

Variant of the sinus node artery with an unusual origin and course. A unique postmortem visualization after corrosion casting technique

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SUMMARY

The purpose of this study was to expand our knowledge about anatomical variations of the origin, course and end of the sinus node (SN) artery. Herein I describe a rare postmortem corrosion casting finding, which concerns a unique and previously unreported case where the SN artery had an abnormal origin and course to the SN area. Although the patient was asymptomatic, knowledge of this anatomical variation, its possible involvement with invasive or surgical procedures and its clinical consequences should be considered.

Key words: Heart – Coronary arteries – Sinus node artery – Sinus node area

INTRODUCTION

The origin and course of the sinus node (SN) artery in normal hearts have been well investigated (James, 1961; Mac Alpin, 1975; Nerantzis and Avgoustakis, 1980; Nerantzis et al., 1983). In most of the cases the SN artery originates from the proximal 2-3 cm of the right coronary artery and the proximal 1-2 cm of the left circumflex (LCx) artery, which is branch of the left coronary artery.

The SN artery has no constant origin, but has a constant termination, which is used as a good guide to the location of the SN area. Congenital anomalies of origin and course of a SN artery with or without symptoms are of special interest for anatomists, interventional cardiologists and cardiac surgeons. I describe here an asymptomatic though unique and previously unreported case, in which the SN artery consists of the continuation of the posterolateral part of the left circumflex.

CASE REPORT

The case concerned an asymptomatic 26-year-old healthy female cadaver, victim of a car accident, without known cardiac history. The car accident was not her own fault (information from her relatives). The case is from a series of 60 human hearts (41 males and 19 females) in which the coronary vessels were studied by our corrosion casting technique (Nerantzis et al., 1978). Polyester material is injected into the coronary arteries during closure of the coronary sinus orifice in the right atrium with cotton wool. After this, I received tiny pieces of myocardium from different parts of both atria and from around the SN area to be examined histologically for

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ischemic heart changes. I took care to avoid cutting of vessels. Concentrated hydrochloric acid we used for corrosion of the muscles for 24 hours. In the reported case I found that the posteroanterior projection was most useful in identifying the origin and course of the SN artery until its end. The LCx coursing in the posterolateral atrioventricular groove (AVG) until 5 cm before the crux gives branch (wide arrow) to the posterior surface of the left ventricle. Immediately after that, it leaves the AVG, moving upwards and to the right with a serpentine course (lower thinner arrow) for about 6 cm, meeting the posterior interatrial groove (IG). The artery continues its course in the upper IG (upper thinner arrow) for about 4 cm turn around the superior vena cava in a counterclockwise direction, giving blood to the SN area. During its course, it gives branches to the posterior and upper surface of the left atria (LA), right atria (RA) walls, in the interatrial septum and in the SN area. The SN artery, with its inter

and intracoronary branches, forms a useful atria anastomotic net. I have not found histological changes around the SN area.

COMMENTS

Although this anomaly does not give rise to symptoms, it is essential for anatomists, as well as for cardiac surgeons and interventional cardiologists, so that they can be aware of this variation when supplying their surgical or intervention procedures. According to our previous classification (Nerantzis et al., 1983), the SN artery belonged to group B, since during its course perfuses a small part of LA, the interatrial septum and a large part of the RA. The distal origin of the SN artery is not necessary to provoke perfusion disturbance to the SN area, as supported by Verhaeghe and Hauwaert(1967), and James (1973), because I have not found histological changes in the myocardium of both

