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SURGERY

CASE REPORT: CLINICAL CASE

Combined Treatment for Unusual Behçet's Disease Influencing the Autograft in the Ross Procedure

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ABSTRACT

We report an unusual case of Behçet's disease possibly induced by surgical invasion, resulting in a recurrent pseudoaneurysm at the aortic root leading to the inflammation of the autograft of a Ross procedure. The diagnosis was challenging because of clinical presentations that resembled infectious endocarditis, however, effective surgical treatment was achieved with perioperative anti-inflammatory therapy. (JACC Case Rep. 2024;29:102481)

HISTORY OF PRESENTATION

A 66-year-old man had acute heart failure due to aortic regurgitation. The Bentall procedure with a 23-mm Trifecta valve (Abbott Laboratories) was performed for aortic regurgitation and ruptured sinus of the Valsalva aneurysm (**Figure 1A**).

LEARNING OBJECTIVES

- To be able to prevent the recurrence of pseudoaneurysm and manage the risk of Behçet's disease triggered by surgical stress, it is essential to maintain clinical vigilance in atypical cases.
- To optimize patient outcomes in Behçet's disease by effectively managing the condition through early recognition and prompt initiation of targeted immunosuppressive therapy, in order to mitigate complications and improve prognosis.

Four months later, despite prophylactic antibiotics, the patient developed a persistent fever after a dental treatment. The patient's blood pressure was 160/74 mm Hg, heart rate was 55 beats/min with sinus rhythm, and body temperature was 38.0 °C, and no abnormal findings were observed in the physical examination. Although infective endocarditis was suspected and investigations were conducted, multiple blood cultures yielded negative results. Subsequently, a contrast-enhanced computed tomography (CT) revealed a huge aortic root pseudoaneurysm adjacent to the thoracic wall (**Figures 1B and 1C**). Five months after the first operation, the Ross procedure was performed with a strong suspicion of infection of the valve prosthesis and aortic root.

The operation was successfully done (**Figure 1D**); however, his fever and elevated inflammatory response persisted postoperatively, although repeated blood cultures and cultures of intraoperative specimens were all negative. Five months after the second surgery, the Ross procedure,

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ABBREVIATIONS AND ACRONYMS

BD = Behçet's disease

CT = computed tomography

contrast-enhanced CT showed a recurrent anastomotic pseudoaneurysm (Figures 1E to 1H), along with a characteristic double ring-like appearance suggestive of vasculitis in the autograft of the Ross procedure (Figures 2A to 2F).

PAST MEDICAL HISTORY

Although the patient had never been diagnosed with an autoimmune disease, a detailed examination revealed a positive expression of the HLA-B51 antigen. Additionally, clinical episodes suggested a tendency for his wounds to heal after ulceration. However this was not a typical case, we considered the possibility of signs and symptoms of Behçet's disease (BD) induced by operative stress.

DIFFERENTIAL DIAGNOSIS

Initially, infective endocarditis was suspected because of the patient's persistent fever, inflammation, and formation of a pseudoaneurysm. However, after the recurrence of the pseudoaneurysm and his clinical symptoms, BD was considered.

INVESTIGATIONS

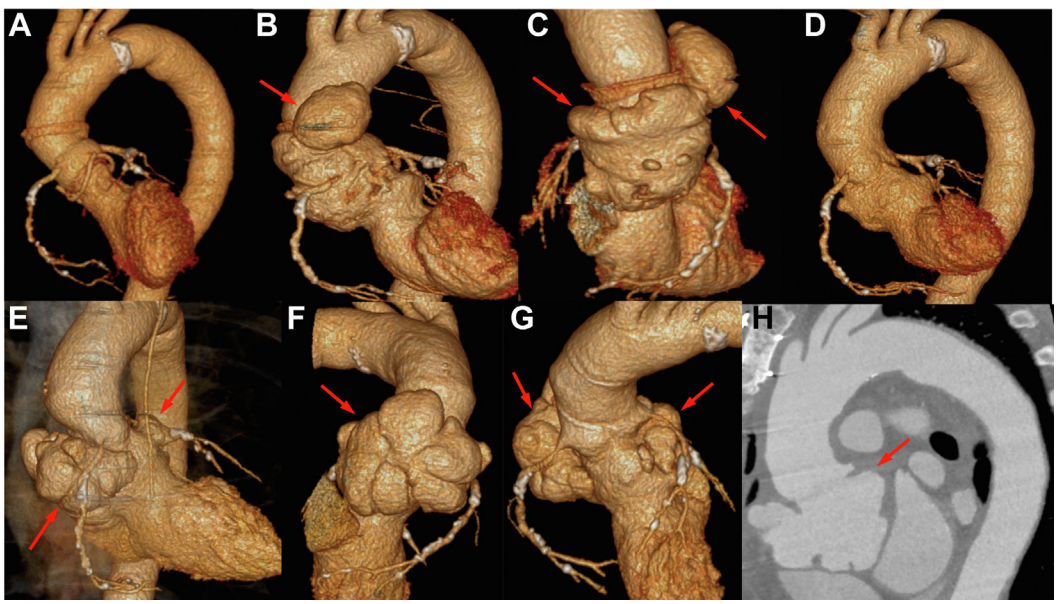
Contrast-enhanced CTs initially revealed a large aortic root pseudoaneurysm adjacent to the thoracic wall. After the recurrence of the pseudoaneurysm after the Ross procedure, additional CTs showed a recurrent anastomotic pseudoaneurysm and a double ring-like appearance suggestive of vasculitis in the autograft of the Ross procedure. Blood cultures conducted multiple times were all negative. A detailed examination revealed positive HLA-B51 antigen expression.

