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Ablation of small renal masses with microwave AMICA-probe. Results of a prospective multicenter phase I-II study

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Introduction: Nephron-sparing surgery (NSS) is the standard of care for small renal masses (SRMs). Surgery may not be feasible in pluricomorbid and elderly patients because of significant risk of intra and postoperative complications. Some minimally invasive treatments performed percutaneously or laparoscopically have been introduced as alternative to NSS. These techniques have been showing an interesting profile in terms of perioperative complications. Unfortunately, oncologic outcomes are still poor, due to significant risk of local recurrence and persistence of viable tumor cells (tumor skipping). This video shows the intraoperative use of a new microwaves (MW) probe (AMICA®), during two cases of laparoscopic partial nephrectomy.

Material & Method: Overall, we treated 14 patients diagnosed with solid renal lesions and scheduled for surgery (radical or partial nephrectomy, with open or laparoscopic approach). 13 patients underwent partial nephrectomy and 1 radical nephrectomy. The surgical approach (open or laparoscopic) depended on surgeon's preference and/or patient's characteristics and did not entail any change in the MW treatment. Surgery was led as usual up to renal vascular pedicle isolation. The lesion was then biopsied and the artery clamped when necessary. At that point, the MW probe was embedded into the renal lesion and the lesion treated with 50 watts for 5 minutes. During the treatment, the temperature of renal parenchyma close to the lesion was assessed by two needle tip thermometer probes. At the end of the procedure, specimens were sliced in order to measure the size of heat-induced macroscopic necrosis. Furthermore, some millimetric chips achieved from the specimen were stained with vital dye Trypan blue, in order to assess on microscopic analysis the persistence of viable cell.

Results: The treatment was well tolerated and did not increase operative times. There were no adverse events neither intraoperatively nor postoperatively. Histology results documented 12 cases of renal cell carcinoma (RCC) and 2 cases of oncocytoma. The average diameter of heat-induced macroscopic necrosis was 24,4 mm (range 10-38 mm). In almost all specimen heat-induced macroscopic necrosis diameter was smaller than tumor size. Pathologic analysis showed RCC histologic architecture in all the specimens, associated with areas of massive necrosis and haemorrhage. Microscopic analysis on chips stained with vital dye showed complete absence of viable tumor cells (no tumor skipping).

Conclusion: The treatment of SRMs with MW probe AMICA® showed a good profile in terms of safety, adverse events and absence of tumor skipping on histology. The second phase of the study will provide further data to evaluate the reproducibility of heat-induced necrosis in standard conditions and the size of lesions suitable for this treatment.