

## HOLMIUM LASER ENUCLEATION OF PROSTATE (HoLEP) : THE CRUCIAL TECHNICAL ASPECTS TO DECREASE THE LEARNING CURVE : OUR INSTITUTIONAL EXPERIENCE OF 500 CASES

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### **Introduction and objective:**

TURP has remained as the standard surgical treatment for Benign hyperplasia of prostate. In large volume prostates open prostatectomy via transvesical ( Millin) approach was typically chosen technique. These procedures can be associated with relatively high morbidity , significant complication and longer hospitalization time. . HoLEP as originally developed in New Zealand by Peter Gilling and Mark Fraundorfer ( Gilling etal 1996). Laser treatment for benign hyperplasia of prostate (BPH) has been an increasingly common choice for urologist and patients. Improvement in the laser technology and good outcomes has attracted many urologist to adopt this technique of surgery for BPH. Holmium- yttrium –garnet laser emits light at 2140 nm but has a pulsed instead of continuous energy emission. This wave length is absorbed by water has an absorption length of 0.4mm with good hemostatic properties. HoLEP allows the surgeon to enucleate the prostate without much bleeding even on patients on heparin. There is an exaggerated learning curve for adopting this technique.

Our objective is to report the initial experience of 500 cases of Holmium laser enucleation of prostate ( HoLEP) for BPH and techniques which we adopt to decrease the learning curve.

### **Materials and method:**

A prospective study was done including all patients who under went HoLEP at our institution from December 2014 to March 2016. Follow up period ranged from 1month to 13 months. A pulsed high power 100 watts Holmium laser with 24 F resectoscope sheath was used. Two lobe or three lobe techniques of enucleation was followed. Versacut morcellator (Lumenis)introduced through 24F nephroscope was used to morcellate the enucleated lobes.

### Pre-operative assessment of patients:

All patients were pre-operatively assessed with ultrasound prostate volume estimation, post void residual urine, uroflowmetry.

Each patient underwent preoperative International prostate symptoms score questionnaire (IPSS).

Prostate biopsies were performed to exclude cancer whenever the serum PSA was elevated or when DRE was suspicious.

### Preoperative preparation:

Besides routine blood , renal function , serum PSA , routine urine investigation and urine culture was sent in all cases. All cases were assessed by anesthetist and done under general anesthesia. Patients who were on clopidogrel or warfarin were switched over to heparin in consultation with physicians. In uncomplicated cases Parenteral antibiotic ( 3<sup>rd</sup> generation cephalosporin ) was given one hour before procedure after test dose.

### **Techniques:**

#### Intra operative events:

A pulsed 100 W Holmium laser with 550 micron end laser fibre and 24 F continuous flow resectoscope with a laser bridge was used. An offset lens of thirty degree was used for the procedure. Irrigation solution was normal saline and power was set at 2 J at 40 -50 HZ.

Xylocaine jelly 2 % was used as lubricant for urethra . Cystoscopy and urethral dilatation was routinely done before introducing resectoscope as our institutional protocol. If there is vesical stones it was cleared with laser or cystolitholapaxy was done before proceeding to HoLEP.

The procedure of HoLEP begins with a bladder neck incision at 5 O'clock and 7 O'clock positions. These incisions are deepened to the surgical capsule, which is identified by its fibres running longitudinally. The incision are lengthened distally to just proximal to verumontanum. Near the verumontanum we used to reduce the power setting to 2 J at 20 – 30 Hz which gives us a total output of 40 -60 W. Incision are widened laterally by following the surgical capsule to undermine the lateral lobes. This gives a good visualization with a larger channel of irrigation of influx to bladder. If there is large median lobe transversely orient the incision which is made in the distal aspects of previously extended bladder neck incision. Slowly surgical capsule is followed and median lobe is lifted off the capsule. Retract the lobe with the beak of scope which gives a good vision for enucleation. Once the median lobe is enucleated advance in to bladder. Care is taken not to under mine the bladder. In the initial cases we had incidence of bladder under mining and perforation of capsule which lead to extravasation. An incision is made at 12 o'clock down to the capsule. Incision made at distal aspects of lateral lobes are developed to enucleate the lateral lobes. The surgical capsule is followed from both the inferior and 12 O" clock position until the entire lobe is free and can be moved in to the bladder. Some times we can see nodules at different planes which are taken out separately. The procedure is repeated on other side and hemostasis ensured.

#### Morcellation technique:

For morcellation versacut (Lumenis) was used which is composed of handpiece with hollow reciprocating blades , a suction pump and foot pedal. Morcellator is passed through the 24 F nephroscope. The bladder is distended to keep the bladder wall away from the blades and prevent injury. A foot operated variable suction is applied to the morcellator to draw the adenoma piece towards the morcellator. Once the adenoma is engaged the morcellators guillotine action slices off are able to be suctioned through the lumen of morcellator. Once all fragments are removed a 22 F three way catheter is placed. We block the irrigation channel with a cap.

