in some cases.

Many studies have been done on the role of FNAC in evaluation of ovarian tumors, like Kar et al., Bandyopadhyay et al., Mehdi et al., Sood et al. and Bohara et al.\(^\text{[12–16]}\) Others like Hemalatha et al. studied the role of US-guided FNAC in abdomino-pelvic masses in general including ovarian masses and obtained diagnostic accuracy rates of 100%, 96% and 94.4% for benign, malignant and non-neoplastic lesions, respectively.\(^\text{[17]}\) The overall accuracy rate was 96.3%.

In the study done by Naguib et al.\(^\text{[18]}\) when trucut was combined with FNAC the rate of inadequate samples had fallen to 0, resulting in 100% adequacy. This was due to the presence of adequate trucut biopsies in cases with hemorrhagic FNACs and vice versa. Their study shows that the diagnostic accuracy of combined trucut and FNAC was 95.5% with sensitivity 94.9% and specificity 100%. The positive predictive value was 100% and the negative predictive value was 71.4%.

Practice
Trucut biopsy for pelvic tumors can be applied to any one of numerous tumors that occur in the pelvis which may involve specific organs, or occupy intra-organ spaces in the pelvic cavity. Tumors occupying specific organs are usually subjected to this technique for preoperative diagnosis, like sacrococcygeal teratoma, tumors of urinary bladder, anal cancer, ovarian and testicular tumors. Tumors involving intra-organ spaces subjected to trucut biopsy are presacral space: teratoma, sacral space (in approximate order of prevalence): teratoma, lipoma, ganglioneuroma, myxopapillary ependymoma, primitive neuroectodermal tumor, aneurysmal bone cyst, Ewing’s sarcoma, metastases from brain stem tumors and so on.

Several modalities can be used to guide trucut biopsy including ultrasound, computed tomography (CT), magnetic resonance imaging (MRI) and a digitally directed approach. CT-guided percutaneous biopsy is considered as an efficient and safe procedure in the evaluation of retroperitoneal and abdominal masses, but in the case of deep pelvic masses it has limitations. This is due to the fact that in the closed osseous pelvic space, there is limited transabdominal accessibility or limited imaging clarity. In spite of high-resolution imaging benefits of MRI, it is used only rarely; as it requires special non-magnetic equipment and experience.\(^\text{[19]}\) Ultrasound guidance is commonly used as it is easily available. It has short procedure time and can offer variable modalities in the choice of biopsy approach like transabdominal, transvaginal and transrectal. The absence of radiation is an additional benefit compared with CT-guidance. Ultrasound-guided trucut biopsy also allows precise real-time acquisition of tissue with control of the needle tip during whole procedure and therefore is widely used.\(^\text{[6]}\)

Depending on location, size and probable diagnosis of the lesion it can be done either transvaginally or transabdominally. A higher adequacy of transvaginal biopsies is probably due to the proximity of the biopsy lesion to the probe and a better capacity for guiding the biopsy probe more precisely into the important parts of the tumor. Because of the proximity between targeted lesions and the probe, transvaginal US provides better imaging quality for gynecologic organs.\(^\text{[20,21]}\) Therefore, US-guided transvaginal biopsy may provide a useful route for deep pelvic masses.\(^\text{[5]}\)

For ultrasound-guided trucut biopsy technique-first strict asepsis is obtained followed local anesthesia by infiltration of the abdominal wall with 10 ml of 1% xylocaine for transabdominal biopsy. It is performed with a trucut needle of 18 gauge size or an automatic biopsy gun. After the lesion is localized by imaging, the mass is manually localized and immobilized. An ultrashort incision is made on the skin over the mass and the needle (trocar) is inserted into the mass. After the tip of the needle is visualized on the monitor, cannula is pushed till the needle tip. Then both trocar and cannula are removed along with the tissue. The tip of the biopsy needle is carefully visualized during the whole procedure to achieve optimal sampling and patient safety. After removal, cannula is pushed backward and the issue cylinder is removed and kept on a wet gauge. One to three tissue cylinders 10–20 mm long (depending on the size of the biopsied lesion) are obtained. All the material obtained from each patient is fixed in formalin, and subjected to histotechnique. In the transvaginal approach a special needle guide (Jezeck, Prague, Czech Republic) is attached to the vaginal ultrasound probe. At the end of the biopsy procedure, bleeding from the biopsy site and vaginal bleeding should be checked. Patients are observed for 2 hours following the biopsy and then discharged. No antibiotic therapy is administered.
Slides from paraffin-embedded tissue blocks are stained with hematoxylin and eosin. Each sample must be examined for the presence of tumor, sufficiency of tissue and suitability for immunohistochemistry staining. When a tumor is noticed, its origin, type and grade (if applicable) should be assessed, and immunohistochemistry for typing can be performed in each adequate sample. Morphology of different tumors in cytology and trucut biopsy are similar to those regularly encountered in practice by the cytopathologists and histopathologists. But the amount of tissue is less in trucut biopsy. Hence one has to be very careful in searching the diagnostic clues to reach at a diagnosis.

