

Lower Urinary Tract

Many technological treatments for BPH have been introduced in recent years, some with successful and others with poor results. Most authors have an initial enthusiasm for their novel technique but in some cases later evaluation of long-term results is somewhat disappointing. The holmium laser has been used in a wide variety of cases of BPH, particularly by the authors from New Zealand, who present their long-term (7-year) results in this section. They are happy to recommend the holmium laser on the basis of their results.

Long-term results of high-power holmium laser vaporization (ablation) of the prostate

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OBJECTIVE

To present the 7-year follow-up data from the initial series of patients treated by holmium laser ablation of the prostate (HoLAP) for symptoms of benign prostatic hyperplasia at our institution.

PATIENTS AND METHODS

In all, 79 patients underwent HoLAP in the initial series between September 1994 and May 1995. All patients were contacted by telephone and mail; those available for follow-up had their peak urinary flow rate, American Urological Association (AUA) symptom score, single-question quality-of-life (QoL) score and adverse events assessed. Patients were also assessed using the International Continence Society 'male short-form' (ICSmaleSF) questionnaire on lower urinary tract symptoms (LUTS).

RESULTS

At a median follow-up of 89 months (7.4 years), 17 patients had died (21%), 28 could not be contacted or refused follow-up (35%), leaving 34 patients (43%) available for assessment. The mean (range) AUA score of the remainder was 10.0 (0–26), the maximum urinary flow rate 16.8 (5–35) mL/s and QoL score 2.1 (0–5). The mean ICSmaleSF voiding score was 5.8 and the mean incontinence score 3.2. The impact score of their current LUTS (QoL) was 0.68, implying a minimal

effect. No patient required pads for incontinence. The reoperation rate was 15%, with one patient each undergoing transurethral resection or bladder neck incision, two undergoing holmium laser enucleation of the prostate and one having a bladder stone removed endoscopically.

CONCLUSIONS

The long-term results of HoLAP were satisfactory in those patients who were available for the follow-up.

KEYWORDS

holmium laser, contact laser ablation, prostate, prostatectomy

INTRODUCTION

Holmium laser ablation of the prostate (HoLAP) uses the vaporising properties of the Ho:YAG laser (2140 nm, 60–100 W; Lumenis Inc., Tel Aviv, Israel) in a near-contact mode. A channel is created within the prostatic fossa to relieve the patient of symptoms of BPH secondary to BPH. HoLAP was the first procedure using the holmium wavelength alone that was carried out on the prostate [1]. The development of holmium laser resection and enucleation techniques that allow the removal of more prostatic tissue have superseded it since the initial report was published. However, HoLAP is a relatively

TABLE 1 Baseline characteristics of patients undergoing HoLAP

Variable	Mean (range)
Age, years	67 (36–92)
AUA score	18.8 (8–34)
Q _{max} , mL/s	9.2 (4–16)
TRUS volume, mL	40.5 (14–133)
Operating room time, min	30.8 (5–90)
kJ used	54.8 (7–164)
Catheter time, days	2.6 (0.25–28)
Re-catheterization rate, %	9

simple procedure to learn as it requires no resection or enucleation of tissue, because the laser fibre is merely 'painted' systematically over the surface of the prostate until a TURP-like cavity is formed. It is a good initial procedure for urologists who are unfamiliar with the holmium laser, and like all vaporisation techniques it is best suited to smaller glands [1].

While there have been several different procedures which can compete with TURP for the surgical management of small prostates, very few of the reported series involving such methods have a follow-up of > 1 year. One of the major concerns about these less-invasive methods is whether the success rate reported at up to 1–2 years is durable in the long-term. The initial series of patients undergoing HoLAP at our institution was reviewed in 1995 [1,2]. We present the follow-up results up to 7 years for this group of patients.

PATIENTS AND METHODS

All patients undergoing HoLAP between September 1994 and May 1995 were reviewed; all data were collected prospectively. Before the procedure each patient had their peak urinary flow rate (Q_{max}), AUA symptom score, serum PSA and prostate volume (on TRUS) measured.

The laser fibre type, power settings, operative duration and energy used were noted during surgery, and afterward the duration of catheterization and hospital stay were recorded. Patients were followed up at 3 and 6 weeks and 3 months in the initial review. A further follow-up assessment was undertaken at ≥7 years after surgery. Patients were contacted by telephone and mail, and

Variable	Mean (range) at		
	1 month	3 months	7 years
N	79	79	34
Q _{max} , mL/s	15.2 (11–25)	14.5 (8–22)	16.8 (5–35)
AUA score	9.4 (5–25)	8.3 (0–21)	10.0 (0–26)
QoL score	N/A	N/A	2.1 (0–5)

interviewed. The Q_{max}, AUA scores, single-question quality-of-life scores (QoL), and the International Continence Society 'male short-form' questionnaire (ICSmaleSF) scores were assessed. All adverse events were recorded.

The ICSmaleSF is a concise, validated instrument developed to evaluate LUTS in men with benign prostatic disease. It differs from the AUA questionnaire in that it contains domains for incontinence (ICSmaleIS) and voiding symptoms (ICSmaleVS), and has separate scores for frequency, nocturia and the impact of symptoms on QoL.

