

The variability of the small cardiac vein in the adult human heart

Monika Cendrowska-Pinkosz

Department of Anatomy, University Medical School, Lublin, Poland

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Direct analyses were performed on 50 hearts submitted for post mortem examination. The remaining hearts were examined by the corrosion method. The aim of the work was to assess the morphology of the small cardiac vein. The small cardiac vein, which runs along the back surface of the coronary sulcus, would usually drain into the coronary sinus at its right side (86% of cases). Cases of the small cardiac vein draining into the middle cardiac vein were also noticed (12%) or directly into the right atrium (1%). In 1% of the preparations it ran along the right margin in the direction of the apex of the heart. In 30% of the corrosion preparations the small cardiac vein was not accessible with the help of corrosion. In 24% of the dissection preparations it was not possible to reach the small cardiac vein with the help of dissection. A statistically significant relationship was observed between the frequency of the presence or absence of the small cardiac vein and the sex of the donor ($p > 0.001$). In the group examined the percentage of men who did not have the small cardiac vein was 6 times higher than among the woman. There was no evidence for any statistically significant dependence between the frequency of occurrence or of absence of the small cardiac vein and the technique employed.

Key words: veins, heart, coronary sinus

INTRODUCTION

The coronary sinus and its tributaries collect the venous blood from the heart wall [1, 7, 8]. In this system the tributaries from the left part of the heart play the dominant role [2, 5, 13]. In the medical literature there is a shortage of information concerning the vessels collecting the venous blood from the right part of the heart. It is of major importance to know the topography of the small cardiac vein and its part in the vasculature of the right part of the heart [12]. The aim of this work was to evaluate the topography and the orifice of the small cardiac vein.

MATERIAL AND METHODS

The research was carried out on 150 hearts of humans aged from 15 to 82. The autopsy material came from corpses in which no pathological changes in the heart and cardiovascular system had been observed. The material was divided according to sex. 76% of the hearts examined came from men. The percentage of men was also higher in individual age groups. 100 hearts were examined by the injection, digestion and corrosion method.

Direct analysis was performed on the 50 hearts submitted for the post-mortem examination and visual conformation. The length of the hearts and

the length of the small cardiac vein were measured. The aim of the parameter analysis was to assess the topography of the small cardiac vein with regard to the morphological parameters of the hearts.

RESULTS

In the material examined the small cardiac vein ran along the diaphragmatic surface of the heart in the right part of the coronary sulcus and had its outlet to the coronary sinus. In 2% of cases this vein went along the right margin of the heart in the direction of the apex of the heart (Fig. 1).

In most cases, the orifice of the small cardiac vein was at the right end of the coronary sinus (86%). Cases were observed in which the vein concerned drained into the middle cardiac vein (8%), or both these vessels joined and drained together to the coronary sinus (4%) (Fig. 2, 3). Direct opening of the small cardiac vein into the right atrium was observed in one case only (2%).

In the material examined the small cardiac vein occurred in 72% of cases. It was also observed in 76% of cases of the hearts used for direct preparation. It was visible in 70% of the corrosive preparations. The absence of the small cardiac vein in 30% of the corrosive preparations could be explained by the possible outflow of the vessel in question directly into the right atrium. The absence of this vein in 24% of cases of the hearts used for direct preparation could be explained by the high

