REVIEW ARTICLE

INTRA-PROSTATIC LOCAL ANAESTHESIA FOR ULTRASONOGUIDED TRANSRECTAL PROSTATE BIOPSY - A REVIEW LITERATURE

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Abstract:

Carcinoma prostate is a common disease in urological aspect. Diagnosis of prostate cancer has evolved through the past century. In additions to estimations of serum PSA which has more predictive value than diagnostic value. In previous days diagnosis of prostatic cancer relied on three measures - DRE, needle biopsy and open biopsy. With development of medical science different biopsy techniques have evolved for prostatic biopsy. Each techniques has its own merits and demerits. This review article presented here discusses on ultrasonoguided transrectal prostatic biopsy following intraprostatic local anaesthesia. A thorough review literature search was done to resolve theses issues and finally a recommendation is drawn to develop a recommendated policy of biopsy for accurate diagnosis of prostatic cancer.

Key words: *Prostate cancer, Prostate biopsy, Intraprostatic local anaesthesia.*

Bangladesh J. Urol. 2013; 16(1): 57-62

Introduction:

Transrectal ultrasound guided prostate biopsy is one of the most common procedures performed by urologists. Since its introduction in late 1980, TRUS guided biopsy has become a routine outpatient procedure for the diagnosis of prostate cancer. Over the past decade, one of the most significant development has been the ability to provide local anaesthesia to patients undergoing TRUS procedure. Initially, biopsy involved taking a limited number of cores from a needle, but it has been changed with the sextant biopsy technique, which soon became the standard.[1]

Despite the procedure was being well tolerated by most patients and performed without any form of anesthesia in most centers, this procedure has been reported to have a 13–90% rate of discomfort [2,3,4]. Additionally, the discomfort tends to become more severe with the increase in the number of cores biopsies and the prevalence of repeat biopsies [5,6]. Despite the abundance of reports in the literature regarding the evaluation of the efficacy of the Intra-prostatic local anesthesia and determination of the optimum value for number, amount and site of injection, little emphasis has been placed on complications and limitations associated with the method[7]. The vast majority of prostate cancers currently are detected by a combination of PSA screening and TRUS-guided biopsy of the prostate. Patient tolerance is a critical consideration based on the sensitivity of the prostate. Previously there was debate as to whether prostate biopsy actually causes significant discomfort for the patient, and clinicians traditionally took the biopsies with no anaesthesia [8]. A review of published reports on prostate biopsy and anaesthesia revealed that the Intraprostatic biopsy is the most safe method [9] . The most common technique uses a basal approach, where lidocaine, under TRUS guidance, is injected directly to the prostate from apex to base .

Local anesthetic administration for TRUS-guided prostate biopsies has been extensively written by many investigators. Many studies report the benefit of local

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anesthetic injection. Most of them assess and report the benefit of intraprostatic local anesthetic injection evaluated the effect of intraprostatic injection with local anesthetic on the level of patient discomfort against no anesthetic injection and found that the former significantly reduced patient discomfort during the procedure[10,11,12,13]. In most recent studies, some investigators reported that intraprostatic local anesthetic injection significantly decreased the pain associated with prostate biopsy [14,15,16]. The use of local anesthetic to reduce patient discomfort during this procedure, as multiple recent studies have also concluded. To minimize further pain a completely new method, namely intraprostatic anesthesia and compared it with traditional periprostatic anesthesia. Better analgesia would be achieved by anesthetizing the prostate itself, which is the source of pain. Such a method would need to block all sensory nerves, not only from the posterior, but also from the anterior side. Intraprostatic administration of local anesthesia significantly decreases pain during prostate biopsy compared with periprostatic injection.

Historical aspects of prostate biopsy:

The technique of prostate biopsy has also developed through years. The diagnosis of prostate cancer relied on three methods: DRE, needle biopsy, and open perineal biopsy. The first documented needle biopsy technique of the prostate was transperineal needle aspiration by Ferguson in 1930. For fear of fecal contamination transrectal approach was limited. With an 18-gauge needle he aspirated a sample of prostate tissue[17].

