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Mitral valve replacement surgery in isolated dextrocardia: a case report

İzole dekstrokardide mitral kapak replasman cerrahisi: Olgu sunumu

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Dextrocardia with situs solitus and mitral valve insufficiency requiring surgical treatment are rare clinical presentations. In this article, we report a 64-year-old female patient with dextrocardia and situs solitus, who was referred to our hospital for surgical treatment of severe mitral valve insufficiency. Mitral valve replacement with a 31-mm mechanical valve prosthesis was performed through the left atrium, while the surgeon stood on the left side of the patient having an excellent exposure.

Key words: Dextrocardia; heart valve prosthesis implantation; mitral valve.

Situs solitusun eşlik ettiği dekstrokardi ve cerrahi tedavi gerektiren mitral kapak yetmezliği, nadir görülen bir klinik tablodur. Bu yazıda, cerrahi tedavi gerektiren ciddi mitral yetmezlik nedeniyle hastanemize sevk edilen 64 yaşında dekstrokardi ve situs solituslu bir kadın olgu sunuldu. Cerrah hastanın sol tarafında dururken, mükemmel bir görüş sağlanarak ve sol atriyumdan 31 mm'lik mekanik bir protez kapak kullanılarak mitral kapak replasmanı yapıldı.

Anahtar sözcükler: Dekstrokardi; kalp kapağı protezi implantasyonu; mitral kapak.

Dextrocardia is a cardiac malposition in which the major axis of the heart (base to apex) points to the right as a result of the congenital malposition itself, not because of any pathological pushing or pulling of the heart.[1] In different studies, the prevalence has ranged from 0.37-0.53% per 10,000 live births.[2,3] Dextrocardia usually coexists with multiple complex congenital cardiac malformations and situs anomalies,[4] with 33% of patients having situs solitus, 37% situs inversus, and 30% isomerism. The venae cavae are defined by position (right, left, bilateral, or other) along with the aortic arch (right, left, or not specified) and the descending aorta (right, left, midline, or not specified), and the atrioventricular and ventriculoarterial connections are classified as concordant, discordant, or not applicable in univentricular hearts or the double outlet right ventricle (DORV) or double outlet left ventricle (DOLV).[5]

Patients with dextrocardia are believed to have a normal life span, and the incidence of coronary artery disease (CAD) is similar to that of the general population.[6] However, there is no study in the literature concerning valvular disease incidence, life expectancy, and dextrocardia. In this case study, we report on a patient with dextrocardia and situs solitus, which is a rare presentation in late adulthood.

CASE REPORT

A 64-year-old female was referred to our hospital for mitral valve surgery due to severe mitral insufficiency after she had visited her physician because of dyspnea. It was known from the patient's prior medical reports that she had dextrocardia, but all other viscera were situs solitus. She had been previously followed up for mild-to-moderate mitral insufficiency and normal sinus rhythm (NSR) but had not been checked for a few years. On her physical examination, an electrocardiogram (ECG) showed rapid atrial fibrillation (AF), and echocardiography revealed severe mitral insufficiency and mild-to-moderate tricuspid insufficiency. The patient's atrioventricular and ventriculoarterial connections were concordant, and her ejection fraction (EF) was 45%. In addition, a chest X-ray revealed dextrocardia. Coronary angiography together with

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ventriculography was performed prior to surgery, and these determined that there was no evidence of CAD, but the severe mitral insufficiency was confirmed with the aortic arch located on the left side. Prior to the operation, cardioversion was used to return the heart to normal sinus rhythm (NSR).

