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The Aberrant Coronary Artery – The Management Approach

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Background

An aberrant coronary artery is a rare clinical occurrence with an incidence of 0.05–1.2%. Often it is an incidental finding detected on coronary angiography or at autopsy. However, symptomatic patients can experience angina, arrhythmia, sudden death or non-specific symptoms such as dyspnoea and syncope. At present, there are no guidelines or dedicated studies assessing the treatment of an aberrant coronary artery leaving management options for these patients controversial.

Methods

Selected international cardiothoracic surgeons were surveyed electronically in November 2016 to determine whether consensus exists on different management aspects for patients with an aberrant coronary artery arising from the contralateral sinus with an interarterial course.

Results

For asymptomatic patients with either an aberrant left main coronary artery (ALMCA) arising from the contralateral sinus or an aberrant right main coronary artery (ARMCA) arising from the contralateral sinus, there was no consensus on surgical correction of the anomaly. If myocardial ischaemia was demonstrated on either coronary angiography with fractional flow reserve measurements and/or stress myocardial perfusion scan, surgical correction was the consensus between the surveyed surgeons. If surgery was deemed appropriate, coronary artery bypass surgery utilising the internal mammary artery was marginally preferred by the respondents in patients with an ALMCA whilst unroofing of the coronary ostium was preferred in patients with an ARMCA. Although no consensus was reached, a large proportion of respondents would not treat a patient over the age of 30 years differently compared to those under 30 years old.

Conclusions

For symptomatic patients or if myocardial ischaemia is demonstrated on either coronary angiography with fractional flow reserve measurements and/or stress myocardial perfusion scan, surgical correction is indicated.

Keywords

Aberrant coronary artery • Surgical correction • Interarterial course

Introduction

Abnormalities of the coronary arteries are rare congenital conditions and are often associated with other congenital cardiac malformations. Up to 95% of coronary artery

anomalies are related to its origin and course [1]. An aberrant coronary artery is usually detected at angiography or autopsy and has a reported incidence of 0.05–1.2%, with an incidence of 0.15% of an aberrant left main coronary artery (ALMCA) arising from the contralateral sinus and 0.03–

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0.92% of an aberrant right main coronary artery (ARMCA) arising from the contralateral sinus [1–6]. The most common course of either of these two aberrant coronary arteries is arising from the aorta and passing between the aorta and the pulmonary trunk (interarterial course) where it is at risk of dynamic compression [1,3,7]. A large proportion of patients are often asymptomatic with the anomaly detected as an incidental finding. If symptomatic, patients with these anomalies can present with angina, arrhythmias, myocardial infarction or sudden death [1–5]. Patients less than 30 years old more commonly present with sudden death frequently associated with intense physical exertion while those over 30 years typically present with syncope, dyspnoea and acute pulmonary oedema [2].

While the 2011 American College of Cardiology Foundation/American Heart Association practice guidelines for coronary artery bypass graft surgery do discuss the management of an aberrant coronary artery, no recommendations on surgical techniques, investigations for myocardial ischaemia or the management of asymptomatic patients exist [8]. As such, surgical management of these rare coronary artery anomalies remains controversial. This study assesses opinions from cardiothoracic surgeons to determine a consensus on different management aspects including indication for surgical correction and surgical technique for these patients.

Method

An online survey of eight questions were distributed to 50 international cardiothoracic surgeons to determine their opinions on the criteria for operative management of patients with an aberrant coronary artery arising from the contralateral sinus of valsalva with an inter-arterial course and their preference on operative technique. The survey questions are outlined in Table A1. One senior surgeon was selected from a variety of different high volume cardiac units from across the world. Each surgeon was contacted individually via email with all responses kept anonymous. Twenty of the surgeons contacted completed the survey within the allocated time-frame and the responses are shown in Table A2. Statistical analysis was performed using dependant T-test utilising SPSS Statistics v22 (IBM corp, USA). Questions were analysed in pairs, as these combinations would provide an opinion on management of an ALMCA, management of an ARMCA, criteria for surgical correction and management of patients with either anomaly over the age of thirty. A consensus was defined as greater than 70% of respondents agreed on one survey option per question.

Results

Aberrant Left Main Coronary Artery Arising From the Contralateral Sinus of Valsalva With An Inter-Arterial Course

Conflicting responses were provided by the participants regarding the need for surgical correction in asymptomatic

patients 30 years of age or younger with an ALMCA arising from the contralateral sinus of valsalva with an inter-arterial course (Table A2, question 2). Nearly half (45%) agreed that surgery was indicated, whilst another 45% disagreed (Figure A1). If surgery was undertaken, 40% of respondents agreed that coronary artery bypass grafting (CABG) utilising the internal mammary artery as conduit was the most preferred technique, whilst only 5% of surgeons would use the great saphenous vein as their conduit of choice (Table A2, question 7). No surgeons nominated using a radial artery as a conduit in this clinical scenario. Unroofing of the coronary artery ostium was preferred by 35% of responding surgeons and the remaining 20% would perform reimplantation of the aberrant coronary artery (Figure A1). Both these questions showed significant difference in opinion of best management options ($p = 0.004$).

Aberrant Right Main Coronary Artery Arising From the Contralateral Sinus of Valsalva With An Inter-Arterial Course

In asymptomatic patients under 30 years of age, there was no consensus on the need for surgical correction of an ARMCA arising from the contralateral sinus of valsalva with an inter-arterial course (Table A2, question 3). Just over half of respondents (60%) believed surgical correction was not required (Figure A1). There was a significant difference in opinion in surgical management options for these patients ($p = 0.013$). Unlike the results relating to an ALMCA, if surgery was undertaken the preferred operative technique was unroofing of the coronary ostium (45%). Coronary artery bypass grafting utilising the internal mammary artery was the second most preferred technique (30%), with both great saphenous vein and radial artery expressed as the preferred conduit by 10% and 5% of respondents respectively. Ten per cent of surgeons would preferentially perform a coronary artery reimplantation in this clinical scenario (Figure A2).

Clinical or Diagnostic Evidence of Myocardial Ischaemia

The majority of respondents (90%) agreed that a patient with either an ALMCA or an ARMCA, regardless of age, who had an unexplained syncopal episode, malignant arrhythmia or aborted sudden death should have surgical correction (Table A2, question 1). All surgeons agreed that, if myocardial ischaemia is demonstrated on a myocardial perfusion scan in a region supplied by the anomalous coronary artery and/or the fractional flow reserve measurement (FFR) is significant (<0.8), surgical correction is indicated (Table A2, question 6). Table A3 demonstrates the consensus from responding surgeons that patients who had either of these coronary artery anomalies with significant results from diagnostic investigations have an indication for surgical correction ($p = 0.186$).

Patients Over 30 Years of Age

When managing asymptomatic patients older than 30 years of age with either an ALMCA or an ARMCA, 65% of

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