MANAGEMENT

After consulting with immunologists, we administered prednisolone at a low dose (5 mg/day) to control the inflammatory response. After controlling inflammation, we performed a third aortic root replacement using a Bentall procedure with a Freestyle valve (Medtronic, Inc) as a xenogeneic conduit at the aortic root.

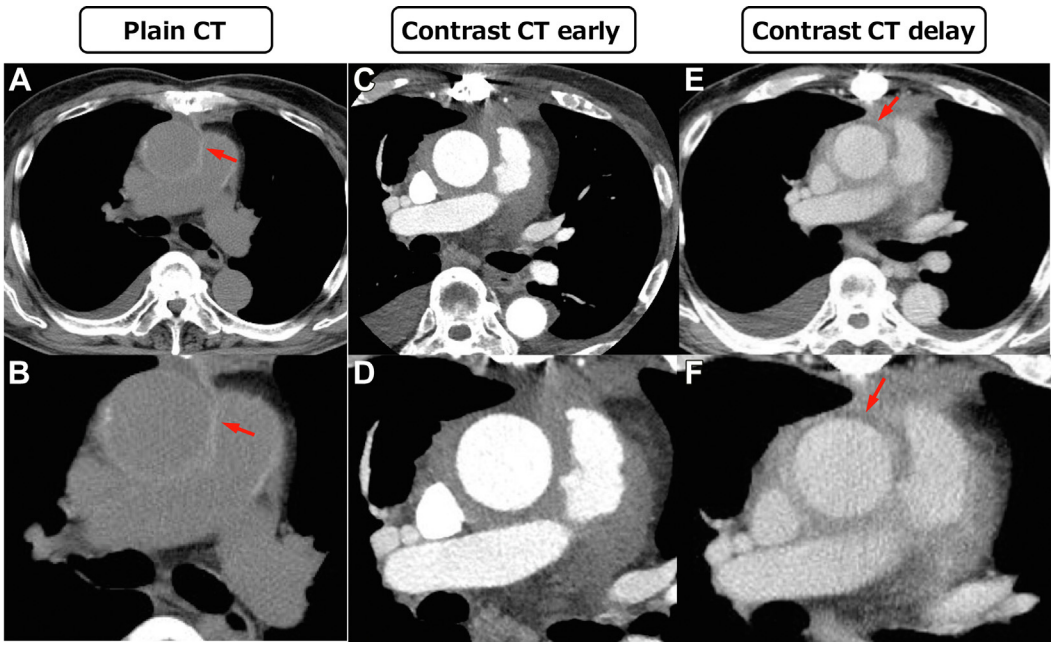
Intraoperative findings revealed anastomosis detachment developed at the left coronary and noncoronary cusp regions, where a pseudoaneurysm developed (Videos 1 to 3). We sutured and closed the

FIGURE 1 Recurrent Pseudoaneurysm at the Aortic Root



The red arrows indicate an anastomotic pseudoaneurysm. (A) Two weeks after the first aortic root operation (Bentall procedure). (B and C) Four months after the first aortic root operation. (D) Two months after the second aortic root operation (Ross procedure). (E to H) Five months after the second aortic root operation and before the third aortic root operation. The images illustrate the progression of the recurrent pseudoaneurysm after the initial Bentall procedure and subsequent Ross procedure.

