Transition Zone Index as a Predictor Value for Success of Trial without Catheter in Patients with BPH with Acute Urinary Retention

Thesis

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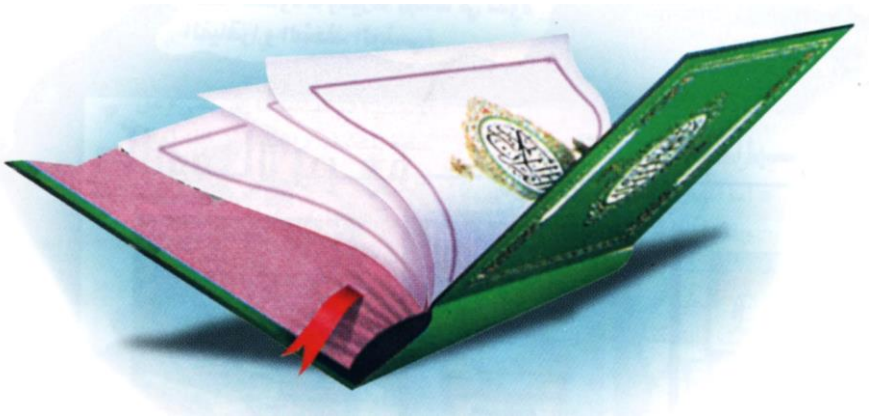
بسم الله الرحمن الرحيم

وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ
عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ



صدق الله العظيم

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Khaled Abdel Sattar Gad

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List of Abbreviations

Abb.	Full term
AP	*Anteroposterior diameter*
ATP	*Adenosine tri-phosphate*
AUR	*Acute urinary retention*
BLSA	*Baltimore Longitudinal Study of Aging*
BOO	*Bladder outlet obstruction*
BPH	*Benign prostatic hyperplasia*
CISC	*Clean intermittent self-catheterization*
CUR	*Chronic urinary retention*
DHT	*Dihydrotestosterone*
EP	*Endocrine-paracrine*
IPP	*Intravesical prostatic protrusion*
IPSS	*International prostatic symptom score*
LTC	*Long term catheter*
LUTS	*Lower urinary tract symptoms*
NO	*Nitric oxide*
PSA	*Prostate specific antigen*
PV	*Prostate volume*
PVRU	*Post voiding residual urine*
SMCs	*Smooth muscle cells*
SPC	*Supra pubic catheter*
TUIP	*Transurethral incision of the Prostate*

List of Abbreviations cont...

Abb.	Full term
TUMT	*Transurethral microwave thermotherapy*
TUNA	*Transurethral needle ablation of the prostate*
TURP	*Trans urethral resection of the prostate*
TWOC	*Trial without catheter*
TZ	*Transition zone*
TZI	*Transition zone index*
UTI	*Urinary tract infection*
VEGF	*Vascular endothelial growth factor*

INTRODUCTION

Benign prostatic hyperplasia (BPH) is the most common urological condition among elderly men, affecting approximately half of men over 80 years of age. It usually begins as a simple micro nodular hyperplasia with a subsequent macroscopic nodular enlargement that may result in bladder outlet obstruction (BOO) and the development of lower urinary tract symptoms (LUTS) ***(Alexandra et al., 2015).***

BPH is secondary to hyperplasia to transition zone with minor contribution from central zone of prostatic gland ***(Oelke et al., 2013).***

A known clinical fact is that total prostatic volume poorly correlates with the degree of LUTS due to measuring the wrong part of the prostate ***(Abrams et al., 2009).***

Transition Zone Index (transition zone volume / total prostatic volume) has a favourable value for assessing severity and progression in patients with BPH ***(Huang et al., 2013).***

Men with BPH typically experience voiding symptoms such as weak or intermittent urinary stream, straining, hesitancy, terminal dribbling and incomplete emptying. They may also report storage symptoms such as urgency, frequency, urgency, incontinence and nocturia ***(Hollingsworth and Wilt, 2014).***

Acute urinary retention is one of the most undesirable events associated with BPH ***(Shinbo et al., 2013).***

