ORIGINAL PAPER

Study of the diameter and number of the pulmonary veins orifices

M. C. NICULESCU[1)], V. NICULESCU[1)], ALINA-MARIA ŞIŞU[1)], IULIA-CAMELIA CIOBANU[1)], ECATERINA DĂESCU[1)], CODRUŢA-ILEANA PETRESCU[1)], ADELINA JIANU[1)], M. C. RUSU[2)]

[1)]*Department of Anatomy and Embryology, "Victor Babeş" University of Medicine and Pharmacy, Timişoara*

[2)]*Department of Anatomy and Embryology, "Carol Davila" University of Medicine and Pharmacy, Bucharest*

Abstract

The present study was made in the anatomy laboratory on 100 heart specimens. It was studied the morphological parameters about diameter and number of the atrial orifices of the pulmonary veins. The number of the orifices and their diameter depends on the lungs weight. Generally (70% of the cases) the orifices number is four and rarely three or five. An increased number of orifices are more frequently in the right side and a decreased number especially in the left side. The orifices diameter is much larger at the male's veins than the female's ones, and much larger in the right than the left side and also much larger at the superiors than the inferior veins.

Keywords: pulmonary veins, diameter, number.

Introduction

The lately interest in the thoracic surgery field, especially in the pulmonary and cardiac ones, needs a better knowledge of the vascular pedicles, especially the veins, whose variability and fragility are unique.

This study concerns the investigation of the morphological parameters about diameter and number of the pulmonary veins orifices and brings some contributions at the causal study of their variability.

The variability study of the pulmonary veins atrial orifices represents a little part of a large investigation that's started years ago, about the pulmonary parameters of the normal and pathological hearts, the results had been seen through the causality point of view.

Material and methods

The study was made in the Anatomy Lab on 100 hearts specimens (55 from the male subjects and 45 from the female ones).

On these hearts specimens were studied the morphological parameters which concern the diameter and the number of the pulmonary veins atrial orifices (Figures 1 and 2).

Data were processed in statistical way and the results have been discussed and interpreted causally.

Results

In the first stage it was measured the diameter (in millimeters) of the pulmonary veins orifices and it was studied the variability of their diameter.

In the second stage it was searched the numeric variability of the pulmonary veins orifices.

I. A. The middle diameter (in millimeters) of the pulmonary veins orifices (Figure 3):

- the superior right pulmonary vein = 46 mm (47 for male heart, and 45 for female heart);
- the inferior right pulmonary vein = 42 mm (44 for male heart, and 40 for female heart);
- the superior left pulmonary vein = 44 mm (45 for male heart, and 43 for female heart);
- the inferior left pulmonary vein = 39 mm (41 for male heart, and 37 for female heart).

I. B. The variability of the pulmonary veins orifices diameter:

- the right diameter is the same with the left one and was found in 11 cases (six in male hearts, and five in female hearts) [1];
- the right diameter was much larger than the left one in 81 cases (44 in male hearts, and 37 in female hearts) [1];
- the right diameter was much smaller than the left one in eight cases (five in male hearts, and three in female hearts).

II. The numeric variability of the pulmonary veins orifices was found almost at one third of cases in following (Figures 4 and 5):

- the classic number of four orifices, two at the right side and two at the left side, was found in 70 cases from the whole number of searched cases (41 in male cases, and 29 in female cases);
- the smaller number of three orifices or bigger of five orifices it show in 30 cases (14 in male cases, and 16 in female cases) [1–3].
- the bigger number of orifices in the right side from the left side appears in 24 hearts (11 in male, and 13 in female hearts);

▪ the bigger number of orifices in the left side from the right side appears only in six cases (three in male, and three in female cases) [1, 4].

Discussions

From the cases analysis it shows that the pulmonary veins atrial orifices have a larger diameter in male heart than the female one and much larger in the right side than the left side, and also much larger in the superiors pulmonary veins from the same side [1, 5–7].

The larger diameter of the pulmonary veins in male heart comparer with the female heart is correlated with the weight differences of the lungs at two sexes (approximately 1300 g at male and 1000 g at female heart).

