Case Study

Myocardial bridging Diagnosis and Management in a student pilot candidate a case study with literature review

Aims:
Management of cardiac disease in aeromedical expertise can be challenging for asymptomatic crew members, especially during the first aeromedical examination, myocardial bridging is a good example.

Presentation of Case: A 24-year-old student pilot candidate showsrepolarization disorders at the electrocardiogram in the aeromedical examination, the exploration allowed the discovery of a myocardial bridge on The Coronary computed tomographic angiography of the left anterior descending (LAD) coronary artery responsible for tight stenosis.

Discussion:the prevalence of myocardial bridging varies depending on the research method ranging from 2% in coronary angiography and 19% in Coronary computed tomography up to 42% at autopsy

The prevalence among active civil aircrew (pilot and cabin crew) monitored at the CEMPN is 0.4%, all revealed by electrocardiogram abnormalities.

Myocardial bridges are usually small and have no clinical significance; but the proximal segment to the region of the myocardial bridging has been associated with atherosclerosis.
Symptomatic patients who have myocardial bridges as their only cardiac abnormality may present with myocardial ischemia, acute coronary syndromes, coronary spasm, syncope or even sudden death.

The aviation environment may expose aircrew to additional physiological stressors (such as hypoxia, hypobaria, and potentially sustained acceleration (+Gz)), and present a risk if associated with cardiovascular abnormalities and lead to incapacity to fly.

Conclusion: the myocardial bridge is an anatomical variant rather than a congenital anomaly with varied symptomatology (ECG abnormality, stable or unstable angina or sudden death), the aeromedical decision is made on a case-by-case basis.

Keywords: Myocardial bridging,aeromedical expertise,aeromedical fitness

INTRODUCTION:

Myocardial bridging (MB) is a congenital coronary anomaly in which a segment of the epicardial coronary artery traverses through the myocardium for a portion of its length[1]. *(figure 1)*

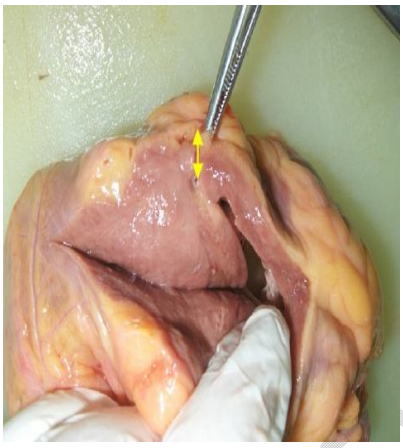

Figure 1: Sagittal section of the left anterior descending artery showing the myocardial bridge at its middle part[2]

Typically benign and asymptomatic, myocardial bridging may impair coronary blood flow on exercise, depending on the length and depth of the tunneled artery, and have relevant aeromedical ramifications and exceptionally be responsible for serious life threatening complications.[1,3]

CASE PRESENTATION:

A 24-year-old student pilot candidate came to the Aeromedical Expertise Center of Rabat (CEMPN) for medical evaluation.

He had no previous medical comorbidities and was asymptomatic. The physical examination was unremarkable,the electrocardiogram revealed repolarization disorders in the anterior area.The transthoracic echocardiography shows no abnormality.The exercise stress testing was negative clinically and suspicious electrically (ST depression regressing in recovery).

Coronary computed tomographic angiography revealed non-calcified coronary arteries, with long intramyocardial path of the middle and distal left anterior descending (LAD) coronary artery responsible for tight stenosis.

Coronary angiography shows non-atheromatous coronary arteries, milking of the distal LAD (figure 2), downstream the artery is of very small caliber, the right coronary is dominant and of large caliber and ensure the vascularization of the apex in place of the LAD.

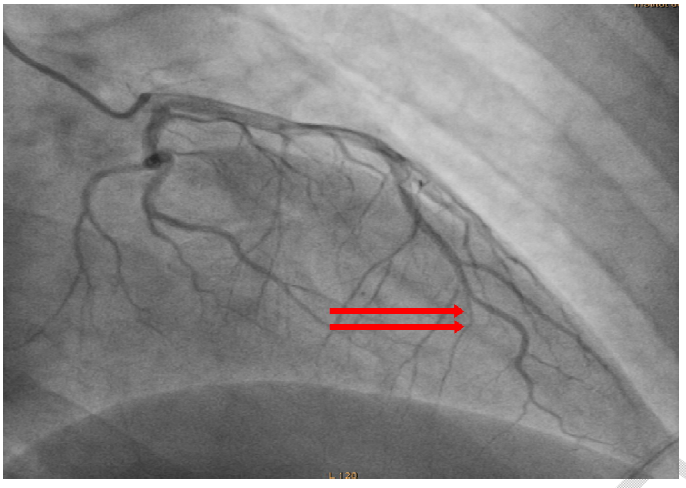

Figure 2: milking of the distal LAD artery in Coronary angiography

DISCUSSION:

First described by Reyman in 1737.The true prevalence of MB is not accurately known it varies depending on the research method ranging from 2% in coronary angiography and 19% in Coronary computed tomography up to 42% at autopsy. Myocardial bridges can be found in any epicardial artery, 67-98% occurs in the left anterior descending coronary artery (LAD) [1,4]

Myocardial bridges are usually small and have no clinical significance. The segment proximal to the region of the myocardial bridging has been associated with atherosclerosis rather than the myocardial bridging segment itself [5]

The mechanical stress caused by systolic narrowing at the myocardial bridging segment may result in endothelial damage, which, conversely, may induce platelet aggregation, coronary vasospasm and eventually acute coronary syndrome. Both hemodynamic and structural changes, such as blood flow disturbance, myocardial malperfusion, deposits of lipids and mucopolysaccharides and elastic damages, can be noted in the coronary artery segment proximal to a myocardial bridge.[1]

All these changes predispose to formation of atherosclerotic plaques in the intima of the coronary artery segment. Obviously, myocardial bridging is associated with degenerations of both myocardium and coronary artery[3,5]. (Figure 3)

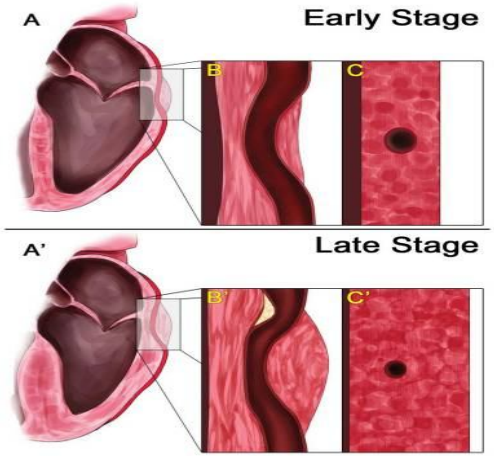

Figure 3: **Schematic Diagram of the Effects of Aging on the Myocardial Bridge[1]**

A: *Heart with myocardial bridging, early stage.* ***B:*** *Longitudinal view of the bridged vessel.* ***C:*** *Cross-sectional view of the vessel in the middle of the myocardial bridge.* ***A':*** *Heart with myocardial bridging, late stage, with ventricular hypertrophy and diastolic dysfunction.* ***B':*** *Longitudinal view of the bridged vessel, with hypertrophied muscle and plaque progression proximal to the bridge.* ***C':*** *Cross-sectional view of the vessel in the middle of the myocardial bridge showing hypertrophied muscle and the negative remodeling of the vessel with decreased lumen diameter. Images were drawn by Clare Wang.*

Symptomatic patients who have myocardial bridges as their only cardiac abnormality may present with myocardial ischemia , acute coronary syndromes , coronary spasm , exercise-induced dysrhythmias like supraventricular tachycardia , ventricular tachycardia or atrioventricular conduction block, transient ventricular dysfunction, syncope or even sudden death .[6]

The prevalence among active civil aircrew (pilot and cabin crew) monitored at the CEMPN is 0.4 %, all revealed by electrocardiogram abnormalities, the ECG is systematically carried out each medical evaluation.[7]

The aviation environment may expose aircrew to additional physiological stressors (such as hypoxia, hypobaria and potentially sustained acceleration (+Gz)), and present a risk if associated with cardiovascular abnormalities and lead to incapacity to fly.[8]

AEROMEDICAL FITNESS

the aeromedical doctor must guarantee both flight safety and mission success. Routine aircrew examinations at the CEMPN include a thorough medical history including a detailed family history, a physical examination, and a systematic 12-lead ECG.

Many native or corrected congenital heart disease diagnoses are associated with abnormal ECG findings and these may mandate further investigation and lead to restriction, or withdrawal, of flying privileges. Cardiovascular pathologies constitute the fourth cause of unfitness (9%) during the periodic medical examinations.

The aeromedical fitness depends on several conditions:

- Discovery mode: symptomatology or complication
- Aircrew function : monitor , single-pilote..
- Cardiovascular risk factors : stress, smoking, diabetes, hypertension, dyslipidemia, obesity, family history
- First or periodic medical evaluation
- Treatementcomptability

The characteristics of the myocardial bridge, the significant modification of the vascularization of the heart exposes in our case to a serious risk of complications especially for an admission visit, the decision was unfitness.

CONCLUSION :

aircrew with myocardial bridging mandates a detailed assessment,The decision with regards to aircrew employability, requires an understanding of potential or current occupational roles, the environmental physiology and a specificrisk assessment. The aeromedical fitness depends on several conditions and the decision is made on a case-by-case basis.

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