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Original Research Paper

Cardiovascular

AUTOLOGOUS PERICARDIAL PATCH VS. DIRECT SUTURE CLOSURE OF OSTIUM SECONDUM ATRIAL SEPTAL DEFECT (ASD): SYSTEMATIC REVIEW OF OUR EXPERIENCE

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ABSTRACT

Background: Systematic experience of Patch versus direct suture closure of ostium secundum Atrial Septal Defect (ASD) our experience of 60 cases of last 4 years. **Introduction :** There are three major types of ASD or interatrial communications: ostium secundum, ostium primum and sinus venosus defects. The ostium secundum is a true defect of atrial septum and involves the region of fossa ovalis. Surgical repair of an atrial septal defects is a safe and effective operation with minimal mortality and morbidity.

KEYWORDS : Atrial Septal Defect (ASD), Ostium secundum, patch repair, direct suture closure.

INTRODUCTION

There are 3 major types of ASDs or interatrial communications: ostium secundum, ostium primum, and sinus venosus defects. The ostium secundum is a true defect of the atrial septum and involves the region of the fossa ovalis. Surgical repair of an atrial septal defect (ASD) is a safe and effective operation with little to no morbidity and mortality. Atrial septal defect can be closed directly with sutures or with synthetic Dacron patch or autologous pericardium. We will compare the two different techniques of atrial septal defect repair. We will analyze the two techniques and find out any differences in outcome.

Background.

Elective closure of atrial septal defect (ASD) is usually recommended during preschool ages. However, ASD may contribute to deteriorating health in the presence of significant comorbidity and may need earlier closure. Retrospective data of patients who underwent surgical ASD closure in last 4 years were collected. Since February 1st 2019 to 31st December 2023 data were collected of 60 consequential ASD patients, 12 had persistent respiratory symptoms, 4 failures to thrive and 14 having pulmonary hypertension. Overall, all patients showed clinical improvement after ASD closure, including improved respiratory status (12/12;100%), resumption of normal growth (4/4; 100%), and resolution of pulmonary hypertension (14/14; 100%). All patients were weaned from mechanical ventilation within 6 hours after ASD closure. Surgical complications were uncommon. Postoperative hospital stay was 4 to 10 days (median 7 days). All of our patients demonstrated significant clinical improvement after ASD closure. Early ASD closure is safe and beneficial for symptomatic infants and young children with associated underlying pulmonary abnormalities and whether Dacron patch or direct suture closure of ostium secundum ASD does not affect the outcome when decided judiciously accessing the size and location of ASD.

Introduction

There are 3 major types of ASDs or interatrial communications: ostium secundum, ostium primum, and sinus venosus defects. Since the early reports of surgical atrial septal defect (ASD) closure in 1948 (without direct visualization) and in 1952 (with hypothermia and inflow occlusion), over 50 years of surgical experience has resulted in an operation with minimal mortality or morbidity (1,2). Today ASDs are closed using cardiopulmonary bypass (CPB) with direct vision of the lesion. The classic approach is by median sternotomy, which we used in this study.

For isolated secundum defects, surgery can be performed with near-zero mortality. Major morbidity can include arrhythmia, pneumothorax, bleeding, pericardial effusions and pleural effusions but are rarely seen now a days. In adults and elderly patients' arrhythmia and prolonged intensive care unit stay are more common (6). The long-term results of surgical repair of secundum defects are excellent, especially when patients are operated on under 25 years of age with an actuarial survival curve identical to the general population (7).

METHODS:

This retrospective review is based on a single Institution experience between February 1, 2019 and December 31, 2023 with 60 consecutive cases (n 46) and paediatric (n 14) surgeries, in which ASD was the primary anatomical diagnosis to ascertain technique of closure and outcomes expected for surgical closure. 30 patients were treated with Dacron patch closure and direct suture were used to close the defect in rest 30 patients. All patients underwent echocardiography to assess successful ASD closure.

RESULTS:

There was no difference between direct suture ASD closure or Dacron patch ASD closure. The most frequent perioperative complications were atrial fibrillation (adult 10%, paediatric 1.2%). All patients had secure and complete closure of ASDs with no residual shunts documented by echocardiography.

CONCLUSIONS:

Surgical technique through standard sternotomy and standard cannulation techniques and midline incision irrespective of age and gender of the patient without deterioration in outcome quality. Standard surgical methods can achieve secure closure of the septum with prosthetic patches, which are incorporated into the tissue structure of the heart and direct suture closure which are free from materials-related failure. Direct suture closure and Dacron patch closure of ASD are equally effective.

