

Robotic Aortic Annular Enlargement With Y-incision And Rectangular Patch For An Aortic Valve Replacement Surgery

Ahsan Ehtesham, Jai Parkash, Muhammad Zain Shaikh, Korey Zellner, Ghulam Murtaza, SSM health St Mary's Hospital



SSMHealth
St. Mary's Hospital
MADISON

Introduction

Surgical enlargement of the aortic annulus enables insertion of a larger prosthetic valve, avoiding patient-prosthesis mismatch (PPM). These procedures are technically challenging via minimally invasive approaches, but robotic assistance makes them possible.

Several aortic annular enlargement techniques exist, we utilized the rectangular patch technique with an inverted Y-incision along the left and non-coronary cusps (Fig 1). This case represents one of the first reported robot-assisted aortic annular enlargements, demonstrating the expanding potential of robotic cardiac surgery.

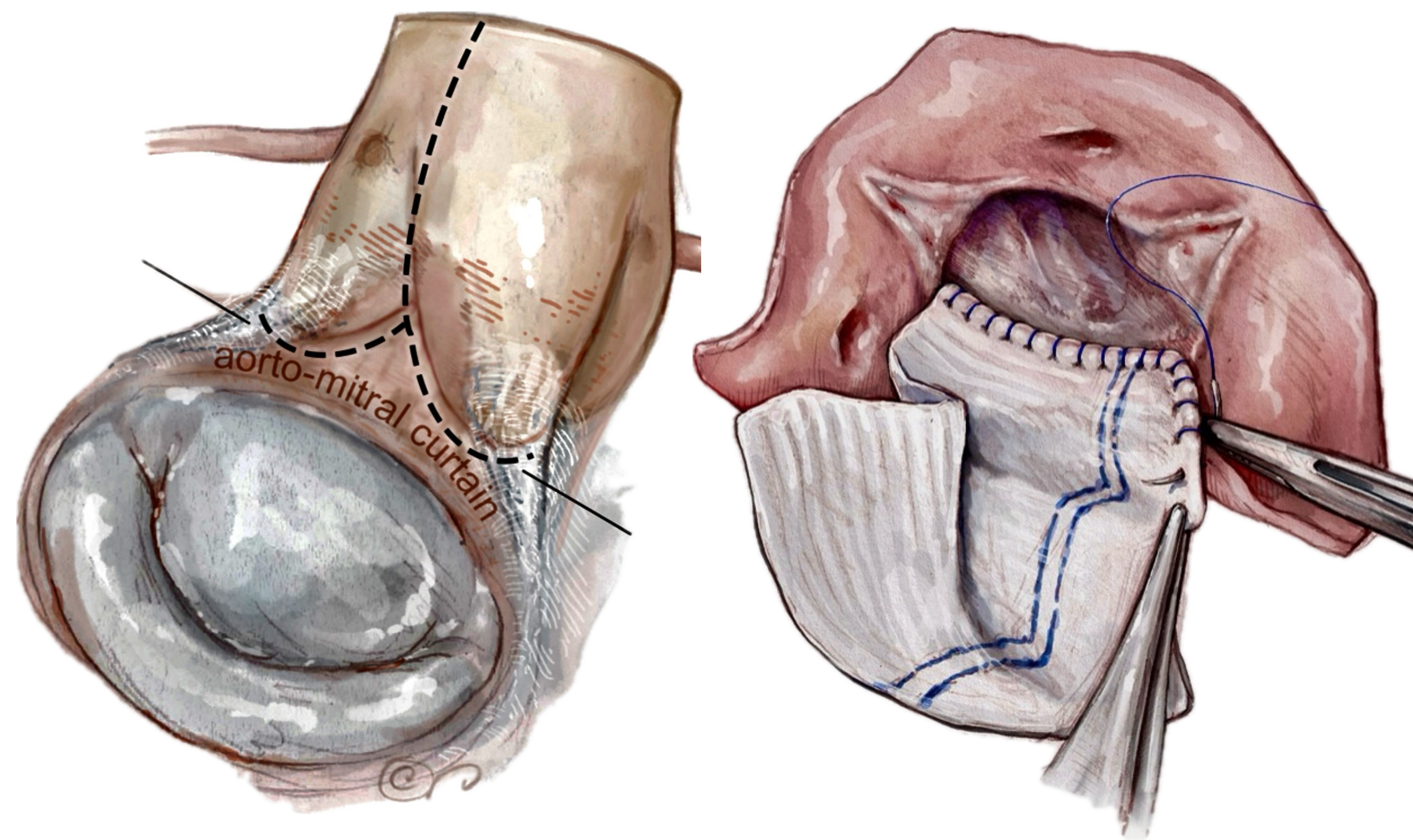


Fig 1: Illustration of the annular enlargement procedure showing the incision line and suturing of the patch

Case Report

We present a 47-year-old female patient with symptomatic severe aortic valve stenosis and evidence of LV dysfunction (ejection fraction 45%).

