

First Series of Coronary Bypass Operations in Mali

Diarra BI*, Doumbia M¹, Touré M^{2,3}, Coulibaly B¹, Daffe S², Sidibé A¹, Doucouré O¹, Coulibaly BM¹, Cissé M¹, Traoré K¹, Traoré S¹, Binta D¹, Koita S^{1,3}, Togola B³, Togo S^{3,4}, Ouattara MA^{3,4}, S^{3,4}, Yena S^{3,4}, Fernandez G⁵, Nadjeboulah B⁵, Flecher E⁵, Langanay T⁵ and Deloche A⁵

¹Thoracic and cardio-vascular surgery department (Andre Festoc center, bamako)

²Cardiology department of the “Luxembourg” mother-child hospital in Bamako (Mali)

³Faculty of Medicine and Odontostomatology, University of Technical Sciences and Technologies of Bamako; Mali

⁴Thoracic surgery department « hopital du mali »

⁵Non-governmental organization chain of hope (France)

*Corresponding author:

Dr Baba Ibrahima Diarra,
cardio-vascular and thoracic surgeon, Mali

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1. Abstract

1.1. Introduction: Coronary artery bypass grafting (CABG), also known as coronary artery bypass grafting (CABG), is a cardiac surgical technique that involves bypassing (bridging) a narrowed or blocked coronary artery by implanting another vessel downstream of it, thereby revascularizing the territory of the affected coronary artery.

1.2. Observation 1: A 56-year-old patient with irregular diabetes was referred to us by the cardiology department for management of severe, symptomatic coronary artery disease. His condition had been evolving for 03 weeks, with the onset of edema of the lower limbs associated with NYHA stage 3 -4 dyspnoea. Coronary angiography had revealed tight, angiographically significant lesions >70% on the anterior interventricular and circumflex. The indication for double bypass surgery was therefore given, and the procedure was performed under full body circulation with the patient's heart stopped.

1.3. Observation 2: A 73-year-old patient with known hypertension and a 35-pack-year smoking cessation habit was referred to us by the cardiac catheterization unit for chronic coronary insufficiency, with a 10-year history of recurrent angina associated with NYHA stage 2-3 dyspnea. He underwent IVA (intra myocardial) bypass with a left internal mammary artery, right middle 1/3 coronary bypass with a saphenous graft and left marginal bypass with a saphenous graft. Anastomosis of the 2 saphenous grafts to the ascending aorta was performed with a 5/0 single-strand suture. Extracorporeal circulation time was 180 minutes and clamping time

100 minutes.

1.4. Observation 3: This 61-year-old patient, known to be hypertensive and diabetic, was referred to us by the interventional cardiology unit for surgical management of bi-truncular damage. She underwent IVA bypass with a left internal mammary artery and diagonal bypass with a saphenous graft. Anastomosis of the proximal end of the saphenous graft (5/0) to the ascending aorta using the cardioplegia port. CEC time was 82 minutes. Clamping time was 47 minutes.

1.5. Conclusion: Developing countries, particularly those in sub-Saharan Africa, have undergone an epidemiological transition in recent decades, marked by the expansion of cardiovascular diseases, particularly coronary artery disease [3-4].

2. Introduction

Coronary artery bypass grafting (CABG), also known as coronary artery bypass grafting (CABG), is a cardiac surgical technique bypassing a narrowed or occluded coronary artery by implanting another vessel by implanting another vessel downstream of it, thereby revascularize the affected coronary territory. For many years, coronary surgery remained the only effective treatment for coronary disease. With the advent of percutaneous dilatation and, above all, the development of stents, patients now have a choice of revascularization techniques: either surgery, whose results are excellent, both in terms of the extent of revascularization and, above all, the durability of the result, at the cost of a real but reduced operative risk [1] (of the order of 1 to 4%); or endovascular techniques, which are not very aggressive, well tolerated, and enable

essential lesions to be treated without scarring, and which certainly enable functional improvement, but whose distant results are questionable, with a high risk of further dilatation or bypass surgery. We report observations from our first series of bypass operations carried out at the Centre Festoc in Bamako.

