Introduction: Microwave ablation (MWA) is a treatment modality with long history in the field of local tumor ablation used to treat patients with unresectable hepatocellular carcinoma (HCC). A novel microwave generator, designed to deliver automatic-adjusted energy by tissue permittivity feedback control into tumor quickly has been applied at our institution. It is a novel method for MWA that theoretically allows for larger and more predictable ablations. The aim of this study is to evaluate the safety, efficacy and feasibility of this new modality used for patients with larger HCC.

Methods: 23 patients with HCC larger than 4 cm in diameter received surgical MWA from July 2012 to December 2012 with more than 12 months of follow-up. MWA was performed using a 902–928 MHz generator at 10–32 W; only single 14-gauge antenna without internal-cooled system was used. The patients were followed up with contrast-enhanced computed tomography or magnetic resonance imaging to monitor for tumor recurrence at 1 month and then every 3 months after tumor ablation.

Results: The mean follow-up duration of the 15 male and 8 female patients was 16.5 ± 1.34 months. The mean tumor size is 5.40 cm, range 4.0-7.0. 18 patients received MWA via open surgical approach and 5 received laparoscopic MWA. The mean ablation time is 1982 second, range 900-3600, and the median ablation session was 2.0 (range 1–4). The complete ablation rate, defined by totally loss contrast-enhancement one month later, was 82.6% (19 of 23). Local recurrence rate was 26.3% (5 of 19). The technical success rate of MWA for HCC (70%) is higher than for metastatic liver cancer (53.8%) within the same diameter range (4.0-7.0 cm), but the difference is not statistically significant. All patients survived during the observation period and the morbidity and mortality rate was 8.6% and 0%, respectively.

Conclusion: MWA using this novel system with tissue permittivity feedback control has a high complete ablation rate and lower morbidity. It was proved to be a fast, easy and effective option for ablation of large HCC.