EP-Heart Team approach with sinus node sparing ablation for complex inappropriate sinus tachycardia and postural orthostatic tachycardia syndrome: A first experience in Central Europe

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We present the case of a 19-year-old woman (body mass index, 19 kg/m^2) who was referred with a 4-year history of dizziness, fatigue, palpitation, exercise and orthostatic intolerance, dyspnea, presyncope, and syncope. Besides sinus tachycardia (ST) over 110 bpm when the patient was in the supine position, her resting electrocardiography (ECG) was normal. Other evident causes for ST were excluded by comprehensive interdisciplinary exams. On 24-hour-ECG-Holter monitoring, the mean sinus rate above 90 bpm was documented for 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.

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), according to guidelines, had failed. The patient suffered from progressive severe disabling symptoms during mild activity [1].

The baseline cardiovascular autonomic test confirmed the criteria for normal autonomic reaction. On head-up tilt test with beat-to-beat blood pressure monitoring (Finapress 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. In the electrophysiological study, the diagnosis of inappropriate ST (IST) was confirmed by excluding other arrhythmias.

The current case report constitutes to the ongoing HEAL-IST registry (NCT05280093) that includes IST and POTS patients and was approved by the institutional ethics board.

After shared decision-making, the patient was referred for sinus node sparing hybrid ablation with typical right-sided video-assisted thoracoscopic surgical (VATS) ablation (Figure 1A–D) [2, 3] according to a structured protocol, as described previously in the SUS-

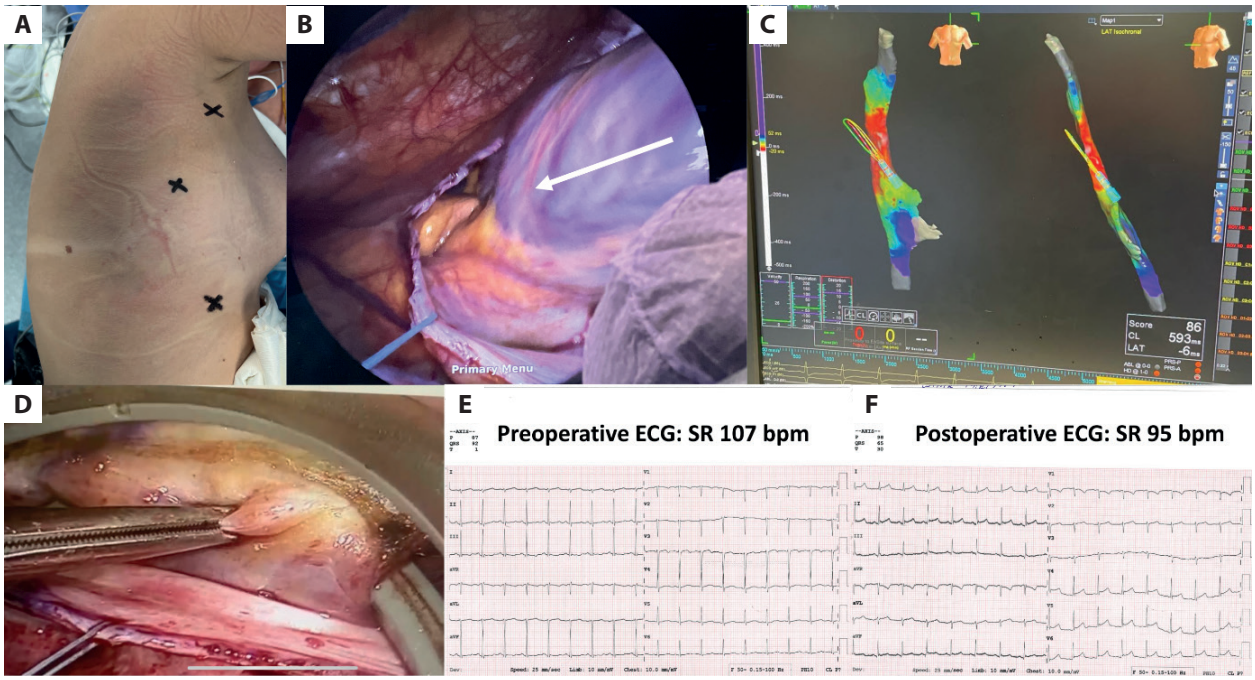

Figure 1. A. Right VATS from 3 ports at the midaxillary line. After opening of pericardial sack, significant signs of right atrial lateral wall fibrosis were revealed (white arrow). **B.** High-density endocardial activation map was performed from femoral access to validated the earliest activation of SN (Advisor HD Grid catheter and Ensite 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

RUTA-IST Registry [4]. Finally, combined endocardial and epicardial remapping with a zero-fluoroscopy approach showed consistent isolations of the 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, the patient was discharged and underwent a 2-week on-site cardiac rehabilitation program. Between the second and fourth post-procedural week, intermittent asymptomatic pericardial effusion (max. 13 mm) was diagnosed despite prophylactic treatment with ibuprofen and colchicine. Moreover, the patient was offered a 2-week tele-rehabilitation program with a hybrid multi-recorder smart-phone-based platform (DrEryk Kardio, Kraków, Poland). One year follow-up confirmed persistence of normal sinus rhythm (87 bpm on average on 24-hour-ECG-Holter monitoring) and disappearance of all earlier symptoms. The control cardiovascular autonomic test and 12-month follow-up did not find any symptoms meeting the criteria for IST/POTS and vasodepressive vasovagal syncope. Finally, the patient became a voluntary consultant of other candidates for that procedure and started 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 a hybrid approach for treatment of cardiac arrhythmia [4], especially in centers familial with minimally invasive VATS for arrhythmias [6]. Moreover, an 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 deconditioning.

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 conflicts of interest are relevant to the current contribution.

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