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Techniques and Training with GreenLight HPS 120-W Laser Therapy of the Prostate: Position Paper

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Abstract

We report the technical recommendations of the International GreenLight User Group on photoselective vaporization of the prostate in men with benign prostatic hyperplasia using the GreenLight HPS system (American Medical Systems, Minnetonka, Minnesota, USA). This high-power system employs a 120-W laser, which is a modification of the previous 80-W potassium-titanyl-phosphate (KTP) laser. The objective of this report is to optimize the efficacy and safety of the procedure by drawing on the experience of this multicentre international group. In this regard, recommendations for training are made, which relate to existing users of the 80-W KTP laser as well as to new laser users.

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1. Introduction

Photoselective vaporization of the prostate (PVP) using the 80-W potassium-titanyl-phosphate (KTP) 532-nm laser is a recent technological development in the use of lasers as an alternative to transurethral resection of the prostate (TURP) for the treatment of symptomatic benign prostatic hyperplasia. Originally introduced by Malek et al. in 1998 utilizing a 60-W KTP laser, a subsequent pilot study of PVP with the 80-W KTP laser showed a good outcome and minimal side effects in men with prostate volumes of 24–76 ml [1]. PVP works on a different mechanism than the existing holmium laser enucleation of the prostate, in that it involves prostate tissue ablation through vaporization as opposed to enucleation.

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Further progress with PVP has been the introduction of the high-performance system (HPS) 120-W laser, which aims to reduce lasing time and improve clinical outcomes while maintaining the same degree of safety for patients. Technical recommendations on the GreenLight 80-W KTP laser (American Medical Systems, Minnetonka, Minnesota, USA) have been published by the International GreenLight User Group, in addition to training recommendations [2]. In this paper, we discuss how the technique is used with the GreenLight HPS 120-W laser system and what the new training requirements will be.

2. General principles

Several factors have to be considered when using the GreenLight HPS 120-W laser. The new HPS system operates with a fibre that emits a beam that is more collimated and more powerful than the 80-W KTP laser. This translates in vitro as well as clinically into faster vaporization and a greater ability to penetrate prostate tissue from longer fibre distances. The increase in vaporization speed is associated with faster bubble generation and more tissue debris, which has the potential to reduce the working visibility. For this reason, it is helpful to work with the fibre slightly further from the cystoscope, which also reduces the risk of damage to the cystoscope from reflected energy. This also translates into better orientation inside the prostatic fossa during surgery (Fig. 1). With this technique, it is important that the surgeon is sure that he/she is firing inside the prostatic fossa and not in the bladder. Caution is recommended at the actual bladder neck, where the fibre should be kept closer to the cystoscope and the tissue to avoid damage to the ureteral orifices.

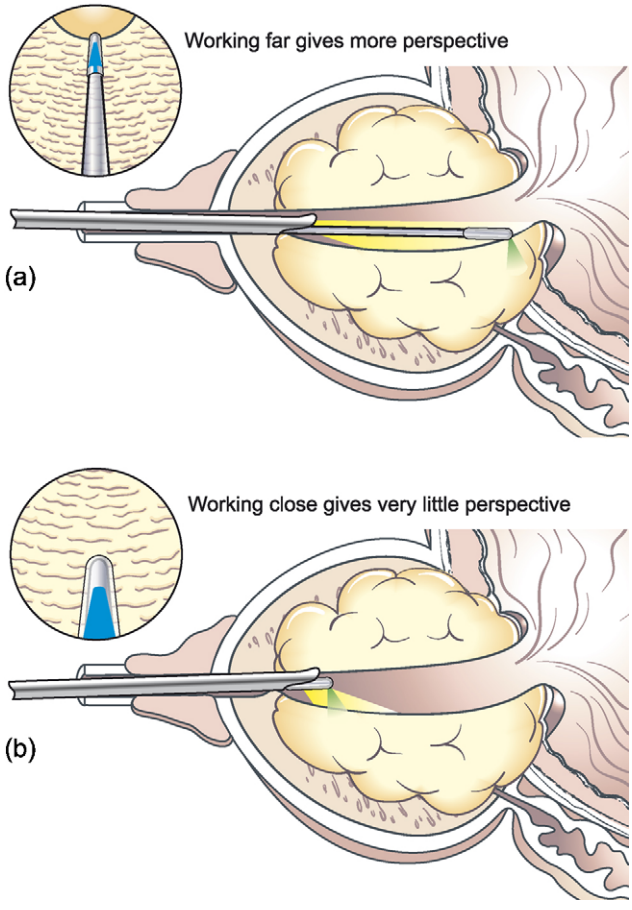

Fig. 1 – Working distance of 120-W fibre from the cystoscope: (a) at a distance where there is more perspective and orientation is better; (b) close to the cystoscope, where there is a higher risk of telescope damage and orientation is worse.

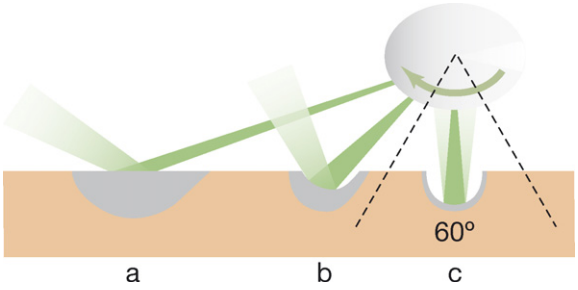

Fig. 2 – Photoselective vaporization of the prostate. The fibre should be rotated in a sweeping fashion with rotation amplitude reduced to an arc of 60° (c). This avoids an increase in the distance from the fibre to the tissue, which would produce an oblique light footprint, reduce vaporization efficiency, increase reflection of light, and increase coagulation (a, b).

When handling the actual fibre during lasing, with the increased 120-W power it is important to move the fibre slowly but constantly to avoid drilling holes in the prostate tissue, and spreading the energy in this way will create a smooth surface. In addition, the rotation speed of the fibre must be adapted to the efficiency of vaporization: if efficiency is high, rotation can be speeded up, whereas if efficiency is low due to poor vascularization of a region, rotation should be slowed down. The rotation angle of the fibre must be kept small (ie, from 5 to 7 o'clock, or 60°) to keep the angle of incidence of the beam as perpendicular to the tissue as possible (Fig. 2). The working distance of the laser from the tissue is a key issue. In vitro studies have shown that it is possible to work slightly further away with the 120-W laser compared with the 80-W laser, at up to 4 mm, and still obtain good vaporization (Fig. 3). However, a more efficient