

Prospective Randomized Study Comparing the Intra-Operative and Postoperative Outcomes of Bipolar Enucleation of the Prostate Versus Thulium Laser Enucleation

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Article History	Abstract
Received: 23 June 2023 Revised: 12 Sept 2023 Accepted: 22 Nov 2023	Background: Benign prostatic hyperplasia (BPH) is an age-dependent patho-physiological condition. Bipolar enucleation of prostate (BipoLEP) is now considered a rather effective method for the management of BPH patients. Aim and objectives: to assess the functional outcome of patients post plasma-kinetic enucleation in patients with large size prostate glands more than 80 cc as measured by Trans-rectal ultrasound. Patient and method: Our study involved 40 patients with symptomatic BPH who underwent endoscopic enucleation of the prostate using bipolar energy. Result: As regard the intraoperative complications our study showed that there were two patients (6.7%) complicated by small bladder perforation during morcellation and four patients (13.3%) had intra-operative bleeding necessitating blood transfusion and in the early postoperative period (the first 48 hours); one patient (3.33%) developed postoperative hematuria. After one month follow up we found that: 12 patients (30%) developed urge incontinence, 7 patients (17.5%) developed stress urinary incontinence and 5 patients (12.5%) developed mixed incontinence one with predominant urge and the other with predominant stress. Conclusion: Bipolar enucleation (BipoLEP) is very effective for managing patients with symptomatic or complicated BPH with large gland size above 80 cc, having a high safety profile and low complications rate. Bipolar enucleation proved to be a very effective technique of endoscopic enucleation of the prostate and can stand out as a strong alternative to laser enucleation whenever laser facilities are not available with comparable results. Key words: Bipolar Enucleation, Thulium Laser Enucleation, Benign prostatic hyperplasia, Transurethral resection of the prostate
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1. Introduction

Benign prostatic hyperplasia (BPH) is an age-dependent patho-physiological condition with initial development after 40 years of age, and prevalence rates of approximately 50% and 90% by 60 and 85 years of age, respectively (1). This study assessed the functional outcome of patients post plasma-kinetic enucleation in patients with large size prostate glands more than 80 cc as measured by Trans-rectal ultrasound.

Transurethral resection of the prostate (TURP) was initially published in the 1920s. Since then, this technique has been applied as the gold standard for the treatment of benign prostatic hyperplasia. Many modifications in the TURP technique were implemented and with experienced urologists, it's considered generally safe. Many complications such as bleeding and transurethral resection (TUR) syndrome in TURP have also been reported (2). Bipolar enucleation of prostate (BipoLEP) requires a combination of highly skilled endoscopic ergonomics combined with the good hemostatic properties of the bipolar current and is now considered a rather effective method for the management of BPH patients (3).

The aim of the work was to assess the functional outcome of patients post plasma-kinetic enucleation in patients with large size prostate glands more than 80 cc as measured by Trans-rectal ultrasound.

2. Materials and Methods:

Bipolar enucleation of the prostate is a transurethral procedure using energy from a bipolar electrosurgical unit. The enucleated prostatic tissues are then removed with a morcellator. Many centers have attempted enucleation using the 'Mushroom technique' without a morcellator (4). Commonly; either 24 or 26 Fr resectoscopes are used for enucleation. The energy settings used by previous researchers ranges from 130 W to 280 W for cutting and from 60 W to 110 W for coagulation (4). Enucleation started by gently peel off the adenoma without using energy if proper surgical plane is found. The electrode is introduced through the working channel of 26 Fr resectoscope with a flat, cuneiform probe. The electrode can advance axially into the surgical plane under direct visual guidance. Three types of morcellators are most commonly used, each of which has different shapes and movements which is either oscillating or reciprocal (5).

Sodium solution 0.9% is used throughout the procedure for irrigation. The height of the irrigating bag is about 60 cm above the operating bed during enucleation and at 80–100 cm during morcellation to allow for maximal bladder distention (6).

For Bipolar enucleation, the first incision was made proximal to the verumontanum so as to avoid damaging the urethral sphincter. The incision should be deep enough down to the level of the surgical capsule. The prostatic adenoma enucleation should be done in a retrograde fashion towards the bladder neck by the resectoscope tip. The resection loop was used to cut off the mucosa and adhesive fibers between the surgical capsule and the prostatic adenoma in addition to hemostasis. The enucleation continued until the bladder neck was reached, which is then cut open by the resection loop. The 2 lateral lobes of the prostate were enucleated in the same manner from the apex to the bladder neck. After finishing the morcellation, a Twenty-Two French Foley catheter was inserted. Bladder irrigation continued till urine clear, adequate analgesic was prescribed to prevent bladder spasm (7).

