

# A large mycotic pseudo-aneurysm of ascending aorta after mitral valve replacement: - the Tinderbox

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## Abstract

Pseudoaneurysm of ascending aorta following cardiac surgery is a very rare and life threatening entity due to risk of exsanguination from its rupture. This is a case report of a 39 year old male patient who presented with impending rupture of ascending aorta pseudoaneurysm following mitral valve replacement. He underwent urgent reoperation under femoro-femoral cardiopulmonary bypass and deep hypothermic circulatory arrest. The pseudoaneurysm was excised and repaired with pericardial patch. He was discharged after an uneventful postoperative course.

*A large mycotic pseudo-aneurysm of ascending aorta after mitral valve replacement: - the Tinderbox*

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## ABSTRACT-

Pseudoaneurysm of ascending aorta following cardiac surgery is a very rare and life threatening entity due to risk of exsanguination from its rupture. This is a case report of a 39 year old male patient who presented with impending rupture of ascending aorta pseudoaneurysm following mitral valve replacement. He underwent urgent reoperation under femoro-femoral cardiopulmonary bypass and deep hypothermic circulatory arrest.

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**Key words** - ascending aorta, pseudoaneurysm, mycotic, deep hypothermic circulatory arrest, cardiopulmonary bypass

## BACKGROUND-

Pseudoaneurysm of thoracic aorta is a rare complication after cardiac surgery with an incidence of about 0.5% <sup>(1)</sup>. The predisposing factors can be dissection at aortic cannulation site, connective tissue disorder, chronic hypertension, aortic calcification, atherosclerosis, increasing age, diabetes mellitus, malignancy, HIV infection, and immunosuppressive conditions (2, 3, 4). Possible sites of aortic pseudoaneurysms after cardiac surgery are shown in figure 1. Because of lengthy procedure requiring meticulous tissue dissection of adhesions, the reoperations for aortic aneurysms carry higher mortality and morbidity (5). Many cases have been reported due to secondary infection caused by bacterial endocarditis and mycotic mediastinitis (6, 7). Mycotic aneurysm can develop by infection at previous aortotomy or aortic cannulation site and it contributes in approximately 13% cases (8, 9). Mycotic pseudoaneurysm cases has been reported several weeks to 3 years after cardiac surgery and are associated with higher mortality rates of about 88-95% (10,11). Aggressive redo surgical treatment is challenging but necessary to avoid the rupture of aneurysm causing significant mortality (12). Here we highlight a post mitral valve replacement patient who developed large pseudoaneurysm of ascending aorta after 8 months, presented with impending rupture and underwent emergency excision and repair under deep hypothermic circulatory arrest (DHCA).

## CASE REPORT-

A 39 year old male who had undergone mitral valve replacement with 27mm St. Jude's Medical mechanical valve, presented to emergency with pain over a large pulsatile swelling of size 8.5×9.5 cm over upper half of sternum for last 2 months which had progressively increased in size. The swelling was soft, initially small in size, in the left parasternal border, 3rd intercostal space and had rapidly increased to present size with necrosis of skin over it (figure 2). He had a history of intermittent high grade fever for 1 month with chills and rigor, about 2 months after the surgery for which was admitted and diagnosed to have infective endocarditis of the aortic valve with mycotic aneurysm of the ascending aorta. Patient was treated conservatively with intravenous antibiotics for six weeks, 2D echo showed no valvular lesion and was discharged on personal request after getting symptomatically better. He was lost to follow up due to Covid pandemic situation and presented now with the present swelling. Contrast enhanced CT (CECT) scan of chest showed a large saccular pseudoaneurysm in anterior mediastinum, arising from ascending aorta with defect of size 30mm, situated approximately 38mm above aortic annulus extending to anterior mediastinal and subcutaneous space with internal thrombosis, causing displacement of all middle mediastinal structures posteriorly (Figure 3). Superior vena cava was compressed leading to obstruction and dilated anterior abdominal wall veins. 2D echo showed no aortic valvular lesion with normal functioning mitral valve prosthesis. Routine blood investigations were normal with a sterile blood culture. Urgent reoperation with repair of ascending aorta was planned as the patient developed increasing pain and discoloration of the skin over the swelling within 12 hours of presentation (figure 3). Cardiopulmonary bypass was established through femoro-femoral cannulation. Redo sternotomy done. The pseudoaneurysm has eroded lateral part of sternum and medial ends of 3<sup>rd</sup> and 4<sup>th</sup> ribs creating a defect of size 6×7cm through 3<sup>rd</sup> and 4<sup>th</sup> costochondral junction (Figure 4). Systemic cooling done to 18 C and deep hypothermic circulatory arrest was achieved. Mannitol, thiopentone, and methylprednisolone were administered for cerebral protection. Clots were cleared and the ruptured sac was dissected. Extensive inflammation and adhesion was found with fragile cardiac tissue forming a cocoon heart. The pseudoaneurysm arose from a defect of size 3×3cm on ascending aorta corresponding to cannulation site. The innominate vein was inflamed, thickened and had a blown out defect of size 1.5×3 cm (Figure 5). Transesophageal echo showed no valvular lesion. Attempt was made for judicious dissection to avoid injury to any cardiac chamber or vessel, as achieving minor hemostasis was difficult because of the inflamed fragile tissues. Defects on both the ascending aorta and the innominate vein were closed with glutaraldehyde treated pericardial patches. Deairing was done through the defects and total period of deep hypothermic cir-

