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# Use of the Holmium Laser for Ablation of the Prostate and Incision of the Bladder Neck

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## Introduction

The holmium laser is a multipurpose surgical laser with excellent stone-fragmenting qualities and well established ablative and hemostatic properties for many soft tissue applications. It is a standard of care for lithotripsy and is becoming an essential tool for urologists. The holmium laser can be used very effectively in several ways for the surgical management of BPH, adding to its value for urologists. The procedure selected depends upon the size of the prostate and the surgeon's experience level<sup>1</sup>.

This update summarizes the ablation and incision techniques for treating patients with small to moderate size prostates. The ablation technique is referred to as holmium ablation of the prostate (HoLAP) and the incision technique is alternatively referred to as bladder neck incision (BNI) or transurethral incision of the prostate (TUIP). Holmium ablation and BNI are easy to do, relatively bloodless procedures that are safe and effective for quick resolution of bladder outlet obstruction with minimal or no patient complications. Both techniques can easily be performed in under an hour and in an outpatient setting.

## Why holmium?

The holmium laser is ideal for cleanly ablating without charring or overheating tissue. Since the holmium absorption depth is only .4 mm, tissue is ablated faster than heat is conducted into surrounding tissue. Holmium energy is delivered in a pulsed mode with each pulse containing enough energy to vaporize the tissue. The vaporized tissue is removed before

it can conduct heat, which minimizes thermal damage. The resulting 'what-you-see-is-what-you-get' effect contrasts to the coagulating effects of Nd:YAG and KTP lasers whose wavelengths penetrate deeper and extend below the visible tissue surface.

Hemostasis with holmium is remarkably good. Its localized coagulation effect 'seals' the tissue and provides hemostasis superior to electrocautery instruments without producing deeper thermal injury associated with Nd:YAG or KTP lasers<sup>2</sup>. These ablating and hemostasis features make the holmium laser an excellent energy choice for BPH treatment.

## Holmium Ablation of the Prostate

Holmium ablation is a simple to do procedure and ideal for moderate sized prostates of 40 grams or less<sup>3,4,5</sup>. Ablation of larger prostates is achievable, but surgical time is proportionate to the amount of tissue removed. Ablation can easily be mastered after only a few cases<sup>4</sup>. The ablation technique results in immediate urinary flow improvements and symptom relief. Gilling, et al. reported that flow rates increased by 65% (6 point improvement) and AUA symptom scores improved by over 50% (10 point improvement)<sup>3,4</sup>. Over one gram of tissue was ablated per minute, with a mean treatment time of 30 minutes. None of the patients required blood transfusions. Catheters were routinely removed the morning after surgery and patients released after an overnight hospital stay. Ablation is simpler to perform than TURP with substantially fewer patient complications.

Gilling <i>et. al.</i> <sup>3,4</sup>		
Number of patients	79	
Mean age (years)	70 (36-70)	
Mean prostate volume (cc)	40.5 (14-133)	
Surgical time	30.8 minutes (5-90)	
	<u>Pre Op</u>	<u>3 Mo Post Op</u>
Urine flow rates (mL/sec)	9.2 (4-16)	14.5 (8-22)
AUA Symptom Scores	18.8 (8-34)	8.3 (0-21)
Length of hospital stay	Less than 24 hours	
Blood transfusions	None	

**Table 1: HoLAP study**

It should be noted that ablation, irrespective of the energy source used, is not efficient for removing a large bulk of tissue.<sup>4</sup> This means ablation is ideally suited for moderate size glands but time-consuming for larger ones. The surgical time depends upon whether a channel is created or all tissue is removed down to capsule. Since the tissue is vaporized, there is none retrieved for histology analysis. However, holmium ablation is a simple to do, easy to learn, safe and effective surgical approach. Ablation also provides an excellent introduction to prostatic tissue effects for those new to using the holmium laser<sup>2,5</sup>. Retreatment data is not yet published, but it is assumed to be the same as for other vaporization techniques. Recently, Gilling, *et al.* reported results that validated long term symptom improvements and durability, with a 15% reoperation rate after seven years.<sup>6</sup>

### Recommended equipment

- VersaPulse® PowerSuite™ 100W, 80W or 60W holmium or 80/100W dual wavelength laser
- 26F continuous flow endoscope, inner sheath modified with fiber stabilization guide or laser bridge that accommodates the DuoTome 7.2F outer diameter
- DuoTome SideLite™ 550 fiber

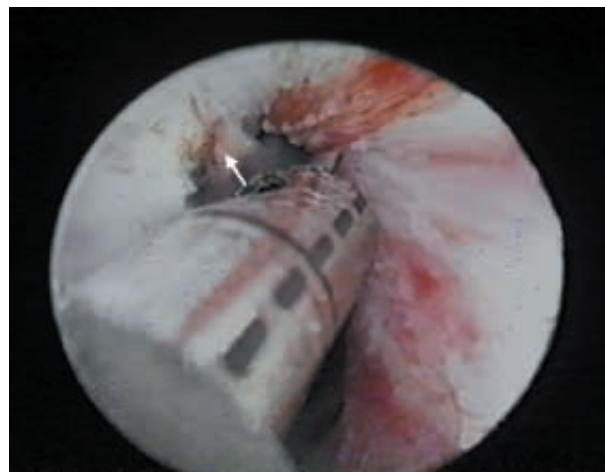
### Recommended laser settings

2.0–2.4 Joules 25–50 Hertz 50–100 Watts<sup>1,9</sup>

### Technique

Holmium ablation is a relatively simple procedure where the prostate tissue is ablated circumferentially. The red aiming beam is used to show exactly where the treatment beam will be delivered. The laser fiber is fixed within the endoscope, and both fiber and scope are moved back and forth to ‘paint’ the tissue<sup>1</sup>. Tissue is ablated until an adequate channel is created.

