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CORONARY ARTERY ANEURYSM: CASE REPORT OF SURGICAL REPAIR OF AN ANTERIOR DESCENDING CORONARY ARTERY ANEURYSM ASSOCIATED WITH MYOCARDIAL REVASCULARIZATION

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ABSTRACT

Coronary artery aneurysm is an uncommon vascular abnormality characterized by abnormal dilatation of a coronary segment and associated with a wide spectrum of clinical presentations, ranging from incidental findings to myocardial ischemia, thrombosis, distal embolization, or the need for surgical intervention. We report the case of a 47-year-old male patient with a history of systemic arterial hypertension, arrhythmia, venous insufficiency, and previous cranioplasty after traumatic brain injury, on chronic use of carbamazepine, acetylsalicylic acid, and rivaroxaban, who underwent major cardiac surgery for correction of a coronary artery aneurysm associated with myocardial revascularization under cardiopulmonary bypass. The procedure was performed under general anesthesia, with invasive monitoring and support appropriate for the complexity of the intervention. Intraoperatively, median sternotomy, cardiopulmonary bypass, surgical correction of the aneurysm, myocardial revascularization, epicardial pacemaker implantation, thoracic and pericardial drainage, and layered closure were performed. Intraoperative images sequentially documented surgical exposure, progressive dissection of the aneurysmal segment, its intraoperative approach during repair, and the final aspect after vascular reconstruction. Postoperatively, the patient was transferred to the intensive care unit receiving low-dose dobutamine, with transient norepinephrine requirement, and evolved with hemodynamic stability, successful ventilatory weaning, preserved renal function, and no major immediate complications. This case reinforces the importance of individualized perioperative planning in patients with coronary artery aneurysm, highlighting the role of the anesthesiologist in cardiovascular risk assessment, maintenance of hemodynamic stability, management of the balance between myocardial oxygen supply and demand, and safe transition to intensive care.

Keywords: Coronary artery aneurysm, Myocardial revascularization, Cardiopulmonary bypass, Cardiovascular anesthesia, Perioperative care.

INTRODUCTION

Coronary artery aneurysm (CAA) is defined as a focal dilation of a coronary vessel exceeding 1.5 times the diameter of the adjacent normal coronary segment. In extreme presentations, it may be classified as giant, although the literature varies regarding this definition, including diameters greater than four times the reference vessel or absolute measurements exceeding 20 mm in adults. From a morphological standpoint, CAAs may be classified as saccular, when the transverse diameter exceeds the longitudinal diameter, or fusiform, when the opposite occurs. They may also be described as true aneurysms or pseudoaneurysms, depending on the integrity of the vascular wall layers. Despite diagnostic advances in recent decades, there is still no fully established consensus regarding the best therapeutic strategy for this condition.[1-3]

The incidence of CAA varies widely among published series, generally ranging from 0.3% to 5% of patients undergoing coronary imaging studies, with a predominance in males. The most frequently affected vessels are the right coronary artery, followed by the left anterior descending artery and the circumflex artery, particularly in their proximal segments. In most cases, CAAs are asymptomatic and incidentally identified during coronary angiography or coronary computed tomography angiography performed for other clinical indications.[1-3]

Its etiology is heterogeneous. In adults, atherosclerosis is the leading cause, although inflammatory, congenital, traumatic, iatrogenic, and vasculitic etiologies have also been described. In children, Kawasaki disease is among the most relevant causes. From a pathophysiological perspective, inflammatory and degenerative changes in the arterial wall, with destruction of elastic and collagen fibers, vascular remodeling, and consequent structural weakening, appear to play a central role in the development of these aneurysms.[2,3]

When symptomatic, CAA may manifest as angina, acute coronary syndrome, thromboembolic phenomena, and distal myocardial ischemia, as well as, more rarely, compression of adjacent structures or rupture. Diagnosis may be established through coronary angiography, coronary computed tomography angiography, echocardiography, and cardiac magnetic resonance imaging. Its management remains challenging and may involve medical treatment with antiplatelet agents, anticoagulants, statins, and renin–angiotensin–aldosterone system modulators, as well as percutaneous coronary intervention or surgical treatment in selected cases. Therapeutic choice generally depends on the clinical presentation, aneurysm size, anatomical location, thrombotic risk, and the concomitant presence of obstructive coronary artery disease. In this setting, the role of the anesthesiologist becomes particularly relevant, since recognition of the potential hemodynamic and ischemic repercussions of this condition is essential for perioperative risk stratification, individualized anesthetic planning, and management of potential cardiovascular complications during diagnostic, interventional, or surgical procedures.[2-3]

Therefore, CAA remains an uncommon entity with variable clinical presentation and no definitive standardized therapeutic approach, requiring individualized management and decision-making based on anatomical characteristics, clinical context, and the expertise of the multidisciplinary team.[2,3] From this perspective, in addition to its cardiological relevance, its importance to anesthetic practice should also be emphasized, particularly regarding preoperative evaluation, definition of anesthetic strategy, hemodynamic monitoring, and surveillance of perioperative cardiovascular outcomes. This report aims to present a case of CAA, emphasizing its diagnostic and therapeutic aspects, as well as discussing, in light of the case, the implications

of this condition for anesthesiologists involved in perioperative management.

