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Surgical Management of Coronary Arteriovenous Fistula in Patients Presenting with Acute Coronary Syndrome

—A Local University Hospital 6 Years Experience

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Abstract

Background: Anomalies of the coronary arteries are uncommon, usually discovered incidentally during diagnostic cardiac catheterization or cardiac computed tomography (CCT). Coronary artery fistula (CAF) is one of the varieties of coronary termination anomalies. Some of CAF patients have symptoms of myocardial ischemia. Methods: In King Abdulaziz university hospital (KAUH) over six years period, five patients presented with acute coronary syndrome (ACS) and were diagnosed to have CAF by cardiac catheterization during the diagnostic workup of ischemic heart disease (IHD), four males and one female, mean age 57.4 ± 6.6 years; four patients had CAF with associated coronary atherosclerotic disease (CAD); one patient had large complex CAF with no significant CAD; all patients with CAD underwent closure/excision of the CAF with surgical revascularization; the patient with no CAD preferred surgical excision over endovascular intervention. Results: All patients had surgery with uneventful postoperative course and they were doing well with 3 to 7 years outpatient follow up. Conclusion: Surgical management is safe in patients with coronary artery anomalies presenting with ACS.

Keywords

Congenital Coronary Vessels Anomalies, Coronary Arteriovenous Fistula, Myocardial Ischemia

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1. Introduction

Coronary artery anomalies incidence is less than 1% of the population. It is classified to anomalies of origin, termination, structure/intrinsic and course. Coronary artery fistulae (CAF) is a type of termination abnormality and is considered as a major congenital anomaly in which the communication blood flows bypass the myocardial capillary bed [1]. CAF is either coronary-cameral fistula (CCF) communicating the coronary arteries to a cardiac chamber, or coronary arteriovenous fistula (CAVF) communicating the coronary artery to pulmonary or systemic circulation [2].

According to the site of origin, CAVF can be classified to three types:

1) Unilateral with origin from one major epicardial coronary artery or its branches (single or multiple sites) and one or more termination sites.

2) Bilateral with origin from two major epicardial coronary artery or its branches (single or multiple sites) and one or more termination sites.

3) Multilateral with origin from all three major epicardial coronary artery or its branches (single or multiple sites) one or more termination sites [3].

Coronary angiography is the gold standard for detection of congenital coronary arteriovenous fistulae. More anatomical details can be provided by cardiac computed tomography (CCT) which is now more frequently used in the work up of coronary artery investigations [4].

Most CAVF patients are asymptomatic. Symptoms are more common in patients older than 20 years of age as compared to patients younger than 20 years (57.5% - 42.5%). In patients older than 20 years, the symptoms include exertional dyspnea, fatigue, palpitations and ischemic chest pain with heart failure as the most common complication [5].

2. Methodology

Cardiac catheterization laboratory in King Abdulaziz University Hospital (KAUH) perform more than 2000 adult coronary angiography procedures per year (diagnostic and/ or therapeutic), this is a retrospective study to review of CAVF patients with ACS patients, ethical approval was obtained from the hospital research ethical committee, data were collected from hospital records. Between July 2008 and January 2014, five patients were referred to cardiac surgery with the diagnosis of ACS and congenital coronary arteriovenous fistula (CAVF) (4 males and 1 female). Mean age was 57.4 ± 6.6 years. All cases had one or more of the risk factors for IHD (diabetes mellitus, hypertension, dyslipidemia and smoking). 4 out of the 5 patients had significant coronary atherosclerotic disease (CAD). all patients with CAD had myocardial infarction with ECG and echocardiographic changes consistent with ischemic heart disease while the patient with no CAD had chest pain, palpitation and syncope with no specific ischemic ECG changes, no significant elevation of cardiac enzymes and no echocardiographic changes.

Summary of patient's data (**Table 1**):

Patient 1: Bilateral CAVF from proximal LAD and conal branch of proximal RCA draining into the pulmonary artery (PA), Occluded med LAD. [Referred from another center], **Figure 1**, **Figure 2**.

Patient 2: Unilateral CAVF origin from proximal LAD drain into PA, **Figure 3**, **Figure 4**, normal coronary arteries with. The patient is a 60-year-old nurse and she prefers surgical excision over percutaneous intervention.

Patient 3: Bilateral CAVF from proximal LAD and proximal RCA, with 3 vessel CAD.

Patient 4: Bilateral CAVF from proximal CCX and distal RCA draining into PA, with sever LAD stenosis. **Figure 5**, **Figure 6**.

Patient 5: Unilateral CAVF with 2 origin sites from proximal LAD drain in PA, occlude distal CCX and RCA **Figure 7**.