culatory arrest lasted for 24 minutes. Rewarming done and patient weaned off cardiopulmonary bypass after restoration of normothermia with stable hemodynamics. Sternal closure done and the thoracic wall defect was repaired with mobilization of ipsilateral pectoralis muscle and soft tissue (Figure 6). Postoperatively he was extubated after 16 hours, had no neurological sequelae and had uneventful recovery. He was discharged home on 7<sup>th</sup> post-operative day.

## DISCUSSION-

In our case, the patient required urgent reoperation because of the impending rupture of pseudoaneurysm which carries high mortality. Even successful percutaneous exclusion of the pseudoaneurysm is reported. Surgery is more appropriate in cases with mediastinal infection, hemodynamic instability or impending rupture (13,14). The mortality rate of ascending aorta pseudoaneurysm has been reported from 29-46% which increases in cases of rupture during redo sternotomy leading to fatal bleeding particularly in anteriorly located large pseudoaneurysm > 55mm, eroding into outer sternum (4,15,16). Ascending aorta pseudoaneurysms has rarely been reported from aortic posterior wall by cardioplegia cannula (17). The most important part of this surgery was to maintain proper neuroprotection and avoid unnecessary bleeding. This was accomplished by deep hypothermic circulatory arrest and femoral cardiopulmonary bypass, even carotid cannulation for cardiopulmonary bypass and femoro-femoral bypass under Moderate hypothermia with transient circulatory arrest has been used (1, 18). Ascending aortic aneurysm also has been reported following cardiac transplantation (19). The Repair of recurrent mycotic pseudoaneurysm in an 18-month-old baby, early after subaortic membrane resection has been reported, by replacing the infected ascending aorta using bovine jugular vein graft (20). Most appropriate therapy if a mycotic pseudoaneurysm involves the ascending aorta is replacement of the aorta with a homograft which is a lengthy and more complicated procedure. If the neck of the pseudo aneurysm is small and the surrounding aorta is not affected, the pseudo-aneurysm may be repaired with a patch. It is better to use biologic rather than synthetic material, because a Dacron patch (DuPont, Wilmington, DE) can be easily seeded with pathogens, therefore causing reinfection (21).

Methods to prevent postoperative mediastinal pseudoaneurysms has been emphasized, such as performing proper aortic suture technique, careful handling of the aorta wall, strict asepsis, and aggressive treatment of perioperative infection (22). Even causative organisms have been isolated from cultures after surgery for mycotic aneurysms in 50-70% cases, we could not find any organism from culture of surgical specimen, most likely because of patient had received multiple antibiotic treatment at other centers prior to presenting in our emergency (21, 22).

In our case we speculate the psuedoaneurysm might have developed due to bacteremia after mitral valve replacement.

## CONCLUSION-

Although pseudoaneurysms after cardiac surgery are rare, prompt diagnosis and timely surgical intervention can avoid the associated catastrophic complications and mortality. Patients with perioperative or early postoperative infection should undergo proper evaluation to rule out bacteremia. Patients with infective endocarditis should be followed up regularly in view of the fatal complications like mediastinal pseudoaneurysm. Strategies like establishing femoro-femoral cardiopulmonary bypass and deep hypothermic circulatory arrest can be used successfully for emergency reoperation of ascending aortic aneurysms. Surgeons ought to maintain appropriate sterility in perioperative period and secure the possible sites of development of pseudoaneurysm.