CASE REPORT

A 47-year-old male patient was admitted to the intensive care unit (ICU) in the postoperative period following major cardiac surgery, after surgical repair of a coronary artery aneurysm associated with myocardial revascularization under cardiopulmonary bypass.

His past medical history included systemic arterial hypertension, arrhythmia, venous insufficiency, and previous neurosurgery with cranioplasty after traumatic brain injury secondary to a gunshot wound, with a history of seizures. There was also a history of neuropathic pain under outpatient follow-up. His regular medications included carbamazepine 200 mg, acetylsalicylic acid 100 mg, and rivaroxaban 20 mg daily, with no history of drug allergy.

In the preoperative period, the patient was in fair general condition, conscious, oriented, and cooperative, without relevant complaints, hemodynamically stable, eupneic on room air, and afebrile. He was tolerating oral diet and maintained adequate glycemic control. Physical examination revealed mildly decreased vesicular breath sounds at the lung bases, normal heart sounds, a soft abdomen with present bowel sounds, absence of tenderness on palpation, and well-perfused extremities without inflammatory signs at vascular access sites.

Complementary evaluation with chest computed tomography demonstrated bilateral laminar pleural effusion with adjacent atelectatic areas, as well as a small pericardial effusion associated with pericardial leaflet thickening, without evidence of acute structural complications. No extensive consolidations or severe pulmonary involvement were observed.

The procedure was performed under general anesthesia with advanced monitoring compatible with the complexity of the surgery, including continuous electrocardiography, pulse oximetry, invasive arterial pressure monitoring, capnography, temperature monitoring, and urine output assessment, in addition to large-bore peripheral venous access and central venous catheterization. Anesthetic induction was preceded by preoxygenation and performed with sedoanalgesia and neuromuscular blockade, followed by maintenance with balanced anesthesia and continuous infusions.

After median sternotomy, wide exposure of the operative field allowed identification of the mediastinal structures and planning of the surgical approach. This initial stage was documented in the first panel of the figure, which demonstrates the anatomical exposure of the field and the need for careful management given the complexity of the coronary lesion (Figure 1A).

As dissection progressed, the aneurysmal segment was more clearly individualized, allowing direct assessment of its relationship with adjacent cardiovascular structures and the affected coronary artery course. This step was essential in guiding the correction strategy and its association with myocardial revascularization, particularly considering the risk of distal coronary flow impairment (Figure 1B).

Subsequently, after surgical field preparation and establishment of cardiopulmonary bypass, direct aneurysm repair was undertaken. Intraoperative visualization demonstrated the anatomical appearance of the lesion prior to reconstruction, highlighting the need for surgical correction in the context of associated coronary artery disease and concomitant indication for myocardial revascularization (Figure 1C).

During the repair, careful manipulation of the aneurysmal segment was performed,

Figure 2. (A) Patient positioning for pre-oxygenation. (B) Video laryngoscopy.

preserving adjacent structures and maintaining adequate surgical field control. This represented the central stage of the intervention, in which aneurysm correction and myocardial revascularization strategy were conducted in an integrated manner under cardiopulmonary bypass support (Figure 1D).

Following correction, the immediate appearance of the vascular reconstruction demonstrated an adequate suture line and anatomical reorganization of the treated segment. The intraoperative documentation illustrates the surgical result obtained after exclusion/correction of the aneurysm and reconstruction of the involved vascular bed (Figure 1E).

At the conclusion of the reconstructive stage, the final appearance of the vascular repair before layered closure demonstrated satisfactory hemostasis and absence of significant active bleeding within the operative field. This final image reinforces the immediate anatomical result achieved after surgical correction (Figure 1F).

The intervention therefore included median sternotomy, institution of cardiopulmonary bypass, surgical correction of the coronary artery aneurysm, myocardial revascularization, weaning from cardiopulmonary bypass, implantation of an epicardial pacemaker, placement of intracavitary catheters, pericardial and thoracic drainage, and layered closure. Cardiopulmonary bypass and aortic cross-clamp times were compatible with a medium- to high-complexity combined cardiac surgery, without significant refractory intraoperative hemodynamic instability.

