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RESEARCH LETTER

Conscious sedation and local anesthesia for transcarotid transcatheter aortic valve implantation: Why not?

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Since Modine et al. [1] performed the first transcarotid (TC) transcatheter aortic valve implantation (TAVI) in 2009, it has become a safe and reproducible alternative for patients not suitable for transfemoral access (TF) [1, 2]. Both self-expandable and balloon-expandable transcatheter valves can be implanted through the common carotid artery. The majority of TC-TAVI are performed under general anesthesia [3], although a minimally invasive strategy (MIS) with local anesthesia and conscious sedation has also been reported [4]. Presented herein, are 2 cases of TC-TAVI implanted through the left common carotid artery (LCCA) under regional anesthesia at the Upper-Silesian Medical Center of the Medical University of Silesia in Katowice, Poland.

Patient 1. An 81-year-old female, who was not eligible for aortic valve surgery because of frailty syndrome and cachexia with low body mass index (19 kg/m^2). The patient presented with decompensated heart failure (New York heart Association [NYHA] class III). The perioperative risk was estimated at 4.6% and 5.7% (EuroSCORE and Society of Thoracic Surgeons [STS], respectively). Transthoracic echocardiography (TTE) revealed severe aortic stenosis with aortic valve area (AVA) 0.65 cm^2, Vmax 4.1 m/s, and mean gradient (PGmean) 40 mmHg. Left ventricular ejection fraction (LVEF) was 65%, and coronary angiography showed no significant stenosis. As multislice computed tomography (MSCT) imaging (Fig. 1A–C) revealed massive calcifications and critical stenosis of both iliac arteries, the patient was selected for TC-TAVI. The LCCA dimension was 6.1 mm, and there was no significant stenosis.

Patient 2. A 75-year-old male with severe aortic stenosis (AVA 0.7 cm^2, Vmax 3.1 m/s, PGmean 28 mmHg), reduced to 35% LVEF, heart failure (NYHA III) and numerous comorbidities (history of several myocardial infarctions, multiple percutaneous coronary intervention with stent implantation, atrial fibrillation, pacemaker, left internal carotid artery occlusion, critical right internal carotid artery stenosis, type II diabetes mellitus, renal failure, hypertension and history of abdominal aorta aneurysm excision) was scheduled for the TAVI procedure via the LCCA (diameter 6.7 mm). The decision was made by the Heart Team based on MSCT (Fig. 1D–F). The STS score was 11.8% and EuroSCORE 36.4%.

The MSCT images analysis, TC-TAVI surgery eligible criteria, intraoperative monitoring, and operation techniques did not differ from those reported in previous studies [5]. Both procedures were performed by a multidisciplinary specialist team in a hybrid operating room. No premedication was administered prior to the surgery. Basic parameters such as electrocardiogram, pulse oximetry, respiratory rate, invasive blood pressure monitoring were acquired with a Philips Intellli-Vue monitor. Oxygen was supplemented through a nasal cannula. Preemptive multimodal analgesia with intravenous oxycodone (2 mg), paracetamol (1 g) and metamizole (1 g) was administered before regional anesthesia. The large venous access was

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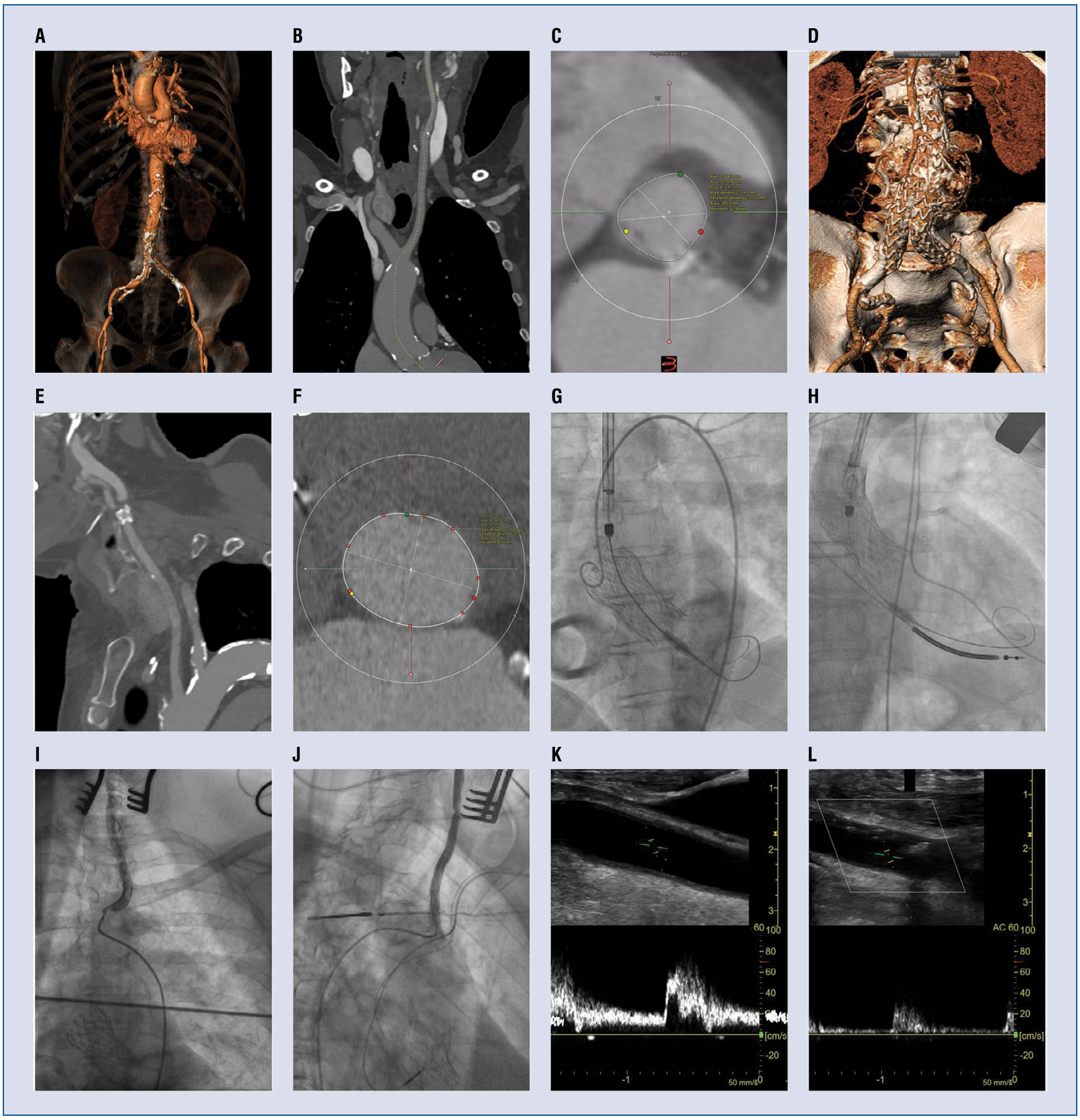

