IN VITRO EFFICACY OF HOLMIUM:YAG LASER LITHOTRIPSY IN NON FLOATING STONES: EFFECT OF PULSE FREQUENCY, ENERGY AND LENGTH - 
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INTRODUCTION AND OBJECTIVES: Holmium:YAG (Ho:YAG) laser lithotripsy is the gold standard in endoscopic stone treatment. Aim of this study was to evaluate the influence of pulse frequency, power and length on the effectiveness of Ho:YAG laser lithotripsy using two different artificial stone compositions in-vitro.

METHODS: Three different Ho:YAG laser devices (Sphinx, RevolixDuo (both LisaLaser, Germany) and Odyssey 30 (Cook, Ireland)) were tested. The devices were used at different pulse energy rates (1 and 2 Joule) and frequency settings (5 and 10 Hz) all resulting in an output power of 10W, respectively. Where possible (Sphinx and Odyssey 30), pulse length was modified (350 vs. 700 mSec). The light was transmitted via flexible 365um fibers. Experiments were performed in a water bath using cone shaped artificial stone (20ml volume) consisting of a soft stone composition (plaster of paris; Quick-mix, Germany) and a hard stone composition (Fujirock type 4 dental stone; GC Europe, Belgium). Lithotripsy was performed for 60 sec in contact mode on fixed stones applying 600 W in total per setting. Stones were dried for 72 h; fine granulated sand was used to measure the volume of the craters. Sample size was n=10 for all settings using hard stones, and n=6 when using soft stones. Unpaired t-test was used for statistical analysis.

RESULTS: In all of the 5 tested groups per stone type, a slower pulse rate but increased pulse energy (5 Hz/2 J vs. 10 Hz/1 J) resulted in a higher stone disintegration. At 5 Hz/2 J Ho:YAG laser lithotripsy was more effective applied on hard stones (+ 27.46% (10-55.4%); all p < 0.05) and on soft stones (+ 33.62% (8-54.3%); 3 of 5 tested groups p < 0.05) compared to the 10 Hz/1 J setting.

Furthermore, reduction of the pulse length from 700 to 350 mSec resulted in a significantly higher stone disintegration (+ 71.58% (57-120.6%); all p < 0.05) in soft stone composition in 4 tested groups. In hard stone composition, reducing the pulse length was associated with a significant higher stone disintegration (+ 27.25% (23.8-30.7%); all p < 0.05) in combination with higher pulse energy (2 J/5 Hz). At lower pulse energy (1 J/10 Hz), the increased stone disintegration rate was not significant (+ 6.5% (6.4-6.5%); p > 0.05, respectively).

CONCLUSIONS: Our results indicate that higher pulse energy and shorter pulse length increase disintegration rates of Holmium:YAG laser lithotripsy when retropulsion is excluded in vitro. This may help to improve efficacy of Holmium:YAG laser lithotripsy using two different artificial stone compositions in-vitro. Biopsies were taken from all detected lesions using the biopsy forceps and sent for examination by a pathologist blinded to the gross description of the lesion. Pathology interpretations were then compared to the corresponding WL and NBI images. Holmium laser vaporization was performed for all apparent lesions.

RESULTS: Subjectively, NBI significantly improved the endoscopic visualization of the tumors, providing a detailed description of their limits and vascular architecture. Objectively (out of 35 detected tumors) 5 additional tumors (14.2%) in 4 patients (14.8%), as well the extended limits of 3 tumors (8.5%) in 3 patients (11.1%) were detected by NBI when the findings by WL imaging were considered normal.

CONCLUSIONS: This is the one of first report regarding the use of NBI on UUT-TCC. From this study we recommend the NBI as is a valuable diagnostic method, as it considerably improves tumor detection rate by 22.7% comparing to the WL.

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NARROW BAND IMAGING DIGITAL FLEXIBLE URETEROSCOPY IN DETECTION OF THE UPPER URINARY TRACT TRANSITIONAL CELL CARCINOMA: INITIAL EXPERIENCE - 
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INTRODUCTION AND OBJECTIVES: The conservative treatment of the (UUT-UT) needs a high quality of endoscopic exploration in order to visualize all the existing tumors. We aimed to compare narrow band imaging (NBI) to white light (WL) using the new URF-V Olympus digital flexible ureteroscope (DFU) in detection of the upper urinary tract transitional cell carcinomas (UUT-TCC).

METHODS: NBI and WL were performed in 27 patients at our university teaching hospital, 14 with known cases of UUT-TCC as follow-up, and 13 patients with first-suspicion of cancer. All patients underwent NBI and WL Upper urinary tract examination using the URF-V DFU performed by a single urologist. Full renal collecting system examination was performed first under WL and then under NBI.