The major advancement in prostate needle biopsy was the use of transrectal ultrasonography (TRUS). Initially developed in the 1960s, TRUS became popular in the 1980s as a method to supplant digitally directed needle biopsy of prostate. Several years later, a spring-loaded core biopsy device was developed that operated via a TRUS probe. In 1987, the first literature appeared describing the use of TRUS with transrectal biopsy [16].

Operational definition

1. Systemic extended cores biopsies
2. Targeted biopsies
3. Saturation biopsies

Zonal distribution of Prostate Cancer:

The glandular elements of the prostate have been divided into discrete zones. Normally the transition zone accounts for 5% to 10% of the glandular tissue of the prostate. The transition zone commonly gives rise to benign prostatic hypertrophy. It is estimated that 20% of adenocarcinomas of the prostate originate in this zone. Central zone constitutes 25% of the glandular tissue of the prostate. Only 1% to 5% of adenocarcinomas arise in the central zone [16,18] .

The peripheral zone makes up the bulk of the prostatic glandular tissue (70%) and covers the posterior and lateral aspects of the gland. Seventy percent of prostatic cancers arise in this zone, and it is the zone most commonly affected by chronic prostatitis. Up to one third of the prostatic mass may be attributed to the nonglandular anterior fibromuscular stroma[19] .

In 85% of nonpalpable tumors diagnosed by needle biopsy (stage T1c), the major tumor mass is peripheral in location [17]. In the remaining cases, tumors are predominantly located in the transition zone. Tumors that appear to be unilateral on rectal examination are bilateral in approximately 70% of cases when examined pathologically. Adenocarcinoma of the prostate is multifocal in more than 85% of cases [18].

Mechanism of action of local anaesthesia :

The nerve supply of the human prostate is abundant. The plevic plexus is 4 or 5 mm long and its midpoint lies at the tips of seminal vesicle. The pelvic plexus runs at the posterolateral border of the prostate on the surface of the rectum and lateral to the prostate capsular vessels, which are called neurovascular bundle. The pain associated with prostate biopsy may be caused by direct contact of biopsy needle with these nerve within the stroma and prostate capsule which are richly innervated. Therefore, prostatic anesthesia is considered to be achieved by blocking the prostatic sensory branches of the neurovascular bundles, which originate in the pelvic plexus. A completely new method, namely intraprostatic anesthesia, hypothesized that better analgesia would be achieved by anesthetizing the prostate itself, which is the source of pain.

Role of transrectal ultrasound in Prostate cancer:

Three advances established transrectal ultrasonography (TRUS) as the preferred approach for prostate biopsy. First was the development of high-frequency transducers, allowing greater resolution and identification of hypoechoic area. The second advance was a spring-driven biopsy device that converted prostate biopsy into a quick OPD procedure. Finally description of the sextant biopsy method took much of the subjectivity out of prostate biopsies [19].

