

Case Report

Patient with D transposition of Great Arteries Operated by Senning Procedure: A Case Report

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Abstract

The atrial switch operation, the Mustard or Senning operation, for the transposition of the great arteries (TGA) was introduced in the late 1950s and was the preferred surgery for TGA until the early 1990s. The arterial switch operation has become the procedure of choice for patients with transposition of the great arteries (TGA) in most medical centres. Although atrial switching may occasionally be employed in some centres in cases with delayed diagnosis, pulmonary hypertension and some other unusual entities. We preferred to use the atrial switch operation Senning procedure for 5 months old child with TGA, small atrial septal defect (ASD) and patent ductus arteriosus (PDA). [Journal of Current and Advance Medical Research 2017;4(1):31-33]

Keywords: Congenital heart disease; transposition of great arteries; Senning procedure

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Introduction

Transposition of the great arteries (TGA) is a common but serious congenital heart malformation, with an incidence of about 1 per 5,000 live births¹. Until the late 1950s, this lesion was uniformly fatal, with most infants dying before the age of 1 year². The development of the Senning and Mustard atrial level repairs, however, led to good immediate outcomes and long term survival.

This procedure, a form of atrial switch, was developed and first performed by Senning in 1957 as a treatment for d-TGA (dextro-Transposition of the great arteries) before improvements in

cardiopulmonary bypass made more curative surgical techniques feasible³.

With the Senning surgical repair, a baffle or conduit is created within the atria that reroutes the deoxygenated blood coming from the inferior and superior venae cavae to the mitral valve and therefore to the pulmonary circulation⁴. This is accomplished by creating a systemic venous conduit that channels deoxygenated blood from the superior and inferior vena cava towards the mitral valve. After this complex plastic reconstruction using flaps from the right atrial tissue and the interatrial septum and lets the oxygenated pulmonary venous blood flow to the tricuspid valve and from there to the systemic circulation. The

anatomic left ventricle continues to pump into the pulmonary circulation and the anatomic right ventricle will work as the systemic pump, in other words the ventriculo-arterial mismatch is left unrepaired.

In the Senning's operation, atrial tissue is used to create the baffle. No prosthetic material is introduced. A complex work of incising and refolding of the native atrial tissue - which is so technically complex that has been referred to as "origami", is necessary to build the venous baffle. Indeed the Senning technique was difficult to reproduce and was not widely embraced. In this article we describe a cases in which Senning procedure was done to correct D-Transposition of great arteries with PDA and ASD in a 5 months female baby.

Case Presentation

A 5 months female baby, hailing from Shirajdikhan, Munsiganj district of Bangladesh admitted to National Institute of Cardiovascular Diseases, Dhaka, Bangladesh institute with the complaints of bluish discoloration of tongue, lips and fingernails for 4 months. Furthermore repeated attack of fever, cough and respiratory distress were also present which were associated with chest in drawing and reluctant to feed for same duration. There was no history of hemoptysis, syncope, convulsion, cyanotic spell, leg swelling or other extra cardiac congenital defects. On examination body built was below average (weight 4kg). Patient was neither icteric nor anemic. Cyanosis and clubbing were present; pulse was 132/min; BP was 80/40 mm Hg, respiratory rate was 40 breaths/min. On precordial examination there was no visible apex beat, apical impulse palpable at left 5th intercostal space along mid clavicular line. First heart sound and second heart sound was normal. Continuous murmur best heard at left 2nd intercostal space, grade 3/6, no radiation. No pericardial rub. Other system revealed no abnormality. Chest X-Ray P/A view showed narrow superior mediastinum with plethoric lung fields and Cardiac shadow is enlarged in transverse diameter (Figure I). Echocardiography revealed D-Transposition of great arteries. Pulmonary artery was coming out from LV and aorta was coming out from RV. A large PDA seen (size-3.0 mm) with left to right shunt, non-restrictive. A small ASD is seen (2.5mm) with left to right shunt, non-restrictive. PASP was 35 mmHg. Severe right ventricular hypertrophy was seen with regressed left ventricular posterior wall. Intraventricular septum was intact. No coarctation, no intracardiac mass or vegetation

was seen. Valves and other tracts were normal. No pericardial effusion was seen (Figure II).

It had been planned for Senning procedure to correct these deformities. With all aseptic precaution midline sternotomy was done and D-Transposition of great arteries was found with anterior-posterior relation of aorta and pulmonary trunk. Then, aortic and bicaval cannulation were done. PDA ligation done and CPB was established. Heart was arrested with cardioplegic solution; then 2 parallel incisions was given; one at the RA and another one at LA just in front of pulmonary veins.