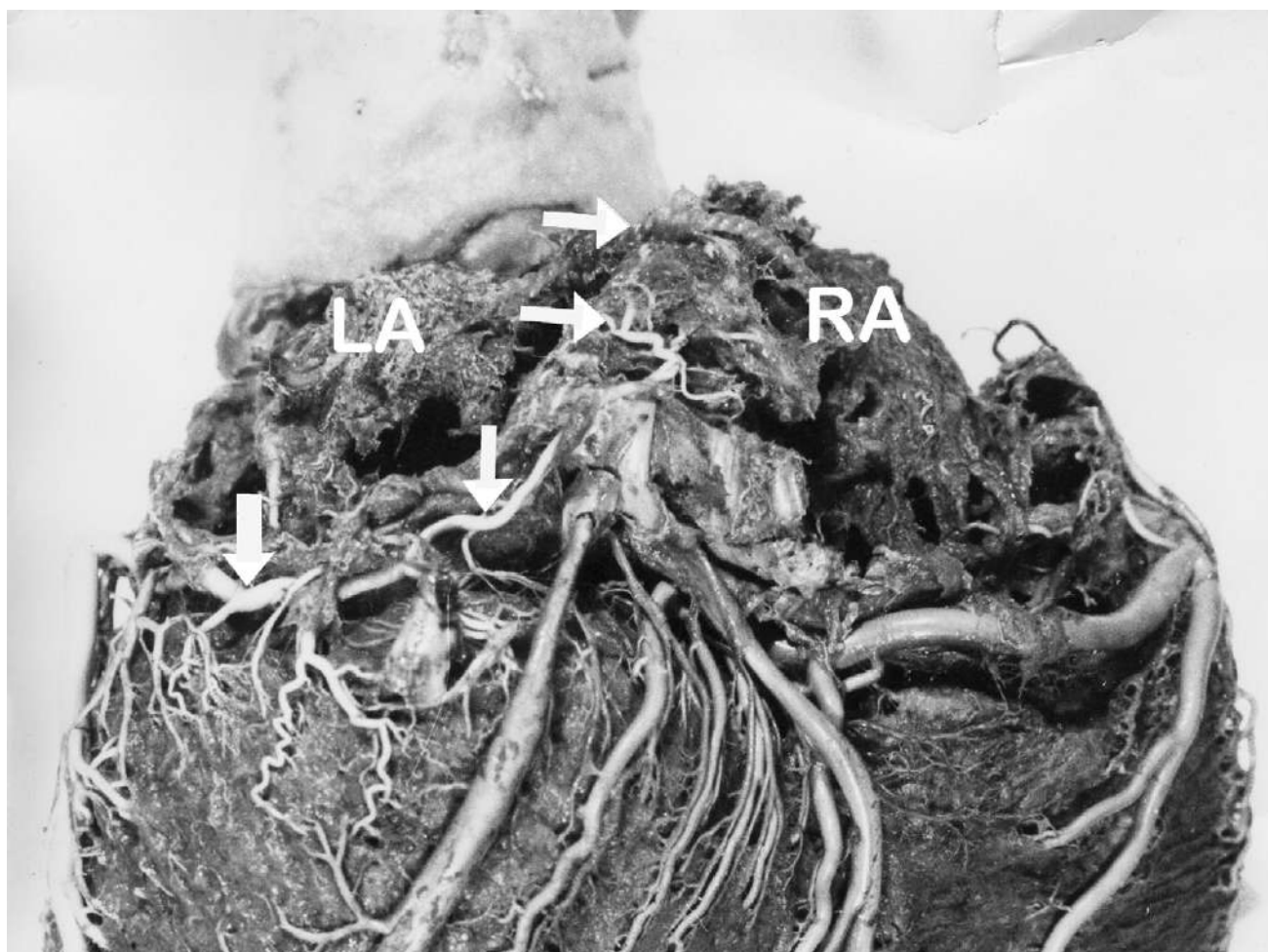


Fig. 1.- Slightly backward oblique posteroanterior view of corrosion casting of heart. It shows the origin of the sinus node artery from the left circumflex (wide arrow), and its course to the sinus node area (three narrow arrows).RA=right atrium, LA=left atrium.

atria and in the SN area. The SN artery appears to be disproportionately large in comparison with other atria arteries for two reasons, a) it receives a strong pulse to regulate its functioning (Verhaeghe et al., 1967) and b) it supplies with blood large part of atria myocardium, except the SN area (Nerantzis et al., 1983).

In conclusion, detailed anatomical knowledge of the blood supply to the SN is essential because of the wider implementation of cardiac surgery or interventional cardiology, in order to avoid damage of the SN artery during their medical procedures. I believe that such a complication could result in the destruction of the artery, damage of the collateral circulation, dysfunction of the atria myocardium and the onset of arrhythmias as mentioned and by Gaudino et al. (2003).

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