3. Results and Discussion

I) Preoperative Assessment: Our study involved 40 patients with symptomatic BPH who underwent endoscopic enucleation of the prostate using bipolar energy. The mean age of the patients was 67.8 years (SD = 7.6); most of the patients (59%) had no relevant medical history; as regards the surgical history there were 7 patients (16.7%) who had mesh hernioplasty, 5 patients (13.3%) had hemorrhoidectomy and another 6 patients (17%) had anal fistula surgery. Our protocol as regards antiplatelet/anticoagulant therapy is that patients were asked to stop any new oral anticoagulant/antiplatelet apart from aspirin one week before surgery. 22 patients (63.3%) had refractory retention, 8 patients (6.7%) had chronic retention, 4 patients (6.7%) had bladder stones and 11 patients (23.3%) had severe LUTS refractory to medical treatment. The mean preoperative IPSS score of the patients was 30.8 (SD = 2.34). All patients had a digital rectal exam (DRE); we had 5 patients (12.5%) with a 2+ prostate size while the rest had a 3+ prostate size by DRE.

All patients had performed a documented abdominopelvic ultrasound; 5 patients (12.5%) had bilateral hydronephrosis, 19 patients (47.5%) with bladder stones and 15 patients (37.5%) with significant residual urine volume (RUV) and the mean prostate size by abdominal ultrasound was 129 grams (SD = 39.84). By transrectal ultrasound, the mean whole gland size was 152.17 grams (SD = 28.7) and the mean adenoma size was 100.52 grams (SD = 21.6). Only 8 patients (26.6%) in had undergone a systematic trans rectal biopsy for elevated PSA levels in addition to the routine volume measurements. Uroflowmetry was done for every patient before enucleation and it was found that the the mean Qmax was 10.1 ml/s (SD = 1.45) and mean Qavg of 4.5 ml/s (SD = 1.05).

II) Technique of endoscopic enucleation: The bilobar technique was performed on 25 patients (62.5%), the trilobar technique was performed on 14 patients (35%) and the en-bloc technique was performed on only one patient (2.5%).

The mean total operative time was 163.2 mins (SD = 33.04), the mean enucleation time 125.8 mins (SD = 26.03) and the mean morcellation time 37.3 mins (SD = 12.71). As regards the intraoperative complications; two patients (6.7%) were complicated by small bladder perforation during morcellation and four patients (13.3%) had intra-operative bleeding necessitating blood transfusion. In the early postoperative period (the first 48 hours); one patient (3.33%) developed postoperative hematuria necessitating bladder irrigation and wash for one more day.

The mean net weight of the specimen extracted was 135.5 gm (SD = 21.3). The enucleation index is calculated by dividing the net weight of the specimen by the enucleation time and similarly the morcellation index is calculated by dividing the net weight of the specimen by the morcellation time.

In our study, the mean enucleation index was 0.94 gm/min (SD = 0.23) and the mean morcellation index was 3.28 g/min (SD = 0.86).

III)Catheter time and hospital stay: After endoscopic bipolar enucleation of the prostate the patients are discharged from the OR theatre with a continuous wash via the three-way catheter. The was is continued overnight and the catheter is removed in the next morning and the patients were discharged back to their home as soon as we confirm that they voided properly.

IV)One-month Follow-up: The mean IPSS among the patients at one month post bipolar enucleation was 4.7 (SD = 1.71). Patients were asked to perform a uroflowmetry at the 1-month follow-up; were the mean Qmax was 22.4 ml/s (SD = 3.54) and the mean Qavg was 11.7 ml/s (SD = 1.96); with insignificant residual urine volume by complementary ultrasound.

During the one-month follow-up we traced complications that could have occurred one month after surgery for example; any attacks of hematuria with or without clot retention, any attacks of febrile UTI, any degree of incontinence whether urge, stress or mixed. We found that; 12 patients (30%) developed urge incontinence, 7 patients (17.5%) developed stress urinary incontinence and 5 patients (12.5%) developed mixed incontinence one with predominant urge and the other with predominant stress.

V)Three-month Follow-up: The mean IPSS at 3 months for the patients was 3.53 (SD = 1.07). The mean Qmax was 22.1 ml/sec (SD = 3.2) and the mean Qavg was 12.05 ml/sec (SD = 2.2). All patients had an insignificant RUV (less than 50 cc) by post-voiding pelvic US apart from three patients (7.5%) with RUV above 200 cc. The mean total PSA at 3 months in the study was 1.87 ng/dl (SD = 1.1). The mean percentage of PSA reduction at 3 months was 75.8% (SD = 9.13).

Three months after bipolar enucleation; 2 patients (5%) had persistent urge incontinence at 3 months and 5 patients (12.5%) were still complaining from stress incontinence with two of them suffering from severe stress affecting their quality of life.

Our patients had different indications for intervention yet both groups had refractory retention as the main indication. We had 19 patients (47.5%) had refractory retention, 2 patients (5%) had chronic retention, 2 patients (5%) had bladder stones and 7 patients (17.5%) had severe LUTS refractory to medical treatment. It should be noted that in cases with refractory retention, the IPSS recorded is the most recent symptom score recalled by the patients before the attack of retention. The mean preoperative IPSS in our study was 31.6 (SD = 2.50).

Each patient was asked to perform a urine culture before the surgery; in we had 22 patients (55%) had no infection in their cultures while 8 patients (20%) were positive for infection. After Bipolar enucleation, we had two patients (6.7%) who developed a persistent postoperative fever that improved on intravenous imipenem & meropenem respectively. This explains why there is a high possibility of postoperative febrile UTI and even urosepsis in patients with preoperative persistent UTI.

