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## **EP-Heart Team approach with sinus node sparing ablation for complex inappropriate sinus tachycardia and postural orthostatic tachycardia syndrome.**

### **The first experience in Central Europe**

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## **EP-Heart Team approach with sinus node sparing ablation for complex inappropriate sinus tachycardia and postural orthostatic tachycardia syndrome. The first experience in Central Europe**

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We present the case of a 19-year-old woman (body mass index = 19) who was referred with 4-year history of dizziness, fatigue, palpitation, exercise and orthostatic intolerance, dyspnea, presyncope and syncope. Besides sinus tachycardia (ST) over 110 bpm with the patient supine her resting electrocardiography (ECG) was normal. Other evident causes for ST were excluded by comprehensive interdisciplinary exams. On 24-h-ECG-Holter monitoring mean sinus rate above 90 bpm was documented at 71% of time (103 bpm on average). Moreover, several episodes of symptomatic ST (>130–150 bpm) were associated with bed-rest, upright position and mild stress.

According to guidelines, several non-pharmacological recommendations (including exercise training, compressive garments, etc.) and pharmacological treatment (bisoprolol 2.5 mg bid, metoprolol 25 mg bid, ivabradine 7.5 bid [2 months], verapamil or combination of ivabradine 5 mg bid and bisoprolol 2.5 mg bid titrated to the highest tolerated doses) had failed. Patient had suffered from progressive severe disabling symptoms during mild activity [1].

Baseline cardiovascular autonomic test confirmed criteria for normal autonomic reaction. On head-up tilt test with beat-to-beat blood pressure monitoring (Finapres Nova, Enschede, the Netherlands) the criteria for postural orthostatic tachycardia syndrome (POTS): (increase of sinus rhythm from 78–95 to 135–140 bpm within 10 min of test without hypotension) and late vasodepressive vasovagal syncope were confirmed. On electrophysiological study, the diagnosis of inappropriate ST (IST) was confirmed by exclusion of other arrhythmias. This case report was approved by institutional ethics board and patient with coincidence of IST and POTS were accepted for inclusion to the ongoing HEAL-IST registry (NCT05280093).

After shared decision-making patient was referred for sinus node sparing (SNS) hybrid ablation with typical right-sided video-assisted thoracoscopic surgical (VATS) ablation (Figure 1A–D) [2, 3] according to structured protocol as described previously in the SUSRUTA-IST Registry [4]. Finally, combined endocardial and epicardial remapping with zero-fluoroscopy approach showed consistent isolations of superior vena cava, right pulmonary veins and *crista terminalis*. An additional endocardial RF ablation was completed to achieve cavo-tricuspid isthmus bidirectional block [5]. Sinus rate changed from 107 to 96 bpm (Figure 1E–F). After 5 days patient was discharged and underwent 2-week on-site cardiac rehabilitation program.

Between second and fourth post-procedural week intermittent asymptomatic pericardial effusion (max. 13 mm) was diagnosed despite prophylactic treatment with ibuprofen and colchicine. Moreover, patient was offered 2-week tele-rehabilitation program with hybrid multi-recorder smart-phone based platform (DrEryk Kardio, Krakow, Poland). One year follow-up confirmed persistence of normal sinus rhythm (87 bpm on average on 24-h-ECG-Holter monitoring) and disappearance of all above mentioned symptoms. Neither symptoms or criteria of IST/POTS and vasodepressive vasovagal syncope was documented during control cardiovascular autonomic test and late 12 months follow-up. Finally, patient become voluntary consultant of other candidates for that procedure and start her first job with heavy physical activity.

Our case documented the first case in Central Europe of sinus node sparing hybrid ablation and EP-Heart-Team approach for complex IST/POTS. That procedure is the further area of hybrid approach for treatment of cardiac arrhythmia [4] especially in centers familiar with minimally invasive VATS for arrhythmias [6]. Moreover, individualized comprehensive approach for cardiac rehabilitation program (on-site and tele-rehabilitation) is yet to be developed to ensure patient improvement of exercise performance with possible early intermittent pericardial effusion, risk of pericarditis, exercise and/or orthostatic intolerance as well as long lasting de-conditioning.

