The invention of microwave surgical scissors for seamless coagulation and cutting

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Purpose: We developed a microwave energy-based scissors device (MWCX) that is capable of performing cutting and coagulation using 2.45 GHz microwave energy. This paper aims to present the concept of the device and assess the basic functions including the hemostasis, cutting, and sealing abilities.
Methods: Seven beagle dogs were used in our experiments. In six dogs, we measured the coagulation time (CT), lateral thermal injury (LTI), bursting pressure (BP). The dogs were then subjected to re-laparotomy 1 week later to allow us to investigate the results. In one dog, the same factors and the quantities of smoke and mist emitted were compared to those observed when using a Harmonic Focus (HF) device.
Results: At 60 W, the MWCX could cut and seal small (5 s, diameter 1-2 mm) and medium-sized (10 s, 3-4 mm) vessels with complete hemostasis. The liver (length 2 cm) was cut for 30 s. Harvested vessels were sealed for 10 s (artery, 17 times; vein, six times). The mean BP was 887. 8 ± 41.5 mmHg in the medium arteries and 457.2 ± 118.0 mmHg in veins, with a mean diameter of 4.5 ± 1.3 mm. In a comparative study, the MWCX showed similar results to the HF with regard to the CT, BP and LTI, and emitted less smoke and mist.
Conclusion: The MWCX showed similar levels of functionality and safety to HF, as well as the advantages offered by the use of microwave energy. Microwave devices might be used in the majority of applications for which traditional energy devices are used.