

Robotic patch repair of a Ventricular Septal Aneurysm during an Aortic Valve Replacement Surgery

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Introduction

Interventricular septal aneurysms (IVSA) are an uncommon cardiac anomaly characterized by septal wall protrusion, typically into the right ventricle. While most commonly encountered as a consequence of myocardial infarction, these aneurysms may also develop following the spontaneous closure of congenital ventricular septal defects.



Fig 1: CT scan showing the IVSA

Case Report

Patient History

A 47-year-old male with a known symptomatic moderate aortic stenosis and severe aortic regurgitation was planned for valve replacement. During preoperative CT scan, an unexpected finding of a membranous IVSA emerged, confirmed by subsequent echocardiograms, while excluding the presence of any associated shunt. Coronary angiogram demonstrated patent coronary arteries.

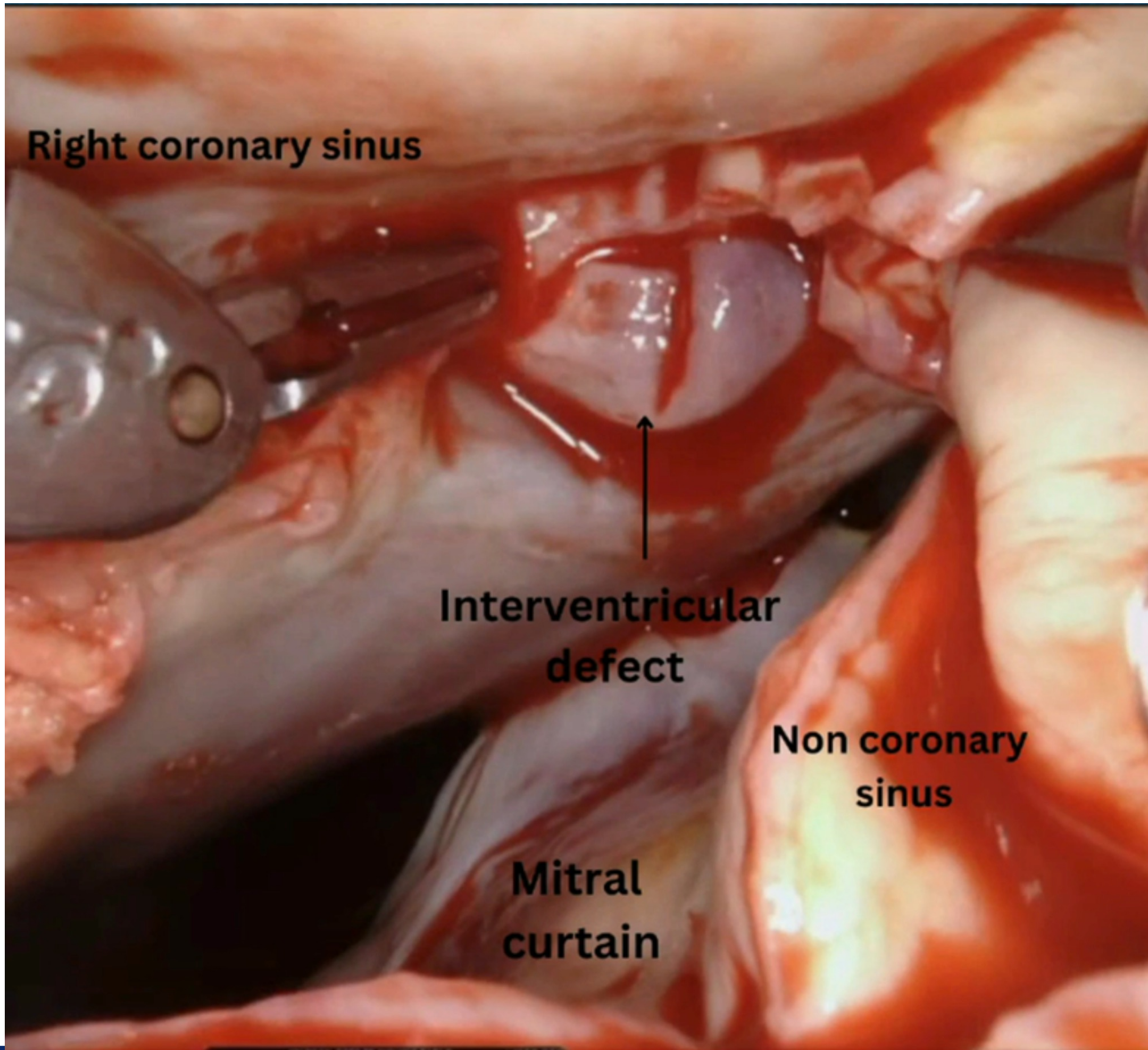


Fig 2: Labeled diagram of the IVSA

Surgical Technique

Our surgical approach was through a minithoracotomy in the fourth intercostal space. Three 8 mm robotic ports were placed around the access port. Cardiopulmonary bypass was established through the right femoral vessels

After an extended oblique aortotomy, the aortic valve was examined and excised, allowing for an excellent visualization of the membranous IVSA.