The patient was initially considered for TAVR due to her multiple comorbidities. However, her preoperative CT scan measured the aortic annulus at 18 mm (patient's BSA 1.9) and she was turned down for TAVR and referred to us for surgical AVR with root enlargement. We offered her robotic surgery for better outcome than conventional sternotomy.

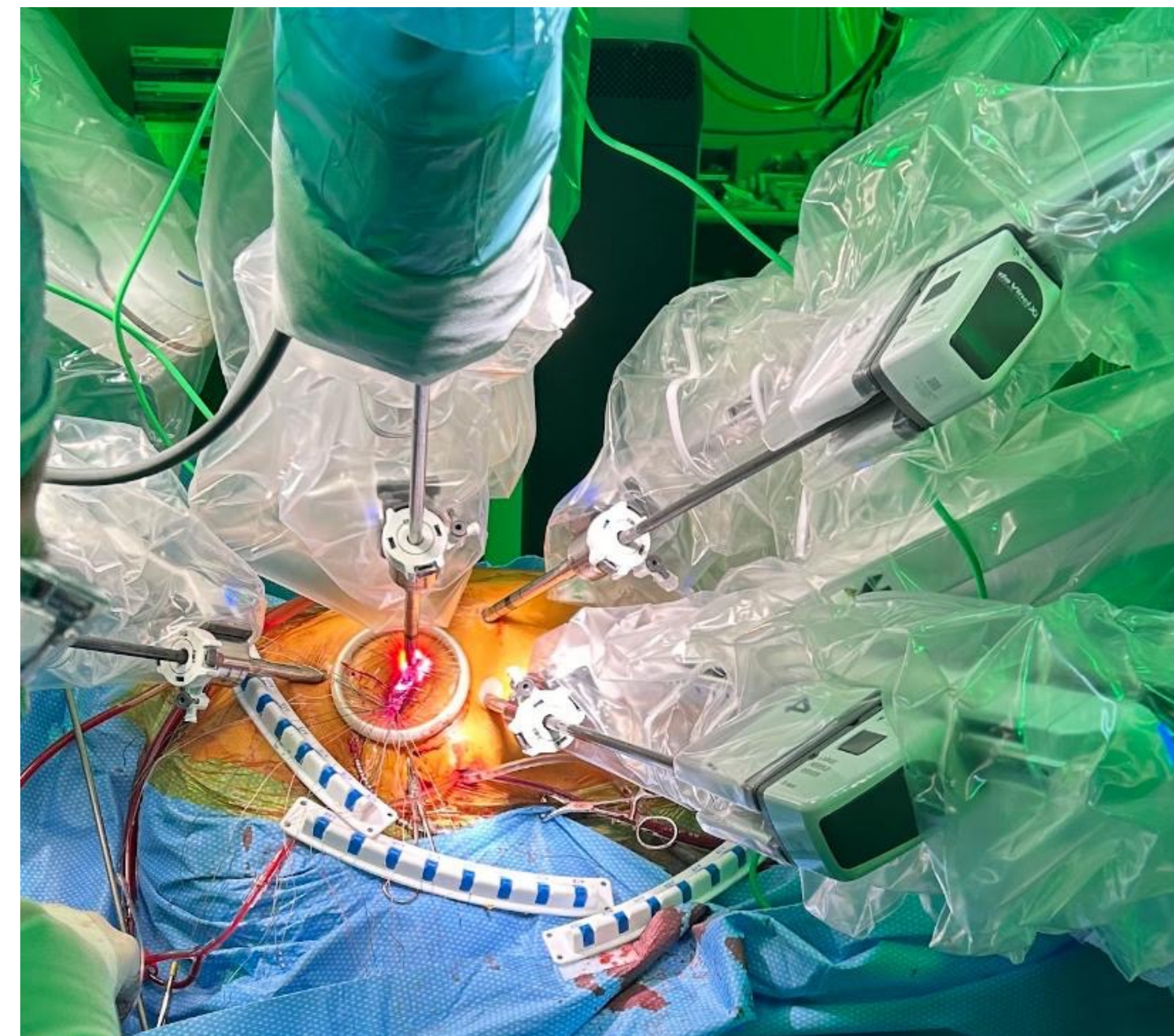


Fig 2: Surgical setup used for the procedure

Operative technique

Our approach was from the 4th ICS, mini thoracotomy at the anterior axillary line (Fig 2). Three 8 mm robotic ports were inserted surrounding the access incision. Cannulation of the right groin vessels was done to establish cardiopulmonary bypass.

