

Cite this article as: Hiromoto A, Sakamoto S-I, Suzuki K, Ishii Y. On-pump beating-heart technique for managing a ruptured left coronary artery aneurysm. *Interdiscip CardioVasc Thorac Surg* 2023; doi:10.1093/icvts/ivad067.

On-pump beating-heart technique for managing a ruptured left coronary artery aneurysm

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Received 28 December 2022; received in revised form 12 April 2023; accepted 8 May 2023

Abstract

We present the case of an 86-year-old woman with a ruptured left coronary artery aneurysm associated with coronary-pulmonary artery fistula. She was transferred to our hospital with complaints of chest discomfort. Echocardiography revealed cardiac tamponade, and subsequently, a bloody pericardial effusion was drained. Coronary angiography and computed tomography revealed a ruptured left coronary artery aneurysm originating from a branch of the proximal left anterior descending artery and a coronary-pulmonary artery fistula. In the emergency operation, under cardiopulmonary bypass, the inlet and outlet vessels were ligated, and the aneurysm was closed without arresting the heart. By utilizing cardiopulmonary bypass, the pulmonary trunk was easily decompressed, and dissection around the aneurysm and identification of the inlet and outlet vessels was facilitated without cardiac arrest. Thus, to conclude, an on-pump beating-heart technique should be considered in such cases.

Keywords: Coronary artery aneurysm • Coronary-pulmonary artery fistula • On-pump beating-heart technique

CASE REPORT

An 86-year-old woman was transferred to our hospital with complaints of chest discomfort. Echocardiography demonstrated massive pericardial effusion, vital signs of shock were seen, and pericardiocentesis was subsequently performed. Coronary angiography and enhanced computed tomography revealed a left coronary artery aneurysm (CAA) originating from a branch of the proximal part of the left anterior descending (LAD) artery and the coronary-pulmonary artery fistula (CPAF) between the proximal LAD and the anterior aspect of the pulmonary trunk. The diameter of the aneurysm was 14 mm and extravasation of the contrasting media implied rupture of it (Fig. 1). Therefore, an emergency surgery was performed and the heart was approached using median full sternotomy. The aneurysm was easily visualized after the haematoma around the heart was removed. There was no bleeding from the aneurysm, indicating that haemostasis had occurred spontaneously. Cardiopulmonary bypass was initiated through the ascending aorta and right atrial cannulation. A saphenous vein graft was anastomosed to the ascending aorta such that the LAD could be grafted immediately if cardiac ischaemia was induced. First, we taped the LAD proximal and distal to the aneurysm. After the LAD was taped, the spurting haemorrhage from the aneurysm restarted spontaneously. The bleeding point was tentatively closed with sutures. The inlet and outlet vessels were identified and ligated (Fig. 2a), and then, the aneurysm was opened. Blood flow

from another small branch was still observed and ligated and complete isolation of the blood flow was confirmed (Fig. 2b). The redundant aneurysmal wall was resected and the aneurysm was closed with a 5-0 polypropylene running suture (Fig. 2c). There were no signs of cardiac ischaemia; therefore, the saphenous vein graft was ligated and dissected near the ascending aorta. She was weaned off the cardiopulmonary bypass uneventfully. The aneurysm was not observed by coronary computed tomography 8 days postoperatively (Fig. 2d).

DISCUSSION

CPAF with the formation of a CAA is a rare cardiac anomaly, and rupture of the aneurysm is reported to occur in 2% of cases [1]. Several reports have described the repair of ruptured CPAF-related CAA [2-4]. Transcatheter embolization is also reported for treating CPAF; however, its utility for ruptured CPAF-related CAA is unknown [5]. We believe that the advantages of the on-pump beating-heart technique over other methods (off-pump or on-pump arrest) are as follows: it effectively decompresses the pulmonary trunk and facilitates dissection around the aneurysm, especially when it exists near the pulmonary trunk. Second, it sustains haemodynamic stability even in unexpected situations such as massive bleeding or cardiac ischaemia. In addition, by opening the aneurysm while the heart is beating, residual blood

Presented at the 8th International Coronary Congress, Tokyo, Japan, 1-3 December 2022.

