OUR INITIAL EXPERIENCE WITH HoLEP

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Objective: To present our initial experience with Holmium Laser Enucleation of Prostrate (HoLEP) and to address the issues like the learning curve, the efficacy and safety of the procedure.

Patients and Methods: Between July 2004 when HoLEP was first done in our hospital till June 2005, 55 patients were treated using HoLEP by a single urologist in our hospital. The patients were selected at random for the procedure and were assessed pre-operatively and post-operatively based on IPSS and QOL scores. The times for enucleation and morcellation were made note of. The time to catheter removal, duration of hospital stay, the need for bladder irrigation and the type (intermittent vs continuous) and duration of bladder irrigation, if needed, were also recorded.

Results: The mean (range) prostate size was 61.87gm (59-89 gm). The mean enucleation weight per minute was 0.8mg/min. The mean morcellation time per minute was 2.71mg/min. From the trendline, it is found that the enucleation time of 1gm/minute is achieved around the 40^{th} case for the surgeon. The average haemoglobin loss was 1.29gm/L. None of the patients had TUR syndrome. The mean fall in Na level was 1.26 mmol/L. The mean time for trial without catheter (TWOC) was 26 hours while the mean hospital stay after surgery was 42.30 hours. The mean

IPSS after the procedure fell from 24 to 5.6 while the mean QOL scores fell from 6.4 to 2.4 after the procedure. The incidence of urinary incontinence was found in 5 cases of 55 at the time of discharge while none had it at the time of 2nd review.

Conclusion: HoLEP is an effective treatment option especially for larger prostate adenomas. Complications like TUR syndrome and blood loss associated with resection of larger prostates by TURP are conspicuous by their absence. The efficiency of enucleation and morcellation increases as experience increases.

Introduction:

The use of the holmium: YAG laser for treating BPH has developed substantially over the last decade. The Ho: YAG laser is used to cut tissue by vaporization and coagulate blood vessels simultaneously at a depth of 1-2mm, generating minimal histological damage. The intrinsic properties of the laser combined with the enucleation concept gives HoLEP an advantage over TURP in several aspects i.e., decreased bleeding, decreased catheter time and bladder irrigation time, no prostate size limitation and no TUR syndrome.

Patients and Methods:

Between July 2004 when HoLEP was first introduced in our hospital till June 2005, 55 patients were operated by the HoLEP by a single urologist in our hospital. No specific exclusion criteria were used and the surgeon performed all the cases referred to him using the HoLEP technique. The laser was set at an energy of 2J and frequency of 40Hz or 50Hz. The first few cases were at set at a frequency of 50Hz while the last 15 were set at 40Hz.

The mean haemoglobin fall, mean change in Na^+ levels, need for irrigation, mean duration of irrigation, mean time for trial removal of catheter, duration of hospital stay, incidence of incontinence at discharge were made note of. To calculate how the duration for enucleation improved with the number of cases, the weight of specimen enucleated per minute was calculated for each case. Similar calculation was done for

the morcellation time too. These values were then plotted in a graph and a trendline drawn to study the learning curve.

The total duration of enucleation was defined as the interval between introducing the resectoscope and inserting the catheter.

Briefly the important steps were:

1. Incisions at the 5 and 7'o clock positions extending from a point distal to the ureteric orifice to each side of the verumontanum.
2. Deepening of the groove to the level of the surgical capsule. As the groove is developed, it should also be undermined and widened to allow the separation of the lateral lobes and the median lobe.
3. Enucleation of the median lobe.
4. Creation of anterior groove at 12 o'clock position
5. Separation of the right lobe from the capsular floor. The plane between the capsular floor and right lobe should be developed proximally towards the bladder. Completion of the right lobe enucleation.
6. Enucleation of the left lobe.
7. Achieving hemostasis by coagulation.
8. Morcellation under direct vision.
9. Catheterisation +/- irrigation.

Results:

Patient characteristics

The age patient mean of the 55 patients treated was 74.47 ± 8.27 years (range 59-89). Of the 55 who were treated, 30 had catheters put in pre-operatively either for acute or chronic retention, while 25 had severe Lower Urinary Tract Symptoms (LUTS). The mean time between catheterisation and the procedure was 4.6 months (2-11 months).