FIGURE 2 Aortic Evaluation With and Without Contrast-Enhanced CT



(A and B) The ring-shaped high attenuation (red arrow) in the precontrast computed tomography (CT) image represents the thickened wall of the autograft of the Ross procedure. B is an enlarged image of A. (C to F) The thickened wall shows a double-ring enhancement pattern (red arrow) in the early and late contrast phases. D and F are enlarged images of C and E, respectively. The double-ring appearance is characterized by a brightly enhanced outer ring of inflamed media and adventitia surrounding a poorly enhanced edematous intima.

false lumen around the left coronary and noncoronary cusp regions with 3-0 Nespiren (nonabsorbable monofilament; Alfresa Pharma Corporation) to build the new annulus and sutured a 27-mm Freestyle valve onto the new annulus (Videos 3 and 4). We struggled with the reconstruction of both coronary artery bottons because they were sclerotic and fragile, leading to easy bleeding (Videos 5 and 6). Finally, we achieved hemostasis and acceptable blood flow by coronary artery bypass grafting after occluding both coronary ostia; saphenous vein graft to the right coronary artery and left internal thoracic bypass graft to left anterior descending artery (**Figures 3A and 3B**).

OUTCOME AND FOLLOW-UP

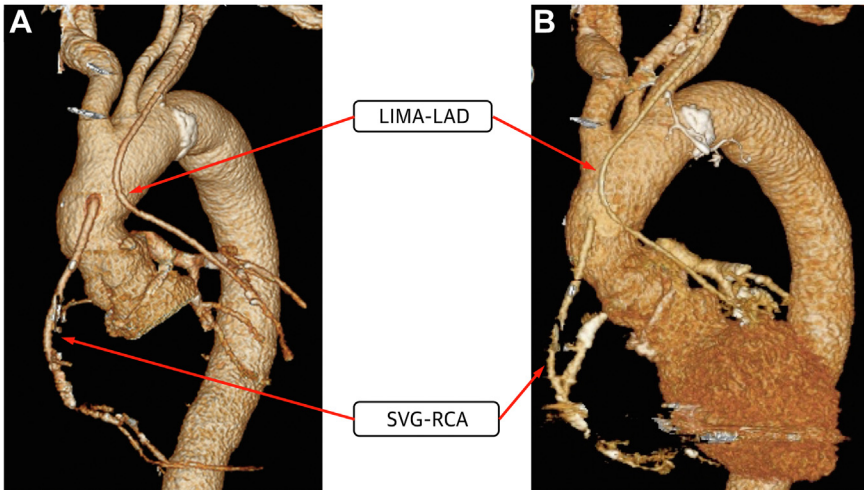
The pathologic findings from the third procedure revealed nonspecific inflammation involving the outer adventitial layer of the autograft's wall, predominantly characterized by lymphocytic and plasmacytic infiltration (**Figures 4A to 4C**). Additionally, granulomatous inflammation involving the autograft's wall was identified, represented by aggregates of epithelioid cells and concomitant infiltration of small lymphocytes, consistent with histopathologic findings suggestive of BD (**Figures 4D and 4E**).

The patient recovered with continuous administration of prednisolone without a recurrent pseudoaneurysm. The patient continued to visit our hospital for follow-up for more than one and a half year.

DISCUSSION

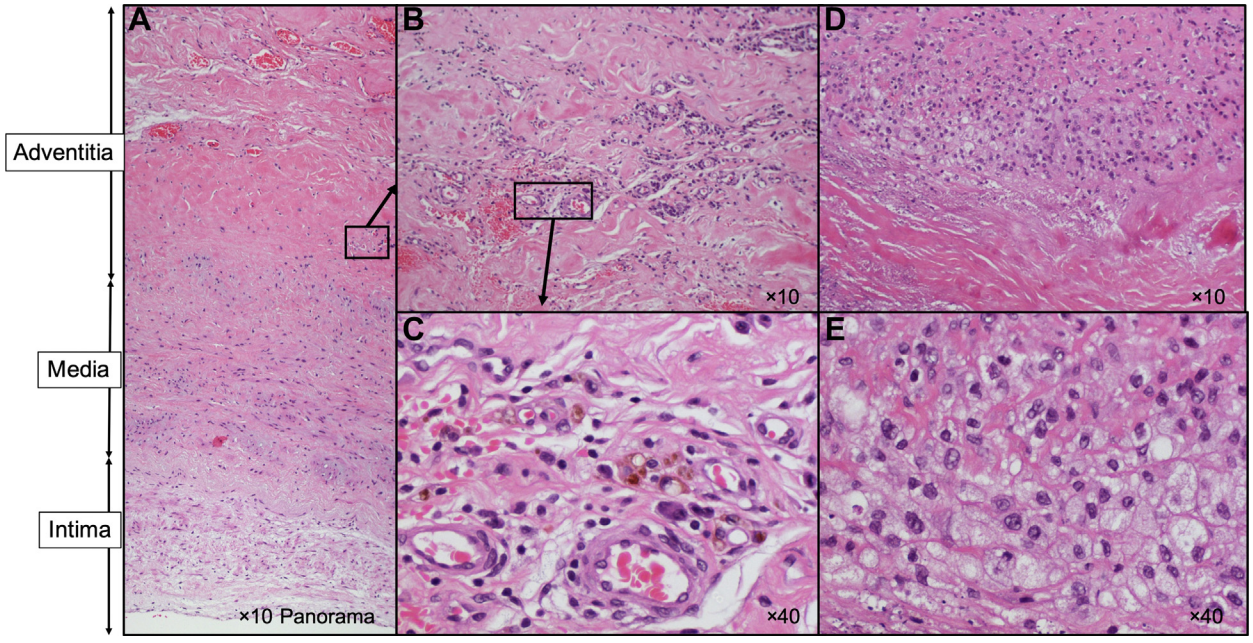
BD could be complex to diagnose, because patients may overlook it if specific symptoms are subtle. In cases of delayed diagnoses, patients may be at risk of developing severe cardiovascular complications, such as aortic aneurysms or valvular involvement, which can significantly impact prognosis and treatment outcomes.[1] Therefore, recognizing and promptly treating BD is crucial to prevent serious cardiovascular manifestations and ensure optimal patient care. Although positive HLA-B51 is associated with a 6-fold increased risk of developing BD, diagnosis solely based on HLA-B51 expression is inadequate.[2] The exact cause of BD is unknown, yet the clinical