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## Ethical Approval-

Approved by zonal and institutional ethical committee.

## Informed Consent-

Verbal and written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

## FIGURES-

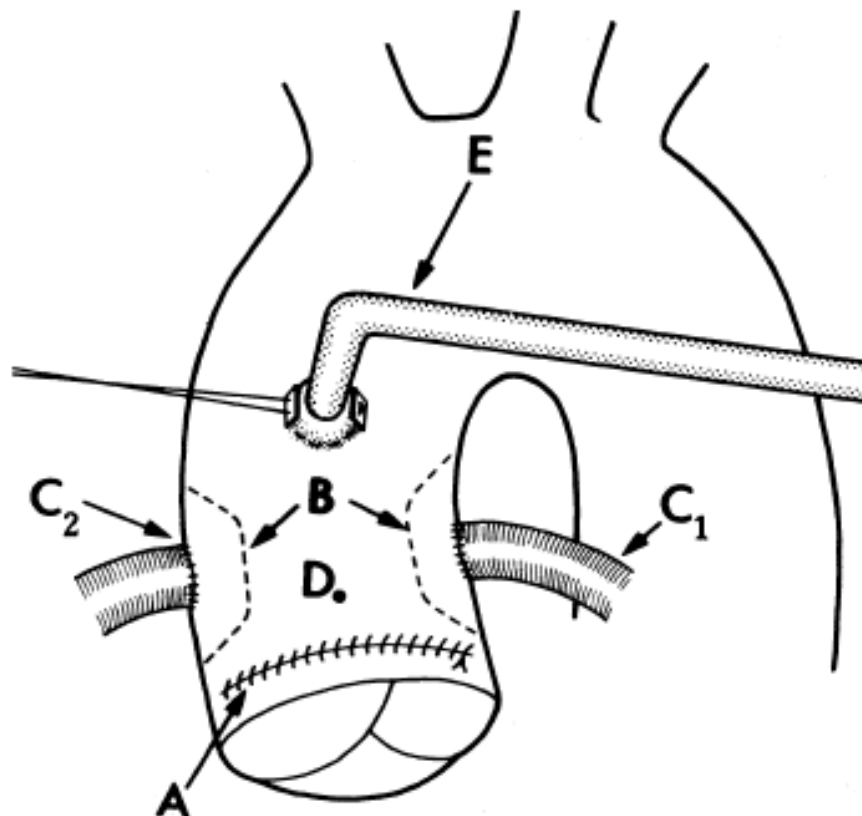


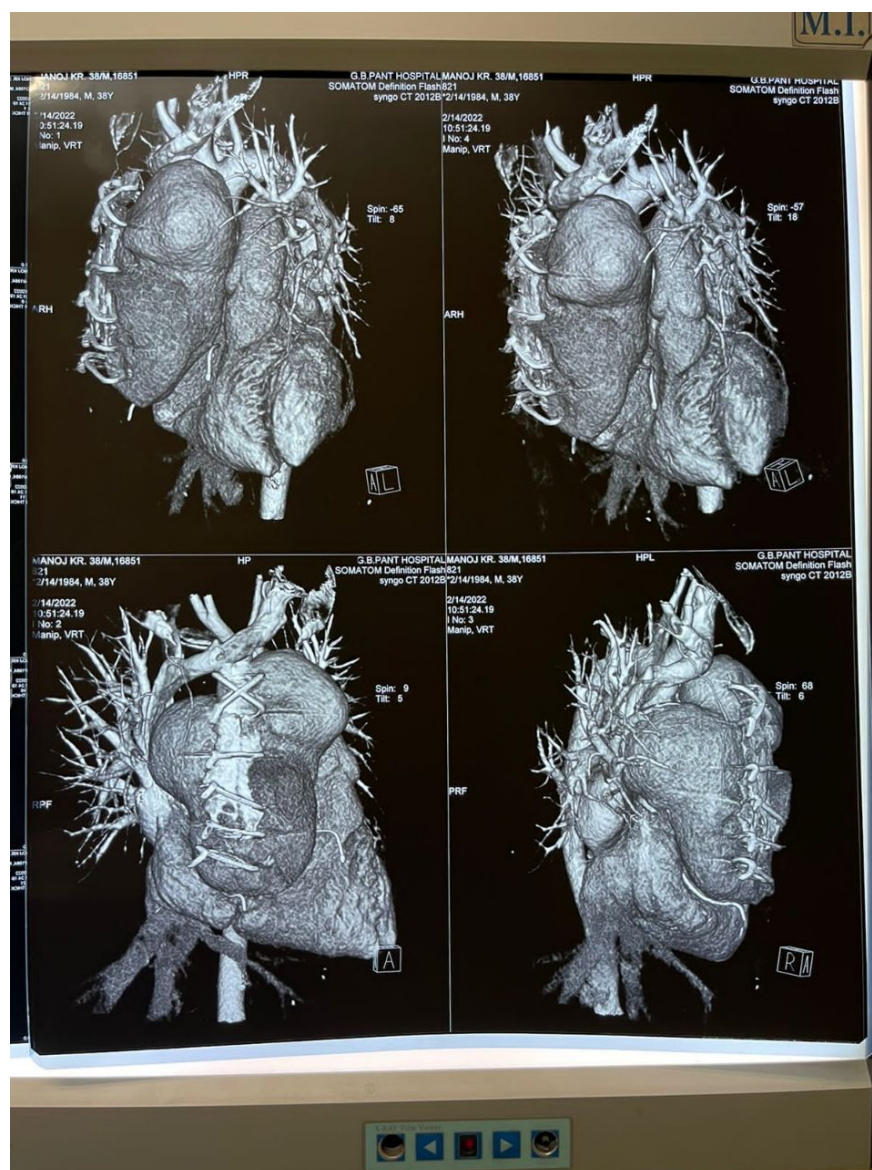
FIGURE 1. Drawing of ascending aorta illustrates potential sites for pseudoaneurysm following cardiac surgery. *A* is valvulotomy site; *B*, clamping site; *C1*, graft; *C2*, graft anastomosis; *D*, needle site; and *E*, cannulation site.







