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Platinum Priority – Editorial and Reply from Authors

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# Laser Enucleation Is Increasingly Becoming the Standard of Care for Treatment of Benign Prostatic Hyperplasia of All Sizes

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Laser technologies for benign prostatic hyperplasia (BPH) have steadily replaced transurethral resection of the prostate (TURP) over the past 10 yr in many parts of the world [1]. For example, the rate of TURP performance declined 47.6% in a US Medicare population between 2000 and 2008 [2]. Techniques for laser prostatectomy used in each country vary, with enucleation preferred in some countries [3] and vaporisation preferred in others [2]. The European Association of Urology and the American Urological Association BPH guidelines panels consider both holmium laser enucleation of the prostate (HoLEP) and photoselective vaporisation of the prostate to be equivalent to TURP, with long-term data favouring HoLEP; however, there are now a plethora of "me too" technologies (both electrosurgical and laser) that need to be considered, with a bewildering array of acronyms, now described [4].

The Thulium:Yttrium-Aluminium-Garnet (YAG) laser (2014 nm wavelength) is one of four contemporary groups of laser systems used for BPH treatment. Holmium:YAG (2140 nm wavelength), 532-nm lasers, and diode systems (a variety of wavelengths) are the others [4]. Thulium laser techniques have followed the development of holmium laser prostatectomy, which evolved from a modality used initially for ablation and resection to enucleation more than 15 years ago [5]. Currently, four distinct procedures utilise the thulium laser: vaporisation (ThuVAP), vaporesection (ThuVARP), vapoenucleation (ThuVEP), and enucleation (ThuLEP). Each is described by different authors [6].

In this edition of the journal, Gross and colleagues, who are pioneers with this wavelength, describe a series of 1080 patients who underwent ThuVEP at their institution [7]. They comprehensively document the peri- and early postoperative outcomes and complications in this prospective study. A variety of lasers were used over the 4-yr period, from 70 W to 200 W, reflecting the evolution of the technology over this time. A mechanical morcellator was used, and the data of 11 different surgeons were included. By department protocol, bladder irrigation was used overnight in all cases, and the catheter was removed on the second day. Complications were classified using the modified Clavien system, and rates were compared for differently sized prostates and different phases of the learning curve.

The authors found that a median of 30 g of tissue was retrieved from their patients (median preoperative transrectal ultrasound volume: 51 ml), and incidental prostatic carcinoma was found in 5.5% of these patients [7]. These values are similar to those found in a large unselected series of patients undergoing HoLEP [8]. Minor complications not requiring intervention (Clavien 1 and 2) occurred in 24.6% of patients. These included recatheterisation in 9%, prolonged irrigation in 3.5%, and transfusion in 1.7%. More important, major complications requiring reintervention (Clavien 3a, 3b, and 4a) occurred in 6.6% of patients, including incomplete morcellation (1.7%), residual apical tissue (2.7%), and coagulation of the prostate fossa for bleeding (2%). A decrease in complications was noted as the series progressed.

Since laser enucleation (HoLEP) was first described in large prostates [9], the claim of being a *size-independent* procedure has been made for HoLEP by a number of authors. Gross and colleagues assessed complications and outcomes by prostate size for ThuVEP [7]. They found that there were no differences in transfusion rates or for any other complication, for that matter, in patients following ThuVEP when these were analysed by prostate size

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(<40 ml, 40–79 ml, and >80 ml). They also showed once again that enucleation efficiency (grams per minute) improves as prostate size increases, further supporting the contention that endoscopic enucleation is a procedure that should be offered to all patients with large prostates if the local expertise is available. If the morbidity of laser enucleation (with the holmium and thulium wavelengths) is minimal, the procedure is cost-effective, and it is truly size independent, then the need for more morbid and costly alternatives such as laparoscopic and robotic simple prostatectomy disappears. With double the operative time, double the hospital stay, a catheter time longer than a week, and a significant increase in cost, a robotic approach to enucleation becomes difficult to justify [10]. The data from randomised trials confirming that endoscopic enucleation (in this case, HoLEP) is equivalent to open prostatectomy in these patients is compelling.

It is likely that the selection of an energy source for endoscopic enucleation in the future will be a matter of personal choice. Electrosurgical approaches have been proposed, as have techniques using a variety of laser wavelengths. The so-called Green EP (532 nm) has been described, as have enucleation procedures utilising diode lasers (the Eraser Laser, using a 1318-nm laser, and the DiLEP, at 980 nm). The thulium laser (around 2 microns) has a wavelength similar to holmium but operates in a continuous rather than pulsed mode. The absorbing chromophore is water (which comprises around two-thirds of the prostate) for both lasers, giving them similar optical penetration (0.2–0.4 mm) [4]. From a technical standpoint, the pulsed nature of the holmium laser allows it to be utilised for stone fragmentation as well as soft tissue applications, making it a more versatile endoscopic tool. More important, however, is the fact that the plane of enucleation is easier to develop and follow, and the visibility seems to be superior with the holmium laser (due to its pulsed mode) compared to energy sources (including electrocautery) operating in a continuous mode [11]. There is also noticeably less charring of the tissue in pulsed mode. Whether these differences are important clinically has yet to be determined, but comparative trials of these techniques by investigators experienced in enucleation will be the next step in this evolution.

*Conflicts of interest:* The author has nothing to disclose.

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