3. Results

All patients with CAD had aorto-coronary bypass grafts (CABG) with the use of cardiopulmonary bypass and mild hypothermia 30˚C - 32˚C. All five patients with CAVF had surgical ligation +/− excision. There were no intraoperative or postoperative complications. They were discharged home within one week after surgery. All patients are followed in the outpatient clinics no complaints and no recurrence of symptoms for more than 2 years, the first patient has completed to 6 years of follow up.

Table 1. Summary of patient's data.

Case No.	Presentation	Age	Gender	Type of coronary anomalies	Origin of CAVM	Drainage site	Coronary artery disease	CAD risk factors	Surgical procedure
1	ACS, AWMI	52	Male	Bilateral CAVF	LAD and RCA	PA	Occluded LAD	Hypertension	CABG + Excision of CAVF
2	Syncope, angina and palpitation	60	Female	Unilateral CAVF	CCX	PA	Non	NIDDM	Excision of CAVF
3	ACS, AWMI	55	Male	Bilateral CAVF	LAD and RCA	PA	3 Vessel CAD	DM and hypertension	CABG + excision of CAVF
4	ACS, unstable angina	64	Male	Bilateral CAVF	RCA and CCX	PA	Sever LAD stenosis	NIDDM, dyslipidemia, HTN & smoking	CABG + excision of CAVF
5	ACS, IWMI	56	Male	Unilateral CAVF	2 Sites proximal LAD	PA	Occluded both CCX & RCA	NIDDM, dyslipidemia & hypertension	CABG + excision of CAVF

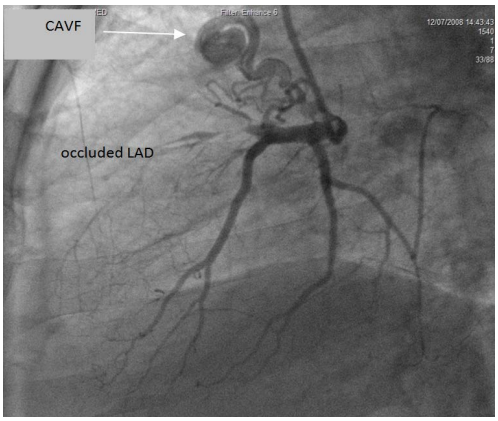

Figure 1. Patient 1, bilateral CAVF origin from proximal LAD drain into PA. [Cardiac catheterization].

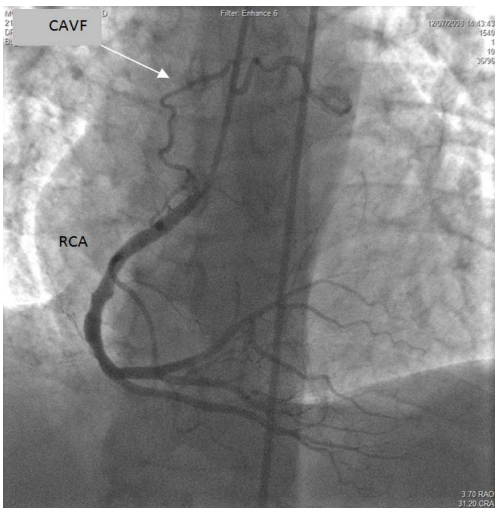

Figure 2. Patient 1, unilateral CAVF origin from conal branch of RCA drain into PA. [Cardiac catheterization].

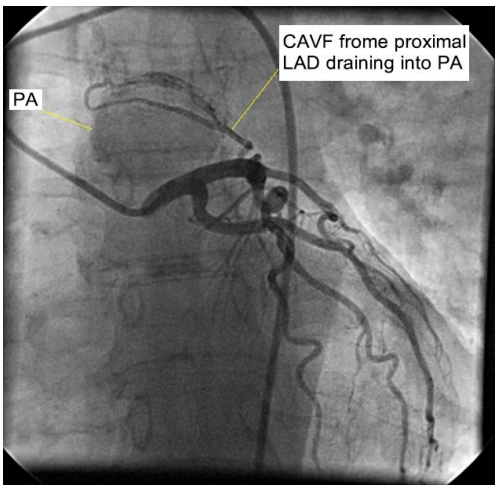

Figure 3. Patient 2, unilateral CAVF origin from proximal LAD drain into PA. [Cardiac catheterization].

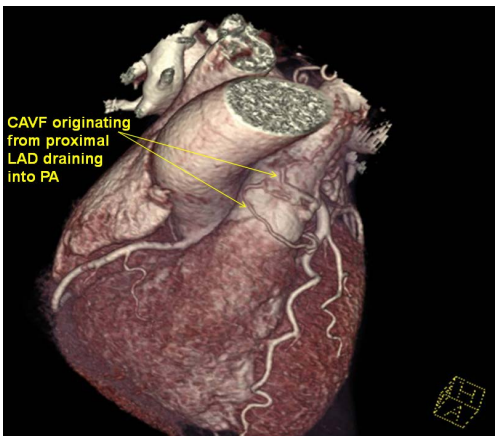

Figure 4. Patient 2, unilateral CAVF originating from proximal LAD draining into PA. [Cardiac CT scan].