Perioperative data

Table 1 lists the perioperative results. The mean actual weight of enucleated tissue was 61.87 ± 39.67 gm (range 7.5 – 180 gm). The average rate of tissue enucleated per minute 0.808 ± 0.46 gm/min (Fig. 3) while the average rate of tissue morcellated per minute is 2.71 ± 1.82 gm/min (Fig. 4). The mean decrease in haemoglobin level is 1.29 ± 1.52 gm/dL (Fig. 1) while the mean fall in Na^+ levels is 1.26 ± 3.04 mmol/L (Fig. 2). No case had TUR syndrome. 2 patients required post-operative blood transfusion because of heavy hematuria in the 1st 48 hours. Histological examination revealed adenocarcinoma (Gleason's grade 3+3) in 6 patients. One patient developed lower abdominal distension towards the end of the procedure. Hence a laparotomy was done which revealed about 50ml of clear fluid in the Retzius pre-peritoneal space while there was no fluid intraperitoneally. There was no obvious bladder injury. 18 cases were put on continuous bladder irrigation, while irrigation started for 6 cases in the 1st 4 hours because of dark hematuria or clot retention. The rest 31 out of 55(56.4%) cases did not have irrigation.

TABLE 1: *Perioperative data on 55 patients*

	Mean ± SD
Age (in years)	74.47 ± 8.27
Weight of prostate enucleated (in grams)	61.87 ± 39.67
Total Operative Time (in min)	102.63 ± 44.34
Total Enucleation Time (in min)	76.36 ± 30.86
Total Enucleation Time / gram of tissue (in gm/ min)	0.808 ± 0.46
Total Morcellation Time (in min)	26 ± 18.06
Total Morcellation Time / gram of tissue(in gm/min)	2.71 ± 1.82
Fall in haemoglobin levels (in gm/L)	1.29 ± 1.52
Fall in Serum Sodium levels (in mmol/L)	1.26 ± 3.04
Time to TWOC (in hours)	26 ± 11.19
Hospital Stay from surgery (in hours)	42.30 ± 23.86

Complications and postoperative course

6 patients had post-operative pyrexia though their blood and urine cultures showed no growth. There were given a 3 day course of ciprofloxacin 500gm twice a day. 4 patients had clot retention which required bed-side bladder wash, clot removal and continuous bladder irrigation. 1 patient was on heparin infusion post-operatively because of he had a mechanical heart valve and was on warfarin for 15 years. Also 5 patients had to rewarfarinised. They had longer hospital stay to optimize their warfarin levels.

The total successful TWOC's were 81% (Fig. 5). Of these the patients who were on catheter pre-operatively had a success of 86.7% (26/30) while 80% (20/25) patients who were operated for LUTS were successful at 1st TWOC (Fig. 6). Those who were unsuccessful were sent home on catheter and asked to come back to the clinic after 2 weeks for a re-TWOC. All but 2 were successful (Fig.7). These 2 patients were taught intermittent self-catheterisation and are on follow-up. (1 of them had been catheterised pre-operatively for chronic retention and the other had severe LUTS).

The mean hospital stay after surgery was 42.30 ± 23.86 hours (Fig. 8). This also included patients who had to have the warfarin levels optimized before discharge.

5(10.9%) patients had incontinence at the time of discharge. They were taught pelvic floor exercises. At 1st review 3 months later, 3 had become dry and the other two had not done their exercises. At the 2nd review, none had urinary incontinence. The mean I-PSS score and QOL score pre-operatively were 24 and 5.6, while at first follow-up were 6.4 and 2.4 respectively.

Figure 1:

Graph showing the pre-operative and post-operative haemoglobin levels. 2 of the patients with post-operative haemoglobin less than 8gm/L required transfusions.