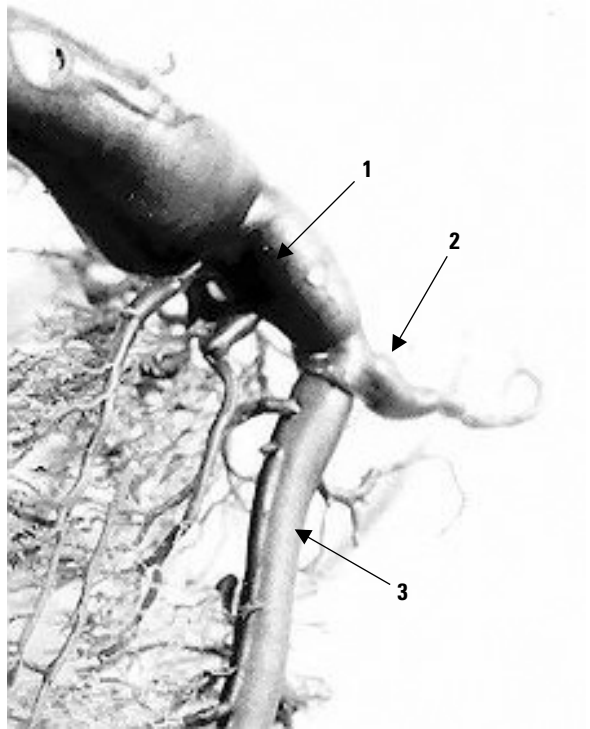


Figure 2. The small cardiac vein and middle cardiac vein joined and drained together to the coronarius sinus; 1 — coronarius sinus, 2 — small cardiac vein, 3 — middle cardiac vein.

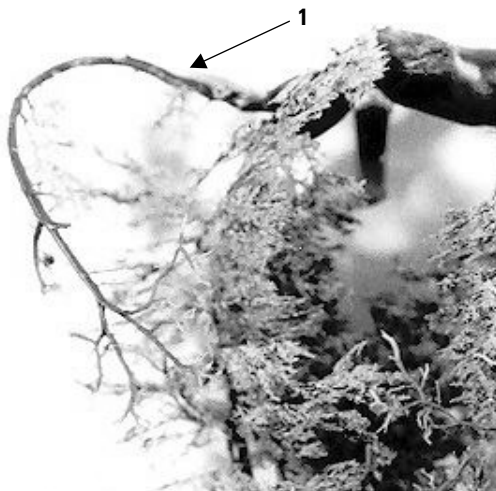


Figure 1. The small cardiac vein ran along the right margin in the direction of apex of the heart; 1 — small cardiac vein.

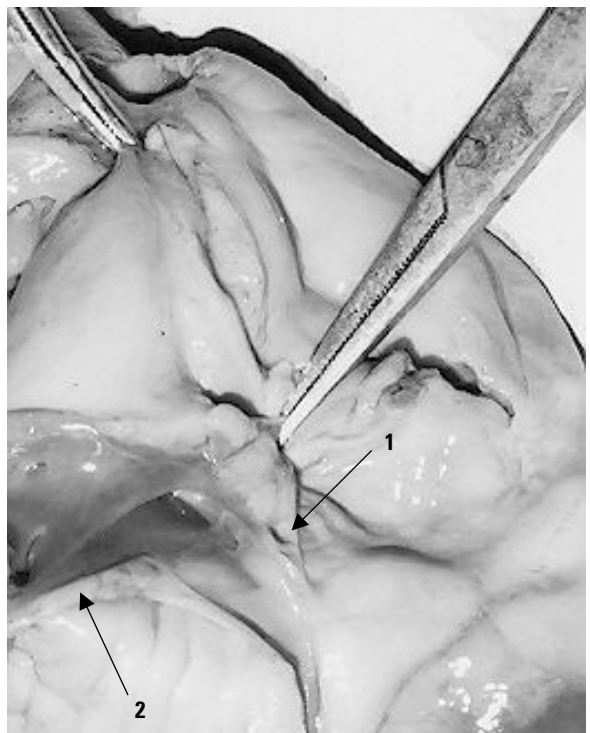


Figure 3. The small cardiac vein drained into middle cardiac vein; 1 — small cardiac vein, 2 — coronarius sinus.

degree of involution of the venous sinus. The other reason for the absence of the small cardiac vein might be shortcomings in the techniques applied. In the cases in which the small cardiac vein was not visible well-developed tributaries of the great cardiac vein in the area of the apex of the heart and the middle cardiac vein were usually observed (Fig. 4).

