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Editorial Comment On "Effect Of Laser Settings And Irrigation Rates On Ureteral Temperature During Holmium Laser Lithotripsy, An In Vitro Model" By Wollin Et Al.

Ho:Yag Laser and intraoperative Temperature control: the latest boundary of safety.

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In the paper written by Wollin and colleagues, the Authors approach a hot topic, because of the essential and widespread use of Holmium:Yttrium-Alluminium-Garnet (Ho:Yag) Laser in endourology. The same day of Wallin's group publication, Aldoukhi et al. published a similar paper[i]. Ho:Yag energy has been demonstrated to be absorbed by water and has short extinction length in tissue with a depth of penetration of 400 μm[ii,iii] and urologists focused their attention on laser effectiveness in breaking stones or cutting tissue rather than on potential damages caused by laser energy. The low morbidity profile of F-URS is demonstrated in several studies[iv] .However, the laser high density of power absorbed in irrigation solution and tissue results in a rough overheating[v]. As stated by Authors, 43 °C is the threshold for exponential thermal cytotoxicity. Above this temperature, cellular functions may be altered as a consequence of protein denaturation.

Until now, there are a few studies on the effect of laser setting and irrigation system on intraluminal temperature during intra-ureteral surgery[vi]. Ho:Yag Laser has been used in the upper urinary tract not only to treat ureteral and kidney stones, but also to cut ureteral strictures and ablate upper tract neoplasm. Many studies have been done, aiming to define the most efficient laser setting for different endourological procedures, in respect of patient safety avoiding damages of instruments used. Companies are launching on the market machines more and more powerful, up to 120 Watt often implemented with specific software for stone treatment. Irrigation is an issue of primary importance in endourology allowing and providing a better vision and cooling the system. Flexible ureteroscopes are constantly downsizing due to technical advancements with working/irrigation channel diameter decreasing to 3.6 Fr for majority of ureteroscopes making critical the irrigation when the working channel is occupied by instruments. Several systems to force irrigation are available ranging from the cheapest gravitational system, to pumps able to define exactly temperature and pressure output[vii]. Wollin and Colleagues paper, underlines how temperature control can help endourologist in a more conscious usage of laser power reducing potential ureteral injuries.

Authors decided to use a flow unit (0 cc/min, 50 cc/min, 100 cc/min). This is easy to calculate if you have a system able to measure exit flow or if flow is maintained constant during all surgery, which in daily practice does not happen. Most urologist uses gravity system, with or without the auxilium of different irrigation systems. It would be useful if

authors, repeating the experiment in vivo, report the correlation pressure/flow. Aldouki et al in their experiment report both flow and pressure. It is evident how two parameters are related[1]. To obtain a flow of 15 ml/min in their model, pressure required was 100 cmH2O, to obtain a 40 ml/min flow pressure was calculated to be 304 cmH2O. Nowadays, surgeons have to consider the intra renal pressure to prevent upper tract damages and postoperative infections, the technique preferred to treat the target that is the appropriate laser energy and now even the heating effect due to laser power. Wollin and colleagues paper shed some light on this topic and correlating irrigation and temperature give some more freedom in laser setting choice to be effective respecting patient tissues. Moreover, looking at the primary results in vitro and according to Aldoukhi study too, beside the need of a proper irrigation, we can assume that high power machines doesn't seem to be necessary for upper urinary tract treatment. In fact, high frequency (more than 40 Hz) results in blurred vision[viii] and high power results in high intraluminal temperature. The logical question is: do we really need high power holmium laser machines for upper urinary tract disease during uteterorenoscopy? The answer, up to day, is on debate. We congratulate the Authors for identifying this outcome and for continuing to seek out temperatures in the future with in vivo study during lasing in ureterorenoscopy.

Holmium:Yttrium-Alluminium-Garnet = Ho:Yag

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