Isolated Congenital Left Ventricular Diverticulum in Adults

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Isolated congenital left ventricular diverticulum is a rare cardiac malformation. Here, we report the case of a 33-year-old woman who had suffered from recurrent transient ischemic attacks for 6 years. Preoperative cardiac magnetic resonance imaging and computed tomography angiography revealed a diverticulum near the apex. The diverticulum was successfully obliterated by cardiopulmonary bypass. We suggest that isolated congenital left ventricular diverticulum can be easily corrected with a low surgical risk by patch repair and plication techniques.

Key words: 1. Cerebral infarction  
2. Congenital  
3. Diverticulum  
4. Heart ventricle

CASE REPORT

A 33-year-old woman had a history of recurrent transient ischemic attacks (TIAs). The first episode occurred at 28 years of age. Sudden onset of right-sided weakness occurred and recovered spontaneously after 2 hours. Further, when the patient was 29 years old, sudden aphasia occurred and subsided spontaneously later in the day. Moreover, when she was 30 years old, right-sided weakness and aphasia occurred simultaneously, and she visited Seoul National University Hospital for the first time. On cardiac magnetic resonance imaging (MRI), a congenital left ventricular diverticulum (LVD) at the apical lateral wall of the left ventricle was discovered (Fig. 1A). The LVD was 2.6 × 3 cm in size, and the wall motion of the diverticulum was synchronous with that of the left ventricle. There was a possibility that the LVD was the source of the cardiogenic embolism that induced the recurrent TIAs. However, at that time, the patient did not undergo an operation and was just observed, with daily administration of aspirin (100 mg).

When the patient was 33 years old, right-sided weakness and aphasia recurred. This time, brain MRI showed acute infarction in the left middle cerebral artery territory. Cardiac MRI showed no change in the LVD. Computed tomography (CT) angiography also revealed an LVD (Fig. 1B). The patient recovered from the cerebral infarction after anticoagulation therapy. Although there was no definite evidence of a thrombus in the LVD, we decided to operate this time.

The operation was performed using standard cardiopulmonary bypass. Median sternotomy was conducted, and standard ascending aorta and bicaval venous cannulation was used. Several pieces of gauze were placed below the heart, and the apex was elevated. The diverticulum was located between the second diagonal branch of the left anterior descending coronary artery and the second obtuse marginal branch of the left circumflex coronary artery, near the apex (Fig. 2A). After the
Fig. 1. (A) Cardiac magnetic resonance imaging demonstrates a congenital LVD (arrow). (B) Coronal section. (C) Computed tomography angiography demonstrates a congenital LVD (arrow). LVD, left ventricular diverticulum.

Fig. 2. (A) After the apex was elevated, the diverticulum was well exposed. (B) The diverticulum was incised. (C) The defect was obliterated by using a Dacron patch. (D) The apex was closed, and aneurysmorrhaphy was performed.
cardiopulmonary bypass was started, ventricular fibrillation was induced by cold cardioplegia infusion and cold saline irrigation of the heart. During ventricular fibrillation, the margin of the diverticulum was well palpated. After marking the margin of the diverticulum with a marking pen, we incised it. There was no definite thrombus in the diverticulum cavity. There was a defect measuring approximately 2 × 3 cm communicating with the left ventricular cavity (Fig. 2B). The defect was repaired using a Dacron patch (Bard Peripheral Vascular Inc., Tempe, AZ, USA) (Fig. 2C). Further, the remnant diverticulum cavity was filled with FloSeal (Baxter Healthcare Co., Westlake Village, CA, USA). The incised apex was closed, and aneurysmorrhaphy with plication was performed (Fig. 2D).

The patient recovered without any complications and was discharged on the eleventh postoperative day. Postoperative cardiac MRI and CT angiography confirmed thorough obliteration of the LVD (Fig. 3A-C).

**DISCUSSION**

Isolated congenital LVD is a rare cardiac malformation. The incidence of LVD in adults was reported to be 0.42% in a recent large single-center study [1]. This condition tends to be associated with other cardiac, vascular, or thoracoabdominal abnormalities in approximately 70% of patients [2]. The other 30% of patients present with isolated congenital ventricular diverticulum.

Congenital ventricular diverticulum should be distinguished from congenital ventricular aneurysm in certain ways. A diverticulum has a small or narrow communication with the ventricle, whereas an aneurysm has a wide communication with the ventricle. A diverticulum contracts in synchrony with the ventricle, whereas an aneurysm is usually akinetic or dyskinetic. A diverticulum includes all layers of the heart (endocardium, myocardium, and pericardium). However, an aneurysm mostly consists of fibrous tissue [2]. In the present case, the diagnosis was consistent with a diverticulum with regard to all of these factors.

The symptoms can vary. Most cases are asymptomatic, but others may present with atypical chest pain, chest distress, systemic embolism, heart failure, valvular regurgitation, ventricular wall rupture, ventricular tachycardia, or sudden cardiac death [2-5]. In the present case, the patient had suffered from recurrent TIA for 6 years. Although there was no definite evidence of a thrombus in the LVD, the diverticulum was suspected to be the possible source of the cardiogenic embolism. Therefore, we decided to operate.

During the operation, the diverticulum was easily exposed by elevating the apex. However, the exact margin of the diverticulum was not easily distinguished by gross examination. After ventricular fibrillation was induced, the margin was easily distinguished because the movement of the diverticulum...
portion was markedly weaker than that of the normal left ventricle.

According to several recent case reports, congenital LVD has been successfully corrected by resection, patch repair, or plication on the basis of its size and location [3,4,6,7]. In the present case, because the diverticulum was not too large, resection of the diverticulum was not necessary. Thus, we incised the diverticulum and repaired the defect with a patch inside the ventricle. The remnant space of the diverticulum was filled with FloSeal to obliterate the dead space. The incision was closed with a pledgeted suture, and aneurysmorhaphy with plication was also performed. The operative procedure was very simple, and the surgical risk was not high.

In conclusion, this case report describes a case of isolated congenital LVD in a patient with a history of recurrent TIA. The diverticulum was successfully obliterated by cardiopulmonary bypass, and the patient recovered without any complications. We suggest that isolated congenital LVD can be easily corrected with a low surgical risk by using patch repair and plication techniques.

**CONFLICT OF INTEREST**

No potential conflict of interest relevant to this article has been reported.

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