

THE BULBUS ARTERIOSUS OF THE HOLOCEPHALAN HEART

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Previous work has shown that the outflow tract of the elasmobranch heart, namely the cardiac portion intercalated between the ventricle and the ventral aorta, does not consist of a single component, the conus arteriosus, as has classically been assumed, but two, the myocardial conus arteriosus and the non-myocardial bulbus arteriosus. From the evolutionary viewpoint, knowledge of the anatomy of the cardiac outflow tract of the holocephali is suitable, as they are the sister group of elasmobranchs. The aim here is to report the results of a study of the cardiac outflow tract of four holocephalan species, two of them, *Chimaera monstrosa* and *Hydrolagus affinis* of the family Chimaeridae, and the other two, *Harriotta raleighana* and *Rhinochimaera atlantica*, of the family Rhinochimaeridae. The cardiac outflow tract of the four species consisted of a myocardial conus arteriosus, furnished with valves, and a bulbus arteriosus devoid of cardiac muscle. Both the bulbus and conus showed a tubular shape. The length of the bulbus with regard to the total length of the outflow tract was somewhat smaller in the rhinochimaerids (15%-19%) than in the chimaerids (19%-23%). The bulbus was covered by epicardium and crossed by the main coronary artery trunks. Histologically, it was mainly composed of elastin and collagen, and, to a lesser extent, by smooth muscle. This suggests that in holocephalans, the bulbus actively helps to protect the gill vasculature from exposure to high-pressure pulses of blood. The present findings prove that the bulbus arteriosus is common to chondrichthyans. In addition, they support the notion that the cardiac outflow tract consisted of a conus arteriosus and a bulbus arteriosus from the beginning of the jawed vertebrate radiation, contributing thereby to a better understanding of the morphological changes that have occurred at the arterial pole the heart in both actinopterygians and sarcopterygians.

298 words