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Study Summary

Thulium Fibre Laser versus Holmium:YAG for Ureteroscopic Lithotripsy: Outcomes from a Prospective Randomised Clinical Trial

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Objective and Indication

To compare outcomes of thulium fiber laser (TFL) and holmium:yttrium-aluminium-garnet (Ho:YAG) laser treatment in elective day-case ureterorenoscopic (URS) lithotripsy. Primary outcome measure was stone-free rate (SFR).

Design and Methods

- Prospective randomised clinical trial.
- Group 1: Ho:YAG laser (Medilas H Solvo 30 W; Dornier MedTech, Weßling, Germany); Group 2: TFL (SOLTIVE™ Premium 60 W; Olympus, USA).
- Inclusion: patients >18 years with ureteral and/or renal stones >5 mm, confirmed on preoperative non-contrast computed tomography for which conservative treatment had failed.
- Exclusion: untreated urinary infection, known anatomic abnormality, urothelial tumor, negative URS, direct extraction of the stone(s), failure to reach the stone in the upper urinary tract with ureteroscope.
- For both groups, the start-up laser settings were 0.4 J at 6 Hz.

Results

- 120 patients randomised to undergo treatment with either Ho:YAG laser (n=60) or TFL (n =60*).
- After a single session treatment, TFL group shows significantly higher SFR at three months follow-up than Ho:YAG group (92% vs. 67%, respectively; p = 0.001).
    - SFR for ureteral stones was comparable between the groups (100% in both groups).
    - SFR for renal stones was significantly higher in the TFL group than in the Ho:YAG group (86% vs. 49%, respectively; p = 0.001).
- Operative time with TFL was significantly shorter than Ho:YAG treatment (49 min vs. 57 min, respectively; p = 0.008).
- The most frequent intraoperative adverse event was bleeding, which occurred significantly more often in the Ho:YAG group than in the TFL group (22% vs. 5%, respectively; 13 vs. three patients; p = 0.014).

Key Findings

- TFL treatment in URS lithotripsy led to significantly higher SFR, shorter operative time, and fewer intraoperative complications (bleeding) than Ho:YAG laser treatment. TFL is the emerging laser of choice for stone lithotripsy.

Conclusion

Thulium fiber laser (SOLTIVE Premium) treatment achieved significantly higher stone free rate, shorter operative time, and fewer intraoperative complications compared to Ho:YAG laser (Medilas H Solvo 30W) treatment in patients with renal stones in this randomized controlled trial.

*In TFL group, one patient was lost to follow-up and had therefore missing data on SFR. SFR with TFL was analyzed with the outcome of the remaining 59 patients.

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