Figure 1. Periprocedural imaging. **A.** Three-dimensional (3D) reconstruction image of the multislice computed tomography (MSCT) of the iliofemoral arteries and abdominal aorta in Patient 1; **B.** Image of the MSCT of the left carotid artery and aortic arch in Patient 1; **C.** Image of the MSCT dimensions of the aortic annulus in Patient 1; **D.** 3D reconstruction image of the MSCT of the iliofemoral arteries and abdominal aorta in Patient 2; **E.** Image of the MSCT dimensions of the aortic annulus in Patient 2; **F.** Image of the MSCT of the left carotid artery and aortic arch in Patient 2; **G.** Implanted aortic valve prosthesis in Patient 1; **H.** Image of the implanted aortic valve prosthesis in Patient 2; **I.** Image of the control left common carotid artery (LCCA) arteriography in Patient 1; **J.** Image of the control arteriography of the LCCA in Patient 2; **K.** Image of the control Doppler ultrasonography of the LCCA in Patient 1; **L.** Image of the control Doppler ultrasonography of the LCCA in Patient 2.

obtained under the ultrasound guidance. A Pajunk SonoTAP needle was inserted under the posterior border of the sternocleidomastoid muscle targeting the superficial cervical plexus and 20 mL of 0.5% Ropivacaine. The quality of the block was evaluated with the pinprick sensation test.

Both procedures were successful, and no major complications occurred during the surgery. Self-expanding valves (Evolut R 26 and Evolut R 34; Medtronic, Inc., Minneapolis, Minnesota, USA) were implanted without pre- or post-dilatation. Both procedures' duration was similar (60 and

55 min, respectively) (Fig. 1G, H). No neurological incidents were observed in the perioperative period. The values of cerebral oximetry acquired during the MIS were comparable to those obtained during procedures under general anesthesia. Moreover, hemodynamic profiles of patients were stable, and no inotropic support was required. A control carotid angiography (Fig. 1I, J) showed normal flow in the LCCA of both patients. The postoperative renal function was preserved at normal levels (estimated glomerular filtration rate 78 and 59 mL/min/1.73 m^2, respectively). One patient had a postoperative complication unrelated to the carotid access. This concerned major bleeding per the Valve Academic Research Consortium-2 consensus from the femoral artery after the removal of the vascular sheath used for the pig-tail catheter [6]. The bleeding site was managed surgically, and the patient received two units of packed red blood cells. A TTE assessment confirmed the correct function of the implanted valves (PGmean 5.2 mmHg and 7 mmHg, Vmax 1.8 m/s and 1.9 m/s), no paravalvular leak and no LVEF reduction in both patients. A Doppler ultrasound (Fig. 1K, L) showed the normal flow through the LCCA (low values of maximum systolic velocity and end-diastolic velocity). The patients were discharged home after 8 and 6 days, respectively, with improved physical status (NYHA I and II, respectively).

To this day, at the documented hospital, the vast majority of TC-TAVI (37 of 39) have been performed under general anesthesia with endotracheal intubation. This seems to be comparable with the experience of other centers [3, 4]. In contrast to TF-TAVI, the TC-TAVI technique improves the implantation precision due to the short distance between the system insertion site and the aortic valve but requires the patient's immobility. Thus, while general anesthesia eliminates the patient's involuntary movements, it is the method of choice for uncooperative patients. The decision in the present cases to perform TC-TAVI under conscious sedation and local anesthesia was based on two reasons: in the cachectic Patient 1, there was a risk of the endotracheal tube misplacement in the trachea and making the LCCA difficult to be exposed. Additionally, in Patient 2 with diffuse carotid arteriosclerosis, MIS allowed for conscious cerebral function monitoring during the procedure.

There are no clear guidelines concerning the anesthesia to be used in TC-TAVI. According to Azmoun et al. [7], MIS reduces respiratory complications in older patients with frailty syndrome. In addition, although Debry et al. [4] showed a reduction of cerebrovascular incidents with MIS, this was not confirmed by the General Anesthesia versus Local Anesthesia for carotid surgery (GALA) study [8]. General anesthesia with low surgical impulsion can develop into hypotonia, increased demand for vasoactive agents, and consequently worsen kidney function, whilst patients under local anesthesia have an increased risk of hypoventilation and aspiration [9].

Our initial observations of TC-TAVI procedures performed under conscious sedation and local anesthesia confirm that it can be safely performed by a well-trained Heart Team and an experienced anesthesiologist.

Conflict of interest: None declared

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