Novel Technique in Performing Standard Transperineal Template Prostate Biopsies Under Local Anaesthetic

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Purpose: Transperineal template prostate biopsies (TPTPB) are now increasingly commonly performed for the diagnosis of prostate cancer. TPTPB is traditionally performed under general anaesthetia. However, this poses a significant strain on hospital theatre capacity. As such, local anaesthetic (LA) TPTPB is becoming more popular. We describe a novel technique for performing the standard TPTPB under LA in the outpatient setting.

Materials and Methods: Between February 2019- February 2021, 254 consecutive men (median age 69; range: 44-80 years) with a median PSA of 8.7 ng/ml (range: 2.2-76) underwent L/A TPTPB using our novel technique. This is whereby 50mls of 1% prilocaine was injected partially around the perineal skin and partially deep bilateral periprostatic areas. Multiple simultaneous prostate biopsies were then taken with the standard template grid and stepper.

Results: A total of 250/254 (98.4%) men underwent successful L/A TPTPB with a median visual analogue pain score of 4 (range: 2-8). The median prostate volume was 49cc (range: 14-240cc). The median number of cores taken were 18 (range: 14-24). A total of 163/250 men (65.2%) had a positive histology for prostate cancer with a median of 5 cores being involved with prostate cancer (range: 1-18). In addition, 101/163 men (62.0%) diagnosed with prostate cancer had either a Gleason score 3+4 = 7 or greater. None experienced urosepsis and only 2/250 men (0.8%) had temporary urinary retention.

Conclusion: Our novel LA technique in performing the standard TPTPB is safe, feasible, well tolerated and associated with a high rate of prostate cancer detection.

Keywords: anaesthetic; biopsy; local; perineum; prilocaine; prostate

INTRODUCTION

Over the past two decades the role of transrectal ultrasound guided prostate biopsies, in the detection of prostate cancer, has been steadily falling out of favour due to its limited ability to accurately biopsy the prostate, in particular the anterior gland,[1,2] along with its associated risk of urosepsis in up to 5% of cases[3,4]. As such, transperineal template prostate biopsies (TPTPB) have increasingly become the standard diagnostic tool in obtaining adequate and accurate prostate tissue[5-7]. In addition, multi-parametric magnetic resonance imaging (mpMRI) of the prostate now plays an important role in directing biopsies to the most suspicious areas within the prostate; thereby increasing our ability to detect prostate cancer[8]. However, as up to 20% of men with a negative MRI scan of the prostate can still harbour clinically significant prostate cancer[8,9], it is important not only to be able to accurately take biopsies from the MRI suspicious areas but also to perform saturation biopsies from all other areas of the prostate.

TPTPB has traditionally been performed under general anaesthetia (GA). However, the rapid rise, over the past two decades, in the number of men undergoing such a procedure has resulted in a great strain in gaining access to the operating theatres. To address this dilemma, a local anaesthetic (LA) approach in performing TPTPB has been increasingly desired. To date, the commonly used technique in performing LA TPTPB is by using PrecisionPointTM. Unfortunately, not only does this technique add to the cost of performing such a procedure but there is some evidence that this technique may not be as accurate in detecting prostate cancer as the standard TPTPB performed under GA[10,11]. We, therefore, prospectively determined whether it is feasible to perform the standard TPTPB using the template grid and a stepper by modifying the LA technique.

PATIENTS AND METHODS

Between February 2019 and February 2021, a total of 254 consecutive men with no selection bias underwent TPTPB under LA in our unit by a single surgeon (MAK). As previously described, all men had pre-procedure antibiotic cover with oral Ciprofloxacin 500 mg, Co-Amoxiclav 625 mg and intravenous Gentamicin 120 mg. The men were placed in the lithotomy position and the perineal area was shaved and cleaned with

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Figure 1: The marked region demonstrates the skewed horse-shoe area anaesthetised.
X: represents the approximate places where the spinal needle is inserted to inject the deep peri-prostatic local anaesthetic around the right and left apical areas.