A DuoTome side-fire fiber is preferred because the laser energy is directed at a 70° angle,



**Figure 1: Laser energy is delivered with a side-fire fiber that is used to ‘paint’ the prostatic tissue until an adequate channel is created**

	Gilling <sup>3</sup> BNI		Cornford <sup>6</sup> TUIP	
Number of patients	69		100	
Mean age (years)	69 (32-86)		62 (30-86)	
Mean prostate volume	24.4 cc (11-50)		Less than 30 grams	
Catheter removal	Morning after surgery		97% without post op catheter	
	<u>Pre Op</u>	<u>3 Mo Post Op</u>	<u>Pre Op</u>	<u>2 Yrs Post Op</u>
Urine flow rates (mL/sec)	7.9 (3-14)	19.0 (7-15)	9.8 (6.2-13.4)	18.5 (10.4-26.6)
AUA Symptom Score	22.3 (8-35)	8.1 (0-25)	19.2 (13.5-24.9)	3.9 (0-8)
Other comments	No untoward perioperative events		No significant complications	

Table 2: BNI and TUIP studies

making it easier to maintain the laser beam perpendicular to the prostate surface for total vaporization. The fiber tip should be held against the tissue to be most effective. An end-fire 550 or 1000 micron fiber may be used if necessary.

### Bladder Neck Incision and Transurethral Incision of the Prostate

BNI and TUIP have been reported very effective with prostates less than 30 grams. Incision through the bladder neck, prostate, and to or through the prostatic capsule can provide effective relief with greater efficiency and less morbidity than can TURP<sup>2,7</sup>. The technique is simpler and less invasive than TURP<sup>6</sup>. Voiding symptoms are improved, catheters are not required postoperatively and no significant complications occur. The substantial symptom improvements have proven durable after two years<sup>6</sup>.

### Recommended equipment

- VersaPulse PowerSuite 100W, 80W or 60W holmium or 80/100W dual wavelength laser
- 26F continuous flow endoscope, inner sheath modified with fiber stabilization guide or laser bridge that accommodates the SlimLine 2.3F outer diameter
- SlimLine™ 550 fiber

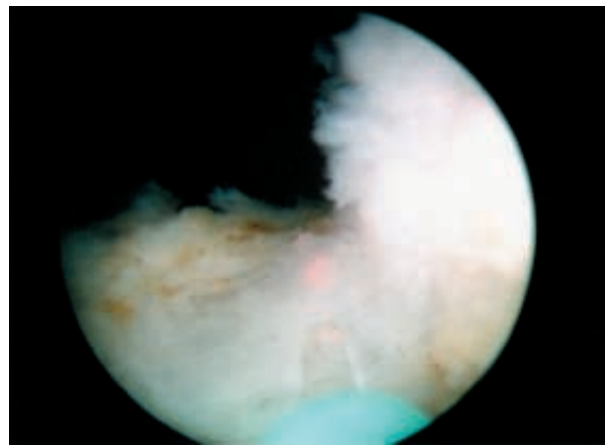


Figure 2: Endoscopic view of BNI

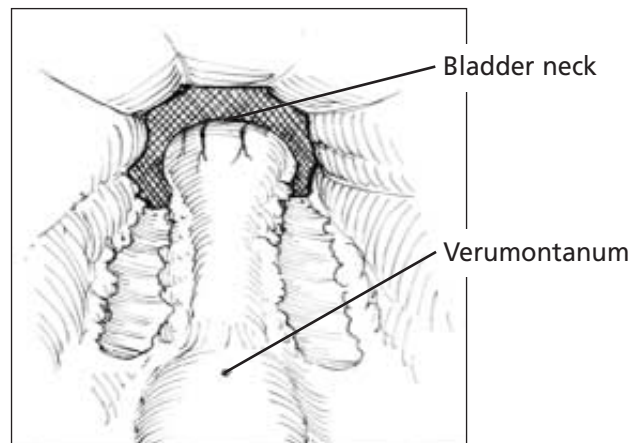


Figure 3: Completed bilateral BNI

### Recommended laser settings

1.0–2.0 Joules 10–50 Hertz 10–100 Watts<sup>1,9</sup>

## Technique

BNI is the simplest of all the prostatic procedures and is frequently the first procedure urologists attempt when using holmium<sup>5</sup>. The technique depends upon the surgeon's preference for either a single incision or bilateral incisions<sup>1</sup>. The prostate is incised from the bladder neck to the verumontanum and incisions extended to the prostatic capsule. The single incision is usually made at the 6 o'clock position; the bilateral incisions made at the 5 and 7 o'clock positions. Cornford uses a single incision from the right ureteral orifice through the bladder neck to the level of the verumontanum, through the prostate and capsule to fat<sup>6</sup>.

## Summary

The holmium laser is a versatile and precise surgical tool for many specialties and an

excellent choice for BPH treatment. Holmium ablation, BNI and TUIP are minimally invasive, simple to perform techniques with short learning curves. They are relatively bloodless, 30 minute procedures that are safe and effective for quick resolution of BPH symptoms with minimal or no patient complications.

An added benefit of the holmium laser not addressed in this update is that resection and enucleation techniques have been developed for treating prostates of all sizes. Both are highly effective techniques with significantly less morbidity than other approaches. HoLRP and HoLEP enable tissue retrieval for histology and represent the state-of-the-art procedures for prostatectomy with this wavelength.

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