The patient underwent surgery with general anesthesia and a median sternotomy incision. When the pericardium was opened, it was observed that the venae cavae were positioned on the right side and were draining into the right atrium, which was positioned on the right posterior side and had a morphological right atrial appendix. In addition, the connection between the inferior vena cava (IVC) and the right atrium was situated deeply at the posterior aspect. There was also rudimentary persistent draining of the left superior vena cava (SVC) into to the coronary sinus, which was H-connected to the right SVC. The coronary sinus itself was not in the normal atrioventricular groove but was situated in the left atrial free wall in a more anterosuperior location (Figure 1). Furthermore, the left atrium (with a morphological left atrial appendix) was in the anterior position and positioned to the left of the right atrium, and the venous ventricle was positioned at the anterior aspect in contrast to the arterial ventricle which was at the posterior aspect. The left aortic arch was also observed, and the pulmonary artery (PA) was located anterior to the aorta. Cardiopulmonary bypass (CPB) under moderate hypothermia was established with right common femoral arterial and venous cannulae. Next, the SVC was selectively cannulated after the establishment of CPB for technical ease. Myocardial management was provided by antegrade intermittent cold and terminal warm blood cardioplegia. With the surgeon situated on the left side of the patient, a left atriotomy was then performed parallel and superior to the coronary sinus on the left side of the patient, perfectly exposing the bicuspid mitral valve, which was moderately calcified and severely degenerated. However, the aortomitral continuity was located subordinate to the P3 segment. Additionally, the anterior leaflet also had a prominent prolapsus, making it unsuitable for valve repair. Therefore, the native valve was excised and replaced with a 31 mm mechanical valve prosthesis (Medtronic ATS Medical, Inc., Minneapolis, MN, USA). We made the decision not to manipulate the tricuspid valve since the insufficiency was not severe and we could not explore the posteriorly-situated right atrium from a sternotomy incision. The patient had AF early in the postoperative stage, which was then cardioverted to NSR electrically. The postoperative course was uneventful, and the patient was discharged on the postoperative fifth day (Figure 2). The patient was followed up for six months with no complaints and at last report was in sinus rhythm.

DISCUSSION

Dextrocardia should alert clinicians and surgeons to the possibility of associated cardiac malformations, and a well-established description of the whole situs should be known prior to surgery. For the evaluation of anomalous venous return, magnetic resonance imaging (MRI) is the preferred imaging technique, and echocardiography can easily be used to confirm the presence or absence of valvular disease and other cardiac malformations.[4]

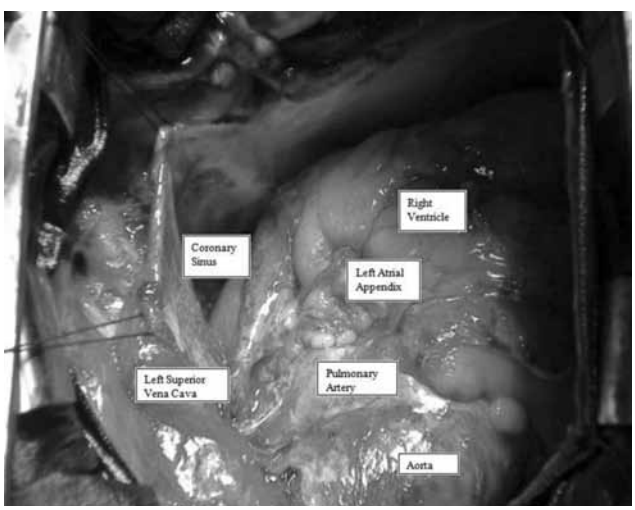

Figure 1. Operative image showing the coronary sinus on the left atrial free wall.

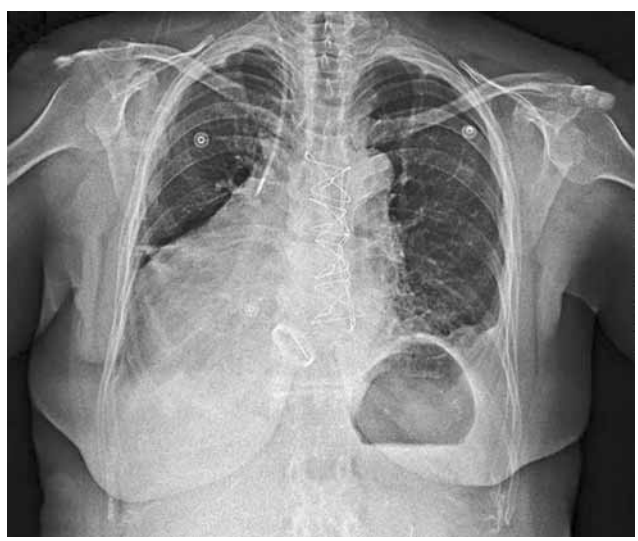

Figure 2. Postoperative day four chest X-ray.