An oblique aortotomy was made, revealing a severely diseased bicuspid aortic valve (Fig 4). An annular diameter of barely 19 millimeters was seen after valve removal (Fig 5). After dissection of the aorta in Y configuration (Fig 6), a 3-centimeter wide bovine pericardial patch was sutured into position, beginning at the nadir of the left coronary cusp, anchored inferiorly to the aortomitral curtain, and laterally sewn up the ascending aortic wall (Fig 7).

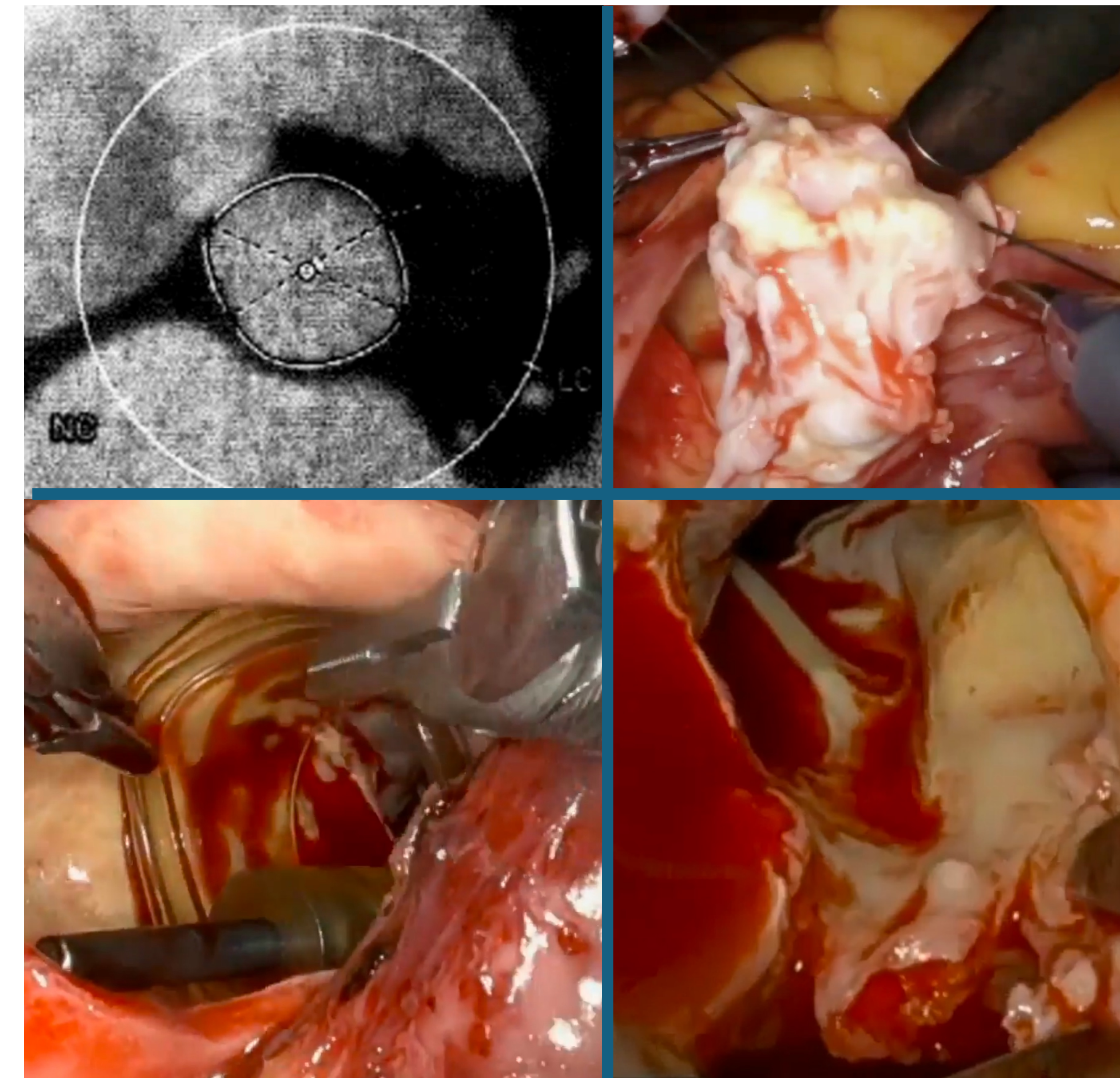


Fig 3: CT scan of the annulus, Fig 4: Excised Aortic Valve, Fig 5: Sizing of the annulus, Fig 6: Annulus dissected in Y shape

