Pulmonary Myocardium Assessed in Medical School Cadaveric Material

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Introduction

The heart is basically a unidirectional double-pump. In order to fulfill its purpose, it needs a coordinately contracting myocardial network and some valves. The coordination of the myocardial contraction is assured by the size of the connexins in the gap junctions between each cardiomyocyte. The gap junctions are channels formed by connexons, which in turn are built upon connexins. The size of the connexins will determine the speed of the electrical impulse crossing the gap junctions – smaller the connexins are, the faster the speed. Thus, we have the fastest junctions/smaller connexins in the conduction system, then atria, the biggest connexins/slower junctions in the ventricles. The particular arrangement of the connexins in the ventricular myocardium (slow conduction) and conduction system (fast conduction) allows the ventricles to start contracting from their furthest point from the valves.

With the development of the electrophysiology, it became possible to map the path of the electrical impulse within the cardiac muscle. Soon, it was observed that very high percentage of the atrial fibrillations (94%) is actually originating from outside the heart, from the pulmonary veins [1,2]. With the help of different ablation methods, now these type of fibrillations are successfully remediated. The reason why ectopic electrical impulse can come from the pulmonary veins is that during the embryonic development the left atrial myocardium outgrows that very high percentage of the atrial fibrillations (94%) is actually originating from outside the heart, from the pulmonary veins [1,2]. With the help of different ablation methods, now these type of fibrillations are successfully remediated.

The goal of our study was to start determining the prevalence and extent of ectopic atrial myocardium growth into the pulmonary veins in cadaveric material. Some of the rehydrated samples were processed for protein extraction.

Methods

Sample collection:
- We have arbitrarily chosen 5 cadavers from our anatomy lab, which had comparatively normal hearts.
- Our samples are from both males and females, with no specific indication of heart disease in their cause of death.
- We started our study by arbitrarily choosing the superior pulmonary veins, which were dissected out from the lungs until their third branching.
- 3-5 mm rings were excised from the main segment and subsequently from the 1st-, 2nd- and 3rd branching.

Histology, immunohistochemistry:
- The excised samples were thoroughly washed and rehydrated in phosphate-buffered saline.
- Then processed for paraffin embedding and sectioning – 5 μm sections were cut on a rotary microtome, then collected on regular glass slides.
- Some of the slides were processed for hematoxylin-eosin (H&E) staining, the rest of them for immunohistochemistry.
- For immunohistochemistry we used the anti-human cardiac myosin heavy chain antibody which is myocardium specific.

Biochemistry:
- Some of the rehydrated samples were processed for protein extraction.
- The tissue lysates were normalized based on their protein content.
- 20 μl of samples were loaded into the membrane.
- Each sample was run 3 times and labeled with anti-connexin 43 antibody.

Results

We have successfully processed cadaveric material from the anatomy lab for histology, immunohistochemistry and biochemistry. We would like to thank VCOM for providing the opportunity, equipment and supplies for our project.

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References