

Extracardial coronary anastomoses と extracoronary arteries の形態的特徴について

三浦真弘¹ Michael von Lüdinghausen² 島田和幸³

¹大分大学医学部生体構造医学講座（解剖学1） ²Institute for Anatomy and Cell Biology, University of Würzburg

³鹿児島大学大学院医歯学総合研究科神経病学講座

Background

For cardiac surgery, detailed knowledge of extracardial coronary anastomoses (ECaAn) and extracoronary arteries (ECoAr) is necessary for diagnosis and important for the treatment of ischemic heart disease¹. Studies on the extracardial arteries have been done by many radiologists using coronary angiography. Macroscopic findings of such vessels, however, have not been satisfactorily described in detail. The present study aimed to anatomically clarify the morphological characteristics and the incidence of these vessels in the normal human heart.

Materials and Methods

We used 34 randomly selected heart specimens of male and female subjects (German adult cadavers), from a dissection course for medical and dental students in the Würzburg University. In the removed hearts, the origin, course and distribution of the vessels were carefully examined under an operating microscope.

Results

In 8 of 34 hearts (23.5%), we found slender vessels of the ECaAn and ECoAr. These two arterial systems ran together close to the pericardial reflexion, and entered the mesocardium venarum (*slit-like portion of the venous porta*)², which was formed between Vv. pulmonalis. The incidence of ECaAn in the atrial area between the ECoAr and coronary artery was 14.7% (5/34 hearts) (Fig. 1). In this study, such communicating patterns could be roughly classified into 4 types (Fig. 2, A~D) on the basis of their running courses. The origin portion of the communicating arteries between the extracardial and coronary arteries did not correspond exactly in 3 cases. In all hearts, there were significant changes in the origin of the atrial arteries which originated from the main coronary arteries. In 3 of 34 hearts, the incidence of the ECoAr was 8.8% (Fig. 3). The ECoAr had no communicating branch with coronary arteries, and were distributed in the intrinsic area of the atrial wall as a non-coronary sup-

plying area. All arteries of both types arose from a branch of a bronchial artery, and were distributed in a portion of the atrial myocardium. On the other hand, the extracardial veins were noted in 27 of 34 hearts (incidence, 79.4%) (Figs. 1, 3, *white arrows*), and these veins originated from some slender branches of Vv. mediastenalis.

Discussion

The present study first clarified the macroscopically precise anatomical characteristics of the ECoAr and ECaAn in the human heart. According to Björk's angiographic study³, extracardial arteries were more frequently observed in patients with the coronary artery disease. That is, the incidence of ECaAn in patients with coronary arterosclerosis was markedly higher (48%) than in patients with the coronary artery (22%). In the present study, we used all non-

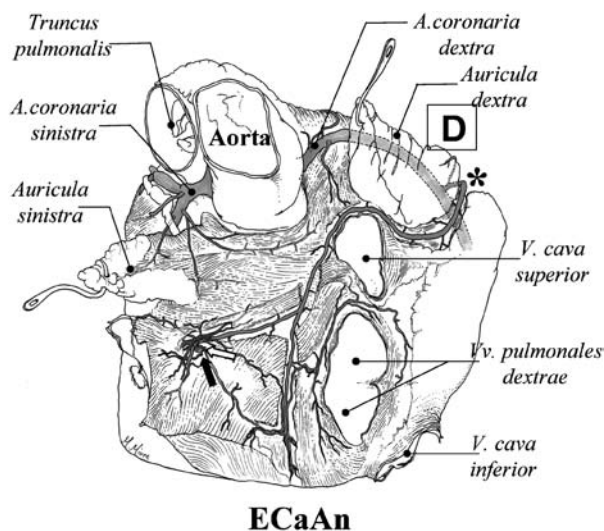


Fig. 1 Schematic drawing of ECaAn case between the extracoronary and main coronary arteries. Superior-dorsal view. The asterisk indicates communicating point between both arteries. The black arrow indicates a cut edge of the ECoAr coming from bronchial artery. The white arrow indicates a extracardial vein. Type D case.

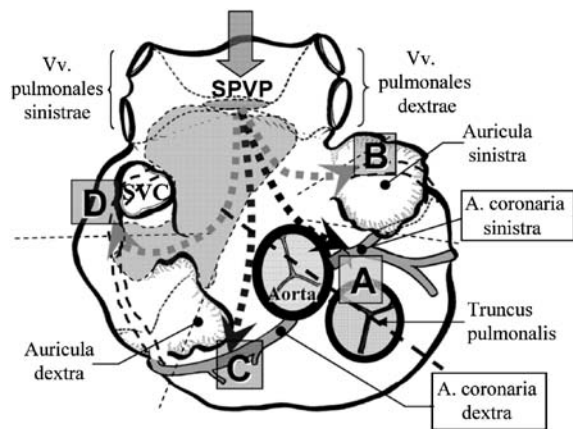


Fig. 2 A schematic showing the preset pattern of communicating courses between extracardiac and main coronary arteries. Superior-dorsal view. These communicating patterns are roughly classified into 4 types (A~D dotted arrows). The slit-like portion of the venous porta (SPVP) is also shown.