3. Observation 1

This was a 56-year-old patient with irregularly monitored diabetes who had been referred to us by the cardiology department for management of severe, symptomatic coronary artery disease. His condition had been evolving for 03 weeks, with the onset of edema of the lower limbs associated with stage 3 -4 dyspnea (NYHA). The worsening condition prompted a cardiology consultation, where ultrasound and coronary angiography revealed the lesions. On admission, the patient showed mild edema of the lower limbs, with normal vitals. Heart sounds were regular and muffled on auscultation, and there were discrete crackling rales at both lung bases. Biological assessment revealed mild hyponatremia, which had been corrected. Cardiac echocardiography revealed a dilated, hypokinetic left ventricle with an ejection fraction of 55%. The right ventricle was also hypokinetic but not dilated. Ultrasound revealed a 4 mm pericardial detachment. Coronary angiography revealed tight, angiographically significant lesions >70% on the anterior interventricular and circumflex. The indication for double bypass surgery was therefore established and performed under cardiopulmonary bypass. The left mammary artery was anastomosed to the circumflex artery (Figure 2) and a saphenous vein graft was interposed between the ascending aorta and the anterior interventricular (Figure 1, Figure 2). The post-operative course was marked by the onset of glycemic imbalance, which progressed well on insulin and oral antidiabetics; and right basal pneumopathy, which progressed favorably on antibiotic therapy with 3rd-generation cephalosporin.

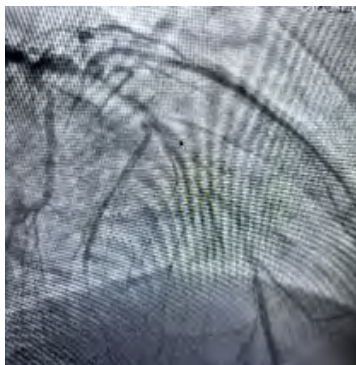


Figure 1: (coronary angiography): Tight stenosis of the circumflex artery

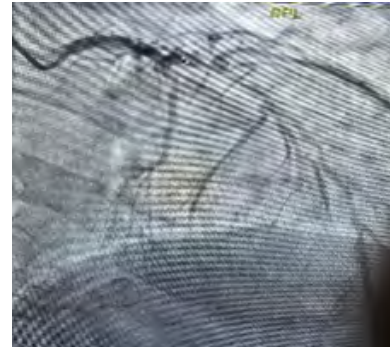


Figure 2: (coronary angiography): Tight stenosis of the proximal IVA

4. Observation 2

This is a 73-year-old patient with known hypertension and a 35-pack-year smoking habit, who was referred to us by the cardiac catheterization unit for chronic coronary insufficiency, with a 10-year history of recurrent angina associated with stage 2-3 dyspnea (NYHA). This had necessitated several consultations with a general practitioner, where a treatment of unknown nature had been prescribed without improvement, as well as a conventional treatment. Given the persistence of these signs, the patient was referred to cardiology, where he underwent coronary angiography and was referred to us for surgery. On physical examination, the patient was in good general condition. Vitals were normal. Cardiac auscultation revealed no abnormal sounds. Biological tests were normal, apart from a slight disturbance of the lipid profile. Chest X-ray showed a normal cardiac silhouette with an ICT of 0.48. The electrocardiogram showed a regular sinus rhythm, with a normal axis. Negative T waves were noted in D1 to LV and from V1 to V6. Echo-doppler of the supra-aortic trunks was normal. Coronary angiography. A left internal mammary artery bypass of the IVA (intra myocardial), a right middle 1/3 coronary bypass with saphenous graft and a left marginal bypass with saphenous graft were performed. Anastomosis of the 2 saphenous grafts to the ascending aorta was performed using a 5/0 prolene overjet. Cardiac recovery was in BAV, probably due to a second cardioplegia for the breast bypass. Recovery was good. Extracorporeal. Circulation time was 180 minutes and clamping time 100 minutes. The evolution was marked by the onset of persistent pneumopathy since resuscitation, requiring several NIV sessions and appropriate antibiotic therapy. The length of stay in intensive care was 7 days.

