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Transperineal prostate biopsy – tips for analgesia

Running title: Transperineal prostate biopsy – tips for analgesia

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Introduction

The modern transperineal prostate biopsy (TPB) technique was first described in 1983(1). Since its introduction, TPB has become favorable over transrectal ultrasound prostate biopsy (TRUS-PB) approach due to higher cancer detection rates particularly in the anterior and transition zones, lower rates of sepsis, and decreased risk of rectal bleeding(2). Using a standardized template for prostate biopsy – sampling of the prostate is improved with TP prostate biopsy when compared to transrectal-guided biopsy(2).

The innervation of the prostate is important to consider when performing prostate biopsies. Pain afferent fibers supply the prostate via the pudendal nerve, the perineal nerve, and the pelvic plexus(3). Kubo et al also describes multiple structures that may be pierced during prostate biopsy. The bulbocavernosus and levator ani muscles, the deep transverse perineal muscles, and the prostatic capsule are thought to be the causes of pain post TPB(3).

Accordingly, TPB are typically performed under general anaesthesia due to difficulties in pain control. Some groups have adopted to perform the procedure under local anaesthetic only. TRUS-PB are typically performed under local anaesthetic with sedation and is well tolerated by patients. The aim of this review is to determine if it is safe and feasible for TPB to be performed under local anaesthetic only. If TPBs are able to be performed safely under local anaesthetic

only, this will have a great impact on health care systems, by decreasing inpatient costs, and providing a streamlined service for patients being investigated for prostate cancer.

Patients are being subjected to different types of local anaesthetic nerve blocks to decrease peri-operative and post-operative pain. Types of prostatic blocks described in the literature include: subcutaneous perineal block, periprostatic nerve block, pudendal nerve block, periapical triangle block, or a combination of these. Pain scores are typically evaluated using visual analogue scales (VAS). Additionally, patients rate their pain from 0-10 where "0" is defined as no pain and "10" is the worst pain imaginable.

Method:

A non-systematic literature review using the keywords transperineal, prostate biopsy, pain, analgesia was conducted on Pubmed, Web of science, Ovid Medline, EMBASE.

Transperineal biopsy pain relief

Subcutaneous perineal nerve block

Smith et al describe their technique for subcutaneous perineal skin block. The subcutaneous layer of the skin of the perineum is infiltrated with local anaesthetic (1% lignocaine with 1:200,000 adrenaline) in a rectangular fashion with a triangular extension superiorly, just above the anus in three bilateral segments lateral to the midline(4) (Figure 1). No comparative data for the use of subcutaneous perineal nerve block has been reported by Smith et al.

Periprostatic nerve block (PPNB)

Iremashvili et al described their technique for bilateral PPNB for TPB. A 22 gauge spinal needle inserted through the perineal skin 1.5-2.0cm above the rectum at a 30 angle from the medial line. Using transrectal ultrasound guidance, local anaesthetic is administered at the vascular pedicle located at the prostatic base(5) (Figure 2).

Pudendal nerve block

Pudendal nerve blocks are performed with the patient in lithotomy via a transperineal approach. To perform this, the ischial tuberosity is palpated and a 23 gauge needle is passed through the skin to just under the ischial spine where local anaesthetic is infiltrated(5) (Figure 1). Iremashvili et al, performed a randomized prospective study to evaluate the effectiveness of PPND and a combined PPNB with pudendal nerve block in pain control for patients undergoing TPB. They demonstrated a difference between PPNB and combined PPNB and pudendal nerve block with a statistically significant improvement on VAS pain scores during the biopsy (3.63 ± 1.71 – 2.07 ± 1.22) and up until 1 hour post-biopsy (1.13 ± 0.74 – 0.72 ± 0.70; p<0.001) respectively. They also demonstrated that the pain scores associated with performing pudendal nerve block were greater than that of PPNB (1.72 +/- 1.03 - 2.38 +/- 1.56 p<0.006), however the pudendal nerve block was still well tolerated by patients.

Periapical triangle block

Kubo et al describe a periapical triangle (PAT) block to assess tolerability of patients undergoing TPB in conjunction with a transrectal prostate biopsy for a three-dimensional 26-core prostate biopsy. PAT is characterized by the ultrasound-guided infiltration in the region bounded by the levator ani, the rhabdosphincter and the external anal sphincter muscle(3) (Figure 3). This area typically contains the pudendal nerve, the perineal nerve and the prostatic plexus. VAS scores were assessed at each step. They demonstrated that there was no significant difference in VAS pain scores between the two prostate biopsies (2.93 ± 1.97 – 2.67 ± 1.88; p<0.275) respectively. As such, TPB are well tolerated using a PAT block.

Prostatic apex block

Smith et al described a technique for prostatic apex block with an aim to safely perform TPB with high tolerability in the outpatient setting. Under ultrasound guidance local anaesthetic is infiltrated to the prostatic apex and the pelvic floor. Typically a volume of up to 35mLs of local anaesthetic – given as 1-2 mL injections at the prostatic apex and along the pelvic floor with a total of approximately 18 injections(4) (Figure 2). VAS scores were recorded for ultrasound probe insertion,

infiltration of LA, and prostate biopsies, with the questionnaire for each step filled out at the end of the procedure. This group demonstrated VAS scores of 2.88 ± 1.28 when the TPB was being performed. Pertinently, this group reported that LA infiltration was the most painful part of the procedure with VAS scores of 3.29 ± 1.13.