FIGURE 3 Computed Tomography Images Obtained After the Third Aortic Root Operation



Images taken (A) 3 months and (B) 5 months after the third aortic root operation. Both grafts of the coronary arteries were patent. Controlled inflammation prevented the appearance of any signs of pseudoaneurysm even half a year later. LIMA-LAD = left internal mammary artery-left anterior descending; SVG-RCA = saphenous vein graft-right coronary artery.

FIGURE 4 Histopathologic Features of Inflammation in the Autograft of the Ross Procedure



(A) Panoramic view at 10× magnification showing the entire autograft. (B) 10× magnification of the outer adventitial layer of the autograft. (C) 40× magnification of the outer adventitial layer, demonstrating nonspecific inflammation characterized by lymphocytic and plasmacytic infiltration. (D) 10× magnification of the granulomatous lesion within the autograft's wall. (E) 40× magnification of the granulomatous lesion, depicting aggregates of epithelioid cells and concomitant infiltration of small lymphocytes, consistent with histopathologic findings suggestive of Behçet's disease.

features of BD could emerge in response to certain invasions or stressors.[2-4] BD may emerge without meeting all criteria, leading to delayed diagnosis and improper treatment.[5] In this case, the clinical course resembled infective endocarditis, leading to delayed suspicion of BD, and the absence of typical symptoms made the diagnosis more challenging. The patient in this case did not completely meet the diagnostic criteria for BD, yet we believe surgical stress may induce an abnormal immune response and lead to repeated pseudoaneurysm formations.[3,4] As evidence, a CT before the third surgery revealed a distinctive double-ring appearance characteristic of aortitis.[6] Additionally, based on the pathologic findings, it was observed that inflammation, not infection, occurred in the autograft of the Ross procedure. The vascular imaging, combined with pathologic findings indicating inflammation extending to the autograft of the Ross procedure and clinical presentations, strongly suggested the presence of BD.[3,4,6] Overall, we believe it is acceptable to diagnose this case as unusual BD. To our knowledge, prior reports of Bechet's vasculitis occurring in the autograft of a Ross procedures have been scarce.

Cardiovascular complications in BD are associated with poor prognosis.[5] Surgical treatment of BD is challenging because of the high mortality and recurrence rates of a pseudoaneurysm.[7] The clinical utility of perioperative steroids is considered beneficial when autoimmune inflammation is present, as emphasized by the successful treatment in our case. In BD, the aneurysms were caused by the fragility of the tissue and recurrent inflammation.[7] Therefore, vascular pathologies should be considered as vasculitis, and surgical treatment should be performed after suppressing the inflammation to prevent high morbidity and disruption of the suture lines.[8] We believe that controlling inflammation, especially during the perioperative period, is the most important aspect of the therapy for BD, because it will lead to the prevention of complications such as bleeding and pseudoaneurysm formation.

CONCLUSIONS

We experienced an unusual case of BD affecting the autograft of a Ross procedure and successfully performed repeated aortic root replacements with perioperative anti-inflammatory steroid therapy.

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APPENDIX For supplemental videos, please see the online version of this paper.