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Comparison of Safety and Efficacy between Thulium Fibre Laser and Holmium YAG Laser for Retrograde Intrarenal Surgery

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Abstract : Introduction: After Holmium:yttrium-aluminum-garnet (Ho: YAG) laser has revolutionized the management of urolithiasis, the introduction of Thulium fibre laser (TFL) has already challenged Ho:YAG laser due to its multiple commendable properties. Nevertheless, there are only few studies comparing TFL and holmium laser in Retrograde Intrarenal Surgery(RIRS). Therefore, this study was carried out to compare the efficacy and safety of thulium fiber laser (TFL) and holmium laser in RIRS. Methods: This prospective comparative study, which included all patients undergoing laser lithotripsy (RIRS) for proximal ureteric calculus and nephrolithiasis from March 2022 to March 2023, consisted of 63 patients in Ho:YAG laser group and 65 patients in TFL group. Stone free rate, operative time, laser utilization time, energy used, and complications were analysed between the two groups. Results: Mean stone size was comparable in TFL (14.23±4.1 mm) and Ho:YAG (13.88±3.28 mm) group, p-0.48. Similarly, mean stone density in TFL (1269±262 HU) was comparable to Ho:YAG (1189±212 HU), p-0.48. There was significant difference in lasing time between TFL (12.69±7.41 mins) and Ho:YAG (20.44±14 mins), p-0.012). TFL group had operative time of 43.47± 16.8 mins which was shorter than Ho:YAG group (58±26.3 mins),p-0.005. Both TFL and Ho:YAG groups had comparable total energy used(11.4±6.2 vs 12±8 respectively, p-0.758). Stone free rate was 87%for TFL, whereas it was 79.5% for Ho:YAG, p-0.25). Two cases of sepsis and one ureteric stricture were encountered in TFL, whereas three cases suffered from sepsis apart from one ureteric stricture in Ho:YAG group, p-0.62). Conclusion: Thulium Fibre Laser has similar efficacy as Holmium: YAG Laser in terms of safety and stone free rate. However, due to better stone ablation rate in TFL, it can become the game changer in management of urolithiasis in the coming days.

Keywords : retrograde intrarenal surgery, thulium fibre laser, holmium:yttrium-aluminum-garnet (ho:yag) laser, nephrolithiasis
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