Using carbon dioxide for a safer epicardial access: a case report

Mateja Lovrić*,
Ivica Benko,
Mirela Adamović,
Marina Žanić,
Marija Grlić,
Mario Tomašević,
Ivan Horvat,
Ivan Zeljković,
Nikola Pavlović

Dubrava University Hospital, Zagreb, Croatia

KEYWORDS: epicardial ablation, carbon dioxide, ventricular tachycardia, pre-procedure planning.

CITATION: Cardiol Croat. 2024;19(11-12):401. | https://doi.org/10.15836/ccar2024.401

***ADDRESS FOR CORRESPONDENCE**: Mateja Lovrić, Klinička bolnica dubrava, Avenija Gojka Šuška 6, HR-10000, Zagreb, Croatia. / Phone: +385-91-7863-659 / E-mail: mlovric@kbd.hr

ORCID: Mateja Lovrić, https://orcid.org/0000-0003-1457-6521 • Ivica Benko, https://orcid.org/0000-0002-1878-0880
Mirela Adamović, https://orcid.org/0000-0003-4922-7436 • Marina Žanić, https://orcid.org/0000-0001-5123-8586
Marija Grlić, https://orcid.org/0000-0002-4288-9659 • Mario Tomašević, https://orcid.org/0000-0003-0931-9272
Ivan Horvat, https://orcid.org/0000-0002-0480-7341 • Ivan Zeljković, https://orcid.org/0000-0002-4550-4056
Nikola Pavlović, https://orcid.org/0000-0001-9187-7681

Introduction: The epicardial approach for ventricular tachycardia (VT) ablation is sometimes necessary but high-risk procedure. While most VTs can be successfully treated with endocardial ablation, certain cases, especially those associated with arrhythmogenic and particularly non-ischemic cardiomyopathies, require epicardial mapping and ablation for effective treatment. The use of epicardial approach, however, poses procedural risks, such as injury to coronary arteries, phrenic nerves, subdiaphragmatic vessels, and accidental puncture of the right ventricle. To enhance the safety and efficacy of this approach, intentional puncture of coronary venous branches with epicardial carbon dioxide (EPI CO_2) insufflation has emerged as a valuable technique to facilitate pericardial space visualization and access. In this technique, a coronary sinus branch is cannulated using a diagnostic JR4 coronary catheter, followed by intentional perforation of the branch using an angioplasty wire (Conquest PRO). A microcatheter (Corsair PRO, Asahi Intecc, Japan) is then positioned over the wire into the pericardial space, allowing CO_2 insufflation. This enables direct visualization of the anterior pericardial space, facilitating safer subxiphoid puncture.[1-3]

Case report: 36-year-old female with arrhythmogenic cardiomyopathy and ventricular tachycardia, previously unresponsive to medical therapy, underwent combined endocardial and epicardial ablation. She had a history of ventricular fibrillation during childbirth in 2020. The procedure, performed under deep sedation with midazolam, propofol, and fentanyl, involved epicardial ablation using an 3D mapping/ablation catheter (Navistar SmartTouch ST/SF, Biosense Webster), with phrenic nerve stimulation monitoring and coronary angiography. After the ablation, VT could no longer be induced. At the end of the procedure, intrapericardial corticosteroids were administered to prevent pericarditis and minimize its symptoms.

Conclusion: Proper pre-procedural planning and understanding of potential complications are essential for reducing the risks associated with the epicardial approach. Techniques such as EPI CO_2 insufflation represent significant advancements in improving the safety and precision of percutaneous epicardial access, especially for complex VT cases.

RECEIVED:
October 12, 2024

ACCEPTED:
October 31, 2024

LITERATURE

1. Silberbauer J, Gomes J, O'Nunain S, Kirubakaran S, Hildick-Smith D, McCready J. Coronary Vein Exit and Carbon Dioxide Insufflation to Facilitate Subxiphoid Epicardial Access for Ventricular Mapping and Ablation: First Experience. JACC Clin Electrophysiol. 2017 May;3(5):514-521. https://doi.org/10.1016/j.jacep.2016.11.002
2. Greenbaum AB, Rogers T, Paone G, Flynn SE, Guerrero ME, O'Neill WW, et al. Intentional Right Atrial Exit and Carbon Dioxide Insufflation to Facilitate Subxiphoid Needle Entry Into the Empty Pericardial Space: First Human Experience. JACC Clin Electrophysiol. 2015 Oct;1(5):434-441. https://doi.org/10.1016/j.jacep.2015.06.007
3. Juliá J, Bokhari F, Uuetoa H, Derejko P, Traykov VB, Gwizdala A, et al. A New Era in Epicardial Access for the Ablation of Ventricular Arrhythmias: The Epi-Co2 Registry. JACC Clin Electrophysiol. 2021 Jan;7(1):85-96. https://doi.org/10.1016/j.jacep.2020.07.027