

## Real use of a novel automatic motorized laser balloon for the ablation of atrial fibrillation

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**Funding Acknowledgements:** Type of funding sources: None.

**Background:** Electric isolation of the pulmonary veins (PVs) can successfully treat patients with atrial fibrillation (AF). Isolation of pulmonary veins can be achieved by several methods: radiofrequency, cryoballoon or laser balloon ablation (LBA). The main procedural challenge with either method is to achieve a continuous circumferential lesion at the left atrium-PVs junction, with the persistence of functional gaps.

**Purpose:** A novel endoscopic ablation system equipped with a precise motor control system (MCS) has been evaluated. The balloon is used with an endoscope to directly visualize and ablate tissue at the left atrial-PVs junction with laser energy. This system enables uninterrupted, high-speed, circumferential lesion creation under direct control of the physician. The MCS is intended to reduce procedure time and to ensure continuity of ablation lesions. The feasibility of the motorized ablation in terms of extent of applicability along each PV-left atrium junction and time of use of the manual point-by-point mode has been investigated.

**Methods:** sixteen consecutive patients (male 68.7%, age  $60.9 \pm 7.8$  years) with paroxysmal or persistent AF who underwent LBA were enrolled in our institution. Exclusion criteria were any contraindication for the procedure including the presence of intracavitary thrombosis and contraindications to general anesthesia or deep sedation. After transseptal puncture, the balloon-based endoscopic ablation system was advanced to each PV ostium, and laser energy were projected onto the target.

**Results:** A total of 62 PVs were treated with LBA; in 3 patients there was a redundant right intermediate pulmonary vein; in 4 patients there was a right common ostium and in one a left common ostium. MCS was used for 41 PVs (66.1%): in particular, MCS was used continuously between 180° and 325° degrees (50 to 90% of PV circumference) for 22 PVs (35.5%) and between 326° and 359° degrees (91 to 99% of PV circumference) for 16 veins (25.8%). In 3 PVs (4.8%) MCS was used for the entire circumference. During 5.659 (23.6%) seconds out of a total of 23.986 seconds, laser energy delivery occurred in the rapid mode by MCS.

No clinical complications, either local or systemic (stroke or TIA, pericardial effusion, pericardial tamponade, pulmonary vein stenosis, esophageal injury, temporary or permanent phrenic nerve palsy), were observed neither during the use of MSC nor during the use of manual point-by-point mode. Of note, a pinhole rupture of the balloon occurred in the first 2 cases of our series, during the use of MCS, without harm to the patient and requiring only replacement of the LBA.

**Conclusions:** In our case series, laser balloon ablation with the help of motor control system appears safe and feasible in most cases for large portions of pulmonary vein circumference, providing considerable time sparing (66.1% of total ablation extent in 23.6% of total ablation time).