### **Article information**

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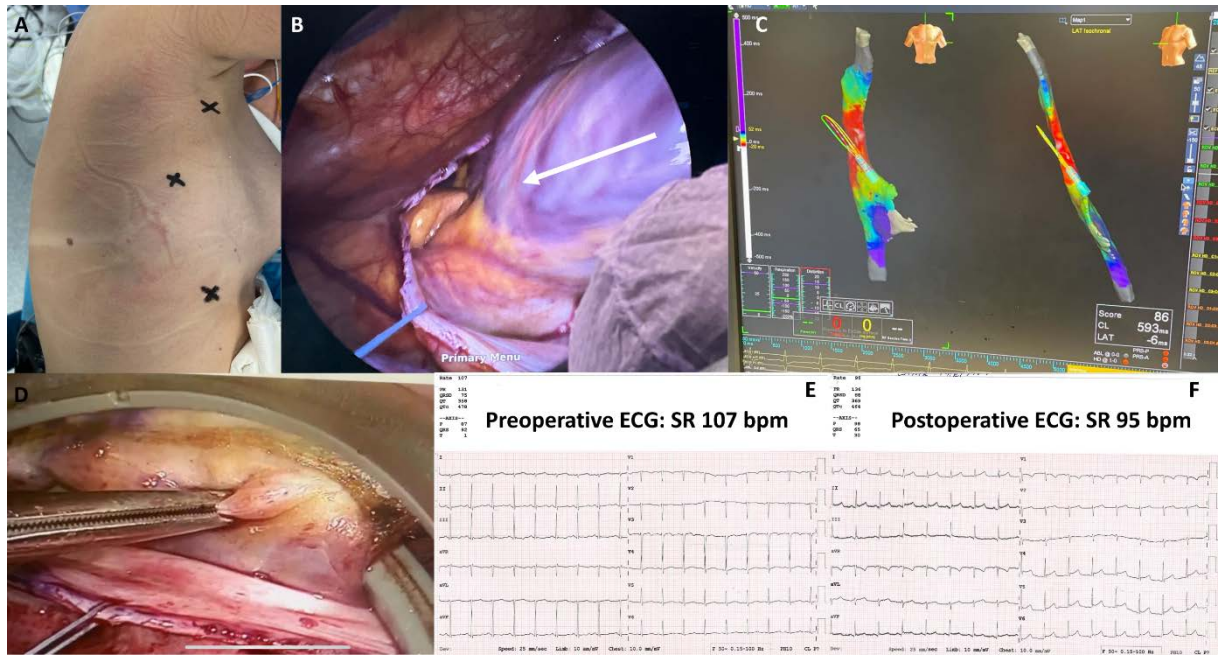
**Conflict of interest:** PS and MLM are consultants for AtriCure; all authors are investigators for the HEAL-IST trial. No other conflict of interests relevant to the current contribution.

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**Figure 1.** **A.** Right VATS from 3 ports at the midaxillary line. After opening of pericardial sack, significant signs of right atrial lateral wall fibrosis were revealed (white arrow). **B.** High-density endocardial activation map was performed from femoral access to validated the earliest activation of SN (Advisor HD Grid catheter and Ensight Precision, Abbott, St Paul, MN, US). **C.** Then, 4 lines (right superior and inferior pulmonary veins isolation, *superior vena cava* isolation, *crista terminalis* line, inferior *vena cava* isolation) were created by bipolar Isolator Synergy Surgical Ablation System (AtriCure, Mason, OH, US). **D.** *Crista terminalis* line. During general anesthesia stable ST 102–105 bpm were observed (EP-System, Ep-Tracer, Schwarzer Cardiotek, Heilbronn, Germany) similarly to preop. 107 bpm on ECG. **E.** After completing lines, drop in sinus rhythm 95 bpm. **F.** Were observed with shift of P wave and shortening of PQ interval (precordial leads with modified position in the first intercostal space Abbreviations: ECG, electrocardiogram; ST, sinus tachycardia; VATS, video-assisted thoracoscopic surgical