Acute urinary retention can result from obstruction of urethra such as BPH, urethral stricture, urinary bladder stones, and prostate cancer. It also can result from nerve problems such as brain or spinal cord injuries or infections, diabetes, strokes, multiple sclerosis and pelvic trauma ***(Marshall et al., 2014).***

Mechanical obstruction in BPH patients is closely related to TZ volume and especially compression of the peripheral zone due to relative enlargement of TZ. Patients with a higher TZ index have BPH with an expanding transition zone within the limited surgical capsule and have a greater chance of developing acute urinary retention ***(El Ghoneimy et al., 2017).***

The initial management of acute urinary retention consists of immediate bladder decompression with a urethral catheter. After catheterization patients may be hospitalized or sent home and reviewed in the outpatient clinic. The functional symptoms of BPH can be reduced by alpha blockers such as tamsulosin. Tamsulosin help to reduce bladder outlet resistance by effects on sympathetic tone of the bladder neck and prostatic stroma that could help relieve acute urinary retention and improve the chances of a successful trial without catheter (TWOC) ***(Siddangouda et al., 2017).***

Aim of the Work

The aim of this prospective study is to determine if transition zone index (TZI) is a predictive value for success of trial without catheter in patients with BPH with acute urinary retention trying to evaluate the clinical usefulness of the index.

ANATOMY OF THE PROSTATE

Gross anatomy

The prostate is a compound tubuloalveolar gland whose base starts at the bladder neck and whose apex merges with the membranous urethra to rest on the urogenital diaphragm. The intact adult gland resembles a blunted cone, weighs approximately 18 to 20 g, and measures about 4.4 cm transversely across its base, 3.4 cm in length, and 2.6 cm in its anteroposterior diameter ***(Eichelberg et al., 2015).***

The urethra enters the prostate near the middle of its base and exits the gland on its ventral surface above and in front of its apical portion. The ejaculatory ducts enter the base on its posterior aspect and run in an oblique fashion to emerge and terminate adjacent to the verumontanum. The capsule of the prostate gland is an inseparable condensation of stromal elements that is incomplete at the apex; it does not represent a true capsule ***(Kiyoshima et al., 2014).***

Fibrous septa emanate from the capsule, pierce the underlying parenchyma, and divide it into multiple lobules. These glandular units drain into branched tubules, which lead into 20 to 30 prostatic ducts. Most of these ducts empty their contents into the prostatic urethra adjacent or distal to the verumontanum ***(Lunacek et al., 2016).***

Denonvilliers' fascia is a visceral pelvic fascia formed by a condensation offused peritoneum; it extends from the anterior peritoneal reflection superiorly to the urogenital diaphragm inferiorly. In its caudal extent, Denonvilliers' fascia envelops the posterior surface of the seminal vesicles and remains affixed to the posterior prostatic capsule ***(Furubayashi et al., 2013).***