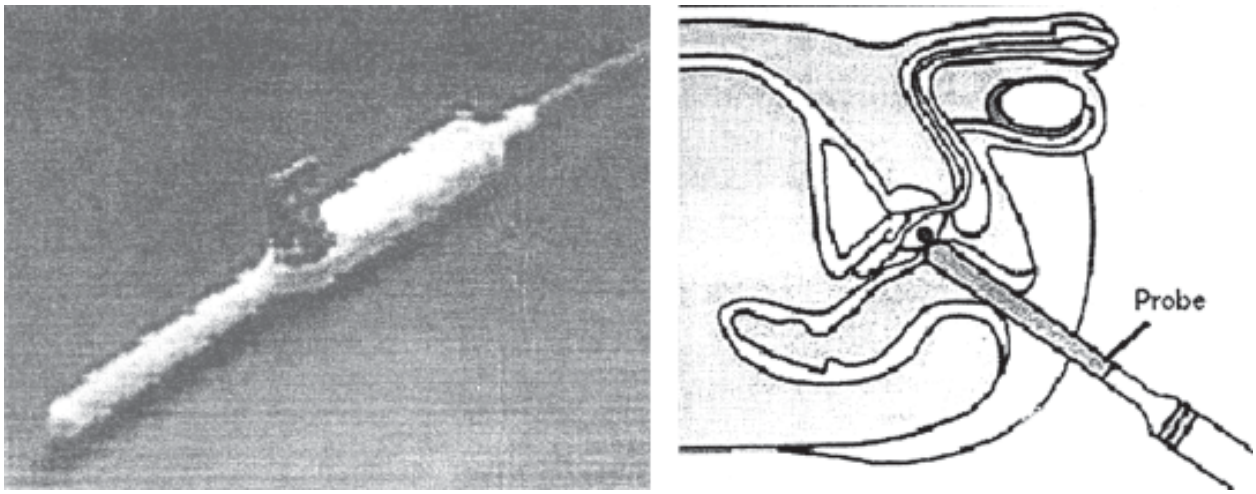

Fig.-1: *Initial probe and TRUS*

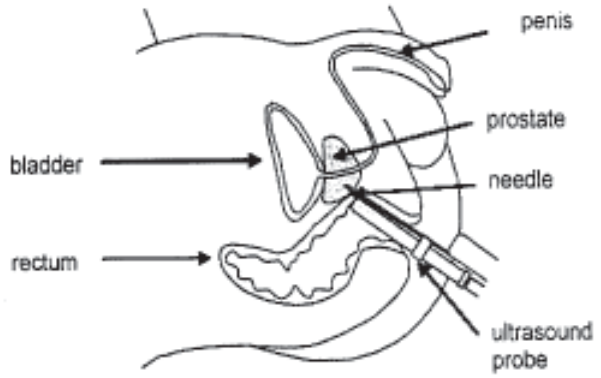

Fig.-2: *TRUS guided prostate biopsy*

The limitations of TRUS in prostate cancer detection are that most hypoechoic lesions found on TRUS are not cancer and that 50% of nonpalpable cancers less than 1 cm in greatest dimension are not visualized by transrectal ultrasound. Although hypoechoic areas on TRUS are more than twice as likely to contain cancer as isoechoic areas, 25% to 50% of cancers would be missed if only hypoechoic areas were biopsied. Therefore, any patient with DRE suspicious for cancer or a PSA elevation should undergo prostate biopsy regardless of TRUS findings .The main function of TRUS is to guide the needle in different region of prostate to obtain proper tissue sample [20,21].

Indication of prostate biopsy:

Prostate cancer rarely causes symptoms until it is advanced. Thus suspicion of prostate cancer resulting a recommendation for prostate biopsy. Early diagnosis of prostate cancer is best achieved using a combination of DRE and PSA[25]. A prostatic biopsy should be performed for any palpable lesion within the prostate. In one study, the detection rate of prostate cancer was 18% among men with an abnormal DRE and PSA <4.0 ng/mL. In contrast, 56% of men with palpable abnormalities and PSA >4.0 ng/mL were found to have malignancy[22] .

Major common complications:

Infection: The most serious complication of prostate biopsy is bacterial sepsis. Even with the most aggressive prophylaxis, infectious complications occur in a small proportion of patients. The rate of bacteriuria ranges from 20% to 53%, and the rate of bacteremia ranges from 16% -73%, but these conditions are usually asymptomatic.

Bleeding:

The most common complication seen after prostate biopsy is bleeding per urethra. At least 50% of patients have microscopic hematuria for up to 7 days after the procedure. The average incidence of hematospermia is about 30%. Per rectal bleeding is usually mild and resolves quickly [23] .

Urinary Obstruction:

Urinary retention may occur in 1-2 % of patients after prostate biopsy and usually resolves promptly with temporary urethral catheterization [19] .

Others : Vasovagal reaction , Hematospermia .

Discussion :

TRUS-guided biopsy of the prostate has become a ubiquitous and critical tool for evaluating and managing prostate cancer. Improving patient tolerance and comfort

associated with the procedure, by decreasing associated pain and morbidity, is therefore of paramount importance.