5. Observation 3

A 61-year-old female patient with hypertension and diabetes was referred to us by the interventional cardiology unit for surgical management of a bi-truncular defect. Her functional signs, which had been present for 1 year, were dominated by epigastric precordialgia radiating to the left hemothorax, associated with palpitations. This had prompted several consultations, notably in general medicine, then in gastroenterology, where treatment based on antacids and proton pump inhibitors was prescribed, with no clear improvement, leading to a consultation in cardiology, then in

the catheterization unit, where a coronary angiogram revealed the lesions. Physical examination revealed a patient in good general condition. Vitals were normal. Cardiac auscultation revealed no abnormal heart sounds. Biological tests were normal, apart from a slight disturbance of the lipid profile. Chest X-ray showed a normal cardiac silhouette with an ICT of 0.48. The electrocardiogram showed a regular sinus rhythm. He had no rhythm or conduction disorders. Echo-doppler of the supra-aortic trunks was normal. Cardiac echocardiography showed minor mitral insufficiency, functional tricuspid insufficiency with PAPS0 46 mmhg and septal and septo-apical dyskinesia (Figures 3-8).

On coronary angiography, the left common trunk of the coronary artery was normal-sized, regular, uncalcified, with a significant 70-90% stenosis in its ostial portion. The anterior interventricular artery was medium-sized, regular, uncalcified, with a significant 70-90% stenosis in its proximal part and an intermediate 50-70% stenosis in its middle part. The right coronary artery was of normal size: regular, uncalcified, and yielded the posterior interventricular and posterior retroventricular. In conclusion, this was a tri-truncular lesion combining significant stenosis of the ostial left common trunk and significant stenosis of the proximal anterior interventricular. She underwent IVA bypass with left internal mammary artery and a Diagonal bypass with saphenous graft. Anastomosis of the proximal end of the saphenous graft (5/0) to the ascending aorta using the cardioplegia port. CEC time was 82 minutes. Clamping time was 47 minutes. The evolution was marked by the occurrence of a persistent infectious syndrome with isolation of a Klebsiella strain, for which she was put on Imipenem with reduction of fever. She was discharged on postoperative day 11. On postoperative day 15, she developed acute pain. This prompted a Doppler ultrasound, which revealed a deep femoropopliteal venous thrombosis. On the sixteenth postoperative day, she suffered a sudden syncope with a drop in height. This prompted the implementation of resuscitation measures (cardiac massage, orotracheal intubation and inotropic therapy) without success. The hypothesis of a massive pulmonary embolism was raised.

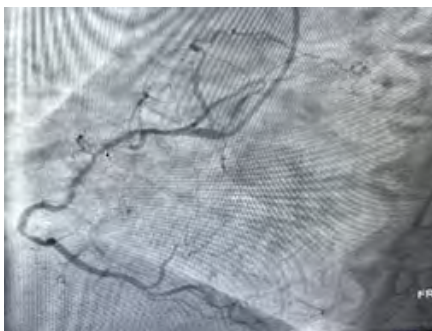


Figure 3: (coronary angiography): Tight stenosis of the middle right coronary

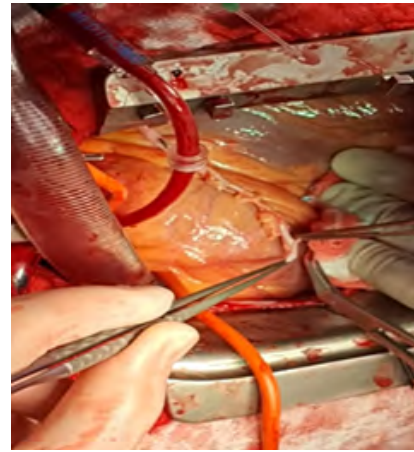


Figure 4: (operative view): Saphenous vein

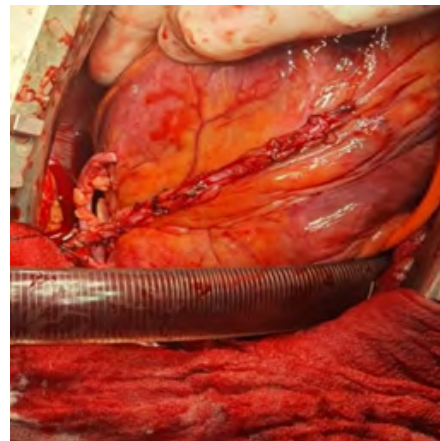


Figure 5: (operative view): Anastomosis between saphenous vein and circumflex artery + anastomosis between left mammary and IVA