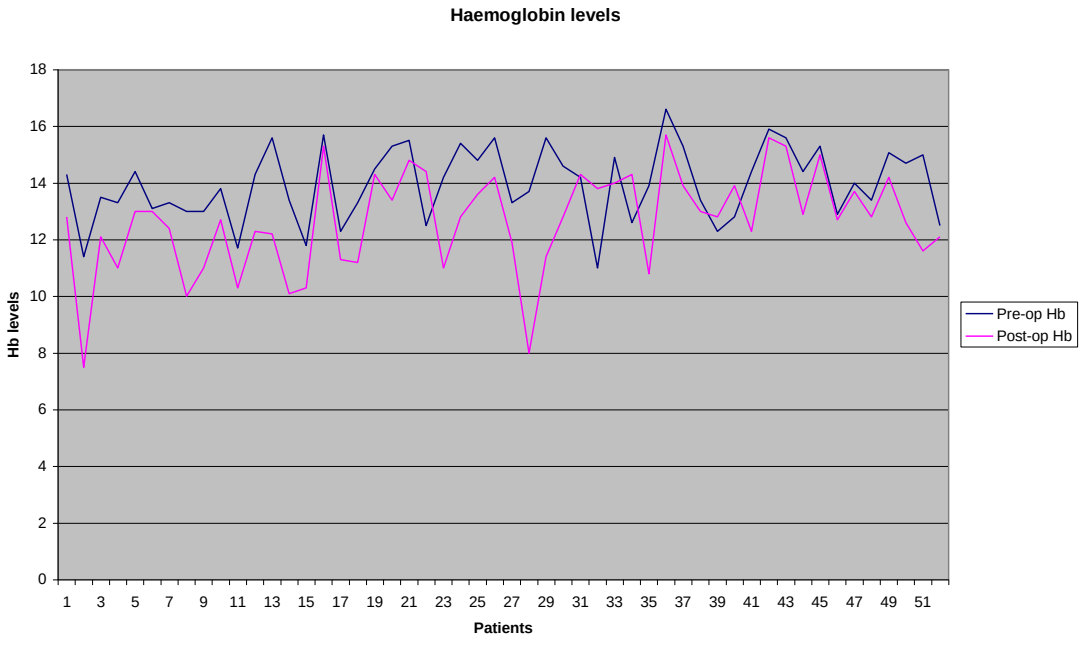


Figure 2 :
Graph showing the pre-operative and post-operative Na^+ levels. None of the patients had TUR syndrome.

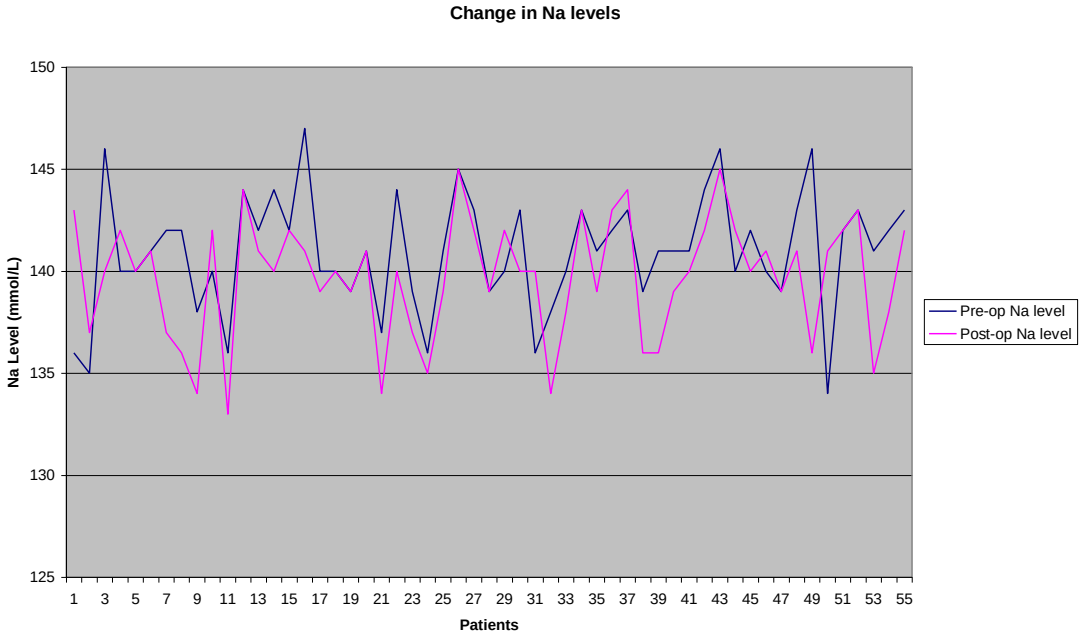


Figure 3:
Graph depicting the rate of enucleation of all cases. The trendline plotted through the values shows an upward inclination.

