

# Prva uspešna endoskopska kirurška revaskularizacija miokarda pri ishemični bolezni srca v Sloveniji

## The first successful endoscopic atraumatic coronary artery bypass graft for coronary artery disease in Slovenia

### Avtor / Author

Anže Djordjevič<sup>1,2</sup>, Boris Robič<sup>1,2</sup>, Peter Jurič<sup>1</sup>, Rene Petrovič<sup>1,2</sup>, Jernej Železnik<sup>1</sup>, Miha Antonič<sup>1,2</sup>

### Ustanova / Institute

<sup>1</sup>Univerzitetni klinični center Maribor, Klinika za kirurgijo, Oddelek za kardiokirurgijo, Maribor, Slovenija; <sup>2</sup>Univerza v Mariboru, Medicinska fakulteta, Katedra za kirurgijo, Maribor, Slovenija; <sup>1</sup>University Medical Centre Maribor, Clinic for Surgery, Department of Cardiac Surgery, Maribor, Slovenia; <sup>2</sup>University of Maribor, Faculty of Medicine, Department of Surgery, Maribor, Slovenia;

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### Izvleček

**Namen:** Mediana sternotomija je dejavnik, ki močno vpliva na obolevnost in umrljivost po operacijah na odprtem srcu. Glavne prednosti minimalno invazivnega pristopa so krajša hospitalizacija, manj transfuzij, manj postoperativne bolečine in boljši kozmetični izgled. Kirurška tehnika je tehnično zahtevna, zato je primer-na za omejeno populacijo bolnikov.

**Priказ primera:** 42-letni bolnik s stenozo proksimalne LAD je bil sprejet na Oddelek za kardiokirurgijo UKC Maribor za kirurško zdravljenje. Levo notranjo prsno arterijo (LIMA) smo odvzeli endoskopsko, anastomozo LIMA-LAD smo napravili skozi levo mini-torakotomijo. Postoperativni potek je potekal brez posebnosti, bolnik je bil odpuščen peti postoperativni dan.

**Zaključek:** Prispevek predstavlja pristop k minimalno invazivni kirurški revaskularizaciji miokarda z

### Abstract

**Purpose:** Coronary artery bypass graft (CABG) using median sternotomy remains the standard care for patients with multi-vessel coronary artery disease (CAD). However, median sternotomy considerably affects morbidity and mortality after cardiac surgery. For this reason, less invasive access routes, including mini-thoracotomy or mini-sternotomy, have been developed to avoid full median sternotomy.

**Case report:** A 42-year-old male patient with a single-vessel CAD was admitted to the Department of Cardiac Surgery, University Medical Centre Maribor for surgical treatment. Endoscopic mammary artery harvesting and direct left internal mammary artery anastomosis via left mini-thoracotomy were performed. The early postoperative course was uneventful and the patient was discharged on the

## Naslov za dopisovanje / Correspondence

Boris Robič, dr. med., Univerzitetni  
klinični center Maribor, Oddelek za  
kardiokirurgijo, Ljubljanska 5, 2000  
Maribor, Slovenija  
Telefon: +386 2 321 1787  
E-pošta: boris.robic@gmail.com

endoskopskim odvzemom notranje  
prsne arterije in našitjem anastomo-  
ze LIMA–LAD skozi levo mini tora-  
kotomijo z uporabo mehkotkivnega  
razpirala.

fifth postoperative day.

**Conclusion:** This report presents the  
first case of a minimally invasive CABG  
procedure using endoscopic mammary  
artery harvesting in Slovenia.