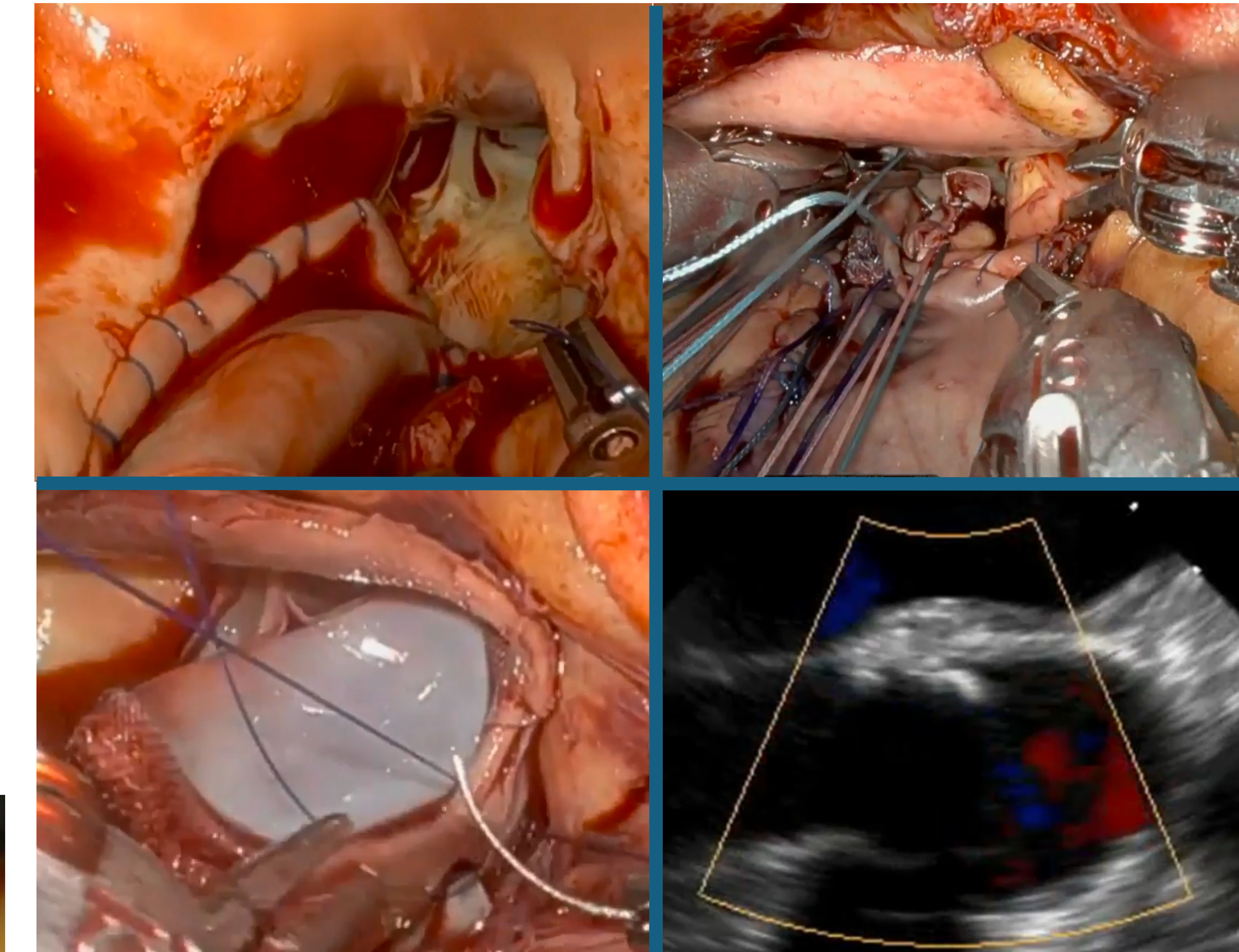


Fig 7: Patch sewn into place, Fig 8: Valve sutures, Fig 9: Valve in place, Fig 10: Post bypass TEE long axis view of the prosthetic valve

This enlargement procedure enabled the successful implantation of a 23-mm bioprosthetic valve (Fig 8). The valve was placed in standard fashion, and the sutures were tied with the LSI SOLUTIONS® COR-KNOT® device.

Intraoperative transesophageal echocardiography confirmed excellent prosthetic valve function with no paravalvular leak and a mean gradient of 4 mmHg (Fig 10).

Postoperative course

The patient's postoperative course demonstrated steady improvement, allowing transfer to the regular cardiac surgery ward and discharged to home on the seventh postoperative day.

Her 2-week outpatient follow-up evaluation showed marked improvement in her symptoms.