Heart transplantation in the Ehlers-Danlos syndrome

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We describe a woman with Ehlers-Danlos syndrome and aortic aneurysm who experienced a myocardial infarction due to spontaneous left circumflex coronary artery dissection 3 weeks postpartum. She developed end-stage heart failure and subsequently underwent a successful orthotopic heart transplantation. To our knowledge, this is the first report of a heart transplant performed in an individual with Ehlers-Danlos syndrome.

Ehlers-Danlos syndrome (EDS) is a connective tissue disorder resulting in joint hypermobility, skin extensibility, and tissue fragility. Individuals with certain types of EDS experience vascular complications, such as arterial dissection and aneurysm. We describe a woman with EDS who received an orthotopic heart transplant in the setting of spontaneous left circumflex coronary artery dissection, ascending aortic aneurysm, and New York Heart Association class IV heart failure.

CASE DESCRIPTION

A 31-year-old postpartum woman with EDS presented with acute onset of chest pain 3 weeks after receiving a cesarean section. She was 73 inches tall and weighed 115 pounds (body mass index, 15.2 kg/m²). She was found to have an acute lateral wall myocardial infarction with left circumflex dissection and an ascending aorta of 4.8 cm in maximal transverse diameter (*Figures 1 and 2*). An echocardiogram demonstrated an ejection fraction of 20% with mild mitral and aortic regurgitation. Due to her chronic systolic heart failure, she was placed on the heart transplant list. The patient was admitted to the intensive care unit with worsening heart failure. Her mixed venous oxygen saturation was 34.2%, and her brain natriuretic peptide was 8898 pg/mL. She underwent a successful orthotopic heart transplantation. The procedure was challenging due to her fragile and thin aorta. Her ascending aorta was replaced with the donor's aorta. Intraoperatively, a limited intimal tear was identified at the aortic root. Postoperatively, she had an uneventful recovery and was discharged home on the ninth postoperative day.

DISCUSSION

EDS comprises a group of connective tissue disorders that exhibit joint hypermobility, skin extensibility, and tissue

Figure 1. Angiogram demonstrating the left circumflex dissection.

fragility. There are six types of EDS. The vascular category of EDS (type IV) is characterized by translucent skin, easy bruising, and fragility of the arteries, intestines, and uterus (1, 2). Individuals with vascular EDS may also have early onset of varicose veins, arteriovenous fistulas, acrogeria, hypermobility of small joints, and tendon rupture (1). Type IV EDS is caused by a mutation in the type III procollagen (*COL3A1*), which is found in the skin, arteries, intestines, and uterus (3, 4). A 30-year retrospective study of individuals with EDS reported a median age of survival of 54 years with the most common

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Figure 2. Computed tomographic angiogram of the aortic root aneurysm, measuring 4.8 cm in diameter, as seen in (a) coronal view and (b) transverse view.

cause of death being vascular complications, such as arterial dissection or rupture (5).

A committee of the American Heart Association recommended that individuals with EDS who have an asymptomatic aortic aneurysm undergo elective surgery for repair when the aneurysm diameter is between 4.0 and 5.0 cm to prevent rupture or dissection (6). Patients with concomitant valve disease or significant coronary artery disease should receive elective repair when the aortic aneurysm exceeds 4.5 cm in diameter (6). The operation of choice for these patients is an excision of the aortic sinuses with a modified David reimplantation or a root replacement with a valved graft conduit (6). Beta-blockers and angiotensin-converting enzyme inhibitors should be administered to patients preoperatively to reduce the arterial blood pressure (6, 7).

Pregnancy can also induce aortic disease or enhance the preexisting aortopathy seen in connective tissue disorders. Histologic and hemodynamic changes during pregnancy influence these pathologic effects on the aorta. Histological analysis of the aorta in the late third trimester demonstrates that the reticulin fibers of the aortic media, which provide structural maintenance to the vessel, become fragmented (8). Similarly, the elastin fibers, which provide stretch and recoil, become discontinuous and lose their ability to retract (8). Hemodynamically, pregnancy induces an increase in heart rate, circulating blood volume, and cardiac output (9). The combination of these hemodynamic changes leads to an increase in aortic diameter. This aortic dilation increases the risk of aortic complications, such as rupture (10). These histologic and hemodynamic changes of the vasculature compound the arterial fragility seen in EDS.

Women with connective tissue disease are at increased risk of vascular and cardiac complications during pregnancy. Specifically, gravid women with EDS are at increased risk for pre- and postpartum arterial bleeding (1). Strict blood pressure control

for these women during pregnancy is suggested. Women with known aortic root dilation or aneurysm should receive routine echocardiograms during pregnancy to monitor the growth rate of the dilation (6).

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