Betadine®. The scrotum was lifted away and fixed in place using a Mepore® sticky tape. A total of 50mls of Prilocaine 1% was used as LA. Of the 50mls of 1% prilocaine approximately 25mls is applied to the skin and subcutaneous tissue covering a wide area around the right of the anal margin. Thereafter, approximately 5 mLof LA is injected immediately above the anal margin at a midline and a slim strip of area to the left of the anal margin in a distorted/skewed horse-shoe distribution using a 23G needle as shown in **Figure 1**. The reason for this distribution of the LA is that all biopsies (right and left) are exclusively taken from the widely infiltrated area on the right. The rationale for adding LA to the other sites is that subsequently the ultrasound probe (BK Medical Pro-Focus 2202, BK Medical, Mileparken, Denmark) with Endocavity BalloonTM is inserted in the rectum and held in place using a mechanical stepper arm (Galil Medical; Crawley, Sussex, UK). Under ultrasound guidance (both sagittal and transverse views), a spinal needle (19G) is inserted to inject 10 mL each of Prilocaine 1% in the peri-prostatic area between the rectum and Denonvellier's fascia (at the posterior lateral area of the apex of the prostate) on the right and left. Hence, the spinal needle is inserted in the areas above and right of the anal margin previously injected by LA (**Figure 1**). In total, 50 mL of 1% prilocaine LA is used.

Thereafter, the prostate volume is measured by ultrasound, and the gland is divided on the ultrasound screen into six areas (Right Anterior, Right Mid, Right Posterior, Left Anterior, Left Mid, Left Posterior). A standard 0.5 cm brachytherapy template grid is fixed to the mechanical arm (stepper) and placed over the right perineal area (**Figure 2**). The stepper not only stabilizes the ultrasound probe but also permits the probe to be tilted in various angles thereby gaining access to the whole of the prostate for biopsy solely from the single area to the right of the anus (**Figure 2**). Thereby, by tilting the ultrasound probe we are able to access both the right and left lobes of the prostate via the anaesthetised right perineal area. TPTPB is then carried out using the template grid and 18G needles. This enables multiple needles to be inserted at the same time ensuring that a wide spread of biopsies is taken (**Figure 2**). The rational for the insertion of multiple simultaneous needles is that it enables us to take biopsies not only from the MRI suspicious areas but also the surrounding and more distant areas. This ensures that targeted, as well as saturation biopsies, are taken. If a single needle is inserted each time a biopsy is taken then there is a risk of sampling the same area repeatedly; thereby risking reducing the cancer detection rate. Cognitive MRI fusion is used to take 4 biopsies from the MRI suspicious areas and two biopsies each from all other areas. In cases where the pre-biopsy MRI scan excluded any suspicious lesions within the prostate (i.e. negative MRI), four biopsies are taken from each of the six areas to ensure that thorough saturation biopsies are undertaken. As such, between 14