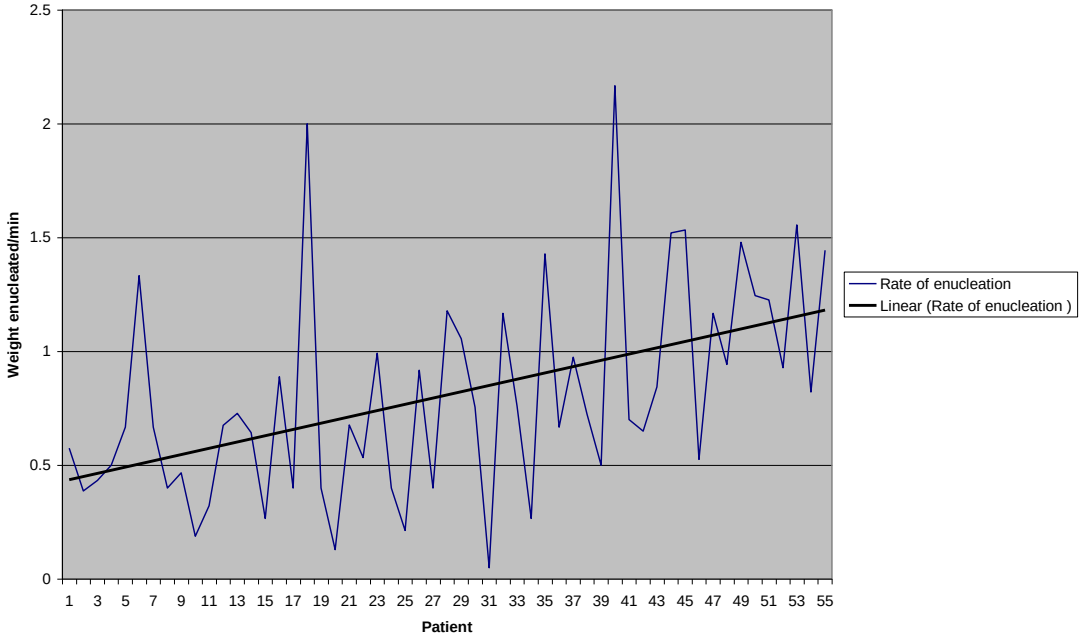


Figure 4:
Graph depicting the rate of morcellation of all cases. The trendline plotted through the values also shows an upward inclination.

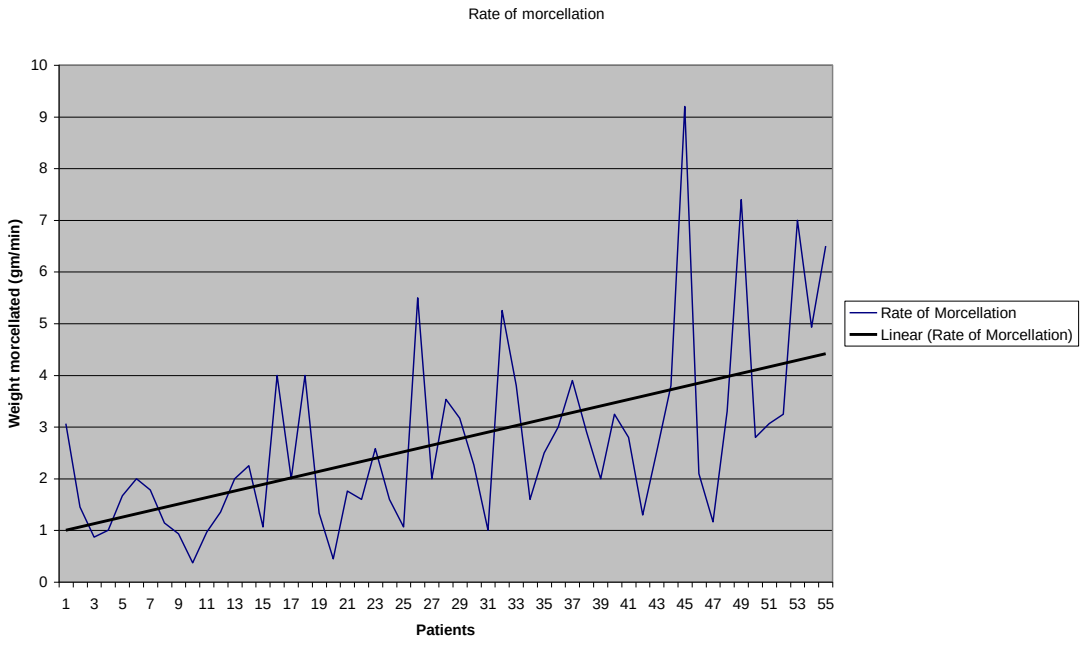


Figure 5:

