High-power thulium fiber laser ablation of urinary tissues at 1.94 microm.

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PURPOSE: This paper describes the preliminary testing of a new laser, the thulium fiber laser, as a potential replacement for the holmium:YAG laser for multiple applications in urology. MATERIALS AND METHODS: A 40 W thulium fiber laser operating at a wavelength of 1.94 microm delivered radiation in a continuous-wave or pulsed mode (10 msec) through either 300-microm- or 600-microm-core low-OH silica fibers for vaporization of canine prostate and incision of animal ureter and bladder-neck tissues. RESULTS: The thulium fiber laser vaporized prostate tissue at a rate of 0.21+/-0.02 g/min. The thermal-coagulation zone measured 500 to 2000 microm, demonstrating the potential for hemostasis. Laser incisions were also made in bladder tissue and ureter, with coagulation zones of 400 to 600 microm. CONCLUSIONS: The thulium fiber laser has several potential advantages over the holmium laser, including smaller size, more efficient operation, more precise incision of tissues, and operation in either the pulsed or the continuous-wave mode. However, before clinical use will be possible, development of higher-power thulium fiber lasers and shorter pulse lengths will be necessary for rapid vaporization of the prostate and more precise incision of urethral/bladder-neck strictures, respectively.

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