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Case Report / Olgu Sunumu

Hybrid synchronous treatment of two separate cardiovascular pathologies: Coronary artery bypass grafting and endovascular aortic replacement

İki farklı kardiyovasküler patolojinin hibrid senkronize tedavisi: Koroner arter baypas ve endovasküler aort replasmanı

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ABSTRACT

Coronary artery disease and abdominal aortic aneurysm may frequently be together, particularly in elderly patients. Treatment strategies should be tailored according to the needs and specific properties of each patient. Hybrid synchronous procedures may be a choice of therapy in these patients, as well as staged procedures. Herein, we present the first hybrid synchronous case of Turkey to treat two separate cardiovascular pathologies.

Keywords: Abdominal aortic aneurysm; coronary artery disease; hybrid.

ÖZ

Koroner arter hastalığı ve abdominal aort anevrizması, özellikle yaşlı hastalarda, sıklıkla bir arada görülebilir. Tedavi stratejisi, her hastanın ihtiyaçları ve özelliklerine göre oluşturulmalıdır. Bu hastalarda basamaklı işlemlerin yanı sıra, hibrid senkronize işlemler de kullanılabilir. Bu yazıda Türkiye'nin, iki farklı kardiyovasküler patolojinin tedavisi için ilk hibrid senkronize olgusu sunuldu.

Anahtar sözcükler: Abdominal aort anevrizması; koroner arter hastalığı; hibrid.

Arteriosclerosis which commonly affects different vascular areas may concomitantly results in abdominal aortic aneurysms (AAA) and coronary artery disease (CAD).[1] Therapeutic strategy and management of patients requiring coronary artery bypass grafting (CABG) for CAD and endovascular aortic repair (EVAR) for AAAs represent a therapeutic challenge. The optimal timing and scheduling of patients requiring CABG and EVAR with concomitant CAD and AAA is still controversial.[2] Two-stage intervention has the risk of complications regarding untreated (or to be treated) pathology. There is a risk of AAA rupture in the postoperative period, when cardiac surgery is performed initially.[3] On the other hand, myocardial infarction (MI) remains the leading cause of death following AAA repair.[4]

CASE REPORT

A 68-year-old male patient was admitted with an infrarenal AAA of 56 mm in diameter which was incidentally diagnosed. He had a history of mild CAD diagnosed by coronary angiography six years ago. On contrasted computed tomography (CT) scan of abdomen, there was a saccular aneurysm of abdominal aorta which is 56 mm in diameter at its widest part, beginning 2 cm below the origin of the left renal artery. Common, external, and internal iliac arteries of both sides were not aneurysmatic. As the patient had previous CAD history and Class 3 angina according to the Canadian Cardiovascular Society Angina Classification, we performed coronary angiography than routine preoperative follow-up. There were severe obstructions of coronary arteries ranging between

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70% and 90% including the first branch of bifid left anterior descending artery (LAD1), second branch of bifid left anterior descending artery (LAD2), circumflex artery (Cx), and posterior descending branch of right coronary artery (RCAPD). Hybrid synchronous CABG and EVAR was planned in the hybrid operation room of our clinic (angiography machine: Artis Pheno Robotic Angiography, CT machine: 12-m Sliding CT Definition AS + 128 slice, Magnetic Resonance Imaging [MRI] Machine: Magnetom Skyra 3T 48 Channel; Siemens AG, Healthcare Sector, Erlangen, Germany).

A written informed consent was obtained from the patient. Coronary artery bypass grafting and EVAR were performed. The patient underwent 4 vessels CABG with the aid of cardiopulmonary bypass (CPB) under aortic cross-clamp, where myocardial protection was achieved using antegrade cardioplegia and mild systemic hypotermia (32°C). The left internal thoracic artery was anastomosed to the LAD1, saphenous venous grafts were anastomosed to LAD2, Cx, and RCAPD. Duration of CPB was 62 min and aortic cross-clamp time was 36 min. The CABG was uneventful and we stepped up to EVAR, when we reached the stage of heparin neutralization with protamine administration after decannulation and before chest closure. Heparin was 3/4 neutralized by protamine as to keep activated clotting time between 180 and 200 sec and EVAR was performed through bilateral femoral incisions which was planned and marked according to Doppler ultrasonography (GE Loqic S8, Ref: 5669845, GE Ultrasound Korea, Ltd., Gyeonggi-do, Korea)-guided preoperative bedside femoral arterial mapping. Common femoral arteries (CFA) were surgically reached and prepared. A modular-type endograft (Medtronic Inc., Minneapolis, MN, USA) was implanted with trunk-ipsilateral component from the right CFA and the attachment of contralateral component from the left CFA. Control double subtracted angiography was performed, and the flow through stent graft was found to be normal without any endoleak. The chest drains were placed and sternal and femoral incisions were closed respectively. The patient was transferred to the postoperative cardiovascular surgery intensive care unit.