Graph showing the ‘time for catheter removal’ post-operatively. The trendline has shown a gradual decline.

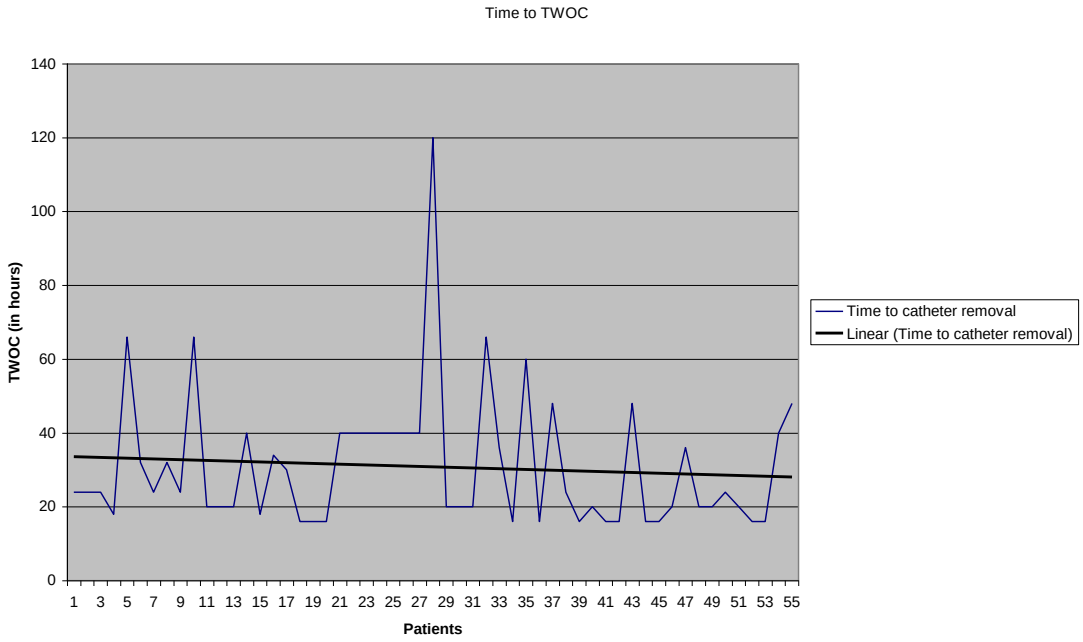


Figure 6:
Graph showing the percentage of successful trial without catheters in patients who were on pre-operative catheters and those who were operated for LUTS.