Figure 2. Pulsatile swelling with discoloration on upper part of sternum





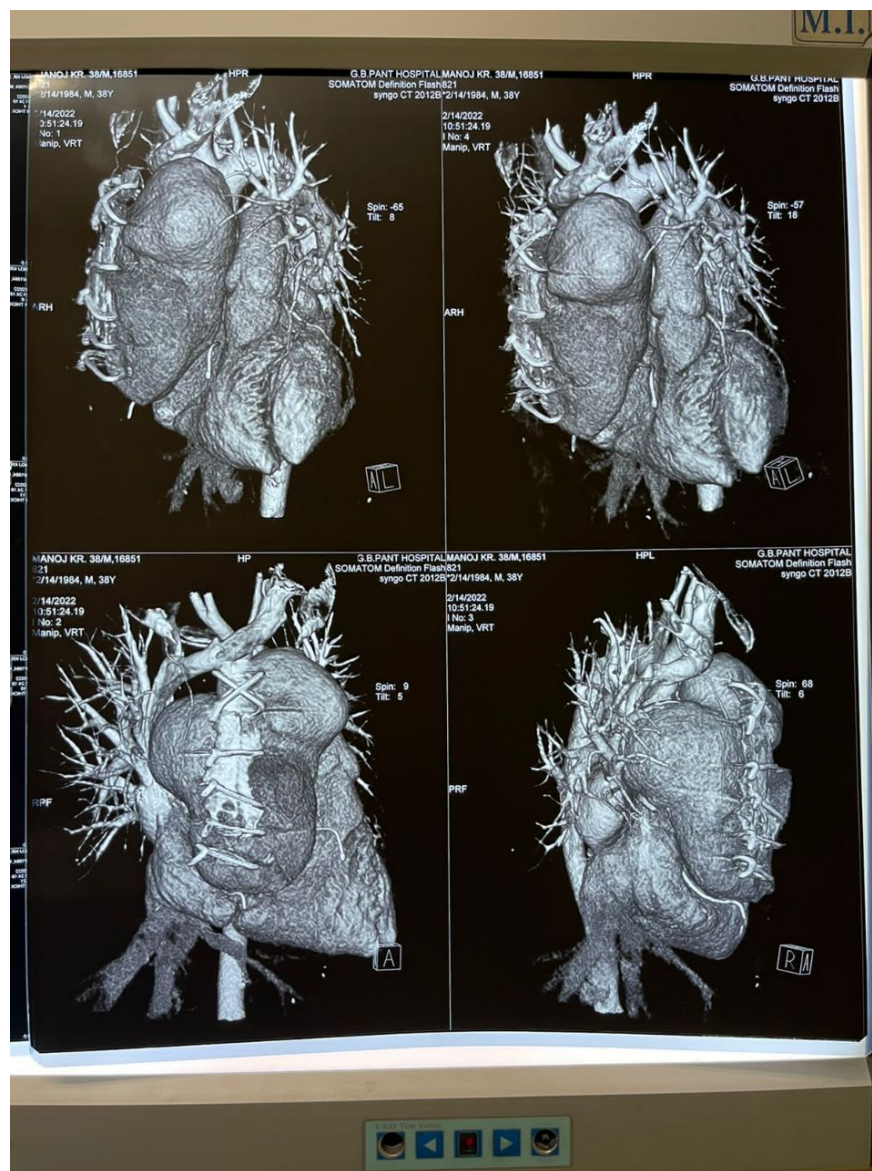


Figure 3. Contrast enhanced CT scan showing