Figure I: Chest X-Ray P/A view showed narrow superior mediastinum with plethoric lung fields and Cardiac shadow is enlarged in transverse diameter

RA flap was created. An incision was made over the IAS and made 1st layer of baffle with Dacron patch from IAS to LA auricle. Then SVC and IVC blood divert to mitral valve by making a baffle. Anastomosis of medial RA flap with LA as a result pulmonary venous blood divert to Tricuspid valve. Weaning from CPB was smooth and patient was shifted to Cardiac ICU intubated, ventilated with haemodynamically stable condition. Patient was extubated after 24 hours and was shifted to the ward on the 9th POD.

Discussion

The arterial switch operation has become the procedure of choice for patients with TGA in most cardiac surgery centres⁵⁻⁶. In cases of delayed diagnosis and complicated with high pulmonary hypertension, when arterial switch operation is contraindicated, only atrial switch is the best option for patient.

Surgical intervention for TGA predates the invention of cardiopulmonary bypass. In 1950, Blalock and Hanlon described the first palliative

procedure to surgically excise the atrial septum, thereby improving mixing and arterial saturation. With early bypass techniques, Senning performed the first 'complete' repair for TGA in 1957⁷. In the Senning repair, a baffle is created within the atria that redirects the deoxygenated caval blood to the mitral valve and the oxygenated pulmonary venous blood to the tricuspid valve. The anatomic left ventricle continues to act as the pulmonary pump and the anatomic right ventricle acts as the systemic pump.

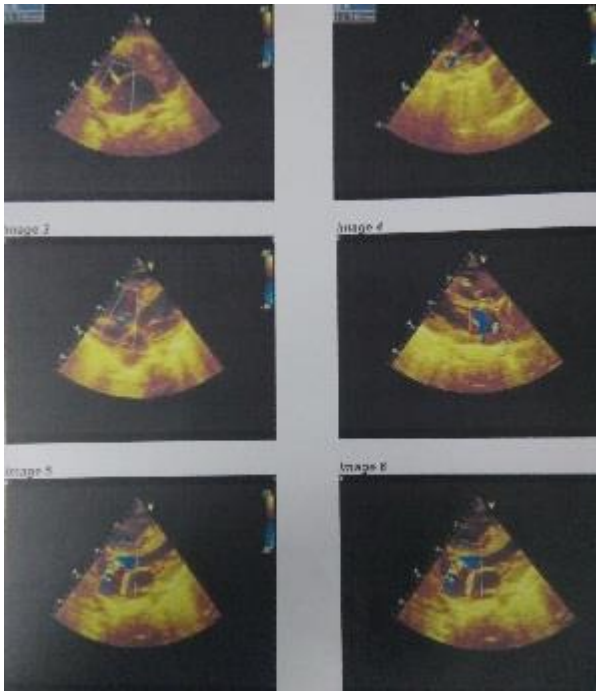


Figure II: Echocardiography revealed D-Transposition of great arteries. A large PDA seen (size-3.0 mm) with left to right shunt, non-restrictive. A small ASD is seen (2.5mm) with left to right shunt, non-restrictive

In Senning's operation, complicated 'origami-style' cutting and folding of the native atrial tissue is required to achieve the venous baffle.

Owing to its complexity, the Senning technique was initially not widely embraced. The Senning procedure was revived by many surgeons in the mid-1970s⁸. Brom pioneered the revival of the original Senning operation, with some technical modifications, and this restored interest in this type of venous switching⁹⁻¹⁰. Surgical advances resulted in atrial-level repairs being performed in increasingly younger infants, with 1-year survival rising to more than 90% by the early 1980s. Troubling late sequelae of atrial-level repairs were, however, becoming increasingly apparent, including atrial arrhythmias, baffle obstructions,

and systemic right ventricular dysfunction, leading to a late decline in survival¹¹.

In this case, 2 parallel incisions were given; one at the RA and another one at LA just in front of pulmonary veins. RA flap created. An incision was made over the IAS and made 1st layer of baffle with Dacron patch from IAS to LA auricle. Then SVC and IVC blood divert to mitral valve by making a baffle. Anastomosis of medial RA flap with LA was made; as a result pulmonary venous blood was diverted to tricuspid valve.

Conclusion

The arterial switch operation has become the procedure of choice for patients with transposition of the great arteries (TGA) in most medical centres. Although atrial switching may occasionally be employed in some centres in cases with delayed diagnosis, pulmonary hypertension and some other unusual entities. We preferred to use the atrial switch operation Senning procedure for 5 months old child with TGA, small atrial septal defect (ASD) and patent ductus arteriosus (PDA).

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