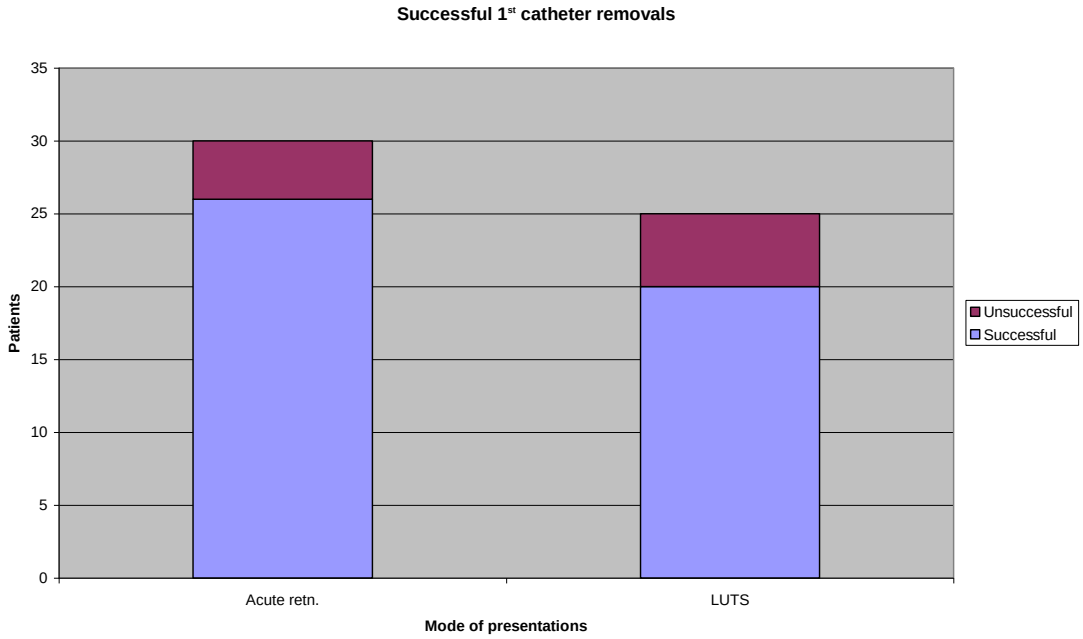


Figure 7:
Graph showing the successful catheter removals at discharge and at 2 weeks post-operatively.

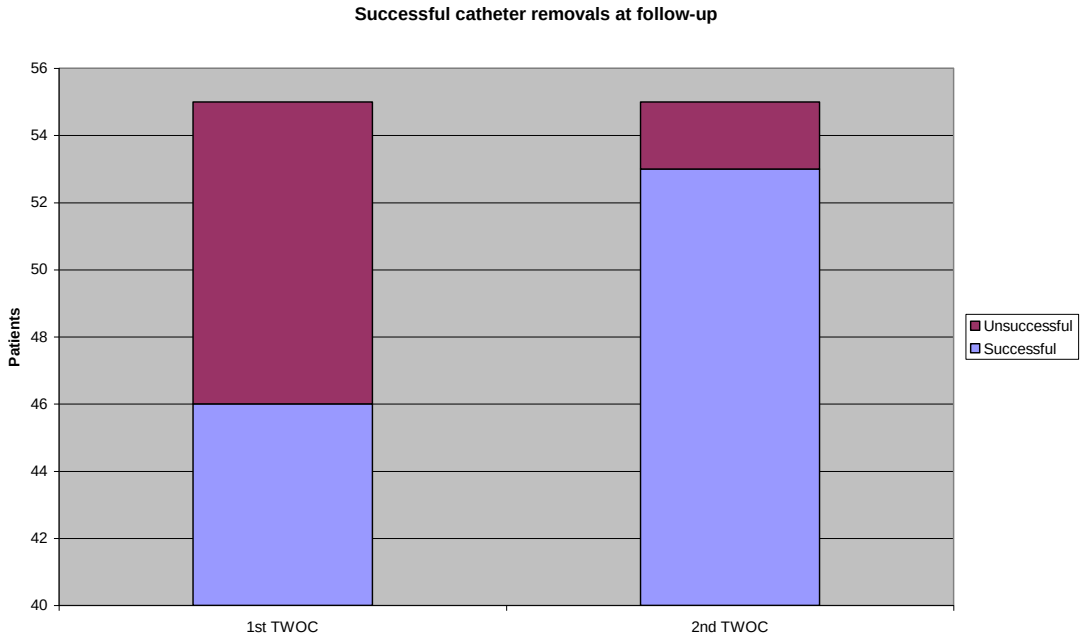
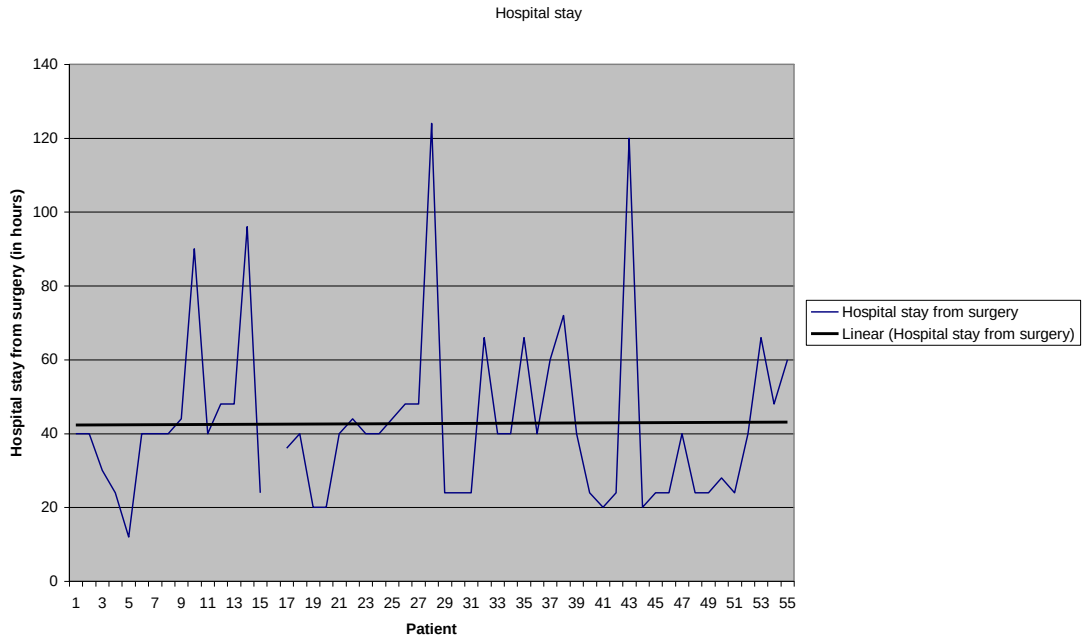