the pseudoaneurysm of ascending aorta.

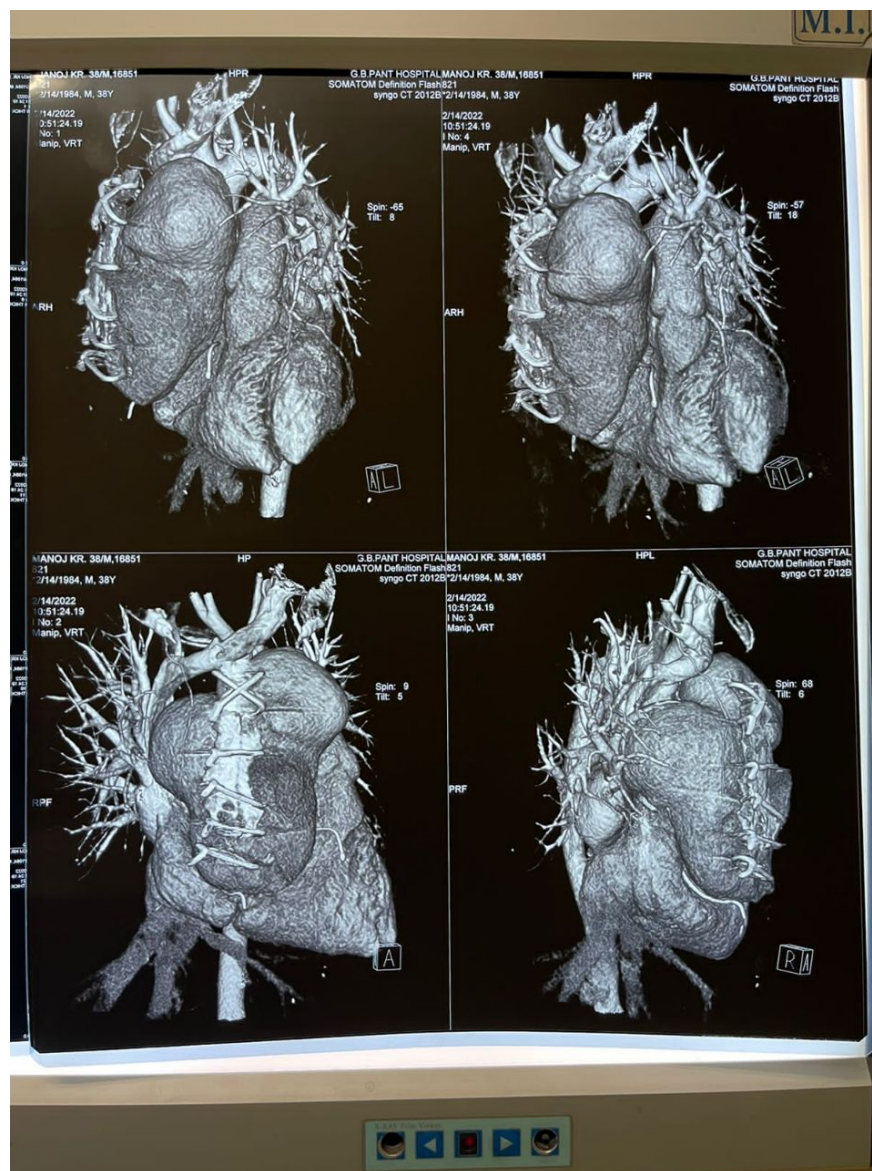


Figure 4. Pseudoaneurysm coming out of chest wall by eroding sternum and ribs.