At the end of the procedure, the patient was transferred to the ICU receiving low-dose dobutamine, with transient need for low-dose norepinephrine during the initial postoperative evolution, remaining hemodynamically stable and without signs of persistent shock. Drainage output was adequately controlled, urine output was preserved, and renal function remained stable, with serum creatinine within normal limits.

In the early postoperative period, the patient evolved satisfactorily after weaning from mechanical ventilation, transitioning to spontaneous ventilation while remaining conscious, oriented, and cooperative. Peripheral oxygen saturation remained adequate, without signs of significant respiratory failure, and cardiovascular stability was maintained, with blood pressure and heart rate within acceptable limits. Cefuroxime prophylaxis was administered for 24 hours, without initial need for expanded therapeutic antibiotic coverage, in addition to standard measures for venous thromboembolism prophylaxis and gastric protection.

During the ICU stay, hemodynamic, neurological, infectious, respiratory, and renal surveillance were maintained, together with analgesia, respiratory and motor physiotherapy, monitoring of drain output, and follow-up by the cardiac surgery team. Clinical evolution was favorable, with progressive withdrawal of intensive support, maintenance of effective spontaneous ventilation, adequate spontaneous diuresis, and absence of evidence of acute kidney injury or acute neurological complications. Progressive reduction in thoracic drainage was also observed.

The respiratory status evolved with expected postoperative findings, including laminar atelectasis and small pleural and pericardial effusions, managed conservatively. Progressive clinical improvement was observed, without the need for surgical reintervention and without occurrence of major bleeding, cardiac tamponade, deep infection, or other severe immediate complications, allowing discharge planning from the unit.

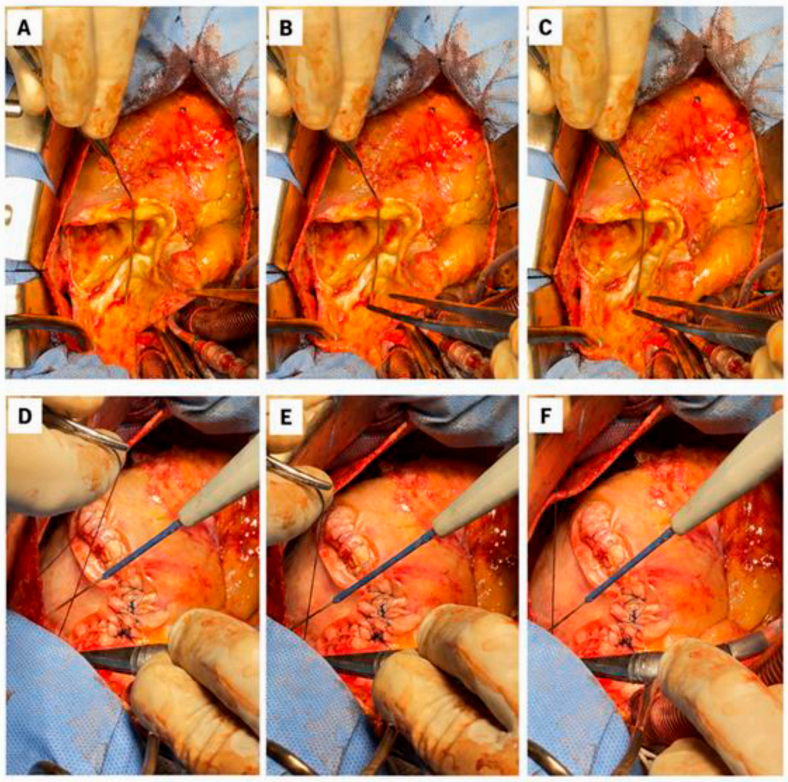

Figure 1: Intraoperative aspects of surgical correction of the coronary artery aneurysm. A: Initial exposure of the operative field after median sternotomy, allowing identification of mediastinal structures and planning of the surgical approach to the coronary artery aneurysm. B: Progressive dissection and individualization of the cardiovascular structures, with improved exposure of the aneurysmal coronary segment. C: Intraoperative appearance of the coronary artery aneurysm prior to reconstruction, highlighting the anatomical complexity of the lesion. D: Surgical manipulation of the aneurysmal segment during the central stage of repair under cardiopulmonary bypass. E: Appearance after surgical correction, demonstrating vascular reconstruction and the suture line at the treated segment. F: Immediate final anatomical result after vascular repair, with satisfactory hemostasis before layered closure.