Figure 8

Graph showing the Hospital stay of patients after surgery. The trendline has remained constant.



Learning curve

As seen in fig. 3, when the values of the amount of tissue enucleated per minute are plotted and a trendline drawn, it shows a definite upward trend. The mean enucleation time for the 1st 10 cases is 0.9 gm/min while for the last 10 cases is 2.02gm/min. The critical value of 1gm/min enucleation time is achieved around the 40th case. The mean morcellation time for the 1st 10 cases is 1.42gm/min while for the last 10 cases is 4.42 gm/min. Therefore, the trendline for the morcellation time also shows and upward curve.

Discussion:

Over the last decade, HoLEP has gained acceptance among the urologists as a suitable method for treating BPH with comparable results. It is, in fact, a fusion of the concept of enucleation used in open prostatectomy with the concept of minimal invasiveness

of endoscopic surgery. The advantage of this technique though is that it is under direct vision unlike open prostatectomy and virtually all bleeders are coagulated.

The other advantage of HoLEP compared to TURP is the relatively bloodless field and therefore better visibility. That the procedure gives excellent hemostasis with minimal blood loss is reconfirmed by our results of a mean haemoglobin loss of just 1.29gm/L. Another absolute advantage as seen from our results is the nil incidence of TUR syndrome even for longer procedures and larger enucleations of over a 100 grams.

The difficulties encountered in HoLEP initially include tissue recognition, i.e., between the adenoma and the capsule. While the adenoma is distinctive yellow-brown when cut, the capsule is whitish with several layers of concentric fibres. The plane of enucleation is between them.

Though some groups have mentioned that holmium laser enucleation has a learning curve of 20 to 30 cases, in this study, we find that if the enucleation rate of 1gm/min is considered as a critical point in the learning curve, it is achieved around the 40^{th} case.

Bladder injury during tissue morcellation has been described in a few papers. However, we did not encounter any incidence of tissue morcellation. Probably because it was ensured that the bladder was kept adequately filled during the entire procedure.

The other results which are to be made note of is that 56.4% of cases did not require any irrigation at all. Two of the enucleations over 100gms did not require irrigation at all. Also the time for catheter removal and the overall hospital stay are very much comparable to the standard TURP, if not short. The incidence of stress urinary incontinence does seem to be at 10.9% at discharge. However, when these patients were followed-up in 3 months time, there were all dry.

Conclusions:

With promising series of papers about HoLEP coming in from various centres across the world, laser prostatectomy is the way to look forward to in prostate surgery. The learning curve of the procedure is not unusually long as often mentioned. The complications of the procedure are definitely less than the standard TURP. Further technical improvements will reduce the per-operative risks and increase the prevalence of the method in many hospitals.