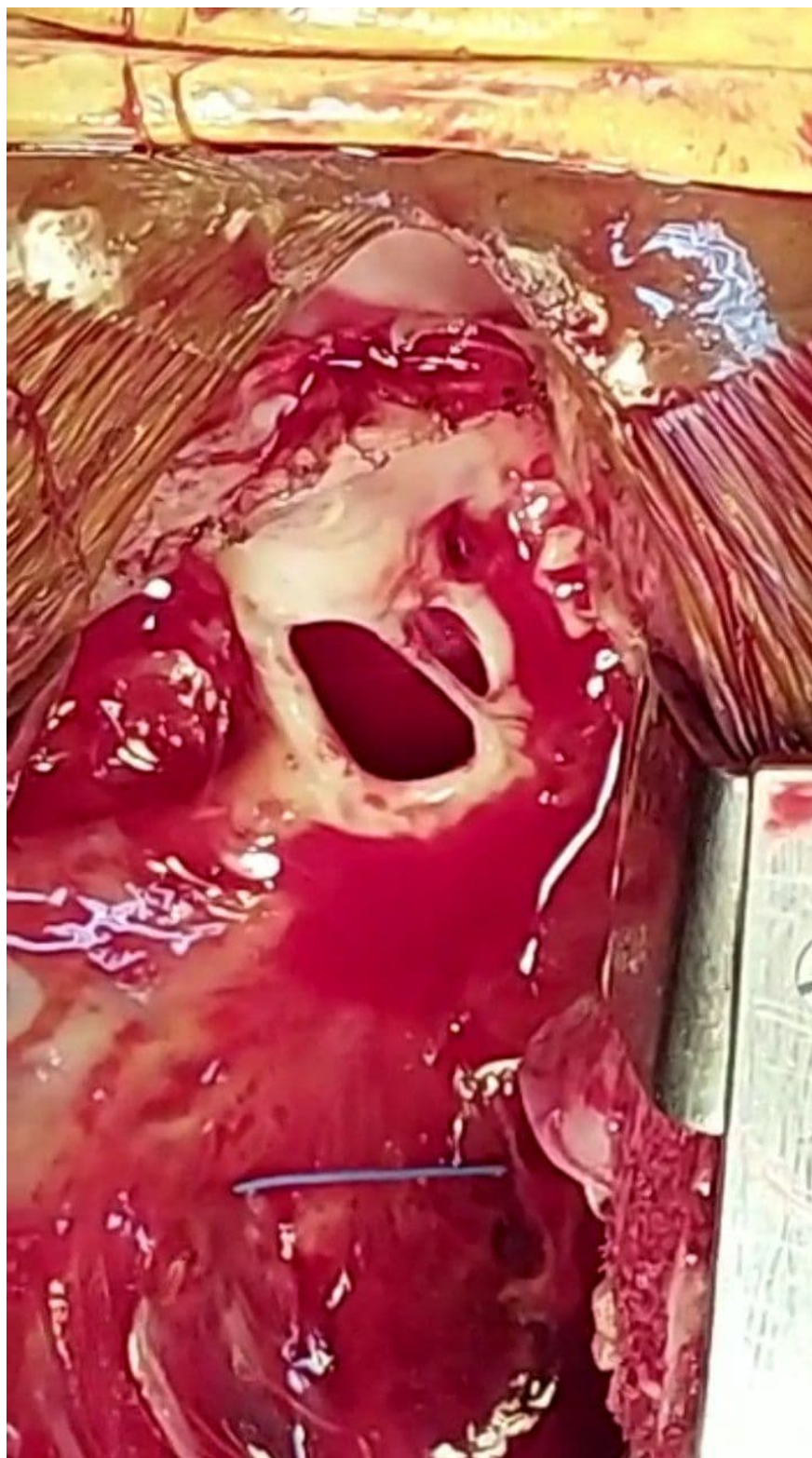


Figure 5. Defect on ascending aorta (black arrow) and innominate vein (white arrow).