DISCUSSION

For The present case illustrates a scenario of high perioperative complexity in which surgical correction of a coronary artery aneurysm (CAA) was associated with myocardial revascularization. This combination is particularly relevant because CAAs are uncommon entities with heterogeneous presentation, lacking definitive therapeutic standardization, and whose management depends on the correlation between anatomical characteristics, clinical manifestations, thrombotic risk, and the presence of associated coronary artery disease. The reviews by Pham et al. and Matta et al. emphasize precisely this difficulty in establishing uniform therapeutic approaches, while the report by Schonarth et al. reinforces, in a real clinical context, the need for individualized management given the anatomical and evolutionary variability of these aneurysms.[1-3]

From an anesthetic perspective, the relevance of this case derives from the fact that coronary aneurysmal disease may be associated with local thrombosis, distal

embolization, myocardial ischemia, arrhythmias, and, more rarely, rupture, making the perioperative period particularly sensitive to hemodynamic fluctuations and loss of balance between myocardial oxygen supply and demand. In light of these characteristics, advanced monitoring and anesthetic management tailored to the different phases of the procedure assume a central role, especially during anesthetic induction, cardiopulmonary bypass, weaning from bypass, and the first hours of intensive postoperative recovery. This interpretation is consistent with the pathophysiological mechanisms, complications, and therapeutic possibilities described in the reviews supporting this manuscript.[2,3]

In addition to the anatomical and surgical complexity, the patient's clinical profile further increased perioperative vulnerability. Systemic arterial hypertension, arrhythmia, and neurological history with seizures required greater caution regarding preservation of cardiovascular stability and systemic perfusion, while chronic use of rivaroxaban and acetylsalicylic acid raised additional concerns regarding hemostasis. Although reviews on CAA primarily emphasize the thrombotic and ischemic risks inherent to the disease, they also make clear that therapeutic decision-making must consider the patient's overall clinical context and the balance between thrombotic and hemorrhagic complications, particularly when invasive or surgical treatment is selected. In this regard, meticulous anesthetic evaluation, preparation for possible transfusion management, and continuous surveillance for bleeding become natural extensions of the individualized perioperative strategy advocated in the literature.[2,3]

The surgical indication observed in this case is also consistent with the current literature. Although many CAAs are diagnosed incidentally and may receive conservative management in selected situations, more complex, symptomatic, larger aneurysms associated with higher risk of complications or concomitant obstructive coronary artery disease generally favor operative management. Pham et al. emphasize that in giant aneurysms, the risks of thrombosis, embolization, rupture, and compression of adjacent structures weigh heavily in therapeutic decision-making, whereas Matta et al. reinforce the absence of a single standard strategy and the importance of individualizing the choice among medical treatment, percutaneous intervention, and surgery.[2,3]

In the postoperative period, the patient's evolution was also supported by the cardiac surgery literature. Small pleural and pericardial effusions, as well as laminar atelectasis, are relatively common findings after median sternotomy, pericardial manipulation, and cardiopulmonary bypass. Ashikhmina et al. demonstrated that pericardial effusion is a recognized complication after cardiac surgery, with risk factors related to the clinical profile and type of operation, while Brookes et al. highlighted that pleural effusion after myocardial revascularization is a common event with potential impact on respiratory recovery and hospital length of stay. Thus, in the absence of significant hemodynamic or respiratory repercussions, conservative management associated with adequate analgesia, respiratory physiotherapy, and serial monitoring appears appropriate and consistent with the management adopted in this case.[4,5]

Finally, the patient's favorable evolution, with progressive withdrawal of vasoactive drugs, preservation of renal function, satisfactory ventilatory recovery, and absence of major immediate complications, reinforces the importance of an integrated perioperative approach. The report by Schonarth et al. already demonstrates, on an individual scale, the need for management tailored to the anatomical and clinical particularities of CAA, while the reviews

by Pham et al. and Matta et al. support the concept that variability in presentation and treatment requires multidisciplinary evaluation and individualized decision-making. When this reasoning is applied to the anesthetic setting, it becomes evident that the anesthesiologist's role extends beyond administration of anesthetic agents and includes risk stratification, hemodynamic planning, preparation for cardiovascular and hemorrhagic complications, and active participation in the safe transition to intensive care.[1-3]

CONCLUSION

Surgical correction of coronary artery aneurysm associated with myocardial revascularization represents a significant perioperative challenge, requiring individualized planning and integrated management involving cardiac surgery, anesthesia, and intensive care teams. The favorable evolution observed in this case, without major immediate complications, highlights the importance of thorough preoperative evaluation, appropriate monitoring, and careful anesthetic management throughout the perioperative period. In a context lacking standardized therapeutic approaches, the anesthesiologist assumes a central role in maintaining clinical stability, preventing complications, and promoting safe postoperative recovery.

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