The larger diameter in the right side comparer with the left side is explained from the weight difference between the two lungs (approximately 700 g right lung and 600 g left lung at male and 550 g right lung and 450 g left lung at female) [1, 8–10].

The larger diameter of superiors pulmonary veins reported to the inferior pulmonary veins from the same side is in tight dependence with the vascular fields, which are much larger for the superior pulmonary veins comparer with the inferior pulmonary veins [11, 12].

The pulmonary veins orifices number is four (in 70% from cases) and increased especially in the right side or decreased especially in the left side in 30% from cases. Instead four pulmonary veins orifices we founded three or five orifices. When were three, one was missed in the left side and when were five it appears one extra in the right side.

The numeric variability of the pulmonary veins atrial orifices it can be explained also from the weight difference between two lungs, the number of orifices increases especially in the right side and decreases in the left one.

Conclusions

The number of orifices and their diameter depends on the lungs weight.

The orifices number is four in 70% from cases (two at the right side, and two at the left side), and three or five in 30% from cases (right and left sides).

The increased number of orifices appears more frequently in the right side and the decreased number especially in the left side.

The orifices diameter is much larger at the male pulmonary veins than the female ones, much larger in the right side comparer with the left side an also much larger at the superiors pulmonary veins than the inferiors pulmonary veins.

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Mailing address
Marius Corneliu Niculescu, Assistant Professor, MD, PhD, Department of Anatomy and Embryology, "Victor Babeş" University of Medicine and Pharmacy, 2 Eftimie Murgu Square, 300 041 Timişoara, Romania; Phone / Fax +40256–220 479, E-mail: niculescu.virgil@gmail.com

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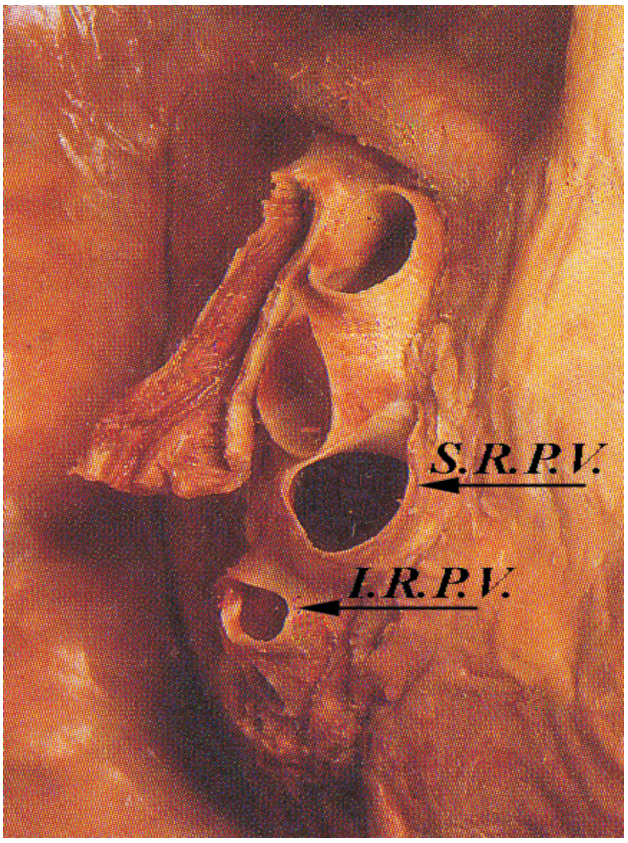