Conclusion

Contemporary literature reporting anaesthetic techniques during TPB are sparse. From the current literature, PPNB alone appears to be an inferior method of analgesia when compared to the other methods described for prostatic nerve block (Table 1). Other techniques or combinations may exist in clinical practice but do not exist in the current literature. A single-blinded randomized control trial is currently recruiting patients to assess the role of peri-operative subcutaneous local anaesthetic infiltration of the perineum on post-operative pain in patients undergoing TPB under general anaesthetic(6). Further comparative large-scale studies are required to determine the efficacy of these prostatic nerve blocks when performing TPB. The identification of a reliable, well-tolerated analgesia modality may increase the feasibility for outpatient TPB.

Conflicts of Interest

None

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Legends to illustrations:

Figure 1: Lithotomy view of perineum for subcutaneous nerve block and pudendal nerve block.
The dotted area containing the number 1 is one half of the landmark described by Smith et al for subcutaneous nerve block. The red asterisk is the site of injection for pudendal nerve block. Black asterix - Site of injection for per-apical triangle and periprostatic nerve blocks (DPN - Deep perineal nerve; IT - Ischial tuberosity; PeN - Perineal nerve; PuN - Pudendal nerve; SPN - Superficial perineal nerve; STL - Sacrotuberous ligament).

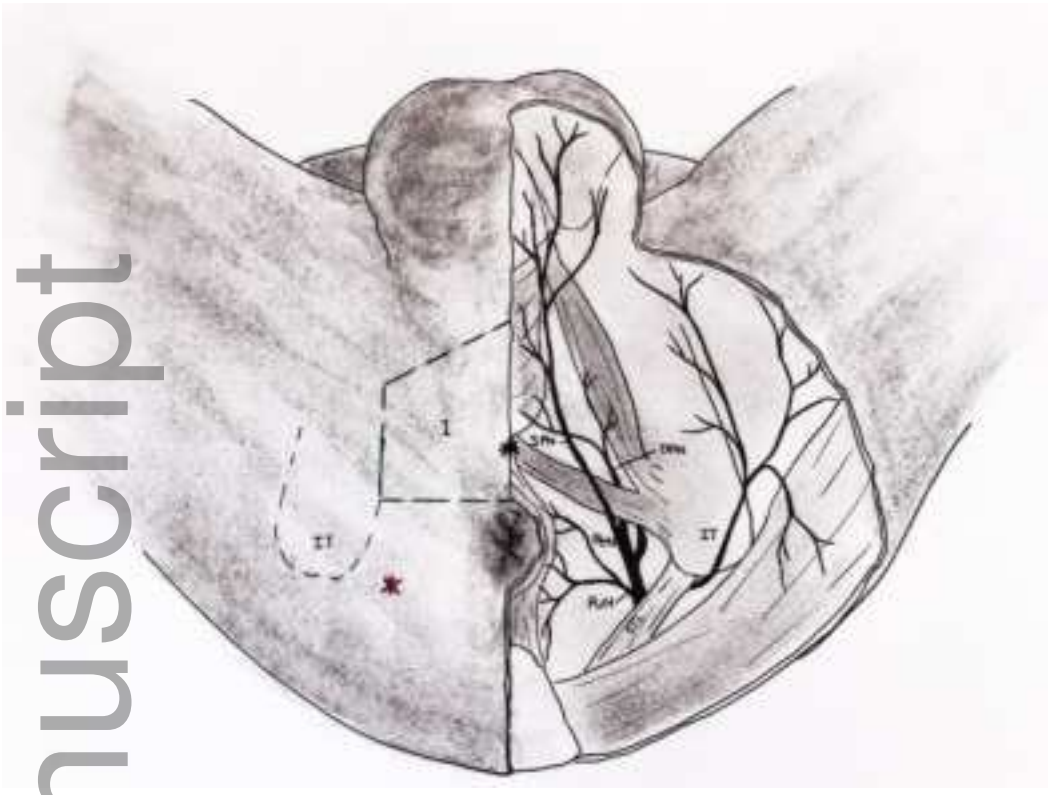
Figure 2: Sagittal cross-section of the pelvis.
The superior arrow shows the site of injection for a prostatic apex block. The inferior arrow shows the site of injection for a periprostatic nerve block (B – Bladder; CC - Corpora cavernosum; CS - Corpora spongiosum; DV - Denonvillier's fascia; P – Prostate; R - Rectum; SV - Seminal vesical).

Figure 3: Periapical triangle.

Periapical triangle (PAT) is bounded by levator ani, the rhabdosphincter and the external anal sphincter muscle (BCM - Bulbocavernosus muscle; EAS - External anal sphincter; LA - Levator ani; RS – Rhabdosphincter).