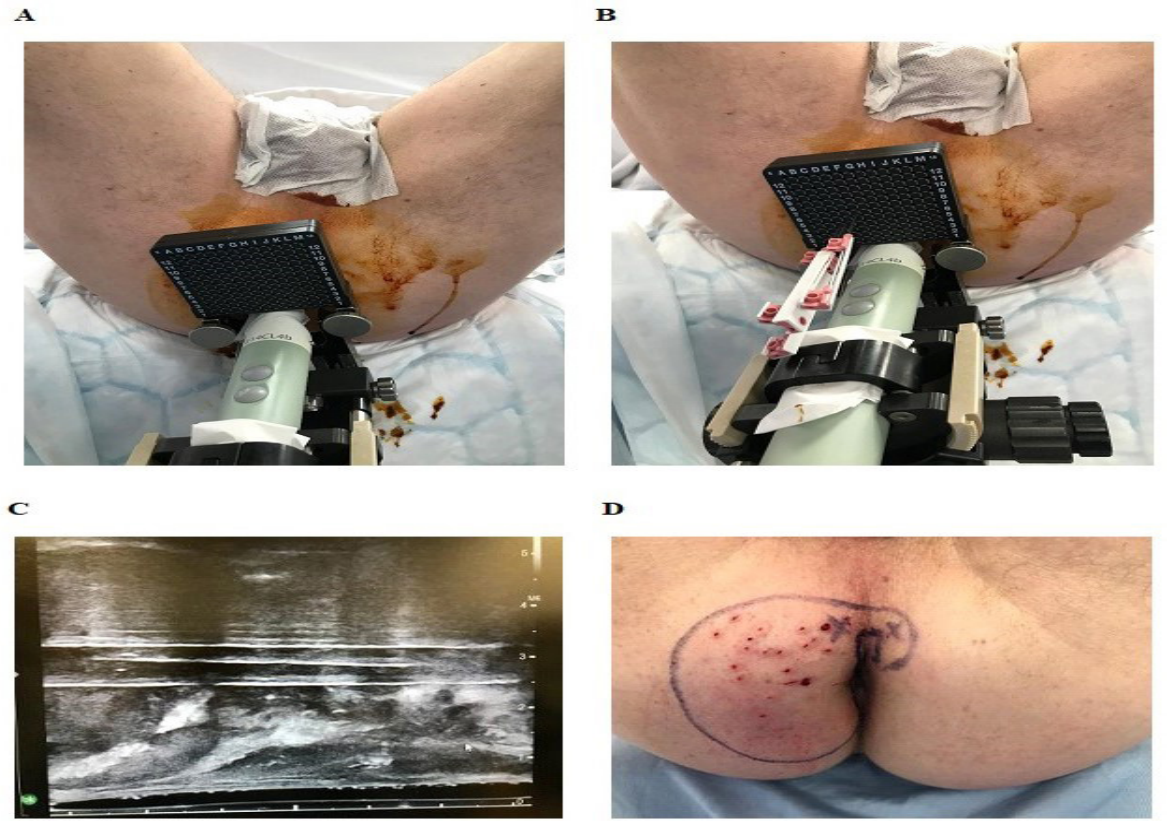

Figure 2: A: Demonstrating the angle of the ultrasound probe with the template grid, stabilised by the stepper, required to take biopsies from the right areas of the prostate. The probe is then adjusted slightly to take biopsies from the left areas of the prostate.
B: Showing simultaneous insertions of multiple biopsy needles.
C: Sagittal ultrasound image of the multiple biopsy needles insertions.
D: Biopsy needle insertion sites around the anaesthetised perineal area (post-procedure)

and 24 biopsies were taken from each man. At the end of the procedure, each man was asked to complete a visual analogue score, where 1 is no pain and 10 is unbearable/severe pain. Subsequently, the men returned to the waiting area, and were discharged home after voiding urine.

This prospective study did not require ethical approval as this was a modified local anaesthetic approach in performing the standard transperineal template prostate biopsies which we have been performing under general anaesthetic in our institution since January 2008. In addition, all men were given written information regarding the procedure many days in advance of having the procedure. Furthermore, on the day of the procedure all men were thoroughly counseled by both a qualified nurse and the operating surgeon before seeking the consent.

RESULTS

Out of the 254 consecutive men, 4 (1.6%) did not tolerate the ultrasound probe under LA, therefore the procedure was abandoned and referred for TPTPB under GA. The 250 men who underwent the procedure had a median age of 69 years (range: 44-80) with a median PSA of 8.7 ng/mL (range: 2.2-76) and a median Prostate volume of 49 cc (14-240cc). A median of 18 cores (range: 24-14) were taken from each man with a median of 5 positive cores (range: 1-18). A total of 163/250 men (65.2%) had positive histology for prostate cancer. Of these, 62(38.0%) had Gleason score (GS) 3+3, 68(41.7%) had GS 3+4, 15(9.2%) had GS 4+3, 10(6.1%) had G4+4 and 8(4.9%) had GS 4+5 as shown in Figure 3. The median pain score was 4 (range: 2-8). The inter-quartile range regarding the VAS for pain is 2. In addition, the 1st quartile of the VAS for pain was 3 and the 3rd quartile was 5. Furthermore, none of the men experienced urosepsis and 2 had temporary post-procedure urinary retention (0.8%). There were no cases of significant urethral bleeding requiring hospital admission.

DISCUSSION

Over the past two decades, TPTPB has gained greater momentum in being the procedure of choice for adequately sampling the prostate. It carries the advantages over conventional TRUS guided prostate biopsies in being associated with a lower risk of urinary sepsis as well as having a higher yield in detecting prostate cancer due to being able to access all areas of the prostate. However, the rapid rise in the volume of TPTPB being performed has added significantly to the burden on operative theatre utilisation as it is commonly performed under GA. In order to move TPTPB out of the theatre environment and towards an out-patient scenario, great effort has been invested in developing LA techniques for this increasingly common procedure.