The repair utilized a pericardial patch, secured circumferentially with running 5-0 Prolene sutures. The distal portion of the patch was anchored to the aortic annulus. Few of the annular valve sutures were also taken through the patch. After placement of a mechanical aortic valve, the procedure was concluded with a two-layer aortic closure, followed by careful decannulation after successful weaning from cardiopulmonary bypass. Post-bypass echocardiography confirmed excellent repair integrity and proper valve function.

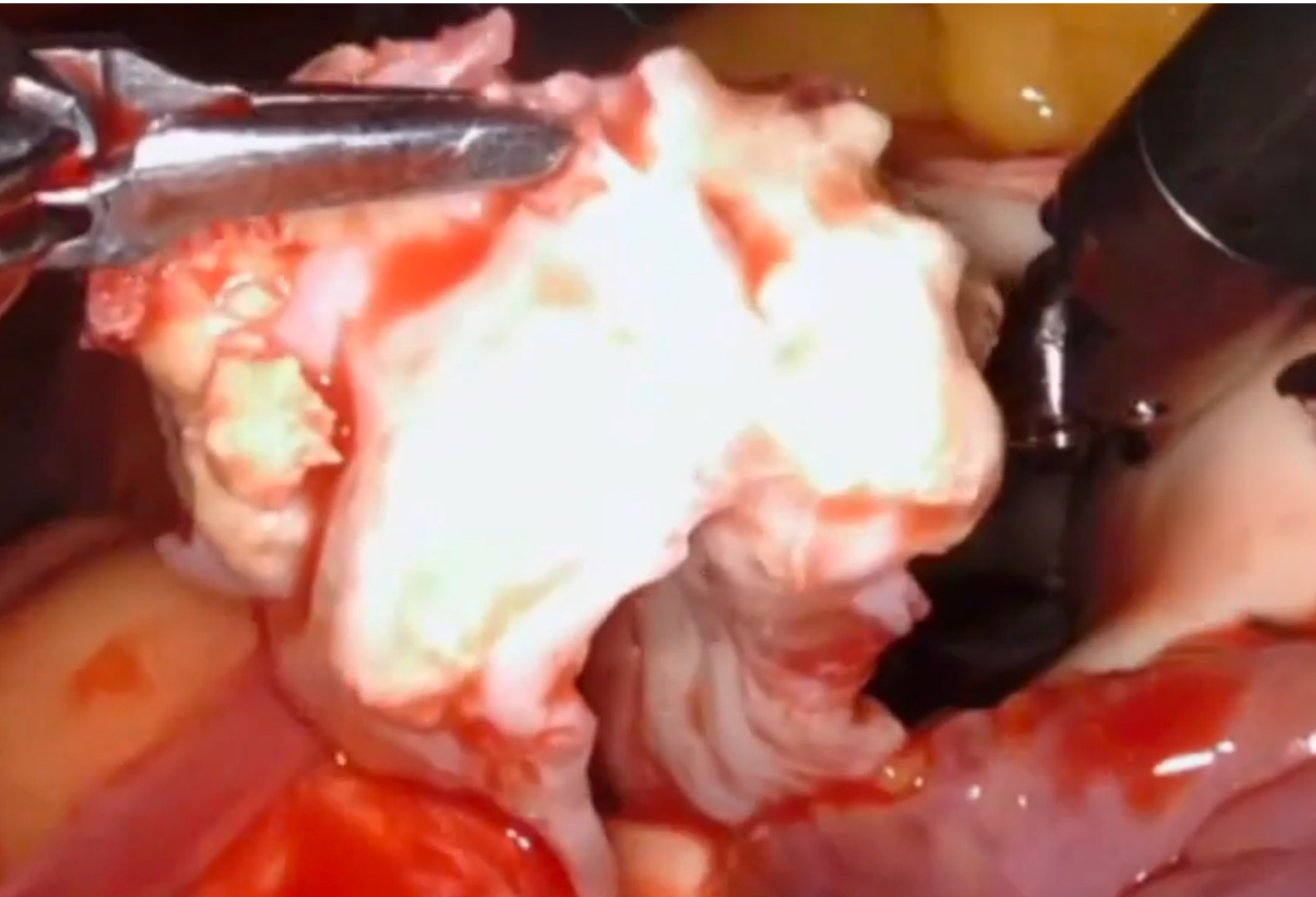