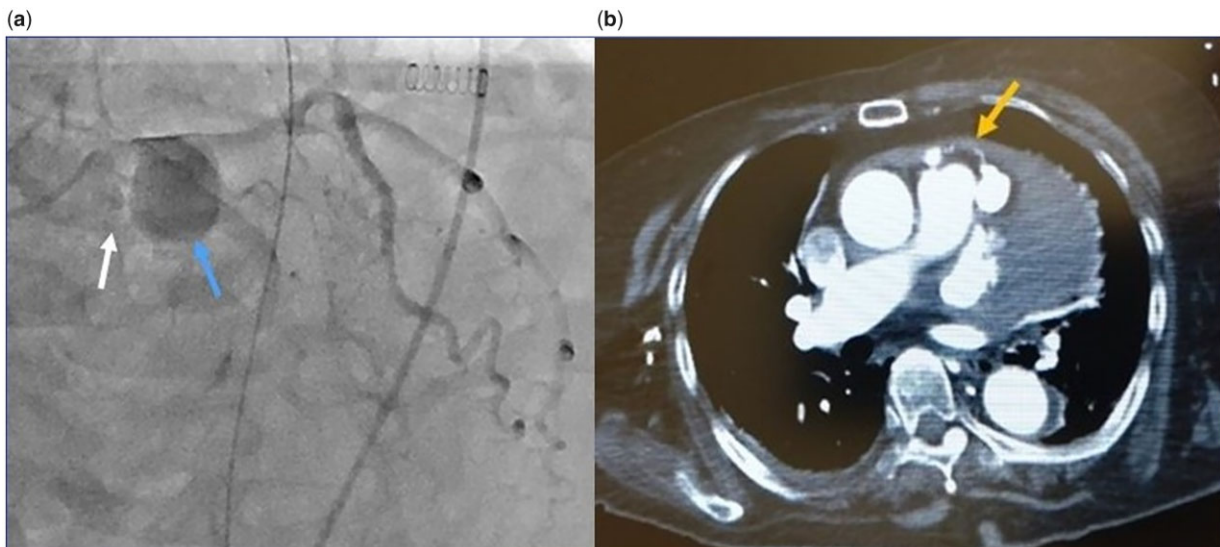


Figure 1: (a) Coronary artery aneurysm and extravasation of contrast media. (b) Anomalous vessel indicating the coronary-pulmonary artery fistula.

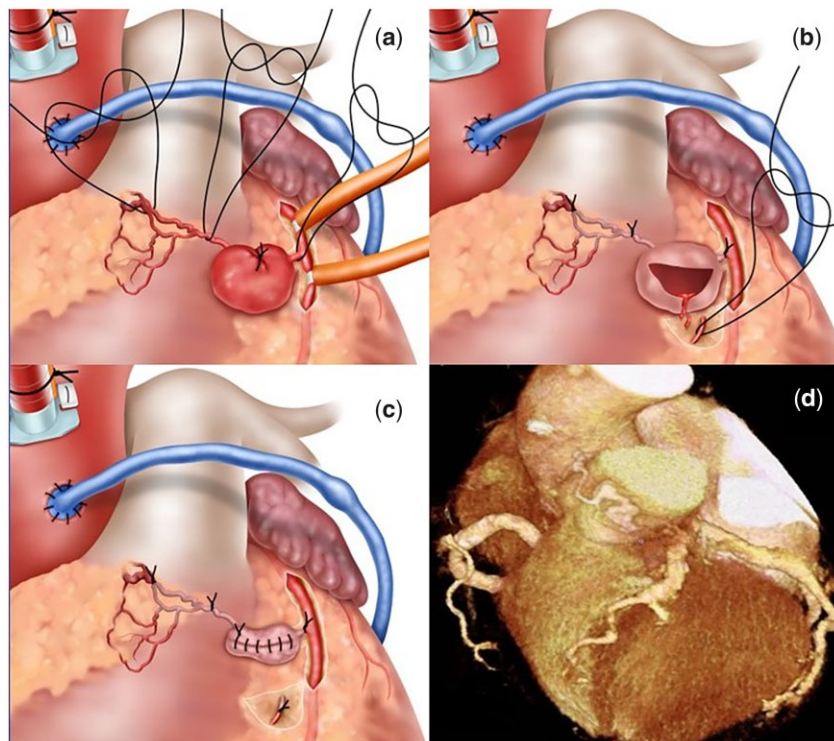


Figure 2: (a) Ligation of inlet and outlet vessels. (b) Identification of residual branch and ligation of it. (c) Closure of the aneurysm. The saphenous vein graft was ligated and dissected finally. (d) In the postoperative computed tomography, the aneurysm is not shown.

flow into the aneurysm can be directly observed. If the heart is arrested, giving cardioplegic solution would be the only method for observing residual blood flow. However, direct observation of blood flow would be better. On the other hand, if the aneurysm exists behind the pulmonary trunk, heart arrest would be necessitated.

In conclusion, the on-pump beating-heart technique should be considered a therapeutic option for repairing CPAF-related CAA. However, the repair on the beating heart could be performed only if anatomy and localization of the aneurysm allow it. Otherwise, it is advisable to arrest the heart.

FUNDING

The authors received no financial support for this article.

Conflict of interest: none declared.

DATA AVAILABILITY

The data underlying this article are available in the article and in its online supplementary material.

Reviewer information

Interdisciplinary CardioVascular and Thoracic Surgery thanks Luca Di Marco and the other, anonymous reviewer(s) for their contribution to the peer review process of this article.

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