Table 1: The VAS pain scores for each type of local anaesthetic (LA) technique at time of infiltration and during the TP prostate biopsy. PPNB = Periprostatic nerve block; PAT = Peri-apical triangle. *Note: patients were not subjected to any other modality of anaesthetic. Maximal doses of local anaesthetic were not reported.*

Author	Type of block	Type of Local Anaesthetic	LA infiltration VAS Score	Procedural VAS Score
Iremashvili(5)	PPNB	10mL 1% lidocaine	1.72 ± 1.03	3.63 ± 1.71
	Pudendal + PPNB	Pudendal – 5mL 1% lidocaine PPNB – as above	2.38 ± 1.56	2.07 ± 1.22
Kubo(3)	PAT Block	5mL of 1% lidocaine	-	2.93 ± 1.97
Smith(4)	Subcutaneous perineal skin + prostatic apex	Skin – 15mL of 1% lignocaine with 1:200,000 adrenaline Prostatic apex – 35mL of 1% lignocaine with 1:200,000 adrenaline	3.29 ± 1.13	2.88 ± 1.28



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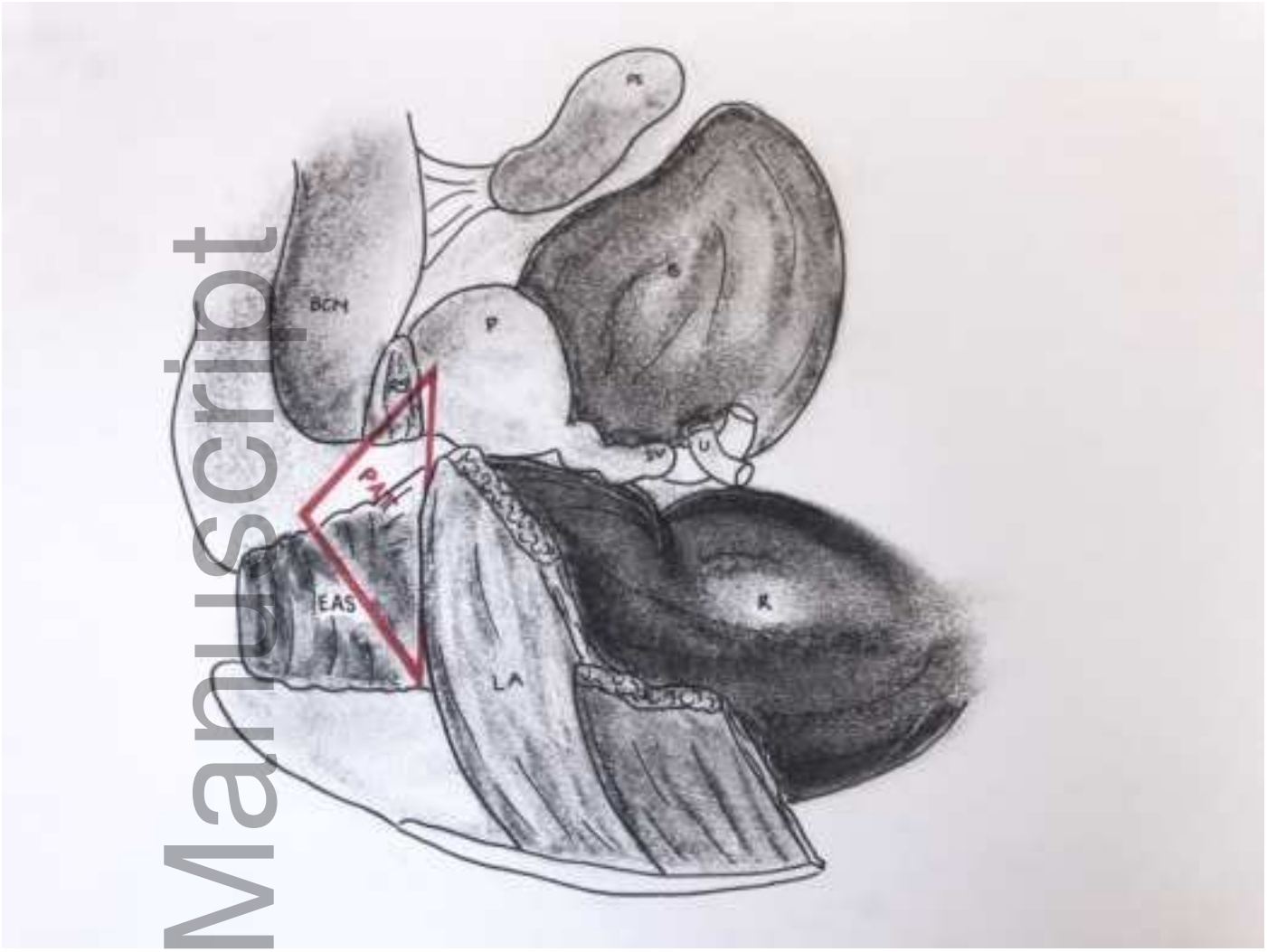

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