Evaluation of Long Term Results of Bipolar Transurethral Resection of the Prostate: 6 Months Results

Thesis Submitted in Fulfillment for the MSc Degree in Urology

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Abstract

Objectives: Evaluation of the results of bipolar transurethral resection (B-TURP), enucleation (B-TUEP), or vaporization of the prostate (B-TUVP) at 6 months postoperatively with special emphasis on continence and urethral stricture disease.

Methods: A series of 32 male patients with symptomatic senile prostatic enlargement who underwent B-TURP, B-TUEP or B-TUVP were evaluated at 3 and 6 months postoperative to assess IPSS, sexual function, continence, urinanalysis ,uroflowmetry and PVR. For patients with suspicion of infravesical obstruction (Qmax ≤15ml/s or PVR ≥100cc or IPSS ≥7), a retrograde urethrography and micturiting cystourethrography and/or diagnostic cystoscopy was done.

Results: None of our patients developed urethral stricture disease or urinary incontinence at 6 months postoperative regardless of the technique used (vaporization, resection or enucleation).

Conclusion: Bipolar TUR-P is safe and effective modality for surgical management of BPH.

Keyword: bipolar, prostate, BPH, urethral stricture, continence.

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Last but not least, allow me to send my deepest gratitude, my great appreciation and sincere thanks to my great family.

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List of abbreviations

AR	Adrenergic receptor
AUA	American Urological Association
BOO	Bladder outlet obstruction
BPH	Benign prostatic hypertrophy
B-TURP	Bipolar transurethral resection of the prostate
B-TUVP	Bipolar transurethral vaporization of the prostate
B-TUEP	Bipolar transurethral enucleation of the prostate
DRE	Digital rectal examination
Ho-YAG	Holmium :yttrium-Aluminum-Garnet Laser
HOLEP	Holmium laser enucleation of the prostate
IPSS	International prostatic symptom score
KTP	Potassium-titanyl-phosphate
LUTS	Lower urinary tract symptoms
M-TURP	Monopolar TURP
Qmax	Peak flow rate
PK	Plasma kinetic
PKEP	Plasma kinetic enucleation of the prostate
PSA	Prostatic specific antigen
PVR	Post voiding residual urine
TRUS	Transrectal ultrasound
TUEP	Trans urethral enucleation of the prostate
TUERP	Transurethral enucleation resection of the prostate
TUIP	Transurethral incision of the prostate
TULIP	transurethral ultrasound-guided laser-induced prostatectomy
TUMT	Transurethral microwave thermotherapy

TUNA	Transurethral needle ablation
TURIS	Transurethral resection in saline
TURP	Transurethral resection of the prostate
TUVP	Transurethral vaporization of the prostate
UTI	Urinary tract infection

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Introduction

Benign prostatic hyperplasia (BPH) is a common pathologic entity encountered by urologists. More than 50% of patients aged 60 years or older will be affected by hypertrophy of the prostate, with this number approaching 90% in those older than 85 years **(Berry et al, 1984)**. The 1984 landmark study by Berry and colleagues summarized the data from five studies demonstrating that no men younger than the age of 30 years had evidence of BPH **(Berry et al, 1984)**. It is striking that the age-specific autopsy prevalence is remarkably similar in all populations studied regardless of ethnic and geographic origin **(Carter and Coffey, 1990).**

Currently, the gold standard for the surgical treatment of BPH-related LUTS is transurethral resection of the prostate (TURP) **(from Baazeem et al,2008).** Despite its excellent clinical outcomes, monopolar TURP is associated with well-known and potentially serious complications. Risks include thermal tissue damage from faulty patient grounding and peripheral nerve stimulation. Additionally, the need for a non-conductive irrigant fluid (distilled water or glycine) can cause dilutional hyponatremia, fluid overload, or specific irrigant toxicities, such as hyperammonemia, myocardial damage and transient blindness **(Hawary et al ,2009).**