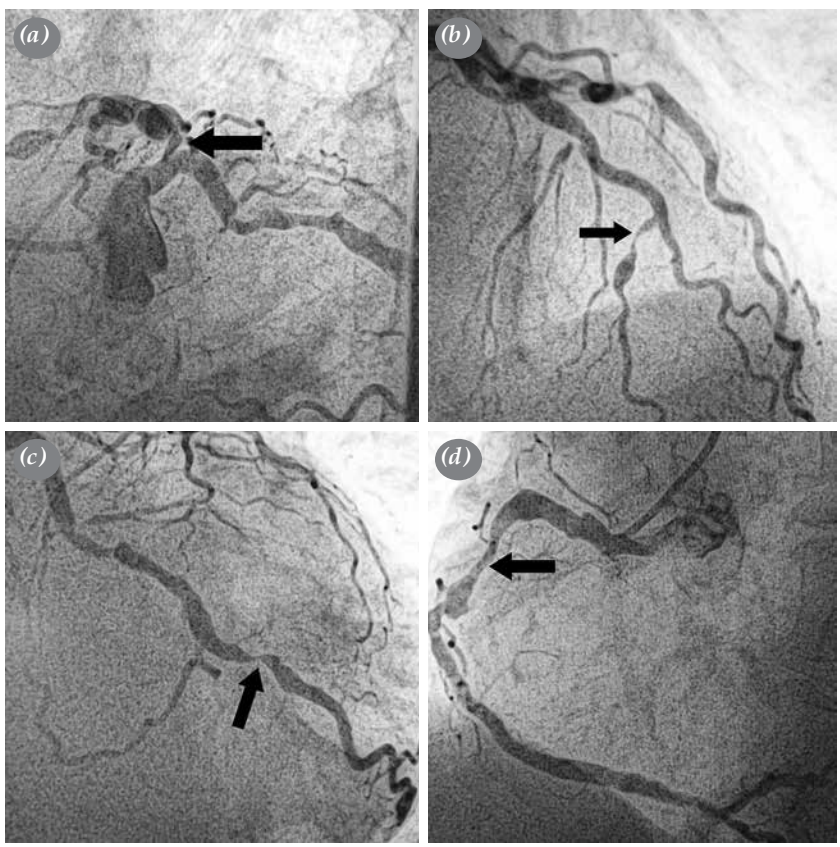

Figure 1. Preoperative coronary angiography. **(a)** An ostial lesion of LAD. **(b)** A proximal lesion of LAD1. **(c)** Lesion in the midportion of Cx. **(d)** Lesion of RCA.

LAD: Left anterior descending artery; LAD1: the first branch of bifid left anterior descending artery; Cx: Circumflex artery; RCA: Right coronary artery.

Figure 2. Images of an abdominal aortic aneurysm. **(a)** Preoperative three-dimensional reconstruction of contrasted computed tomography imaging. **(b)** An intraoperative double subtracted angiography image. **(c)** A postoperative double subtracted angiography image.

Duration of total hybrid procedure was 254 min. Extubation duration was six hour. The patient was transferred to his room at postoperative 22 hours and discharged on postoperative Day 7 after an uneventful postoperative follow-up period.

DISCUSSION

Frequent coincidence of major vascular and cardiac diseases, particularly in elderly patients, emphasizes the importance of a detailed preoperative evaluation to avoid complications result from concomitant diseases. In general, patients of our institution who are scheduled to undergo cardiac or major vascular procedures are investigated in detail in the presence of risk factors for concomitant vascular or cardiac diseases. This may include coronary, aortic, carotid and/or peripheral vascular angiography, as well as thoracic and/or abdominal CT scanning.

It is a well-known fact that AAA ruptures may complicate the postoperative follow-up of CABG, where MI may result in morbidity and mortality in patients undergoing surgery or endovascular procedure for AAAs.[3,4] To avoid undesired disastrous scenarios arising from concomitant aortic or cardiac pathologies of patients undergoing CABG or EVAR, hybrid synchronous CABG and EVAR may be useful. The series reported emphasizes the acceptable morbidity and mortality rates of hybrid synchronous procedures, compared to staged procedures. Postoperative recovery times in hybrid synchronous procedures are as similar as in staged procedures.[5,6]

It is recommended to perform EVAR first to avoid from possible hemodynamic problems which may occur after CPB. Coronary artery bypass grafting is also advised on beating heart or with the assistance of CPB, but without cross-clamping. However, it is also emphasized that each procedure should specifically be tailored according to the pathology and needs of the patient who is planned to undergo hybrid procedure.[5,6]

The most possible postoperative complication is acute renal failure, due to the additive effects of CPB

and contrast agents used during EVAR. However, a team that is highly experienced in EVAR and CABG and the hybrid operating room designed for complex endovascular procedures may be the key for reducing postoperative complications and have an important role in yielding favorable outcomes.[5,6]

In conclusion, we believe that the future will be the era of hybrid procedures which combines traditional, minimally invasive, or robotic surgery with endovascular procedures. Therefore, we advocate that, with the help of improving technology and innovations, experienced teams consist of radiologists, cardiologists, anesthesiologists, and cardiovascular surgeons would play a key role in this era of cardiovascular hybrid procedures.

Declaration of conflicting interests

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