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Irreversible electroporation in the focal treatment of prostate cancer: Initial results

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Background: There are numerous energy modalities that have been employed to treat prostate cancer in a focal approach. The functional and oncological outcomes are variable across different series and some of this heterogeneity may be related to the type of ablation. Non-thermal sources of energy might offer an alternative to technologies that use extreme temperatures in order to kill cells. We report our early results using Irreversible Electroporation (NanoKnife®), which is a novel non-thermal technology, in primary focal treatment of prostate cancer.
Methods: Following medical advisory board approval, patients with locally confined prostate cancer were treated by Irreversible Electroporation. In this retrospective analysis, we included only consecutive patients having the procedure as first-line treatment. Patients were selected for eligibility by multi-parametric MRI and template/target biopsy. Early mpMRI was acquired in the first week. Clinician and patient reported functional outcomes were extracted from patients' notes. Complications were scored using the NIH Common Terminology Criteria. Genito-urinary outcome and PSA-nadir were calculated for those men with preoperative and postoperative complete data.
Results: Eighteen consecutive treatment-naïve men were evaluated. Median age was 65 (range 58-74), PSA 6.57ng/ml (3.5-12.2) and prostate volume 41ml (23-82). According to the UCL transperineal biopsy risk classification, 3 (17%), 7 (39%) and 8 (44%) men were low, intermediate and high risk disease, respectively. All procedures were performed under general anaesthesia using rapid muscle paralysis reversal. Operative time was less than 40 minutes with all patients discharged the same day except one man who stayed for observation one night due to self-resolved tachycardia. No perioperative complication was recorded; the suprapubic (n=6) or the urethral catheter (n=12), inserted during the operation were removed after a median of 3 days (range 3-9). Early contrast-enhanced MRI showed no rectal injury; the volume ablated was calculated by planimetry with a median of 12ml (range 4.8-25ml). At a median follow-up of 6 months (range 1-18), no severe toxicity (grade 3 or 4) were recorded, but 5 (28%) and 4 (22%) had complications scored as grade 2 or 1, respectively. In terms of cancer control, PSA-nadir was 3.37ng/ml (range 0.72-7.55); one patient underwent secondary HIFU for residual disease. Continence was preserved in 100% (10/10), and erections allowing intercourse in 89% (8/9) with 44% (4/9) receiving new PDE5-I treatment.
Conclusions: These preliminary data show that focal irreversible electroporation has limited toxicity, and allows preservation of genito-urinary functions in most men treated. The oncological outcome cannot be defined by the present study. A prospective registered trial (clinicaltrials.gov NCT01726894), using standardized patient reported outcomes and systematic histological verification will help to clarify the role of this novel source of energy in prostate cancer.