Intraoperative echocardiographic assessment of the severe isolated ostial stenosis of left main coronary artery before and after surgical patch angioplasty

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\textbf{Abstract} Isolated critical ostial stenosis of left main coronary artery is currently treated by conventional bypass surgery. Surgical patch angioplasty in an alternative surgical approach. Transesophageal echocardiography enables visualization of proximal branches of left and right coronary artery. The report describes intraoperative echocardiographic assessment of surgical left main coronary artery angioplasty.

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\textbf{Introduction}

Isolated ostial stenosis of left main coronary artery (LMCA) is very rare condition accounting for only 0.2% of patients undergoing coronary angiography and for 1% of all coronary artery disease.\textsuperscript{1,2}

Clinically the disease is usually manifested as a typical angina. The frequency of asymptomatic course as well as risk of sudden death of LMCA ostial stenosis was not investigated. Conventional treatment of such patients is urgent coronary artery bypass grafting (CABG). Alternative surgical
approach is patch angioplasty particularly in younger patients. Such treatment avoids multiple vascular anastomoses.

The report describes successful surgical treatment of a 50 year old woman with isolated LMCA ostial stenosis. The patient was referred for angiography because of unstable angina of 3 month duration.

Coronary angiography revealed isolated ostial LMCA stenosis with otherwise normal coronary arteries (Fig. 1).

Transesophageal echocardiography (TEE) investigation was carried out with 5 MHz multiplane TEE probe (HP Image Point Hx) in the operating room. First TEE was done before initiation of cardiopulmonary bypass (CPB). TEE confirmed LMCA ostial stenosis with diameter of 2 mm at the origin (Fig. 2A). Color Doppler flow interrogation revealed typical *vena contracta* in the ascending aorta at the origin of LMCA with turbulent flow in the entire segment of the left anterior descending coronary artery (Fig. 2B).

Surgical patch angioplasty of the LMCA ostium was then performed with a tailored autologous pericardial patch. TEE done after weaning from CPB showed large ostium of LMCA (Fig. 3A) with normal inflow from aorta and restoration of laminar flow in LAD (Fig. 3B), at pulse and CW Doppler (Fig. 4). The patient had uneventful postoperative course.

**Discussion**

Ostial LMCA stenosis in many cases is atherosclerotic in origin. Inflammatory process (mostly syphilis), congenital etiology has also been reported.\(^2,3\) Iatrogenic lesions after angiography or canulation during cardiac surgery has also been described.\(^4\) Jönsson reviewed coronary angiograms of 384 patients referred for CABG with LMCA stenosis. Ostial LMCA stenosis accounted of 9% of these patients while in 40% distal bifurcation stenosis was found.\(^5\) Patients with an ostial stenosis were younger, women in prevalence with less advanced or absent sclerosis of distal coronary arteries. Isolated LMCA ostial stenosis in young women

![Figure 1](image1.png) **Figure 1** Coronary angiography. An ostial stenosis of left main coronary artery (arrow) with otherwise normal coronaries.
seems to be a separate clinical entity. It is called idiopathic or fibromuscular dysplasia.\textsuperscript{6}

TEE enables good identification of proximal parts of both, particularly left coronary artery.\textsuperscript{7,8} Diastolic \textit{vena contracta} at the origine of the narrowed LMCA ostium detected at color Doppler flow in aorta indicates severe ostial stenosis. It is useful echocardiographic sign which enables identification of ostial LMCA stenosis even in asymptomatic patients.

\begin{figure}
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\caption{A. Preoperative TEE demonstrating narrowed LMCA ostium (2 mm). B. Color Doppler flow showing \textit{vena contracta} at the origin of LMCA and turbulent flow in the distal part of LMCA and LAD.}
\end{figure}
Surgical angioplasty in such cases is a suitable option for younger patients without atherosclerotic involvement of distal coronary branches. Surgical plasty permits to avoid multiple graft operation with known occlusion rate and to spare vascular material for the future conventional CABG.2,3,6,9

Results of such surgical treatment are usually documented by coronary angiography during follow-up. Spiral computed tomography and

**Figure 3**  A. Postoperative TEE demonstrating results LMCA ostium reconstruction with large origin of LMCA. LAD and Cx are also visible. B. Color Doppler flow: non-obstructed normal inflow from aorta to LMCA, laminar flow within LMCA and LAD.

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Results of such surgical treatment are usually documented by coronary angiography during follow-up. Spiral computed tomography and
magnetic resonance imaging were employed for this purpose as alternative non-invasive approach. TEE offers a possibility to assess the results directly at the operating room as well as during follow-up particularly when the patient is asymptomatic. Nevertheless TEE has been seldom used for this purpose. To the best of our knowledge intraoperative echocardiographic assessment of such operation was first reported by Sharoni.11

Figure 4  Recording of blood flow velocity in LAD. A. PW Doppler flow at baseline — before patch angioplasty. B. CW Doppler flow after patch angioplasty of LMCA ostium with signs of reactive hyperemia.
References