

Permanent pacemaker implantation via iliac vein approach in a patient with no venous access to the superior vena cava

Implantacja rozrusznika serca z dojścia poprzez żyłę biodrową u chorej bez żylnego dostępu przez żyłę próżną górną

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An 82-year-old female patient with arterial hypertension, goitre after radioactive iodine therapy (2009 AD; currently hypothyroidism treated with hormonal supplementation), with history of two episodes of pulmonary embolism (2010 AD), with probable pulmonary hypertension based on echocardiogram, was admitted to our clinic due to permanent atrial fibrillation with symptomatic bradycardia (recurrent syncope) to have a permanent pacemaker implanted. Since the patient presented with signs of well-developed circulation in the superficial veins of the neck and chest and widened mediastinal silhouette in X-ray, venography of the upper extremities was performed before the pacemaker implantation (Fig. 1). The examination revealed the occlusion of both subclavian veins, abundant collateral circulation, and no signs of contrast flow through the superior vena cava (SVC). The unavailability of the SVC route for cardiac pacing is a rare but challenging complication. It is met in patients post mastectomy and/or radiotherapy to chest, with previous infection in SVC leads or their multiplicity, recurrent erosion, abnormal venous anatomy, and burns. There are a few options in such instances. Most patients are referred for epicardial lead placement, either by minimally invasive surgical implantation or an open thoracotomy, which bear the increased risk of general anaesthesia, peri-procedural complications, and prolonged hospitalisation and recovery. Additionally, the concerns regarding long-term electrophysiological performance of those leads have been raised. In selected cases the interventional radiology team might attempt the recanalisation using balloon dilatation, which is often not possible due to the occlusion site or unfavourable anatomy, as in our patient. Another option would be to use leadless pacemakers — devices with a power source incorporated delivered to the heart using e.g. a femoral vein route (almost on the market), or systems comprising a small receiver implanted into the heart with a miniaturised pulse generator/transmitter placed under the skin in the upper chest (under evaluation). The transiliac route is a verified but underutilised means of the pacemaker implantation in patients lacking a pectoral approach. The method does not require extraordinary instrumentation or sophisticated operational techniques, and it is currently available and cheaper in comparison to the aforementioned leadless technologies. Moreover, any potentially increased risk of lead dislodgement, infection, and iliac vein thrombosis was disproved in clinical studies (Mathur G et al. *Europace* 2001; 3: 56–59; Guerrero JJ et al. *Pacing Clin Electrophysiol*, 2005; 28: 675–679). The presented patient was qualified for the iliac approach procedure. The external iliac vein was cannulated superior to the inguinal ligament (Fig. 2). An active fixation lead Medtronic CapSureFix Novus 5076 — 85 cm was advanced to the right ventricular septum near the apex (Figs. 3A, B). The lead was secured to the muscular fascia, and a subcutaneous pocket was fashioned in the right lower abdomen where a standard single-chamber pulse generator was placed. The ventricular lead parameters were acceptable: R wave of 6.0 mV,

pacing threshold of 0.8 V/0.5 ms, and an impedance of 700 Ω . Neither peri-procedural complications nor pacemaker parameter abnormalities were recorded during the follow-up of 9 months. Subsequently, while searching for the culprit of the central veins obstruction and possible malignancy, a computed tomography scan of the chest was performed which showed a massive goitre compressing the veins. The patient was referred to surgeons for further diagnostics and qualification for thyroid gland resection. Summing up, the iliac approach is a less invasive and feasible alternative to epicardial lead implantation.

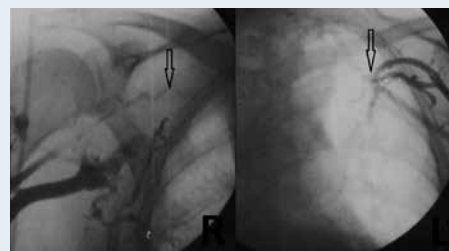


Figure 1. Venography showing i.a. both subclavian veins occlusion (arrows) and developed collateral circulation



Figure 2. The incision site over the right inguinal ligament (arrow). The groin is marked with the dotted line

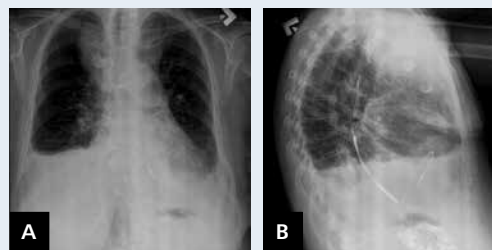


Figure 3. Chest X-ray; **A.** Posterior-anterior view. Apart from widened mediastinal silhouette, fluid accumulation in the right pleural cavity can be observed. The pacemaker electrode tip is positioned on the interventricular septum; **B.** Side view

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