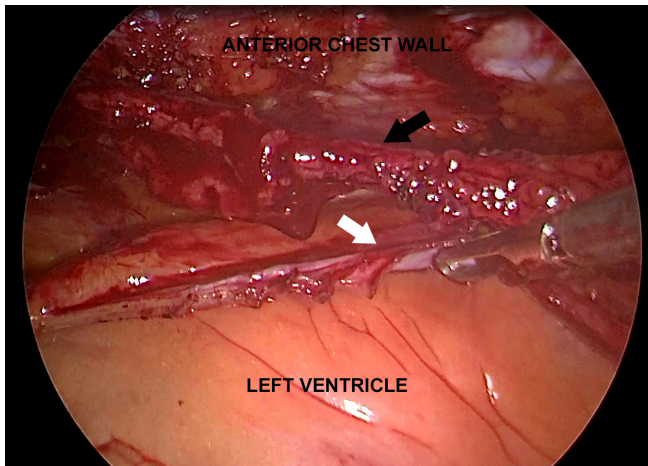
## INTRODUCTION

Coronary artery bypass graft (CABG) remains the standard of care for patients with multi-vessel coronary artery disease (CAD) (1). It is traditionally performed via median sternotomy, which is considered a potential cause of morbidity due to increased risk of deep sternal wound infection, mediastinitis, and delayed return to daily activities (2–3). To avoid these potential complications, less invasive access routes, including mini-thoracotomy or mini-sternotomy, have been developed. New access routes have been associated with excellent surgical outcomes, such as reduced patient recovery time (4), lower transfusion rates, fewer wound infections, shorter hospitalization time, and low hospital mortality rates (5). Apart from a minimally invasive direct coronary artery bypass and total endoscopic coronary artery bypass, endoscopic coronary artery bypass (Endo-CABG) is applicable to single- and multi-vessel coronary artery disease (CAD) regardless of the vessel involved (6). In this report we present the first case of a successful Endo-CABG in Slovenia.

## CASE PRESENTATION

A 42-year-old male patient with single-vessel disease (proximal stenosis of the left anterior descending artery (LAD)) was referred to the Department of Cardiac Surgery for a single CABG. After careful evaluation, a minimally invasive Endo-CABG was performed. The procedure was carried

out under general anaesthesia with the patient in a supine position. Left internal mammary artery (LIMA) was harvested ipsilaterally via three 5-mm endoscopic ports in the second, third, and fourth left intercostal spaces, approximately 2 cm above and below the anterior axillary line in a triangular configuration. The pericardium was freed from fatty tissue and opened anteriorly to the left phrenic nerve (Figure 1). After systemic heparinization, a cardiopulmonary bypass (CPB) was initiated via peripheral cannulation of the common femoral artery and vein through a 2-cm oblique skin incision below the inguinal ligament. A 5-cm skin incision was performed through the left third intercostal space and a soft tissue retractor was placed to provide a sufficient view of the heart. The LIMA–LAD anastomosis was performed on an empty beating heart in a standard fashion using a 7/0 polypropylene suture (Figure 2). After completing the anastomosis, the graft flow was checked with a TransitTime Flow Measurement probe (Medistim ASA, Oslo, Norway). The patient was then weaned from the CPB and heparin was reversed with protamine sulphate. The pericardium was closed with three interrupted sutures, leaving enough space for the LIMA entrance. Thoracic and inguinal surgical wounds were closed in layers in a standard manner (Figure 3). The surgical procedure and the early postoperative course were uneventful and the patient was discharged on the fifth postoperative day. Three months after the procedure the patient is doing well with no episodes of chest pain.



**Figure 1.** Endoscopic view of the left internal mammary takedown: internal mammary artery (black arrow); upper edge of the pericardial opening line (white arrow).



**Figure 2.** LIMA-LAD anastomosis construction via left mini-thoracotomy.



**Figure 3.** Comparison of visual outcomes after endoscopic and median sternotomy CABG.

## DISCUSSION

The key to a successful Endo-CABG lies in careful patient evaluation and selection performed by the cardiac team (cardiologists, anaesthesiologists, and cardiac surgeons). Ideally, the patient has a proximal LAD lesion, left ventricular ejection fraction of >50%, no acute coronary syndrome signs, and no thoracic deformities (7). Indications for Endo-CABG are broad.

However, since the learning curve is very steep, starting with a single-vessel LAD lesion is reasonable. Long-term LIMA-LAD patency has a survival benefit. Vassiliades et al. published the largest single- or bi-vessel Endo-CABG series with long-term outcomes. A total of 607 patients underwent Endo-CABG with 721 constructed anastomoses. The 30-day mortality and five-year survival rates were 1% and 92%, respectively.

After a mean follow-up of 18 months, LIMA-LAD patency was 98.5% (8). In terms of morbidity, postoperative atrial fibrillation (AF) remains the most common rhythm disturbance after an on-pump CABG. With Endo-CABG surgery performed on an empty beating heart without cardiac arrest, the incidence of AF and other extracorporeal circulation-associated comorbidities is likely to decrease (9).

## CONCLUSIONS

Endoscopic atraumatic coronary artery bypass is a viable option for treatment in patients with single-vessel LAD disease. Apart from the benefits of this sternum-sparing technique (fewer infections, shorter mechanical ventilation time, and better cosmetic outcome), it also has a steep learning curve. Therefore, careful patient selection must be a priority for the heart team.

The present manuscript describes the first case of a patient with single-vessel LAD disease successfully treated with Endo-CABG. In the future, off-pump and hybrid approaches in combination with percutaneous techniques will also be a reasonable option for patients with multivessel disease.

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