



A Cadaveric Case Report on Patent Foramen Ovale

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KEYWORDS

Patent foramen ovale, Inter-atrial septum, congenital heart disease.

ABSTRACT:

Patent foramen ovale is one of the common forms of atrial septal defect rarely observed in the elderly people. Foramen ovale is a slit like opening in the atrial septum at the site of foramen secundum of the septum primum. Knowledge of persistent patent foramen ovale is particularly significant for its relationship with many congenital & other valvular heart disorders. In the present study 8 human hearts were collected and dissected from adult cadavers, in the Department of Rachana Shareera at JSS Ayurveda Medical College, Mysuru, Karnataka State, India. Out of 8 specimens only 1 was shown to be having patent foramen ovale. To determine the value of early detection of patent foramen ovale in preventing cryptogenic stroke or relative ischaemic conditions in the general population, more research is required.

INTRODUCTION:

The heart is a four-chambered muscular organ in the chest that pumps blood throughout the body. It consists of two upper chambers, the right and left atria, and two lower chambers, the right and left ventricles, separated by a wall called the septum. The heart also has four valves that ensure blood flows in the correct direction and is surrounded by a protective sac called the pericardium.¹

The heart is the first organ of the body to start functioning. The development of the heart is complex, and it starts as a separate vascular system at the beginning of the 3rd week to supply the nutritional needs to the embryo. The heart is mesodermal in origin. It is formed from splanchnopleuric mesoderm lying immediately cranial to the prochordal plate. Primitive heart tubes develop in the cardiogenic area.

The interatrial septum, developmentally, is derived from septum primum and septum secundum. It presents the fossa ovalis, a shallow depression, representing the site of embryonic septum primum. The annulus ovalis is the margin of fossa ovalis and represents lower free edge of septum secundum.²

Foramen ovale is a slit like opening in the atrial septum at the site of foramen secundum of the septum primum. The septum secundum surrounds the foramen secundum in a crescentic shape and leaves a slit-like opening which

is covered in a valve like manner by the free edge of septum primum. The foramen ovale plays a crucial role in delivering highly oxygenated inferior vena caval blood to the left atrium during intrauterine life. High right atrial pressure in foetal life keeps the valve of foramen ovale open. Left atrial pressure rises quickly after delivery and the flap is lightly pressed against the septum secundum and shuts the foramen ovale functionally. As a result, the valve of the fossa ovalis is pressed against the limbus and forms a competent seal. During the first year of life, fibrous adhesions develop between the limbus and the valve effect which seals the atrial septum. Incomplete closure of foramen ovale is called as patent foramen ovale, which is considered a normal anatomic variant.³

CASE REPORT:

During routine dissection of the thoracic region in the Department of Rachana Shareera, JSS Ayurveda Medical College and Hospital, Mysuru for I BAMS students, we observed an abnormal opening in the inter-atrial septum of the heart of an elderly female cadaver. On observation, the opening was in the superior part of fossa ovalis which suggested it as patent foramen ovale. Among the 8 specimens of heart, 1 heart was found to be having the patent foramen ovale (Figure 1 and Figure 2). The vertical and transverse diameters of the foramen were measured. Transverse diameter is 1cm and Vertical diameter is 5mm. The great vessels from heart (pulmonary trunk and aorta) had normal openings. The other chambers of heart, septum in between ventricles and orifices did not reveal any anomalies.



Fig-1: Patent foramen ovale (PFO) at the upper part of inter-atrial septum surrounded by limbus fossa ovalis seen from right atrium. FO - Fossa ovalis, PFO - Patent foramen ovale, LFO - Limbus fossa ovalis.



Fig-2: PFO- Patent foramen ovale , SVC- Superior Venacava, MP- Musculi Pectinati

DISCUSSION:

Atrial septal defect (ASD) is one of the most frequent congenital cardiac condition in which blood flows between the right and left atria. Normally, the atria are divided by a separating wall termed interatrial septum. If this septum is faulty or absent, then oxygen rich blood can flow directly from the left side of heart to mingle

with the oxygen poor blood on the right side of heart or vice versa. This can lead to lower than normal oxygen levels in the arterial blood that nourishes the brain, organs and tissues.

Different types of atrial septal defects are described which are significant clinically. 1) Upper sinus venosus defect, 2) Lower sinus venosus defect, 3) Ostium secundum defect, 4) Defect involving coronary sinus and 5) Ostium primum defect. 70-80% of all adult ASD's account for ostium secundum type of ASD. Other less common forms of adult atrial septal defects include ostium primum type (15%), sinus venosus type (10%), and the unroofed coronary sinus (<1%).⁴

PFO is a small channel that has some haemodynamic consequence; it is a remnant of foetal foramen ovale. Clinically, it is associated with migraine, paradoxical embolism, and decompression sickness. In roughly 25% of adults, foramen ovale fails to close properly, leaving patients with a patent foramen ovale. Ostium secundum type of ASD is a true defect and the least severe, usually bordered by the edge of the fossa ovalis and the exposed circumference of ostium secundum.⁵ Our observation in this case report belongs to ostium secundum type of defect and was slit like. Persistent PFO was the only anomaly observed in the current specimen.

A secundum atrial septal defect is a true defect and the least severe, usually bordered by the edge of the fossa ovalis and the exposed circumference of ostium secundum. The shape of the defect varies from circular to oval.⁶ Isolated secundum atrial septal defects account for approximately 7% of congenital cardiac defects. Congenital heart defects of significance occur in approximately 8 per 1000 live births. Therefore, 5-6 cases of secundum ASD occur per 10,000 live births. This number refers only to defects that are large enough to come to clinical attention. Many small defects that remain undetected occur in addition to numerous cases of patent foramen ovale.

A secundum atrial septal defect can result from inadequate formation of the septum secundum so that it does not completely cover the ostium secundum. More often, the ostium secundum is excessively large because of increased resorption so that septum secundum cannot cover it.⁷

Patients with small shunts may live a normal life span. Large shunts cause disability by age 40 years. Raised pulmonary vascular resistance secondary to pulmonary hypertension rarely occurs in childhood or adult life in secundum defects but is more common in primum defects. After age 40 years, pulmonary hypertension, cardiac arrhythmia (especially atrial fibrillation), and



heart failure may occur in secundum defects. Paradoxical systemic arterial embolisation is a concern, especially in patients with pulmonary hypertension or venous thrombosis. One uncommon cause of cerebrovascular events in the elderly is paradoxical embolism.⁸

There are no risk factors for the development of PFO. It is mostly a benign condition and its incidental finding in asymptomatic patients requires no specific therapy. Moreover, in the elderly many other syndromes than paradoxical stroke mediated by PFO required full assessment. The management of PFO in aged patients should include the careful evaluation of potential comorbidities and eventual contraindications, such as severe diastolic dysfunction due to for example to hypertensive cardiomyopathy and coronary heart disease, the main causes of diastolic dysfunction.⁹

CONCLUSION:

In order to prevent cryptogenic stroke in patients who would benefit most from the closure of patent foramen ovale, more carefully planned research is required to address a number of unsolved questions surrounding the aetiology and effects of patent foramen ovale. Since patent foramen ovale can cause cryptogenic brain infarction and play a significant role in a number of congenital and other valvular heart problems, it is crucial to comprehend the relationship between it and unidentified blood vascular disorders in the general population.

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