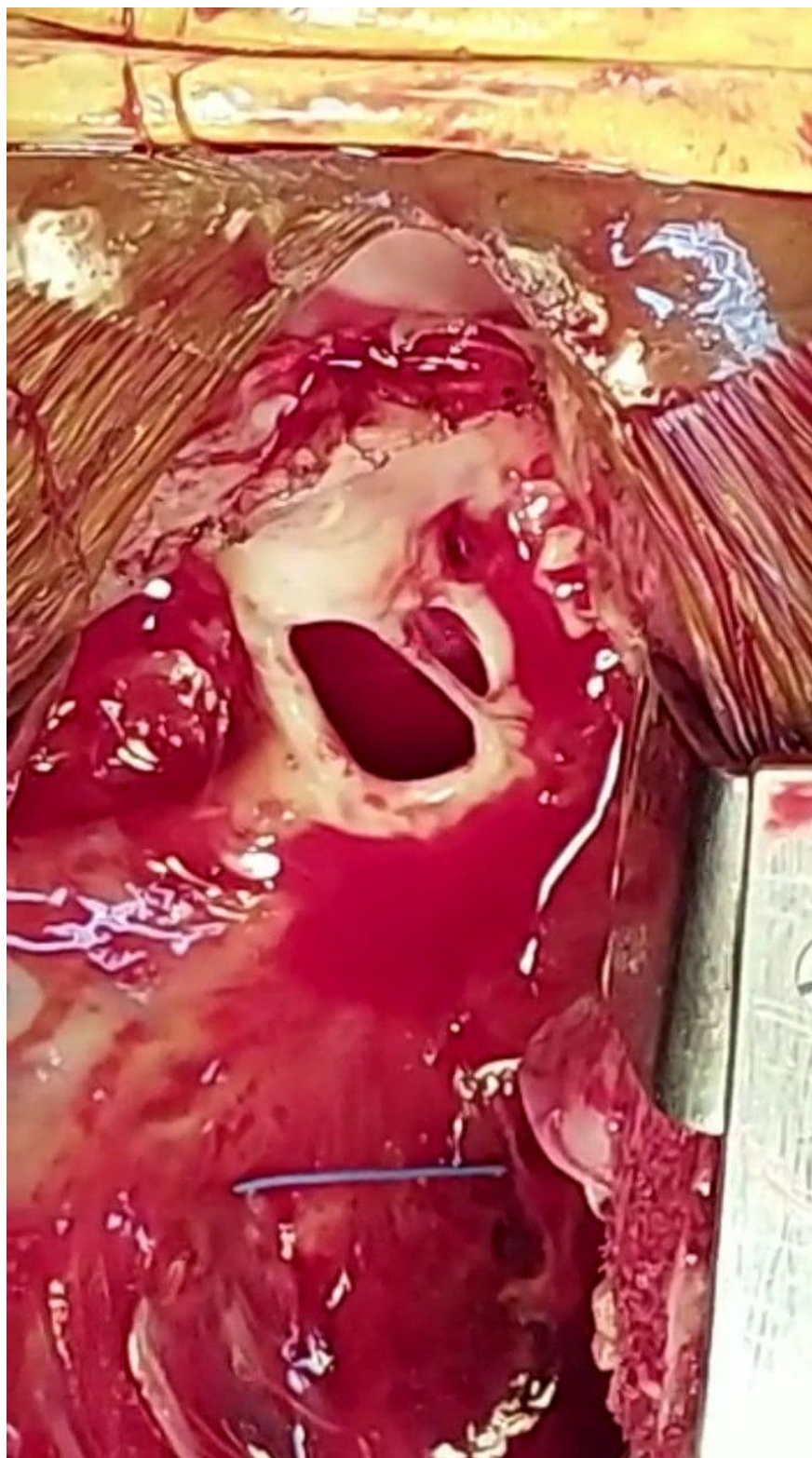


Figure 6. Closure of sternum with mobilization of Pectoralis muscle and soft tissue over the defect

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