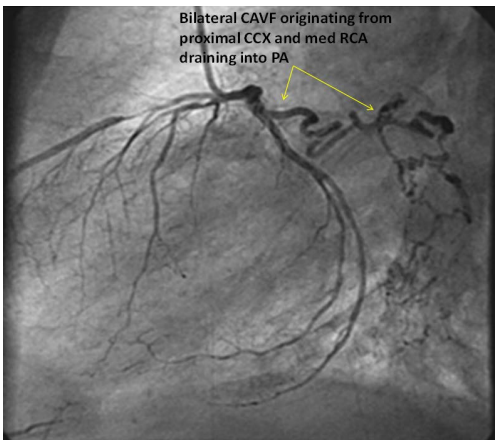

Figure 5. Patient 4, bilateral congenital CAVF, originating from CCX and RCA draining into PA. [Cardiac catheterization].

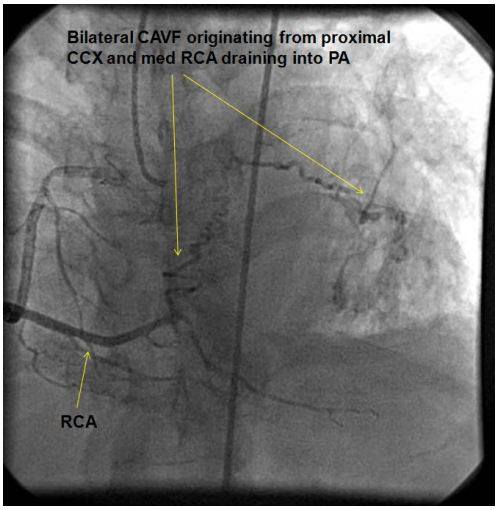

Figure 6. Patient 4, bilateral congenital CAVF, originating from CCX and RCA draining into PA. [Cardiac catheterization].

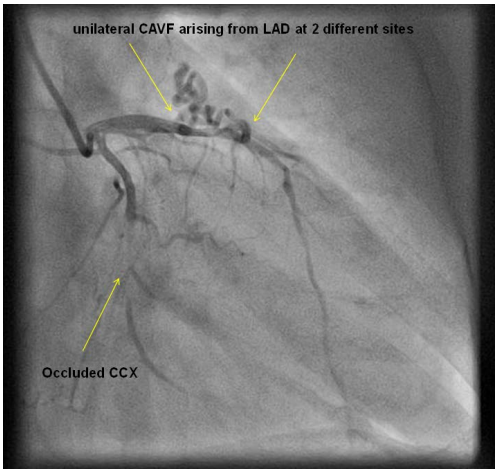

Figure 7. Patient 5, unilateral CAVF arising from LAD at 2 different site, occluded CCX and RCA. [Cardiac catheterization].

4. Discussion

Congenital anomalies of the coronary arteries represent 1% - 2% of all congenital heart diseases, among victims of sudden death the incidence of coronary anomalies is reported to exist in 4% - 15% of young victims and 1% in adult victims. In a comprehensive review of patients undergoing coronary angiographic studies the incidence of coronary anomalies was 110/1950 = 5.6%, absent left main in 13/1950 = 0.67% and coronary arteriovenous fistula (CAVF) in 17/1950 = 0.87% [6]. In recent years, cardiac computed tomography (CCT) has become the test of choice for diagnosis of coronary anomalies [7].

In patients with atherosclerotic coronary artery disease presenting with acute coronary syndrome, surgical coronary revascularization can be safely associated with ligation excision of the CAVF. In patients with normal coronaries should be considered for closure by interventional cardiology technique but surgical closure can be considered in some cases e.g. complex CAF and on patient request.

Our small series contains unilateral CAF originating from single and multiple sites and bilateral CAVF, all draining into the pulmonary artery. All patients are followed in the outpatient clinic for up to 6 years and are doing well.

5. Conclusion

Surgical management is safe in patients with coronary artery anomalies presenting with ACS. Patients with no significant CAD should be considered for interventional closure of the CAF in the catheterization laboratory.

Financial Declaration

I confirm that I had no grant or financial support in my work in this paper or any other paper related to my clinical practices.

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Abbreviations

Acute Coronary Syndrome (**ACS**), Coronary Atherosclerotic Disease (**CAD**), Left Main Coronary Artery (**LMCA**), Right Coronary Artery (**RCA**), Left Anterior Descending Artery (**LAD**), Diabetes Mellitus (**DM**), Non Insulin Dependent Diabetes Mellitus (**NIDDM**), Anterior Wall Myocardial Infarction (**AWMI**), Non ST segment Elevation Myocardial Infarction (**NSTEMI**), Coronary Arteriovenous Fistula (**CAVF)**, Cardiac Computed Tomography (**CCT**).