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Superior vena cava stenosis: A delayed BioGlue complication

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We report a case of superior vena cava (SVC) stenosis with upper body venous hypertension after application of biologic glue in the vicinity of the SVC after a double valve replacement and an annuloplasty procedure. The SVC stenosis was managed successfully with balloon dilatation and stent placement.

Clinical Summary

A 63-year-old man was scheduled for double (aortic and mitral) valve replacement and tricuspid valve annuloplasty. Bicaval cannulation was performed through the right atrial appendage for the SVC and the atriocaval junction for the inferior vena cava; standard ascending aortic cannulation was also performed. Antegrade and retrograde cold blood cardioplegia with moderate core hypothermia (30°C) constituted the cardioprotective strategy. The exposure of mitral and tricuspid valves was obtained through a superior transseptal approach; exposure of the aortic valve was obtained through a transverse aortotomy. After the mitral and the aortic valve replacements, a DeVega tricuspid valve annuloplasty, and closure of the atriotomy incision, there was persistent bleeding from the dome of the left atrium. Despite adequate suturing, local

sponge packing, reversal of all anticoagulants, and plasma and platelet transfusions, the oozing persisted. A fair amount of BioGlue (Cryolife, Inc, Kennesaw, Ga) was placed on the area, with a successful result. The patient had an uneventful recovery, and he was discharged on the ninth postoperative day.

The patient returned 8 months later, reporting headaches, dizziness especially on bending, and significant swelling of the face and neck. Echocardiography revealed a competent tricuspid valve repair and two well-functioning artificial valves, with satisfactory myocardial performance. A retroaortic and paracaval echodense mass was noted to be compressing the SVC at its junction with the right atrium (Figure 1). An upper-body venogram revealed a severe stenosis (>90%) of the SVC (Figure 2, A). Dilatation of the SVC with 7-mm and 12-mm balloons, followed by placement of a 12 × 64-mm Wallstent (Boston Scientific, Watertown, Mass), successfully relieved the stenosis (Figure 2, B). The patient is doing well without recurrent stenosis 16 months after the procedure.

Discussion

After the adverse effects of cyanoacrylate-based glue on the aortic tissues became apparent,¹⁻³ a new bovine albumin-based glue cross-linked with glutaraldehyde, BioGlue, was introduced into the cardiac surgical market as the new, nontoxic glue for hemostasis. The product is a preparation of bovine albumin cross-linked with glutaraldehyde to form a strong adhesive bond. It is supplied in a two-barrel applicator; the two compartments contain albumin and glutaraldehyde, which are mixed at the time of application. After mixture, the glue solidifies in about 30 seconds and achieves maximum strength in about 2 to 3 minutes.⁴ The use of BioGlue in aortic surgery was met with great initial enthusiasm, because not only did it increase the strength of the friable aortic walls in aortic dissection when it was applied between the dissected aortic layers, it was proved effective as a sealing agent at the anastomotic suture line.⁵⁻⁸

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Figure 1. A, Echocardiographic 90° angle bicaval view demonstrating compression of SVC. B, Diagram representing view. Black arrow points to stenosed SVC. LA, Left atrium; IVC, inferior vena cava; M, mass; RA, right atrium.

Recently, experimental and clinical studies have reported on local tissue damage, local inflammatory response, and risk of pseudoaneurysm formation and great vessel stenosis when Bio-Glue is applied circumferentially, especially in the pediatric population.⁹ In experiments with piglets, LeMaire and associates¹⁰ discovered that when BioGlue was applied circumferentially around aorto-aortic anastomoses, it impaired vascular growth and caused anastomotic strictures. In our case we believe that an inappropriately large amount of BioGlue was placed between the roof of the left atrium, the adjacent superior cavoatrial junction, and the aortic root. The initially liquid glue, helped by gravity, encircled the cavoatrial junction. After it solidified, it caused the stricture with time.

We believe that BioGlue should be applied sparingly, avoiding spillage, because when the glue is still liquid it may gravitate to dependent, not easily visible areas. Thus it may surround and damage vascular or neuronal tissues, or even compress and constrict low-pressure vascular structures, when it solidifies.

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Figure 2. A, Upper-body venogram demonstrating SVC stenosis. B, Poststent SVC.

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New technologies for the treatment of type A aortic dissection: A case report

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Aortic arch replacement in the treatment of type A aortic dissection is justified in emergency settings to prevent later complications,¹ even if it is technically demanding and affected by mortality and morbidity.^{2,3} Evolution of residual false lumen remains unpredictable, requiring further high-risk surgical procedures. We report a case of type A aortic dissection treated with ascending aortic replacement associated with a new stent graft positioned in the aortic arch and completed with thoracic endovascular stent graft placement.

Clinical Summary

A 78-year-old woman was admitted for acute type A aortic dissection. Preoperative transesophageal echocardiography showed a primary tear located above the aortic cusps and extending to the descending thoracic aorta. Cardiopulmonary bypass was established between the right subclavian artery and the right atrium. At mild hypothermia, the ascending aorta was crossclamped, and cold blood cardioplegia was administered through the coronary ostia.

The proximal aortic stump was reconstructed with continuous mattress sutures and Teflon collars after gelatin-resorcin-formol glue application to the false channel. At a nasopharyngeal temperature of 24°C, general circulation was arrested, and cerebral protection was obtained by means of right common carotid artery perfusion at a rate of 10 mL · kg⁻¹ · min⁻¹ through the right subclavian artery. Another tear was found near the origin of the brachiocephalic trunk. The Djumbodis dissection system (Saint Come-Chirurgie, Marseille, France), 9 cm long, was inserted in the aortic arch and fixed to the aortic wall with 4 transfixed stitches. The device consists of an uncovered stent made of Steel 316 L provided in 3 lengths (4, 9, and 14 cm) and mounted on a compliant balloon (Figure 1). The balloon is inflated to adapt the stent to the shape of the aortic arch and to coapt aortic layers. The deployed device presents a large-meshed web and can be superimposed at the origin of the epiaortic vessels without any danger of obstruction. A 30° 5-mm endoscope positioned in the aortic arch allowed us to control the correct deployment of the Djumbodis system. The distal end of a Dacron graft was anastomosed to the distal aortic stump and reconstructed with the same technique as used with the proximal one. Extracorporeal circulation was restored, and proximal anastomosis of the Dacron graft was performed during rewarming of the patient. Selective antegrade cerebral perfusion time was 28 minutes, and aortic arch inspection requires 4 minutes of total circulatory arrest. Contrast-enhanced computed tomographic (CT) scanning showed no patent false lumen in the aortic arch. The patient was discharged in an asymptomatic state 12 days after the operation. At 2 months' follow-up CT scanning, a dilation of the false lumen with an aortic isthmian pseudoaneurysm was found: the patient underwent endovascular thoracic stent graft insertion (2 segments, 32 × 32 × 230; Talent World Medical Manufacturing Corp, Sunrise, Fla) through the left femoral artery. Stent grafts were proximally positioned with partial overlapping to the distal end of the Djumbodis dissection system

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