The presence of the vessel studied was observed in 23% of the women's hearts under examination and 49% of the men's hearts. A small statistically significant relationship was observed between the frequency of the presence or absence of the small cardiac vein and the sex of the donor ($p < 0.001$, $\chi^2 = 11.841$). In the group examined the percentage of men who did not have the small cardiac vein was 6 times higher than among the women.

The frequency of the presence or absence of the small cardiac vein was analysed with reference to the techniques applied. There is no evidence to claim any statistically significant differences in the frequency of the presence or absence of the small cardiac vein in relation to the techniques employed.

The length of the small cardiac vein was measured on the corrosion preparations. The measurement was made from the ostium of the small cardiac vein to the sinus up to the strongest extension of the main trunk of the vessel. The length of the vessel

under examination was from 9 mm to 65 mm, with an average of 26 mm.

As a result of the statistical analysis, a considerably significant independence was demonstrated between the length of the vein studied and the length of the heart. There is no evidence, however, to ascertain any substantial statistical difference between the length of the small cardiac vein and the length of the hearts in the age groups investigated ($p > 0.05$).

DISCUSSION

The small cardiac vein is characterised by the greatest course and opening variability of all the cardiac veins. In our investigations we examined the morphology of this vein. Most authors believe that the small cardiac vein opens into the terminal portion of the coronary sinus from the right side [1, 3, 4, 6, 8–13]. The small cardiac vein was described by Adachi in 46% of cases and 94% of cases by Ratajczyk-Pakalska [10]. In our material the vessel under examination usually drained into the coronary sinus as a single vessel. According to Ratajczyk-Pakalska, only 21% of the vessels examined followed such a course. The remaining 79% drained into the lumen of the right atrium. According to Lüdinghausen [4], in 21% of cases the vein drained into the coronary sinus. In these cases a typical system was observed for the remaining tributaries of the coronary sinus. In the research conducted by Maros et al. [6] the small coronary vein drained directly into the coronary sinus in 28% of cases. According to these same authors, the vein finished its course in the lumen of the middle cardiac vein in 30% of cases. In 6% of cases both these vessels had a common trunk and were directed into the coronary sinus. The results of our study are in agreement with the data obtained by Duda et al. [3, 12, 13]. In Duda's research 6% of cases revealed the small coronary vein draining into the middle coronary vein [3]. In only 1% of the cases did the vein drain directly into the right atrium, omitting the coronary sinus and its tributaries. Knowing the proper configuration and outlet of the small cardiac vein is of basic importance in using anatomical data for clinical purposes. The analysis presented confirms the variable character of the morphology of the veins of the heart.

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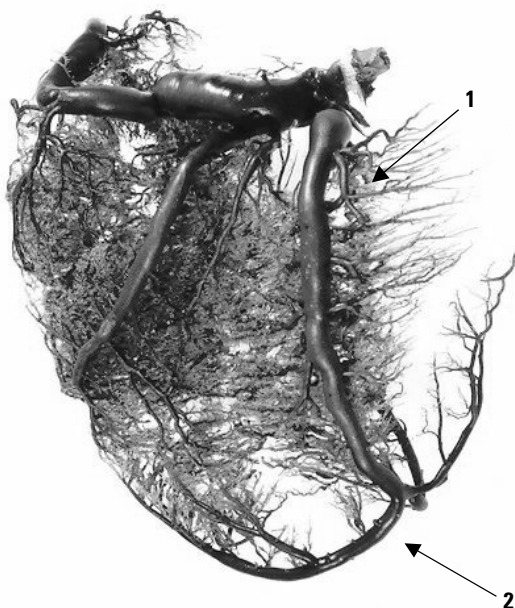


Figure 4. Tributaries of the great cardiac vein in the area of the apex and the middle cardiac vein; 1 — middle cardiac vein, 2 — apex of the heart.

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