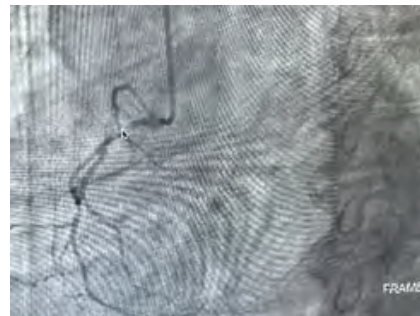


Figure 6: (coronary angiography): Stenosis of the right coronary artery

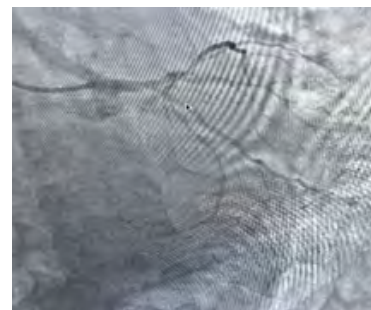


Figure 7: (coronary angiography): Marginal artery stenosis

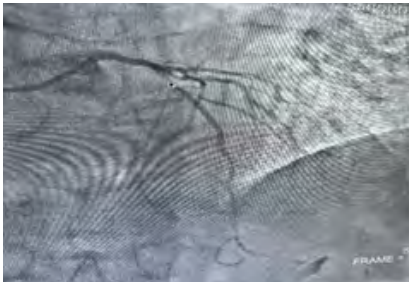


Figure 8: (coronary angiography): Tight stenosis of the IVA



Figure 9: (operative view): Harvesting the long saphenous vein

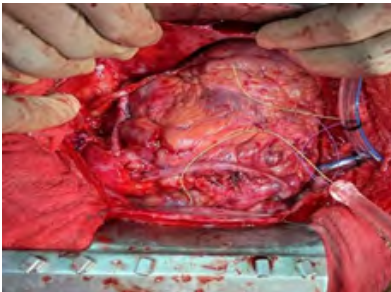


Figure 10: (operative view): Triple bypass (left mammary-IVA; marginal artery-graft-aorta; right coronary-graft-aorta).aorte)

