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Bilateral focal ablation of prostate tissue using low energy direct current (LEDC): A preclinical canine study

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Introduction & Objectives: Low energy direct current (LEDC) is a technology capable of ablating prostatic tissue in a focal manner by applying electric pulses between monopolar electrodes. We evaluated the side effects, erectile function and capability to preserve adjacent tissues in a canine model of bilateral focal prostate ablation.

Materials & Methods: Twelve male Beagle dogs underwent bilateral focal prostate ablation using the NanoKnife™ LEDC system. Three 19G monopolar electrodes were transperineally placed on each side of the prostate under transrectal ultrasonographic (TRUS) guidance using a triangular probe array. Intra- and postoperative side effects were recorded. Erectile function was evaluated at baseline and 4-5 and 26-27 days postoperatively. The animals were terminated at 7(n=6) and 30 days (n=6) for gross and microscopic evaluation of the prostate and adjacent organs.

Results: Median prostate volume on TRUS was 12.1mL (range 8.9-17.2). The electrodes were placed at a median distances of 0.55-0.66cm from the capsule, urethra and rectum. All procedures were completed successfully and recovery was uneventful. There were no episodes of urinary retention. All animals were able to achieve erections postoperatively. Pathological analyses revealed inflammatory changes in the ablation zone at 7 days and replacement by fibrosis at 30 days. On microscopic examination no histological injury to the capsule, urethra, rectal wall or nervous structures was identified.

Conclusions: In this study, bilateral focal prostate ablation using LEDC was safe and had a favorable side-effects profile limited to transient minor events. LEDC ablation effectively spared adjacent structures as well as physiological functions in all animals.