The mean presenting PSA was 10.4 ng/dl (SD = 9.14). Total PSA was repeated after treatment of any culture proven urinary tract infection. In most patients, elevated preoperative PSA was mainly due to the large size of the prostate together with any residual UTI or chronic prostatitis and yet whenever indicated systematic TRUS biopsy was performed. Free/Total PSA ratio as well as the PSA density were calculated to detect any suspicion of prostate cancer. In contrast to our study, many studies reported a lower mean preoperative PSA level, and this may be explained by the smaller mean prostate size.

The mean whole gland size by Trans-rectal ultrasound was 152.17 grams (SD = 28.7) and the mean adenoma size was 100.52 grams (SD = 21.6). In contrast to our study, in the study conducted by Yu-Ting and his colleges to compare the outcomes of thulium laser and bipolar enucleation the mean prostate size in the thulium and bipolar groups were 49.9 grams (SD = 8.4) and 51.3 grams (SD = 20.9) respectively (8).

Total operative time was recorded in minutes with its two components; enucleation and morcellation time. The mean total operative time was 163.2 min (SD =33.04), the mean enucleation time 125.8 min (SD = 26.03) and the mean morcellation time 37.3 min (SD =12.71). Previous studies had demonstrated shorter enucleation and morcellation times in contrast to our study, and this could be explained by the smaller mean prostate size in those studies. In the study conducted by M. Al-radhi and his colleges to compare the outcomes of bipolar enucleation versus bipolar TURP, the mean operative time in the BipoLEP group was 93.7 min (SD = 27.5) (9). This could be explained by the longer time it takes the surgeon to manipulate the larger enucleation loop used in the bipolar enucleation. Enucleation index is calculated by dividing the net weight of the specimen by the enucleation time and similarly the

morcellation index is calculated by dividing the net weight of the specimen by the morcellation time. This means that the larger the net weight of the specimen and the shorter the enucleation/morcellation time, the higher the enucleation/morcellation indices. In our study the mean enucleation index was 0.94 gm/min (SD = 0.23) and the mean morcellation index was 3.28 g/min (SD = 0.86).

Concerning postoperative labs; In the BipoLEP group the mean Hb level was 12.29 gm/dl (SD = 1.8) with a mean Hb level reduction of 1.01 mg/dl (SD = 1.7). As regards intraoperative complications, two patients (5%) were complicated by small bladder perforation during morcellation managed by leaving the catheter for 5 days after surgery instead of the classic 1-day routine. In addition to, four patients (10%) who suffered from intra-operative bleeding proved by reduction in intra-operative Hb level below 10 gm/dl necessitating blood transfusion.

In the BipoLEP group; one patient (2.5%) developed postoperative hematuria necessitating bladder irrigation and wash for one more day. Two patients (5%) developed persistent postoperative fever that improved on intravenous imipenem & meropenem respectively. In the study performed by Yu-Ting and his associates and similar to our study, only one patient had postoperative hematuria managed by bladder irrigation followed by rescoping with revision of hemostasis (8).

In the first month of follow-up; the mean IPSS among patients of the BipoLEP group was 4.7 (SD = 1.71). In the study performed by Yu-Ting and his colleges, there wasn't any clinically or statistically significant difference between the IPSS in the first follow-up visit and this could be the result of early follow-up at two weeks after surgery (8). In the third month of follow-up; the mean IPSS for the BipoLEP group being 3.53 (SD = 1.07). Patients were asked to perform a uroflowmetry at the 1-month follow-up; the mean Qmax was 22.4 ml/s (SD = 3.54) and the mean Qavg was 11.7 ml/s (SD = 1.96). All patients had insignificant RUV (less than 50 cc) upon performing complementary post-voiding US for RUV at one month. Similarly at three-month follow-up; the mean Qmax of 22.1 ml/sec (SD = 3.2). All patients had an insignificant RUV by post voiding pelvic US.

As regards complications at one-month follow-up; 6 patients (20%) developed urge incontinence, 4 patients (13.35) developed stress incontinence and 2 patients (6.7%) developed mixed incontinence one with predominant urge and the other with predominant stress. De-novo stress incontinence that disappears by the third month of follow-up. The presence of urgency and urge incontinence whether isolated or mixed with stress incontinence may be aggravated by postoperative UTI. It should be noted that urgency and urge incontinence were predominant in the first month than later on.

At three-months follow-up; 2 patients (6.7%) out of six still had persistent urge incontinence at 3 month and 4 patients (16.7%) were still complaining from stress incontinence; 3 patients had their SUI improved and one patient suffering from severe stress affecting their quality of life. The two patients that used to suffer from mixed incontinence at one-month, had improved with one patient had recovered completely and the other one still had stress incontinence.

4. Conclusion:

Bipolar enucleation (BipoLEP) is very effective for managing patients with symptomatic or complicated BPH with large gland size above 80 cc, having a high safety profile and low complications rate. Bipolar enucleation proved to be a very effective technique of endoscopic enucleation of the prostate and can stand out as a strong alternative to laser enucleation whenever laser facilities are not available with comparable results.

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