The HoLAP technique was described in detail elsewhere [1,2]; all patients were treated with a side-firing dual-wavelength fibre or end-firing fibre. The prostate was ablated circumferentially to achieve a satisfactory channel. A high-powered holmium laser with a maximum average power of 60 W was used at an energy setting of 2.4 J at 25 Hz in each case. All patients were catheterized after surgery and the catheters removed on the following day.

RESULTS

In all, 79 patients were included in the original series; their characteristics are shown in Table 1. The catheter time included those patients (9%) who required re-catheterization and their total catheter time. At 7 years of follow-up, 17 patients had died (21%) and 28 (35%) could not be located (18) or refused further follow-up (10), leaving 34 patients (43%) for the follow-up. The baseline data for those who were followed was similar to those who were lost to follow-up. The median follow-up was 89 months (7.4 years).

Table 2 compares the symptom scores and flow rates at baseline and 1 and 3 months of follow-up with those at 7 years. The results of the ICSmaleSF in patients available at 7 years is presented in Table 3.

TABLE 2 Symptom scores and flow rates after surgery**TABLE 3** ICSmaleSF questionnaire scores at 7 years

Domain	Mean (range) highest possible score
ICSmaleVS	5.6 (0–16)
ICSmaleIS	3.5 (0–15)
Frequency	1.1 (0–3)
Nocturia	1.9 (0–4)
QoL	0.7 (0–3)

Five of the 34 patients (15%) had one further operation related to the lower urinary tract; one each had a bladder neck incision or TURP, two a holmium laser resection of the prostate and one had bladder stones removed.

DISCUSSION

HoLAP developed from combined endoscopic laser ablation of the prostate, which involved using the holmium laser to vaporize a channel, with the Nd:YAG laser used for coagulation prostatectomy. It was soon apparent that the holmium laser alone had excellent haemostatic properties when the beam was defocused. Experience with holmium vaporization showed that the procedure was slow and tedious, although simple to learn, and was effective in relieving the symptoms and improving flow rates in men with BPH, depending on the size of the channel created. However, it is best suited to smaller glands, with larger glands being more efficiently treated using the holmium laser as an incisional tool, as in the holmium laser enucleation technique. Those patients were treated with a 60 W laser; since then, 80 and 100 W holmium lasers have been introduced and the vaporization efficiency has increased proportionally, allowing larger glands to be treated in a more timely manner.

HoLAP has been compared in a randomized trial with TURP [4], where the efficacy in both

groups was similar at the 1-year of follow-up, but HoLAP was associated with less bleeding, a shorter hospital stay and routine next-day catheter removal. The present study reports on the long-term follow-up data of a group of patients treated with HoLAP. Any series of patients who have a mean age of 70 years at baseline and followed for at least 7 years will have a high loss rate as a result of death from various causes; 22% of the present patients were unavailable for that reason. This was also noted by Keoghane *et al.* [5] in their long-term follow-up of patients undergoing contact Nd:YAG laser ablation. Thus the present results at 7 years are open to bias, in that the patients remaining for analysis may not be representative of the group as a whole.

The mean symptom scores and flow rates in those patients available for follow-up show that HoLAP was a durable treatment in this group. There was an 83% improvement in Q_{max} and a 47% decrease in AUA score at 7 years compared with baseline. Comparing the mean scores from the ICSmaleSF questionnaire with follow-up data from the ICS/BPH trial [6] shows that the results for HoLAP at 7 years are between those of watchful waiting and TURP.

The reoperation rate of 15% should be compared with the series of other methods of contact vaporization of the prostate, e.g. Nd:YAG with contact tip, high-power potassium-titanyl-phosphate laser ablation and transurethral electrovaporization (TUVV). Unfortunately the follow-up in most of the published reports of these techniques is <1–2 years. The Oxford Laser Prostatectomy trial, using a high-powered Nd:YAG contact tip, reported an 18% re-operation rate at 5 years of follow-up [4]. A randomized trial between TURP and TUVV by Hammadeh *et al.* [7] showed a re-operation rate of 13% in the

TUVV arm at 3 years. The best results with vaporization techniques of any kind were in the series of patients undergoing high-powered potassium-titanyl-phosphate laser ablation of the prostate [8], where there was a low complication rate and no re-operations in 55 patients with a follow-up of up to 2 years. While these results are extraordinary in the context of any surgical treatment for BPH, other centres have not reproduced them to date. In comparison, a guideline report gives a re-treatment rate of 10% at 5 years after TURP [9].

One of the disadvantages of any contact vaporization technique is that no tissue is retrieved for histological analysis. It is important to exclude cases of prostate cancer before surgery and to follow patients afterward with serum PSA assays and a DRE if appropriate.

In conclusion, HoLAP is a simple and easily learned procedure. While just over 20% of men had died at 7 years of follow-up in the study, HoLAP provided a durable benefit in relieving LUTS and maintaining good urinary flow rates in those men who were available for analysis.

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Abbreviations: HoLAP, holmium laser ablation of the prostate; Q_{max} , maximum urinary flow rate; QoL, quality-of-life (score); ICSmaleSF, International Continence Society 'male short-form' (questionnaire); TUVV, transurethral electrovaporization.