To our knowledge, our LA technique is the first of its type to be described in the world literature, whereby

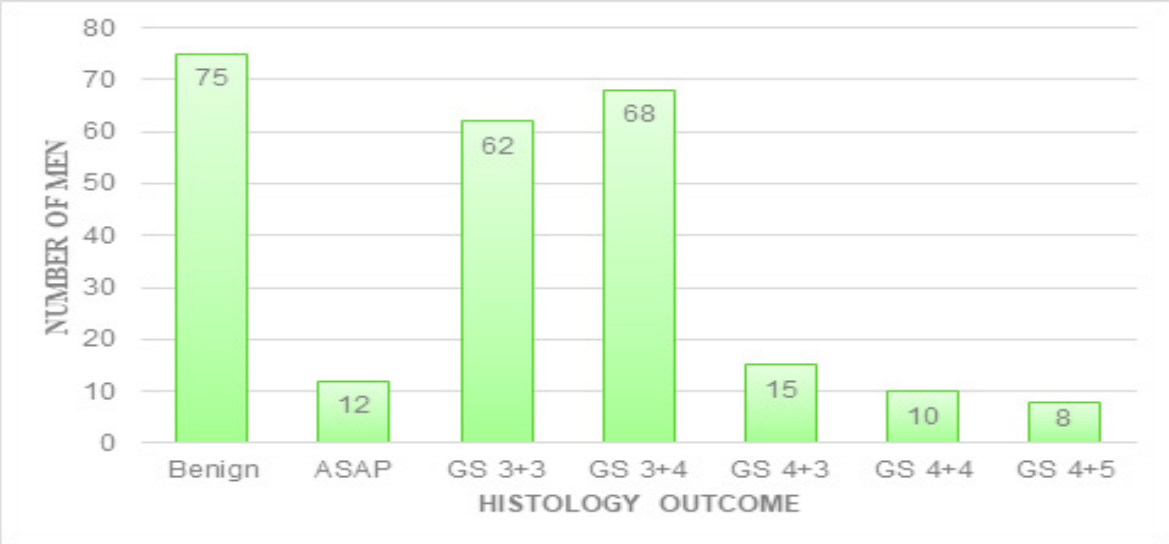

Figure 3. Distribution of the various histology types in men undergoing LA TPTPB (GS=Gleason Score)

we have been able to perform the standard TPTPB using the template grid and stepper along with multiple simultaneous needle insertions; which is currently the technique used when performing this procedure under GA. Our experience has confirmed that it is feasible and safe to perform TPTPB under LA without compromising the areas sampled or the numbers of biopsies taken when compared with the standard TPTPB under GA. In addition, our yield in detecting prostate cancer of 65% is consistent with the standard TPTPB performed under GA[6,7].

At present, there are few readily available systems for performing transperineal biopsies under LA such as PrecisionPoint™ access system[10,11] and the CamProbe [12]. These systems have been shown to be effective in performing transperineal biopsies under LA in the out-patient setting. However, they come with additional financial costs and are free-hand held devices, thus affecting the accuracy in taking biopsies from the appropriate/suspicious areas[13]. In addition, as only a single needle can be inserted on each occasion a biopsy is taken, these two techniques are less predictable in ensuring that appropriate biopsies including saturation biopsies are taken. Therefore, it can be debated whether such biopsy techniques are truly template biopsies.

However, our technique using the template grid permitting the simultaneous insertion of multiple needles offers better needle distribution and ensures that the same point of the prostate is not sampled twice. Furthermore, using the mechanical arm offers motion stability and precision in taking the biopsies. In addition, if a needle is not deemed to be in the correct position, it can easily be withdrawn and reinserted to an appropriate position as per cognitive MRI fusion.

CONCLUSIONS

Our LA technique, which is feasible, safe and well tolerated, enables us to perform the standard TPTPB without compromising cancer detection rates. By avoiding the need for additional specialist equipment and moving this procedure to the out-patient setting will also have a significant cost and time saving benefit.

CONFLICT OF INTEREST

The authors report no conflict of interest.

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