One approach to reduce electrosurgery-related complications has been the introduction of bipolar electrosurgical generators and electrodes in transurethral surgery. With bipolar technology, the ability to use normal saline as an irrigant and the physics of electrical current return theoretically reduce the chances of serious complications during TURP. Moreover it may have the prospects of better hemostasis **(Starkman et al, 2005).**

Despite the fact that the bipolar current has a smaller depth of tissue penetration due to lower peak voltage and high frequency (**Wendt-Nordah, 2004)**, there were reports about it being associated with increased incidence of post-TURP urethral stricture **(Tefekli et al, 2005).**

We aim at evaluating long term (≥ 6months) results of the patients who underwent B-TURP, B-TUVP or B-TUEP with special emphasis on post bipolar TURP urethral stricture disease and continence.

<u>Chapter 1 : Anatomy of the prostate</u>

The surgical anatomy of the prostate gland is challenging and complex, owing to the significant variation of gland architecture among patients and the constraints imposed by the body habitus of the patients.

The normal prostate weighs 18grams and measures 3 cm in length, 4 cm in width, and 2 cm in depth. It is traversed by the prostatic urethra. Although ovoid, the prostate is referred to as having anterior, posterior, and lateral surfaces, with a narrowed apex inferiorly and a broad base superiorly that is contiguous with the base of the bladder. It is enclosed by a capsule composed of collagen, elastin, and abundant smooth muscle. On the anterior and anterolateral surfaces of the prostate, the capsule blends with the visceral continuation of endopelvic fascia **(Brook, 2007)**. The superficial branch of the dorsal vein lies outside this fascia in the retropubic fat and pierces it to drain into the dorsal vein complex. The apex of the prostate is continuous with the striated urethral sphincter **(Epstein, 1989)**

<u>Structure</u> :

The prostate is composed of approximately 70% glandular elements and 30% fibromuscular stroma. The stroma is continuous with capsule and is composed of collagen and smooth muscle. It encircles and invests the glands of the prostate and contracts during ejaculation to express prostatic secretions into the urethra. The urethra runs the length of the prostate and is usually closest to its anterior surface. It is lined by transitional epithelium, which may extend into the prostatic duct. Urethral crest projects inward from the posterior midline, runs the length of the prostatic urethra, and disappears at the striated sphincter. To either side of this crest, a groove is formed (prostatic sinuses) into which all glandular elements drain**.** At its midpoint, the urethra turns approximately 35˚ anteriorly. This angle divides the prostatic urethra into proximal (preprostatic) and distal (prostatic) segments that are functionally and anatomically discrete **(McNeal, 1988)**.

In the proximal segment, the circular smooth muscle is thickened to form the involuntary internal urethral (preprostatic) sphincter. Beyond to the urethral angle, all major glandular elements of the prostate open into the prostatic urethra. The urethral crest widens and protrudes from the posterior wall as the verumontanum **.** The small slit-like orifice of the prostatic utricle is found at the apex of the verumontanum and may be visualized cystoscopically. The utricle is a 6-mm müllerian remnant in the form of a small sac that projects upward and backward into the substance of the prostate. To either side of the utricular orifice, the two small openings of the ejaculatory ducts may be found. The ejaculatory ducts form at the juncture of the vas deferens and seminal vesicles, and enter the prostate base where it fuses with the bladder. They course nearly 2 cm through the prostate in line with the distal prostatic urethra and are surrounded by circular smooth muscle **(Brooks JD, 2007).**

The glandular elements of the prostate have been divided into discrete zones. These zones can be demonstrated clearly with TRUS. Normally, the transition zone accounts for 5% to 10% of the glandular tissue of the prostate. A discrete fibromuscular band of tissue separates the transition zone from the remaining glandular compartments. The transition zone commonly gives rise to benign prostatic hypertrophy, which expands to compress the fibromuscular band into a surgical capsule seen at enucleation of an adenoma. It is estimated that 20% of adenocarcinomas of the prostate originate in this zone **(Brooks JD,2007).`**