disease hearts. For this reason, it may be considered that our findings were similar to the incidence reported by Björk. Our findings suggested that the incidence or development of these arteries was closely related to the trophic disturbances of the myocardium, and also suggested that these vessels, as the collateral supplying branches in patients with the coronary artery diseases, may clinically play an important role in the arterial or venous circulation of the left atrial myocardium. In the true nature of extracardiac coronary arteries, these specific arteries may be a vestigial structure of some branches arising from the variable bronchial arteries⁴⁾ which are distributed in atrial my-

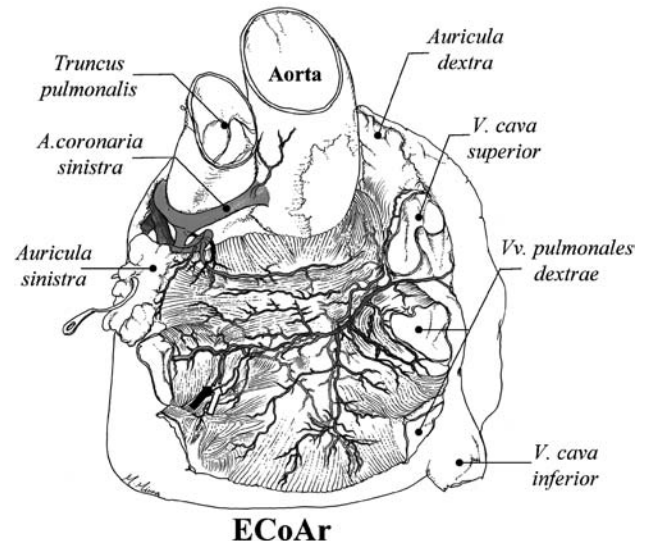


Fig. 3 Schematic drawing of ECoAr case. Superior-dorsal view. The *black arrow* indicates a cut edge of the ECoAr coming from bronchial artery. The *white arrow* indicates an extracardiac vein coming from V. mediastinalis.

ocardium during the process of ontogeny.

References

- 1) Moberg A. 1968. Anastomoses between extracardiac vessels and coronary arteries. Acta med Scandinavica 485 (suppl): 1-26
- 2) Mizukami S, Tanaka S, Nakatani T. 1996. An autopsy case of an extracoronary artery presenting evidence for the dualism of blood supply to the human heart. Acta Anat Nippon 71: 551-556
- 3) Björk L. 1966. Angiographic demonstration of extracardiac anastomoses to the coronary arteries. Radiology 87: 274-277
- 4) Kasai T, Chiba S. 1979. Macroscopical anatomy of the bronchial arteries. Anat Anz 145: 166-181

Morphological characteristics of extracardiac coronary anastomoses and extracoronary arteries in the normal human heart

Masahiro MIURA¹, Michael von LÜDINGHAUSEN², Kazuyuki SHIMADA³

¹Department of Human Anatomy, Faculty of Medicine, Oita University,

²Institute for Anatomy and Cell Biology, University of Würzburg, Germany,

³Department of Neurology Gross Anatomy, Kagoshima University Graduate School of Medical and Dental Sciences

The present study aimed to clarify morphological characteristics of the extracardiac coronary anastomoses (ECaAn) and the extracoronary arteries (ECoAr) using German adult cadavers. Thirty-four normal hearts were selected in the dissection course for medical students in Würzburg University. The removed hearts including the complete pericardium, the origin, course and distribution of the vessels were carefully examined. In 8 of 34 hearts, we found slender vessels of the ECaAn and the ECoAr. These two arterial systems entered into the venous porta. The incidence of ECaAn in the atrial portion between the ECoA and coronary artery was 14.7%. In this study, such communicating patterns could be roughly classified into 4 types. In all hearts, great changes were found in the origin of atrial arteries which originated from the coronary arteries. In 3 of 34 hearts, the incidence of ECoAr was 8.8%. The ECoAr without communicating branches to the coronary arteries were distributed in the intrinsic muscular region as a non-coronary supplying area. All the ECaAn and ECoAr arose from a branch of a bronchial artery and were distributed in a portion of atrial myocardium. The extracardiac veins were noted in 27 of 34 hearts. The present study has first clarified the precise anatomical characteristics of the extracardiac vessels in the normal human heart. The extracardiac vessels always pass through the mesocardium venarum, and are distributed in the atrial muscular wall with or without an anastomosis between the coronary and non-coronary arteries. Our findings suggest that such vessels as a collateral pathway may clinically play an important role in the blood supply of the atrial muscle.

Key words: human heart, coronary artery, extracoronary artery, extracardiac anastomosis, macroscopic anatomy