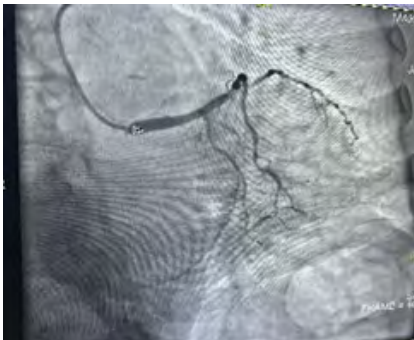


Figure 11: (coronarographie) : Sténose du tronc commun

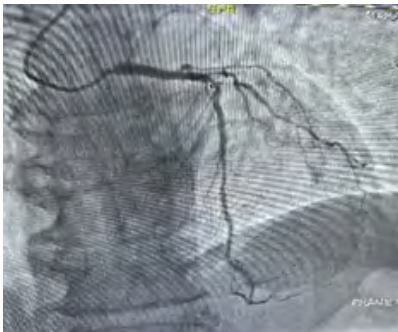


Figure 12: (coronarographie) : Sténose serrée de l'IVA

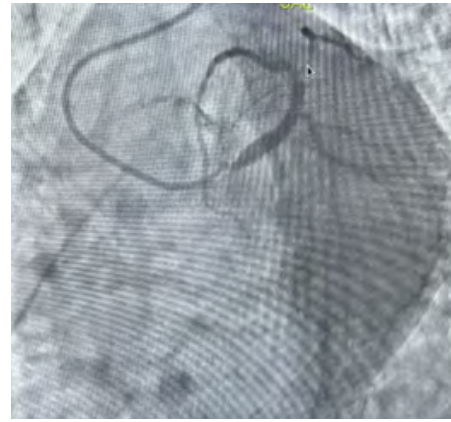


Figure 13: (coronarographie) : Sténose serrée de l'artère diagonal

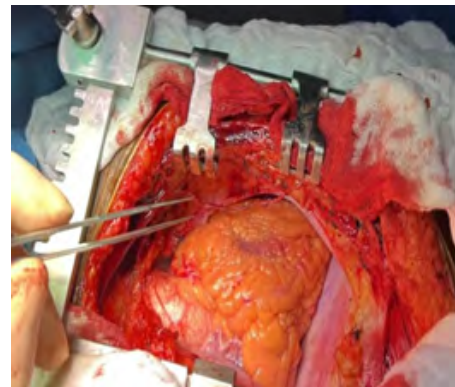


Figure 14: (operative view): left mammary artery harvesting

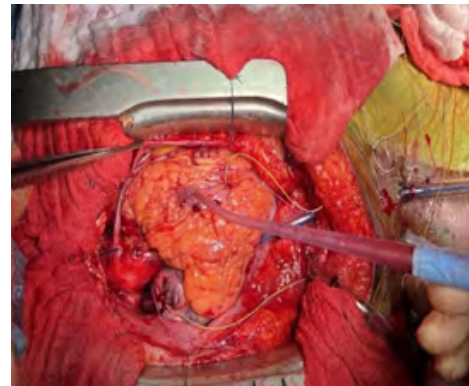


Figure 15: (operative view): Double bypass (left mammary -IVA; diagonal -graft -aorta)

6. Discussion

In recent decades, developing countries, particularly those in sub-Saharan Africa, have undergone an epidemiological transition, marked by the expansion of cardiovascular diseases, particularly coronary heart disease [3-4]. Although the epidemiological and clinical features of acute coronary syndromes (ACS), the most severe form of coronary disease, have been described, very few angiographic series have been reported [5]. The mean age of our series was 63.3 years, comparable to the results found in Chaabouni [10], Girard [11], and Adelborg [12]. But it is lower than the mean age found in the Lamy study [13] and higher than the mean age found in the DIOP series [8] in Senegal, which

reported 62 years. Patients undergoing surgical revascularization are becoming increasingly older, This is due to the evolution of surgical techniques and patient demographics. They tend to have more comorbidities, including diabetes, hypertension, heart failure and renal failure. The major risk factors most frequently found in our series were arterial hypertension in 2 cases, smoking in 1 case, and diabetes in 2 cases. These factors are similar to those found in the literature [16]. Analysis of these risk factors showed no significant differences between clinical presentations. In series reported in the literature, there was a high prevalence of hypertension and smoking [13]. Diabetes is a major cardiovascular risk factor, and coronary artery disease in diabetics has certain specific features, namely the diffuse nature of both severe coronary artery disease and multifocal atherosclerosis. Rigorous management of both diabetes and coronary artery disease is the only guarantee of a successful outcome [15]. Among other things, several studies have concluded that postoperative mortality is higher in diabetic patients. In our series, one of the two diabetics died of a probable massive pulmonary embolism associated with pneumopathy. Similar observations have been made with regard to hypertension and its involvement in postoperative mortality [16-17]. In our study, 2 out of 3 cases were clearly male. This is comparable to series in the literature ranging from 79% to 91% [13]. In our study, the sex ratio was 67.8% in Larrifa [1], 61.3% in Jacq [2] and 3.37 in Diop [8]. This male predominance is inversely associated with age, and disappears from the age of 75 [14]. Angina appears to be the main sign in our series. The same frequency has been observed in other series, such as Tribak et al [18], who reported 92.9%, while the STICHES study [19] reported 64% angina. The second objective sign was stage 3 dyspnoea, which was present in all our patients. STICHES [19] reported 37% dyspnoea, whereas Tribak et al [18] reported only 5.8%. Electrocardiographic signs of myocardial ischemia were found in 2 patients in our series. Cohen et al [20] found these signs in 80.6% of patients, and Carrier in 80% of patients in his series. The mean EF in our population was 60%, with extremes ranging from 55% to 65%. None of our patients had an ejection fraction <30%, whereas in Girard et al's series, 1.5% of patients had a collapsed EF [11]. Studies show that coronary bypass surgery can be performed in patients with with ischemic heart disease and severe left ventricular systolic dysfunction (EF <35%), with acceptable in-hospital morbidity and long-term survival [18]. Most of the lesions observed were located on the IVA, whatever the clinical presentation. This lesion was present in all 3 of our patients. Next came lesions of the right coronary artery, which were present in 2 of our patients. The study by Chauvet [5] in the Ivory Coast also noted a predominance of involvement of the IVA. It was involved in 43.1% of cases. In the study by DIOP [8] in Senegal, the VIA was involved in 48% of cases. Wang [7] in Kenya noted in his series 40% involvement of the IVA and 33% of the right