In current practice there are several methods by which prostatic anaesthesia or analgesia can be achieved, including i.v. or oral sedation, intrarectal gels and periprostatic injection with lidocaine. Of these methods, the periprostatic injection with anaesthetic is clearly the most effective but there is no consensus on the ideal site for delivery of the anaesthetic agent. The rationale is that most prostatic innervation appears to arise from the pelvic plexus, so the incoming nerves are blocked lateral to the prostatic base as they approach the gland. This site is readily identified by the hyperechoic pyramid that corresponds to the fat in the notch between the prostatic base and seminal vesicles on TRUS. Due to its white, peaked appearance, the investigators describe this as the 'Mount Everest sign' to assist clinicians with recognizing the correct site of injection . [09,10,15]

The vast majority of prostate cancers currently are detected by a combination of PSA screening and TRUS-guided biopsy of the prostate. Patient tolerance is a critical consideration based on the sensitivity of the prostate. Previously there was debate as to whether prostate biopsy actually causes significant discomfort for the patient, and clinicians traditionally took the biopsies with no anaesthesia . However, up to 96% of patients report significant pain, and up to a third of patients who previously had a biopsy with no local anaesthetic periprostatic block (PPB) would refuse to undergo a repeat procedure without anaesthesia [08,11,16]. Investigators have evaluated several methods of minimizing pain and improving patient acceptance of biopsy, including oral and i.v. sedation/analgesia, inhaled nitrous oxide , intrarectal anaesthetic gel , and intraprostatic biopsy[16,17]. A review of published reports on prostate biopsy and anaesthesia revealed that the intraprostatic is the most commonly used method and is effective when compared with placebo or intrarectal gel [18,19,20].

Many investigators compared periprostatic local anesthetic injection with intraprostatic anesthesia for sextant TRUS-guided biopsies and found that intra prostatic anaesthesia is better[20,23,24].

Some authors have reported the beneficial effect of transrectal local anesthetic gel prior to TRUS-guided prostate biopsies. They showed that local anesthetic gel was effective in reducing patient pain during TRUS-guided biopsies, compared with no anesthesia. As in many studies, others have reported no beneficial pain reducing effect from topical local anesthetic gel during this procedure. They also showed that apical periprostatic nerve block ensured better pain control during transrectal prostate biopsy, compared with endorectal lidocaine gel. One of the most recent studies, reported that intraprostatic local anesthetic injection significantly decreased the pain associated with prostate biopsy, compared with periprostatic nerve blockand found that transperineal unilateral pudendal nerve injection of local anesthetic was effective in reducing the pain at both biopsy and probe manipulation[26,27,28].

To minimize further pain a completely new method, namely intraprostatic anesthesia and compared it with traditional periprostatic anesthesia. Better analgesia would be achieved by anesthetizing the prostate itself, which is the source of pain. Such a method would need to block all sensory nerves, not only from the posterior, but also from the anterior side. Intraprostatic administration of local anesthesia significantly decreases pain during prostate biopsy compared with periprostatic injection.[28,29,30]

This review article was carried out with an aim to prefer intraprostatic local anaesthesia for transrectal prostate biopsy. Regarding comparison between intra and periprostatic local anaesthetic measures it was observed that intraprostatic route is more comfortable[-24,25] . Regarding the complications of biopsy procedure a study showed that rectal bleeding was more than urinary tract infection in their series [26,27,28,29,30].

Conclusion:

TRUS-guided biopsy of the prostate has become a ubiquitous and critical tool for evaluating and managing prostate cancer. Improving patient tolerance and comfort associated with the procedure, by decreasing associated pain and morbidity, is therefore of paramount importance. Intraprostatic local anesthesia technique is more acceptable technique for prostate biopsy. It is a simple and safe method that is less painful and it should be considered in all patients undergoing transrectal ultrasound guided prostate biopsy. In addition, the decreased discomfort of this procedure may enable more core biopsies to be taken in patients at high risk for prostate cancer or in those with an enlarged prostate.

Conflict of Interest : None Declared

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Abbreviations:

DRE	:	Digital Rectal Examination
TRUS	:	Trans-rectal Ultrasonography
PSA	:	Prostate Specific Antigen