Our patient had a typical case of isolated dextrocardia with situs solitus. Standing on the left side of a dextrocardia patient allows for a perfect, complete, view of the surgical field. We note that the most important point for the exposure of the mitral valve is the anatomy of the patient, and there is little published data on this topic in the literature. St Rammos et al.[7] reported excellent exposure from the left side for mitral valve replacement surgery in a dextrocardia patient. Furthermore, Yokoyama et al.[8] reported a case of mitral valve replacement via a transseptal approach in conjunction with aortic root replacement in a patient with dextrocardia and situs inversus in which they stood on the left side of the patient for exposure reasons. Additionally, Şahin et al.[9] reported on a case of mitral valve replacement surgery via the transseptal approach in a patient with dextrocardia and situs inversus, but they made no mention of where the surgeon stood. In our case, there was no other chance to expose the mitral valve without performing a left atriotomy from the left side of the patient. The question regarding which side of the operating table the surgeon should stand on when performing surgery on a patient with dextrocardia was addressed by Saad et al.[10] They reviewed 20 papers that reported 24 cases, but all of them were myocardial revascularization patients. In five of the cases, the surgeon stood on the right side while 10 stood on the opposite side, three stood on both sides, and six did not mention their position. Karaca et al.[11] also reported a case with dextrocardia who underwent coronary artery bypass surgery in which the surgeon stood on the left side. In addition, mitral valve repair can also be considered as a treatment option if the valve is not severely degenerated.

Femoral cannulation can cause various problems if the patient has abnormal visceral arrangement, but this was not an issue in our patient due to situs solitus. In cases of situs inversus totalis, the varying venous configuration may complicate the venous cannulation process. For such cases, Yokoyama et al.[8] performed an individually designed, complex, functional form of venous cannulation and gave a very detailed description.

The anatomy of the patient is almost always challenging in cases with dextrocardia. Valvular interventions make this difficult situation even worse due to the accompanying deviations of caval connections and the position of the atria. The most important aspect of the operation is exposure since the intervention itself is no different from what is performed on patients with levocardia. We believe that the keys to success for mitral valve replacement surgery in patients with dextrocardia are the surgeon's decision regarding where to stand, the specific sites for venous and arterial cannulation, and, most importantly, the preference for either the left atrial or transseptal approach.

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REFERENCES

1. Arcilla RA, Gasul BM. Congenital dextrocardia. Clinical, angiocardiographic, and autopsy studies on 50 patients. J Pediatr 1961;58:39-58.
2. Report of the New England Regional Infant Cardiac Program. Pediatrics 1980;65:375-461.
3. Ferencz C, Correa-Villasenor A, Loffredo CA, Wilson PD. Genetic and environmental risk factors for major cardiovascular malformations: The Baltimore-Washington Infant Study, 1981-1989. NewYork: Futura; 1997.
4. Cobiella J, Muñoz C, Arís A. Complex cardiac surgery in a patient with dextrocardia and polysplenia. Rev Esp Cardiol 2005;58:1236-8.
5. Bohun CM, Potts JE, Casey BM, Sandor GG. A population-based study of cardiac malformations and outcomes associated with dextrocardia. Am J Cardiol 2007;100:305-9.
6. Khalil S, Kamal A, Ahmed S. Acute myocardial infarction in a patient with dextrocardia and situs inversus. J Electrocardiol 2005;38:412-3.
7. St Rammos K, Bakas AJ, Panagopoulos FG. Mitral valve replacement in a Jehovah's Witness with dextrocardia and situs solitus. J Heart Valve Dis 1996;5:673-4.
8. Yokoyama Y, Satoh H, Abe M, Nagashima M, Kurata A, Higashino H. Cardiac surgery for annuloaortic ectasia and mitral regurgitation in an adult patient with dextrocardia. Gen Thorac Cardiovasc Surg 2011;59:341-3. doi: 10.1007/s11748-010-0682-z.
9. Sahin MA, Guler A, Kaya E. Mitral valve replacement in a patient with situs inversus and dextrocardia. Thorac Cardiovasc Surg 2011;59:305-6. doi: 10.1055/s-0030-1250241.
10. Saad RA, Badr A, Goodwin AT, Dunning J. Should you stand on the left or the right of a patient with dextrocardia who needs coronary surgery? Interact Cardiovasc Thorac Surg 2009;9:698-702. doi: 10.1510/icvts.2009.216317.
11. Karaca MK, Aytaçoğlu BN, Bayrı Ö, Özeren M, Sucu N. Dekstrokardi vesitus inversus totalisi olan bir hastada koroner arter bypass greftleme. Türkiye Klinikleri J Cardiovasc Sci 2009;21:474-6.