Fig 3: Removal of the diseased aortic valve

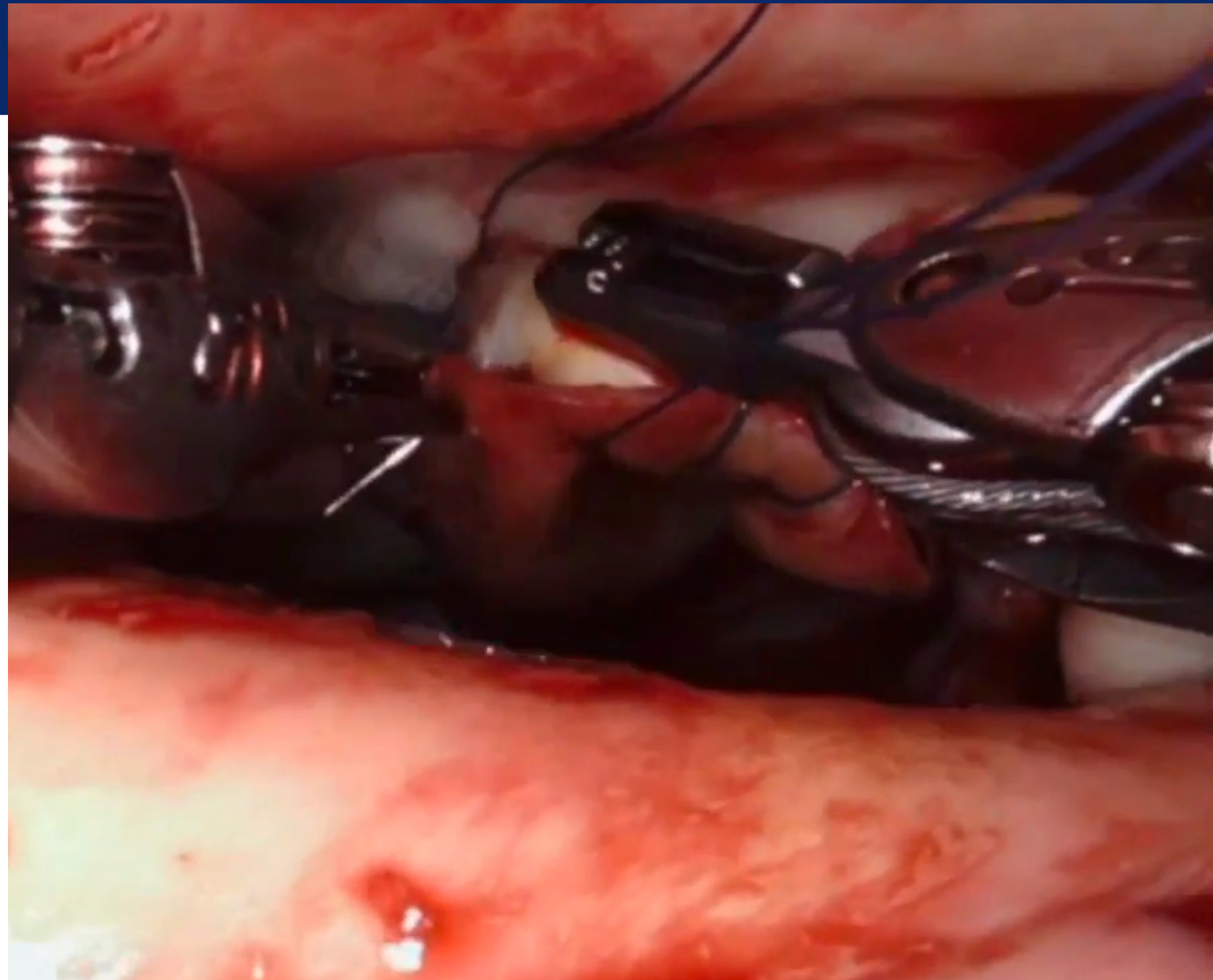


Fig 4: Fixation of the patch on the IVSA

Postoperative Course

The patient was shifted out from the ICU on the 1st postoperative day. His hospital course proceeded swiftly with discharge on the 4th postoperative day. Patient maintained normal sinus rhythm and did not require a permanent pacemaker.

Discussion

Unlike the typical association of septal aneurysms with ischemic heart disease, our patient presented a likely congenital etiology.