Post operative care:

Patients are shifted to room unless there is history of Coronary artery disease or pulmonary disease (COPD). Catheter removal is done at 24 hrs or 72 hrs depending on the clarity of urine. In cases where perforation of capsule has occurred catheter is kept for 3-4 days.

Results :

Baseline Patient Characteristics

Number of patients	500
Age(yrs)	66±8.1
Q Max(m//s)	8 ± 3.1
IPSS	24 ± 5.6
PVR (ml)	115 ± 35
Total Serum PSA (ng/dl)	4.6 ± 3.5
Urinary retention	24
Bladder Calculi	12
Bladder Diverticuli	11
Anticoagulant therapy	30

Five hundred patients underwent HoLEP in our institute of age 66+/-8.1 yrs. They had a Q max of 8+/- 3.1ml/sec, IPSS of 24+/- 5.6, PVR of 115+/- 35ml and S. PSA of 4.6+/- 3.5ng/ml. Twenty four patients presented with urinary retention, 12 had bladder calculi, 11 had bladder diverticuli and 30 patients were on anticoagulants.

## Preoperative prostate gland volume

Preop Gland Volume	
< 50 g	236
50 – 100 g	152
> 100 g	112

Out of the 500 patients 236 had prostates <50gms, 152 had 50-100 gms and 112 patients had prostates exceeding 112 gms.

## Intra and peri operative data.

Total operative time (min)	80.8 ± 39.7
Laser enucleation time (min)	55 ± 22.9
Morcellation time (min)	15.3 ± 10
Morcellation efficiency (g / min)	2.89 ± 1.5
Resected weight (g)	40 ± 27.5g
Hb drop ( g/ dl)	1.1 ± 0.9
Na drop (meq/ l)	2 ± 1.4
Catheter time (hrs)	36 ± 14.7
Hospital stay (hrs)	48 ± 26

The total operative time was 80.8+/- 39.7 minutes which included LASER enucleation time of 55 +/- 22.9 minutes and morcellation time of 15.3 +/- 10 minutes.

The Hemoglobin drop was 1.1 +/- 0.9 and Serum sodium drop of 2 +/- 1.4 meq/L. Consequently no blood transfusions were required in any patient nor any case of hyponatremia was recorded.

The catheter dwelling time was 36+/- 14.7 hours and the hospital stay was 48+/- 26 hours. Typically the urethral catheter was removed after 24- 36 hrs. Thirteen patients were discharged with an indwelling catheter positioned after urinary retention which was then removed on POD 6 on an OP basis

Incidental prostate adenocarcinoma was detected in 3 patients

High risk cardiac patients underwent HoLEP successfully

No significant bleeding or other complications occurred

60% of the patients were high risk group for anesthesia

According to the ASA Grading ( American Society of Anesthesiologists )

- ASA Grade III – 44%
- ASA Grade IV – 16%

All these patients underwent HoLEP successfully without any significant complications

#### **Follow up:**

At 6 months follow-up, total serum PSA dropped to  $1.1 \pm 0.7$  ng/dl compared with the pre operative value of  $4.6 \pm 3.5$  ng/dl ( $p < 0.05$ )

10 % of patients complained of irritative urinary symptoms, typically self-limiting after 2 weeks

Transient stress incontinence was reported in 5 patients which settled by 3 months

Persistent stress leak was reported in 1 patient at 6 months follow up

#### **Discussion**

Results of our study is comparable to the results of several HoLEP studies regarding

IPSS score improvement

- Q Max improvement
- PVR reduction
- Fall in PSA
- Operating time
- Catheterisation time
- Hospital stay
- Peri-operative complications and morbidity

Many studies support HoLEP safety and efficacy for BPH even in the presence of bleeding diatheses and anticoagulation (Elzayat E et al, Kuntz et al, Vavassori et al).

Results of our study also supports the safety of HoLEP in presence of cardiac disease and anticoagulation.

Poor vision is sometimes a problem which can be managed by placing a suprapubic needle and procedure can be completed in the usual way.

A bladder irrigation system was placed only when evidence of significant post operative haematuria (3%) was present and was placed for no longer than 12 hours.

## **Conclusion**

HoLEP combined with mechanical morcellation represents an effective surgical intervention for the treatment of BOO for prostates of all sizes. HoLEP offers clear advantage over TURP in reduced catheter time, hospitalisation, blood loss and can be used in anticoagulated patients and those with large prostates.

A clear understanding of the steps of the two and the three lobe technique should help to reduce frustrations encountered during the early adoption of this technique and helps to shorten the learning curve. The initial experience at our institution has demonstrated .

- Excellent efficacy in terms of symptomatic improvement, improvement in flow rate and reduction in PVR
- Minimal morbidity with no significant bleeding or hyponatremia.
- Safety even in high risk cardiac patients on anticoagulation.

HoLEP may emerge as the size independent gold standard for the management of BPH

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