Ostium Secundum Defect

Defects of septum primum tissue within the fossa ovalis are termed Secundum ASDs. The septum secundum typically remains well developed. Most secundum defects are separate from the atrioventricular valves, vena cava, pulmonary veins, and the coronary sinus. It is the most common ASD if patent foramen ovale is not considered and can range in size from only millimetres to 2–3 cm. large defects are due to complete absence of the septum primum.Treatment

ASD closure is indicated in the presence of any hemodynamically significant shunt causing enlargement of right heart structures, irrespective of the presence of symptoms (11,12). A hemodynamically significant shunt is classically defined as any shunt that causes right-sided volume overload and pulmonary over-circulation. This typically occurs when the Qp:Qs ratio is greater than 1.5 to 1. Other indications for ASD closure include the rare cases of documented orthodeoxia-platypnea—regardless of shunt size, and confirmed paradoxical embolism (12). Small defects without evidence of right heart volume overload may be followed without surgery, however, increased shunt may occur

later in life and closure become necessary.

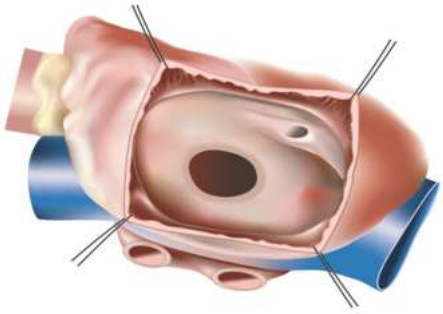
In some situations, it may be unsafe to close an ASD. European and American guidelines suggest that ASDs can be closed if the pulmonary vascular resistance is less than two-thirds of the systemic vascular resistance and the Qp:Qs is greater than 1.5 (11,12). An interatrial right-to-left shunt such as in Eisenmenger syndrome is a contraindication for ASD closure and patients with a calculated pulmonary vascular resistance greater than 8 Woods units should undergo a pulmonary vasodilator challenge or a course of anti-pulmonary hypertensive medication to determine reversibility of pulmonary vascular resistance and thus operability (13). High risk patients with pulmonary hypertension may even require temporary balloon occlusion of the defect with hemodynamic assessment. In severe obstructive or restrictive right and left heart lesions closure of an ASD may also be contraindicated as it serves as a decompressing route for blood flow (12,14).Timing of defect closure

Once a hemodynamically significant ASD is diagnosed then it should be closed electively. There is no lower age limit for defect closure, however, it is customary to refer for surgery prior to school age. We offer elective surgery as early as five years old and preferably before 20 years of age. Even in adults and the elderly, ASD closure is safe and improves symptoms and longevity (6,13,15,16).Treatment strategies

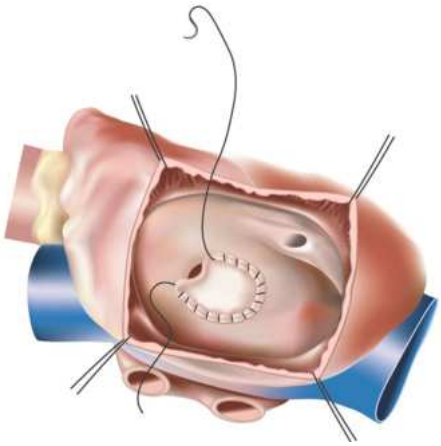
Secundum defects can be closed surgically. Sinus venosus, ostium primum, and coronary sinus septal defects almost always require surgical repair.

Surgical Techniques

Secundum ASD



For an uncomplicated secundum defect the intracardiac repair is relatively simple. The right atrium can be opened longitudinally or transversely and small ASDs or PFOs or longitudinal slit with adequate size of left atrium can be closed by direct suture. Larger defects and defects with small left atrium usually require a patch repair. The traditional approach through a median sternotomy and central cannulation has become exceedingly safe, simple and reproducible. Therefore, advancements in this operation have related to surgical access, in an attempt to reduce trauma and hasten recovery.



Surgical Approach

Median Sternotomy

Median sternotomy is typically thought to be the gold-standard approach and provides the ability to perform any additional cardiac procedure. Skin incision length can be shortened at both the cranial and caudal ends to allow better cosmesis, but the sternum is usually divided in its entirety and thus the requisite recovery unavoidable. Mechanical ventilation and ICU stay times are short and intraoperative time, CPB time is typically shorter using this exposure. Cannulation is via the ascending aorta and both cava directly. Mild hypothermia was used in all the cases at 32 degrees. St. Thomas antegrade cardioplegia was used in all the cases. Cardiopulmonary bypass time was between 8 minutes to 28 minutes with mean of 18 minutes, 4-0 17 mm/5-0 13 mm proline suture was used for ASD closure and right atrial closure respectively.

CONCLUSIONS

The surgical treatment of ASDs in the modern era of cardiac surgery has many faces. The traditional sternotomy approach remains the easiest technique with the shortest ischemic and CPB times. Patch repair or direct suture repair is typically surgeons' choice depending upon the size, location of the defect and assessment of size of left atrium after defect repair. Modern minimally invasive approaches improve cosmesis, shorten hospital stay, hasten return to full function, and can now be performed without increased risk in terms of mortality and morbidity.

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None.

Disclosure

Conflicts of Interest: The authors have no conflicts of interest to declare.

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