The integration of robotic assistance demonstrated several key advantages. First, the enhanced dexterity and precision of the robotic system enabled meticulous patch placement and secure closure of the aneurysmal defect within the confined space of the interventricular septum.

Second, the minimally invasive nature of robotic surgery facilitated a faster recovery, with reduced pain, earlier discharge and return to normal daily activities.

This case represents the first reported instance of robot-assisted repair of an IVSA. Showcasing the feasibility and potential advantages of robot-assisted cardiac surgery.

This procedure can be expanded to other procedures on the LVOT such as septal myomectomy for HOCM, aortic annular enlargement, subaortic membrane resection or even sub-arterial VSDs.

Fig 5:
Placement of
the prosthetic
valve

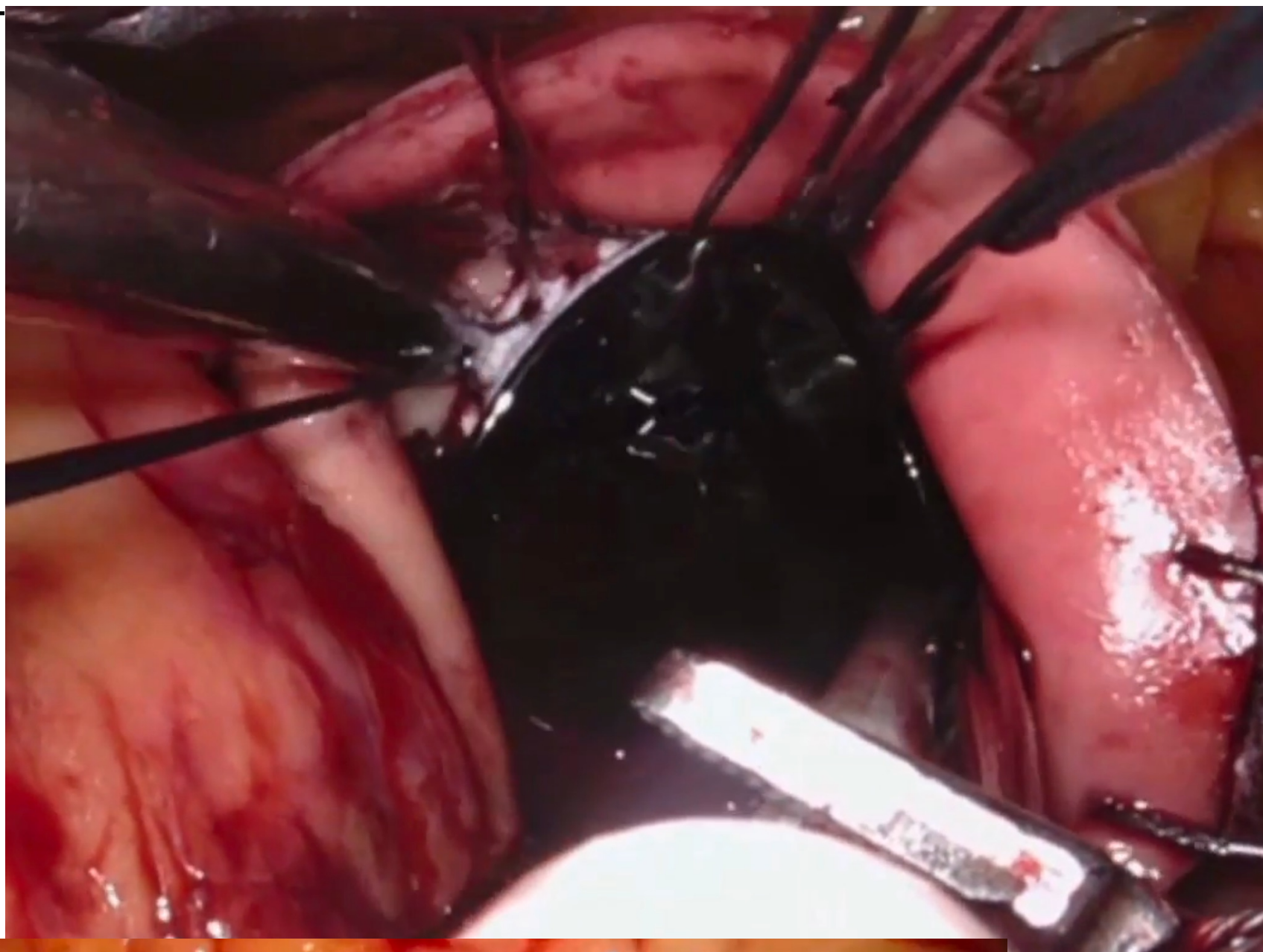


Fig 6:
Closure of
the aorta