Figure 1 – *Right pulmonary veins*

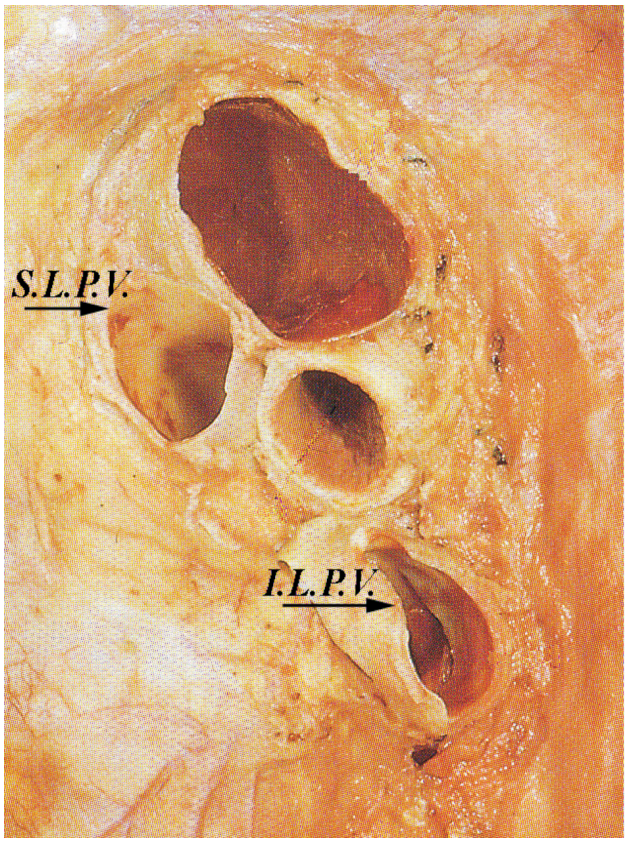

Figure 2 – *Left pulmonary veins*

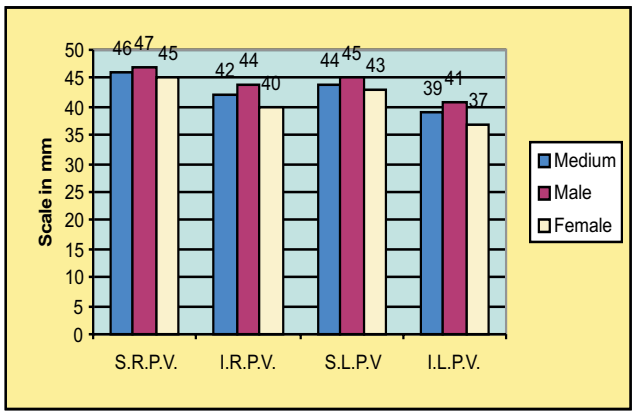

Figure 3 – *Medium diameter (in mm) of the pulmonary veins orifices*

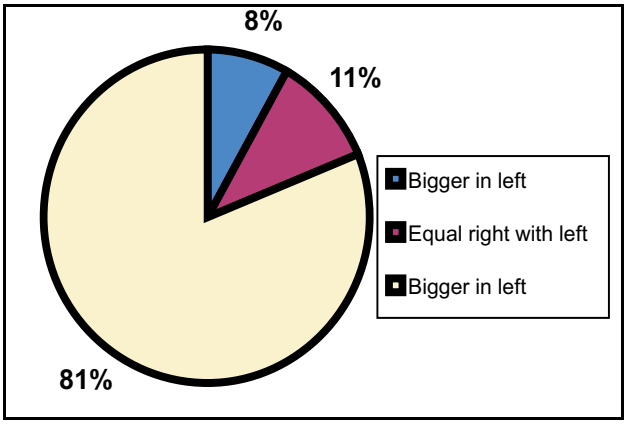

Figure 4 – *Variability of the orifices pulmonary veins caliber*

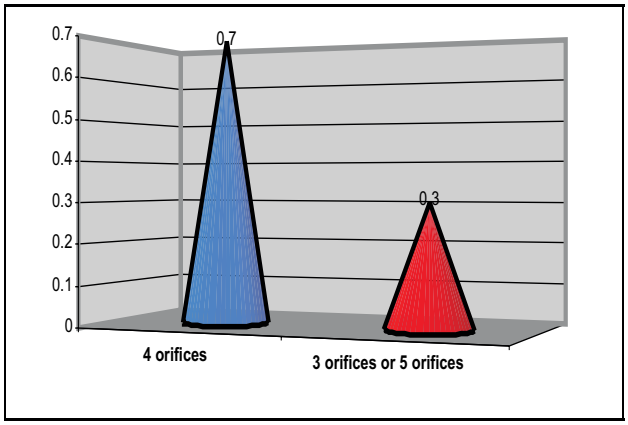

Figure 5 – *Number of orifices: five orifices, usually appears an extra one in the right; three orifices, usually is missing one in the left*