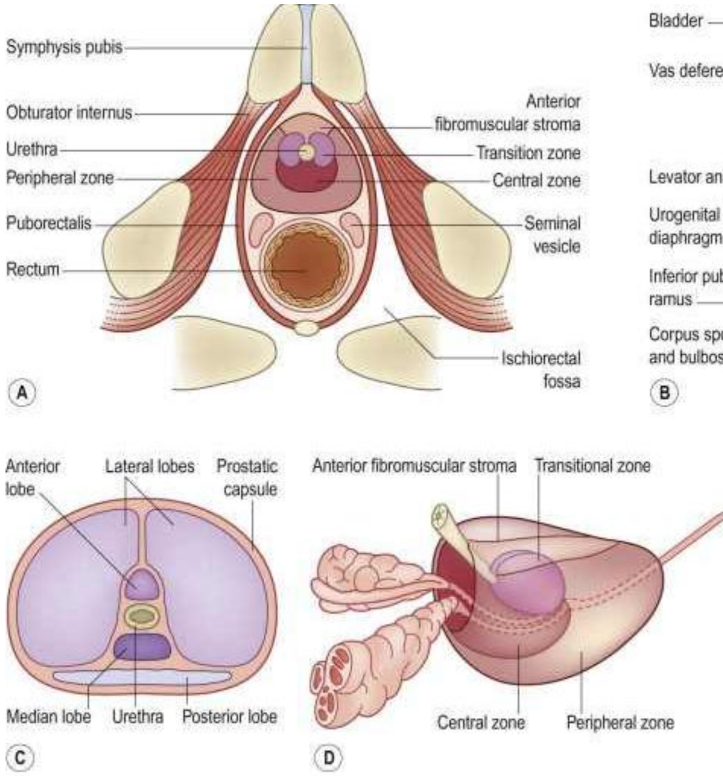

Figure 1: The anatomy of the prostate gland and surrounding structures.

A and B: Axial and coronal line illustrations of the prostate gland and its immediate anatomical relationships (modified from Patel U, Rickards D, Handbook of Transrectal Ultrasound and Biopsy of the Prostate, Martin Dunitz 2002).

C: Line illustration of the classical lobar anatomical model, which is now known to be inaccurate, although certain terminological derivations are still sometimes used, e.g. median lobe enlargement.

D: The zonal model of the gland (modified from Patel U, Diseases of the bladder and prostate, in Ultrasound of the Urogenital System, Baxter G, Sidhu P, Eds, Thieme, 2006).

E: The fascial planes around the gland. These planes are not generally identifiable on ultrasound, except for the capsule (AFS, anterior fibromuscular stroma; TZ, transition zone; CZ, central zone; PZ, peripheral zone; ED, ejaculatory duct; A, artery; V, vein; N, nerve).

The ducts of the central zone arise circumferentially around the openings of the ejaculatory ducts. This zone constitutes 25% of the glandular tissue of the prostate and expands in a cone shape around the ejaculatory ducts to the base of the bladder **(McNeal, 1988).** Only 1% to 5% of adenocarcinomas arise in the central zone, although it may be infiltrated by cancers from adjacent zones.

The peripheral zone makes up the bulk of the prostatic glandular tissue (70%) and covers the posterior and lateral aspects of the gland. Its ducts drain into the prostatic sinus along the entire length of the (postsphincteric) prostatic urethra. Seventy percent of prostatic cancers arise in this zone, and it is the zone most commonly affected by chronic prostatitis **(Brooks JD, 2007).**

Up to one third of the prostatic mass may be attributed to the nonglandular anterior fibromuscular stroma. This region normally extends from the bladder neck to the striated sphincter, although considerable portions of it may be replaced by glandular tissue in adenomatous enlargement of the prostate. It is directly continuous with the prostatic capsule, anterior visceral fascia, and anterior portion of the preprostatic sphincter**.** Clinically, the prostate is often spoken of as having two lateral lobes, separated by a central sulcus that is palpable on DRE, and a middle lobe, which may project into the bladder in older men. These lobes do not correspond to histologically defined structures in the normal prostate but are usually related to pathologic enlargement of the transition zone laterally and the periurethral glands centrally **(Brooks JD,200).**