**Problem**
A deep pelvic lesion is a diagnostic challenge for both FNAC and trucut biopsy because of the risk of injury to space-occupying organs, such as bowel and urinary bladder. Also, route of approach may be limited because of the presence of vessels, nerves and bony structures covering the pelvic cavity. Therefore, to overcome these anatomic barriers, various biopsy techniques with different guiding modalities and approaches have been used.[22]

Obesity is considered as an obstacle for the proper performance of trucut biopsy as it reduces the accuracy of ultrasound (especially by the abdominal approach). Complications after trucut biopsy though minimal are more than cytology. Therefore one has to take precautions before conducting the biopsy.

Even though pathologists are more conversant with histologic picture and trucut offers preservation of tissue architecture, there are many pitfalls in trucut biopsy diagnosis. Many times we get only necrosis and hemorrhage with few broken glands or atypical cells. In these instances though malignancy is strongly suspected no definitive diagnosis can be given. At times there are some malignant glands but not sufficient to subtype it as to what type of surface epithelial tumor it belongs to, implying that subtyping a malignant tumor from the scanty tissue is difficult. And differentiating a borderline or low-grade malignant tumor from a frankly malignant tumor or carcinoma is always considered a difficult task. Low-grade serous and sero-mucinous carcinomas are sources for discrepancy in grading due to the presence of adjacent borderline focus that can be the only sampled area in trucut biopsy. Mixed tumors as sero-mucinous type whether benign or malignant may be a cause of discrepancy since the sampled area can contain one type only resulting in misdiagnosis as serous or mucinous tumor instead of mixed one.

Obtaining only degenerated tissue or fragments from undifferentiated tumors also impose problems in trucut biopsy. Non-representative samples due to sampling errors or imaging problems can lead to false negative results. Firm to hard tumors like smooth muscle tumors and fibromas yield very scanty tissue and make a proper diagnosis difficult. In case of mixed tumors like mixed malignant germ cell tumors and sero-mucinous tumors or mixed epithelial tumors, due to limited sampling one component may be missed and result in erroneous diagnosis. High-grade tumors with more undifferentiated areas may be source for discrepancy in tumor typing between trucut biopsy and final histopathological diagnosis.

**Conclusion**
Trucut and FNAC are complimentary to preoperative diagnosis of pelvic tumors. Difference in sensitivity and accuracy between FNAC and trucut biopsy is not significant. FNAC (especially imaging guided) is a rapid, cost effective, safe, accurate and non-invasive diagnostic procedure used in various abdomino-pelvic masses. Its use can help in avoiding unnecessary, expensive and invasive diagnostic procedures. It has evolved over the time as a reliable method which involves minimal/no risks and complications. However, despite being considered safe, effective and patient friendly procedure, FNAC fails to reveal tissue architecture necessary for tumor typing, subtyping and grading. It is found to be slightly less than trucut biopsy in adequacy (81.1%), diagnostic accuracy (95%) and sensitivity (94.3%). Trucut biopsy offers high accuracy for grading and typing in case of pelvic tumors. It is an efficient, minimally invasive, accurate and safe diagnostic method in the management of advanced, recurrent or atypical abdomino-pelvic tumors. The adequacy of trucut biopsy is mainly influenced by patient type, tumor consistency, site of biopsy and approach. So, concluding, trucut biopsy acts as an adjunct to cytology and histopathology for reliable diagnosis of pelvic/ovarian tumors!!!

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**Conflicts of interest**
There are no conflicts of interest.

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