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Original Article

Morphological study of fossa ovalis and its clinical relevance

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ABSTRACT

Aims: Patent foramen ovale (PFO) has been implicated in the etiology of a number of different pathologies, including cryptogenic stroke, decompression sickness in divers, etc. It can act as a channel for paradoxical embolism. PFO is not an uncommon condition, with a probe-patency in 15–35% population.

The fossa ovalis (FOv) varies in size and shape from heart to heart; the prominence of annulus FOv also varies. The entire FOv may be redundant and aneurysmal. The anatomico-functional characterization of interatrial septum seems to be of paramount importance for both atrial septal defect (ASD) and PFO, not only for the device selection, but also for the evaluation of the outcome of this procedure.

Method: This study was conducted in 50 apparently normal hearts available in Department of Anatomy. After opening the right atrium, the shape of FOv was observed. The size was measured with the digital vernier caliper; the prominence and extent of limbus, and the redundancy or otherwise of FOv were noted; probe patency was confirmed.

Results: In the majority, FOv was oval (82%); average transverse diameter was 14.53 mm and vertical 12.60 mm. In 90%, the rim of the annulus was raised; in 20%, a recess was found deep to the margin of the annulus; and 18% showed probe patency.

Conclusion: As no study of this nature has been carried out in the Indian population, this provides pertinent information on the morphology of FOv, which may be useful for device selection in treating ASD and PFO.

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1. Introduction

Fossa ovalis (FOv) is an oval depression of interatrial septum present toward the right atrium above and to the left of the orifice of inferior vena cava (IVC). It is formed

by the contributions of septum primum and septum secundum in such a way that its floor is represented by septum primum and its limbus or margin is represented by septum secundum superoanteriorly and jointly by septum secundum and endocardial cushion posteroinferiorly^{1–3} (Fig. 1).

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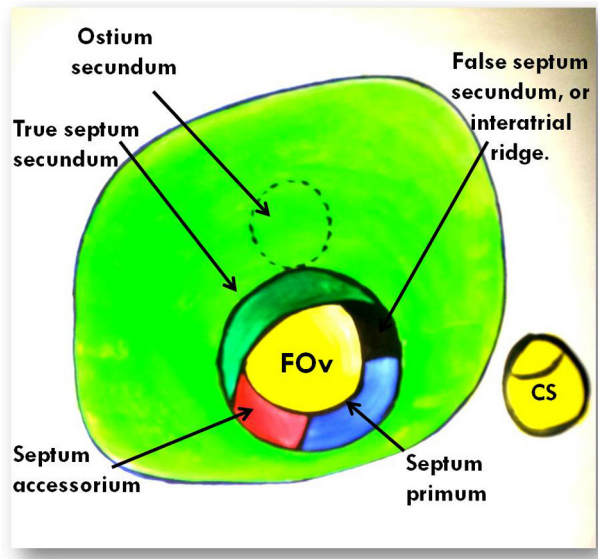


Fig. 1 – Schematic representation of various elements contributing to the formation of annulus FOv. FOv, fossa ovalis; CS, coronary sinus ostium.

During intrauterine life both these septae (primum and secundum) are opposed to each other such that they give rise to a flap valve, which acts like a shunt and the oxygenated blood is directed by Eustachian valve from IVC to the left atrium by way of foramen ovale (FO). This shunt or flap valve is closed by tight apposition of both septae shortly after birth because of increase in pressure in left atrium.^{4,5}

There is presence of probe patency of FO in about 15–35% of general population. But sometimes FO persists to a varying degree, causing mixing of oxygenated and deoxygenated blood, which leads to a number of clinical and subclinical conditions like migraine, cryptogenic stroke, decompression sickness in divers, and platypnea orthodeoxia.⁶ It may also lead to cerebral embolism. Transcatheter closure of patent foramen ovale (PFO) is indicated in these settings,⁷ and prior to device selection, echocardiography is done to look for the

dimensions of FOv and FO, its position along the limbus, redundancy, etc.

This study has been carried out with the aim to evaluate the gross anatomy of FOv including its annulus and floor because all these findings are of paramount importance in the selection of appropriate device for closure of FO.

2. Materials and method

The study was conducted on 50 apparently normal hearts available in Department of Anatomy. The hearts were collected from cadavers and also procured from forensic medicine department, and were preserved in 10% formalin.

The interior of the right atrium was exposed by an incision made parallel to atrio-ventricular groove, further extending along the upper margin of right auricle up to superior vena cava orifice (SVC). Following observations were made:

- Shape of FOv was observed (circular, oval, or elliptical) and recorded. [Circular where the two diameters were equal and oval or elliptical where one of the diameters was longer than the other.]
- Size of FOv was measured (in mm) with the help of digital vernier caliper.
- Extent and location of limbus were noted.
- Redundancy of FOv was observed (aneurysmal, redundant) and recorded.
- Probe patency was confirmed.
- Right surface of interatrial septum was photographed.

3. Result

This work was carried out in 50 apparently normal hearts available in the department.

A. Size of FOv: In the present study, the average transverse diameter FOv was 14.53 mm (range 5.69–29.83 mm) and

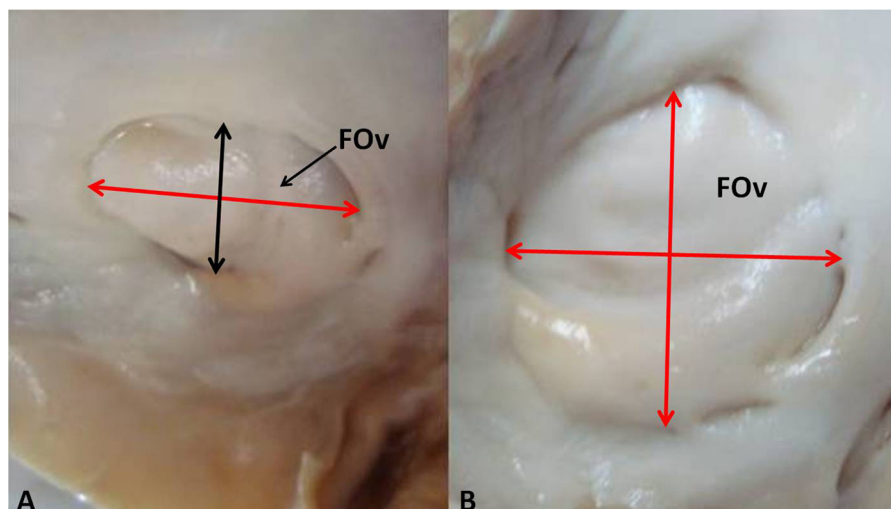


Fig. 2 – Shapes of fossa ovalis (FOv). (A) Oval and (B) circular. Double-headed red arrow indicates the long axis.

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