coronary artery. In our series, 2 out of 3 patients had right coronary artery involvement. In Diop's series [8], 38% had right coronary artery involvement. Coronary artery bypass grafting (CABG) is a surgical revascularization of the myocardium representing a treatment for myocardial infarction following stenosis of one or more coronary arteries. And despite the development of non-invasive interventional cardiology techniques, coronary artery bypass grafting (CABG) remains a key method of myocardial revascularization, and can be performed as part of scheduled or emergency surgery. However, patients referred for surgery are often older and have multiple, complex pathologies. Coronary artery bypass grafting (CABG) is performed using either a venous graft, essentially the long saphenous vein, or an arterial graft (internal mammary artery, radial artery). The latter is preferred for its better long-term patency. An off-pump technique is also available [2].

Our average bypass value was 2.3 bridges per patient, with a predominance of double bypass. Moutakiallah et al [15] in Morocco found the same result. While other studies report higher figures, Girard et al, Chaabouni et al [10], and Tribak et al [18], found 2.6, 2.7 and 2.8 bridges per patient respectively, with a predominance of triple bypass. The mean postoperative length of stay in intensive care for patients in our series was 7 days, close to that of Chaabouni et al [10], which was 7.7 days, but higher than that found in the series of Girard et al [11], with a mean of 2.37 days, and the series of Moutakiallah et al [15], with a mean of 2 days. The average extubation time for patients in our series was 4 h, a very short average compared with those of Chaabouni et al [10], Girard et al [11] and Moutakiallah et al [15], with respective averages of 17h, 16.5h, 14.3h and 7h. Generally speaking, the operative mortality rate for CABG is 0.5 to 3%, depending on the risk category, in elective cases, and risk categories in elective cases, and 3-8% for emergency procedures or in polyvascular patients [22-24]. In the case of unstable angina, mortality is 4-20%; in the case of isolated left-sided dysfunction, all operations combined, mortality is 9.7%. The risk of postoperative infarction is 2-9% [22-24]. Most of these complications occur in the postoperative period, extending up to the first 48 - 72 hours after surgery [25]. This is a particularly high-risk period, requiring close monitoring of patients identified as being at risk. Morbidity is dominated by complications of a cardio-circulatory nature (hypovolemia, hemorrhage, ventricular failure, infarction, arrhythmias, tamponade, vasoplegia, etc.), followed by respiratory (10%), renal (10%), neurological (3%), digestive (2.5%) and wound infections (1.4%) [22-23]. In our study, 2 patients presented with an infection of pulmonary origin. In addition, none of the patients presented with an infection of the sternotomy scar. In the series by Moutakiallah et al [15], 10.7% of surgical scars were infected surgical scar.

7. Conclusion

In recent decades, developing countries, particularly those in

sub-Saharan Africa, have undergone an epidemiological transition, marked by the expansion of cardiovascular disease, particularly coronary artery disease [3-4]. Coronary artery bypass surgery has undeniably evolved over the last few decades, and has been the subject of several studies. It is now clear that patients interested in surgical revascularization are increasingly fragile, and therefore at greater risk of postoperative complications. A good preoperative assessment will help identify the patient's needs in terms of anesthesia and intra- and postoperative resuscitation, thereby improving not only the patient's vital prognosis, but also their postoperative quality of life.

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