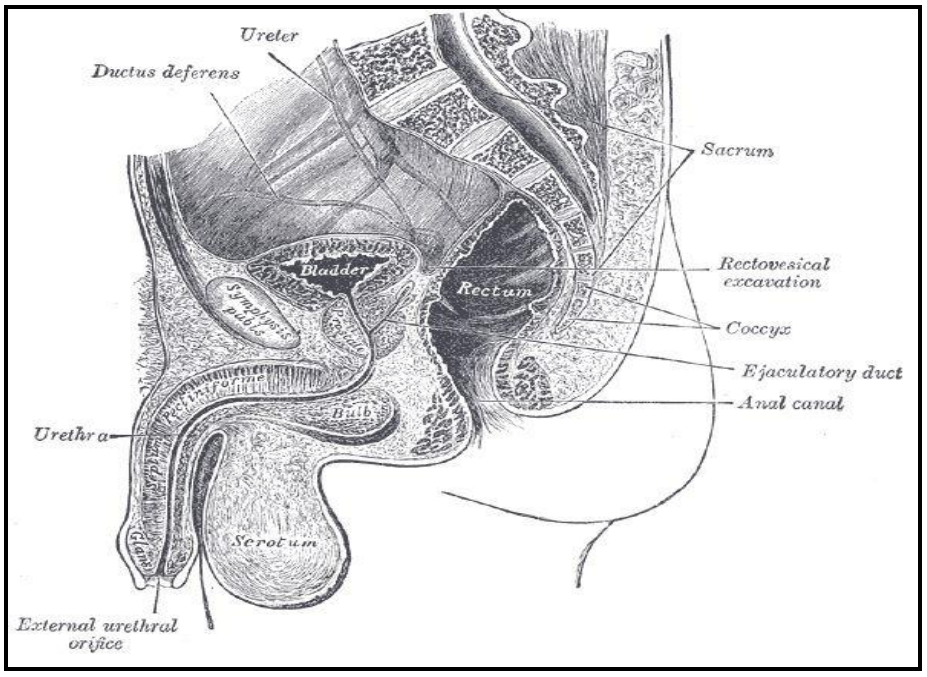

Figure (1): Relations of the prostate ***(Eichelberg et al., 2015).***

Zonal anatomy of the prostate

McNeal has proposed and promoted acceptance of anatomic subdivisions with probable pathophysiologic significance in the adult prostate. He emphasized the use of coronal and oblique coronal sections of prostates obtained between puberty and the third decade of life to study normal anatomy ***(Aaron et al., 2014).***

McNeal observed that the urethra separates the prostate into ventral (fibro muscular) and dorsal (glandular) portions. Approximately midway between the apex and base, the posterior wall of the urethra undergoes an acute 35 degree ventral angulation that serves to segregate the urethra into proximal and distal segments. The verumontanum and ejaculatory duct orifices exist exclusively within the distal segment. McNeal separates the glandular prostate thus delineated into four distinct regions: peripheral zone, central zone, transition zone, and peri-urethral gland region ***(Guneyli et al., 2016).***

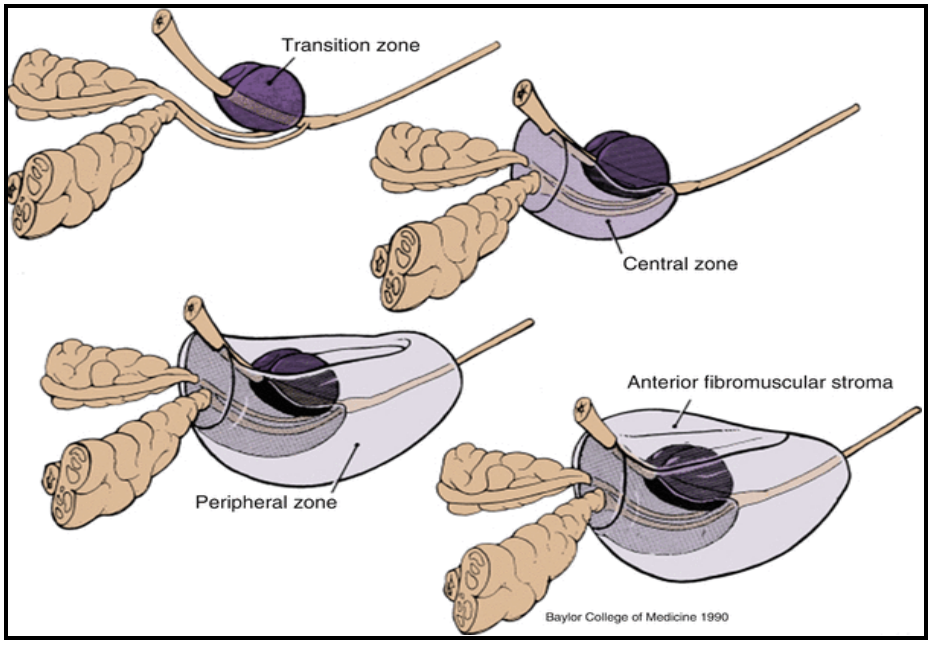

Figure (2): Zonal anatomy of the prostate as described by McNeal (adapted from Am J, 1988) The transition zone surrounds the urethra proximal to the ejaculatory ducts. The central zone surrounds the ejaculatory ducts and projects under the bladder base. The peripheral zone constitutes the bulk of the apical, posterior, and lateral aspects of the prostate. The anterior fibromuscular stroma extends from the bladder neck to the striated urethral sphincter ***(Guneyli et al., 2016).***