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Original Research Article

Anatomical Study of Remnant of Left Venous Valve in the Adult Heart

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Abstract

The remnants of left venous valve of sinus venosus are rarely noticed in the interior of right atrium. The remnants can be seen attached to the floor of fossa ovalis. The incidence of remnants of left venous valve was studied in 50 cadaveric hearts utilised for undergraduate teaching programme. The right atrium was opened and the interior was studied for the presence of these embryological remnants. The incidence of remnants of left venous valve is 12% in the present study. It was seen either inform of membranous structure or fibrous strands attached to the fossa ovalis. This anomaly may give rise to complications like thromboembolism or difficulty during important surgical procedures of the interatrial septum. So knowledge regarding the incidence, morphology and complications of this embryological remnant is mandatory.
Keywords: Fossa ovalis, left venous valve, right atrium, sinus venosus, cadveric hearts.

INTRODUCTION

Right atrial membranes represent embryonic remnants from the fetal development of valves between the sinus venosus and primitive common atrial chamber of the developing heart. During the 4th week of human embryonic development the common atrial chamber is separated from the sinus venosus by a bileaflet valve called as sinoatrial valve of consisting of right venous valve and left venous valve. The right venous valve resorbs and forms eustachian valve of inferior vena cava and thebasian valve of coronary sinus.

The left valve of sinoatrial orifice is incorporated into the right surface of interatrial septum and becomes part of septum secundum [1].

However it may be incompletely resorbed leaving remnants over the fossa ovalis [2-4]. A report or a case study is generally found in the literature regarding the remnants of left venous valve in the interior of right atrium.Most of these findings are based on radiological studies. Very few anatomical studies have been reported [3, 5].

The aim of this study is to find out the incidence of this rare embryological remnant and its associated clinical manifestations.

MATERIALS AND METHODS

A total of 50 heart specimens used for teaching undergraduate students were utilised from the Department of Anatomy, Government Medical college, Nagpur. The specimens were collected irrespective of age, sex, and race for the study. The heart was opened anterior to sulcus terminalis and the interior of heart was observed for remnant of left venous valve.

OBSERVATIONS

Out of the 50 hearts studied the remnants of left venous valve were seen in 6 specimens (12%). Out of these 6 specimens, remnants of left venous valve were seen as thin membranous structure over the fossa ovalis with multiple fenestrations in 2 specimens (Figure 1 & 6). Out of these 2 specimens in one of the specimens, the membranous structure extended from the fossa ovalis attaching it to the crista terminalis (Figure-6). In 2 specimens remants of left venous valve were characterised by presence of 3-4 fine strands over the lower part of fossa ovalis extending upto the its periphery (Figure 2 & 3). In one of the specimens remnants were seen as single fine strand over the fossa ovalis (Figure-5), whereas in one of the specimens the floor of fossa ovalis is highly irregular, interrupted by thick starnds extending from the floor of fossa ovalis till its periphery.

Fig-1: Interior of Right atrium showing the remnant of left venous valve as a thin membranous structure with multiple fenestrations over the anteroinferior part of fossa ovalis. FO – Fossa Ovalis RA - Right atrium.

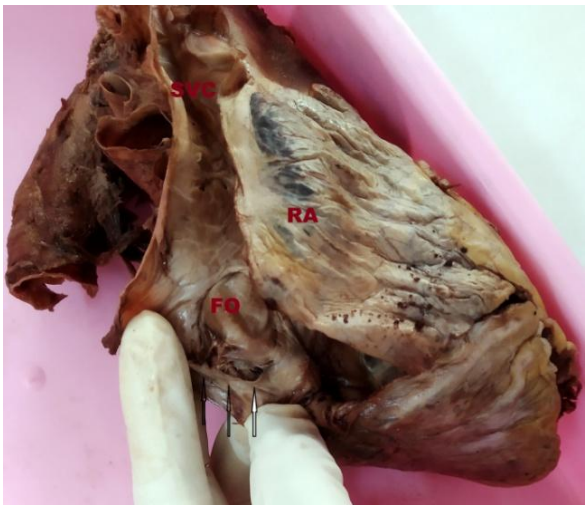

Fig-2: Interior of right atrium showng left venous valve remnant as 2-3 fine strands over the fossa ovalis. The strands are seen extending from the posteroinferior part of fossa ovalis to the limbus fossa ovalis. FO – Fossa Ovalis SVC – Superior Vena cava RA - Right atrium

Fig-3: Interior of right atrium showng left venous valve remnant as 2-3 fine strands from the posteroinferior part of the fossa ovalis extending till limbus fossa ovalis. FO – Fossa Ovalis

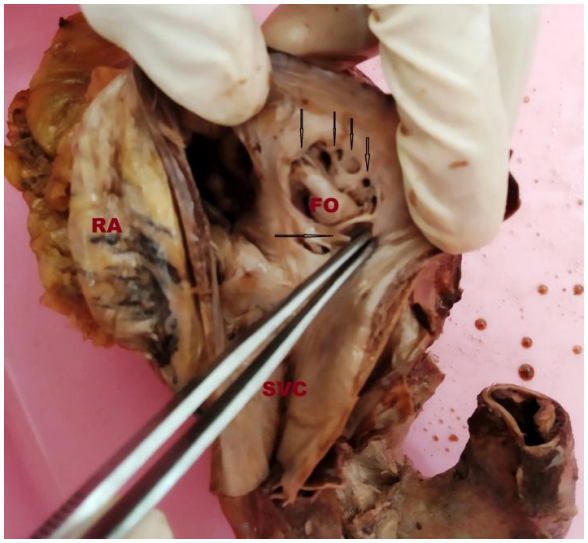

Fig-4: Interior of right atrium shows multiple thick and thin bands separated by fenestrations in the lower part of fossa ovalis.Also 2-3 fine strands are seen separating the fossa ovalis from the limbus fossa ovalis. FO – Fossa Ovalis SVC – Superior Vena cava RA - Right atrium

