Introduction

Coronary artery variants are congenital in origin and found in approximately 1.3% of patients undergoing coronary angiography in the United States [1]. These variations are implicated in out of hospital ventricular fibrillation and in increased risk of developing coronary atherosclerosis within the usual vessel. As ischemic heart disease remains the leading cause of loss of adult life within the growing global population, awareness of the possible variable origin and course of a coronary vessel is important. While angiographic series are valuable they may not reflect the population at large since asymptomatic patients rarely undergo coronary angiography. Anatomical studies are more representative of the prevalence of variant coronary anatomy but more difficult to obtain. Here is reported an anatomical study in continuous series of anatomical donors from the general adult population, describing a variant aortic sinusal origin of the left circumflex artery (LCX) originated from the right aortic sinus and coursing behind the aortic annulus before reaching its usual position into the left atrioventricular groove, between the left atrial appendage and the pulmonary trunk. This is the first LCX variation in a continuous series of 338 human hearts studied, a prevalence of 0.3% in this anatomical series. From a clinical standpoint, unusual origin of the LCX from an independent ostium within the right aortic sinus of Valsalva should be considered when LCX circulation cannot be visualized as a branch of the left main coronary artery.

Case Report

During routine dissection of the heart in the Anatomy Laboratory of the Edward Via College of Osteopathic Medicine (VCOM), Virginia Campus, we found a variant aortic sinusal origin of the left circumflex artery (LCX) in a 65-year-old male cadaver. The specimen was photographed. There was no history of cardiac disease in the individual. In our specimen, the LCX originated from the right aortic sinus of Valsalva and coursed behind the aortic annulus before reaching its usual position into the left atrioventricular groove, between the left atrial appendage and the pulmonary trunk (Figure 1), to supply the lateral and diaphragmatic aspect of the heart. The anterior descending coronary artery arose independently from the left main coronary artery. No atherosclerosis was observed in large coronary arteries. This is the first LCX variation in a continuous series of 338 human hearts studied in conjunction with the Human Anatomy Course at VCOM, a prevalence of 0.3% in this anatomical series.

Discussion

Variant origin of the LCX from the right sinus of Valsalva was first described by Antopol and Kugel in 1933 [6]. This is generally found to be the most common congenital coronary variant, with a prevalence of 0.67 to 0.80% at coronary angiography [1, 7].
From a clinical standpoint, variant origin of the LCX from the right aortic sinus of Valsalva is usually considered benign [4, 7, 8, 9] since it is not known to predispose individuals to sudden cardiac death or higher incidence of atherosclerotic involvement. Patients usually remain asymptomatic and this variant is usually found incidentally at autopsy. However, some investigators consider that a variant circumflex artery is more prone to develop atherosclerosis, perhaps due to the unique retroaortic position of this vessel. West et al. [10] have found significant obstructive atherosclerotic coronary disease in most of their patients with variant origin of the LCX from the right aortic sinus of Valsalva, especially in its retroaortic portion. Samarendra et al. [11] reported three patients in whom the variant LCX was responsible for myocardial infarctions.

Angiographic recognition of origin of LCX from the right aortic sinus of Valsalva is important, especially in patients with obstructive coronary artery disease targeted for coronary bypass surgery or in patients with aortic valve disease undergoing aortic valve replacement [7, 10]. If the angiographer assumes that the vessel is occluded or congenitally absent, significant problems may arise and negligent medical care may result [1]. Similarly, surgical problems can be encountered if a variant vessel is excluded from perfusion during cardiopulmonary bypass or if the surgeon accidentally incises the variant, and hence unanticipated vessel [12]. Additionally during valve replacement surgery, the ostium of the variant vessel may be inadvertently obstructed or the variant vessel may be compressed along its course by a valvular prosthesis [13].
Conclusion
This report describes the most common variant of coronary artery anatomy identified during a postmortem dissection and illustrates the unclear relationship of variant vessel anatomy with atherosclerosis and the importance of careful angiographic identification in patients undergoing coronary percutaneous procedures or cardiothoracic surgery.

Acknowledgements
We thank VCOM students Kyle Lester, Shreya Wachob, Amanda petty and Jessica Bokbinder who ably assisted in this dissection.

References