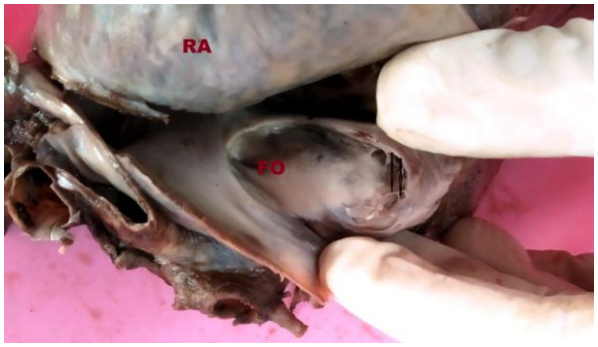

Fig-5: Shows remnant of left venous valve as single fine strand over the fossa ovalis FO – Fossa Ovalis

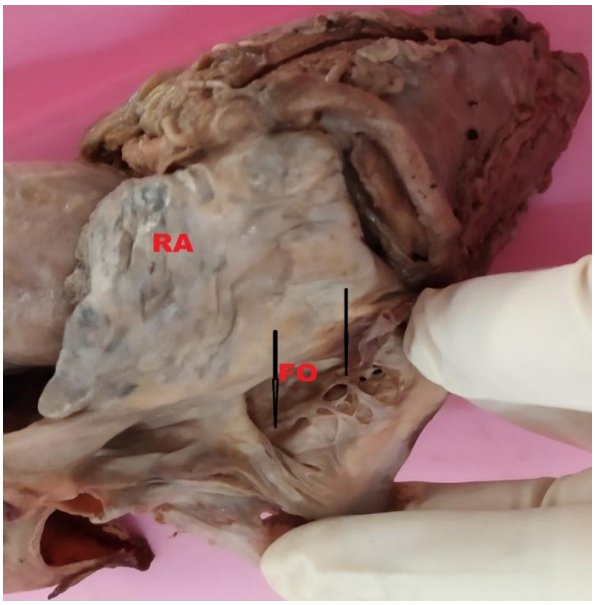

Fig-6: Interior of right atrium showing thin membranous structure over the fossa ovalis with multiple fine stands from the posteroinferior part of fossa ovalis extending till the crista terminalis. FO – Fossa Ovalis

DISCUSSION

In the fifth week of cardiogenesis, embryonic venous drainage reaches the primitive right atrium through the sinus venosus.Both the cavities are connected through sinoatrial orifice which has two valvular folds right and left valve of sinus venosus [7]. Between the 6th and 8th week of development the larger right valve of sinus venosus extends from the superior vena cava to orifices of inferior vena cava and coronary sinus [2, 8]. Later the right valve of sinus venosus atrophies, the cranial part forms crista termnalis and the caudal part forms Eustachian valve of inferior vena cava and Thebasian valve of coronary sinus [9]. The left venous valve fuses with the right aspect of interatrial septum. If this fusion remains incomplete, the left venous valve remains free. It undergoes incomplete resorption by apoptosis. In such cases the remnants of left venous valve are found in the form of strands adherant to to the fossa ovalis or to the right side of atrial septum [6].

Very few cases have reported the incidence of this rare anamoly in literature. In this study remnants of left venous valve of left venous valve were seen in 6 out 50 specimens studied (12%). The incidence of remnants of left venous valve was reported to be 7.5% by D Devi Jansirani *et al*., [3], whereas S. D Joshi *et al*., in 2016 reported only 1 case out of the 50 cadaveric heart studied where he found the remnants in form of large number of fibrous strands in the anteroinferior part of fossa ovalis [5]. E. D. U. Powell and J. M. Mullaney in 1960 observed this anamoly in 3 out of 100 cadaveric hearts [2]. Only one echocardiographic study has been reported by N. M. Pinto *et al*., in 2007 where they observed this anamoly in 3 pediatric cases who were brought to the catheterisation lab for device closure of ASD [4].

In this study the remnant of left venous valve was seen as membranous structure multiple fenestrations in 2 cases and in the form of fine strands single or multiple in 1 and 2 cases respectively. The unfused part of the left venous valve can be seen in form of 2-3 stands attached to the limbus fossa ovalis in 1 case. D Devi Jansirani *et al*., [3], observed this anamoly as fibrous strands in 3 cases and as trabecular membranous structure in 3 cases. E. D. U. Powell and J. M. Mullaney in 1960 observed this anamoly as trabecular network in fossa ovalis in 3 out of 100 cadaveric hearts [2]. S. D Joshi *et al.*, in 2016 reported this anamoly as fibrous strands 0.5 -1cm length arising from fossa ovalis near its middle part and directed to the anteroinferior part of limbus fossa ovalis.

This anamoly can be more accurately diagnosed by transoesophageal echocardiography than the transthoracic echocardiography [4]. The fibrous strands may be sites for thrombus formation. Also the fibres of the remnants are sometimes torn during life, these may break free and the further the emboli may reach the lung [2]. Awareness of this anamoly is important for the successful device closure of atrial septal defects [4].

CONCLUSION

The incidence of remnants of left venous valve in the present study is 12%.It was observed in form of membranous structure and in the form of single and multiple strands over the fossa ovalis. Though this anomaly is rare it should not be considered as harmless structure.

The knowledge of morphology of this anomaly is important for the clinicians to anticipate the possible complications and to achieve success in interventional procedures.

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