

Totally Thoracoscopic Ablation for Treatment of Atrial Fibrillation after Atrial Septal Defect Device Closure

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Atrial septal defect (ASD) is one of the most common congenital heart defects in adults. Surgical repair is the most common treatment approach, but device closure has recently become widely performed in accordance with the trend toward less invasive surgical approaches. Although surgery is recommended when ASD is accompanied by atrial fibrillation, this study reports a case in which a complete cure was achieved by closure of a device and totally thoracoscopic ablation.

Key words: 1. Atrial heart septal defects
2. Atrial fibrillation
3. Minimally invasive surgery

CASE REPORT

A 62-year-old male presented to Samsung Medical Center with a 40-year history of paroxysmal palpitations. Although diagnosed with atrial septal defect (ASD) 30 years previously, the patient elected not to undergo surgical repair. Approximately 1 year prior, he began to visit the pediatric ward of Samsung Medical Center more frequently with symptoms of palpitations and dyspnea lasting 2 to 3 days and occurring in 2- to 3-month intervals. An electrocardiogram showed paroxysmal atrial fibrillation, and secundum-type ASD (22.3 mm) with a left-to-right shunt was diagnosed by echocardiogram. Device closure (Amplatzer septal occlude 28 mm; AGA Medical, Golden Valley, MN, USA) was then performed; however, 1 week after the procedure, the patient continued to experience dyspnea and chest pain after 10 to 20 minutes of walking. Sustained atrial fibrillation was seen on

the electrocardiogram and 24-hour Holter monitor. Cardioversion was performed following hospitalization with the opinion that the persistent atrial fibrillation was due to device closure. The patient was discharged from the hospital after cardioversion to sinus rhythm at 100 J; however, the symptoms recurred. Since it was difficult to perform radio-frequency catheter ablation (RFCA) due to the recent device closure, the patient was referred to the thoracic surgery department for totally thoracoscopic ablation. Surgery was performed under routine procedures. Intubation was performed using a double lumen endotracheal tube. For the surgery, a 10-mm trocar was inserted in the fourth intercostal space (ICS) of the right anterior axillary line, a 5-mm trocar in the third ICS along the anterior axillary line, and a 10-mm trocar in the sixth ICS on the mid-axillary line. Right pulmonary vein ablation, right ganglionated plexi ablation, and ablation of the right half of the space between the right lower pulmo-

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Fig. 1. Division of Marshall's ligament by electrocautery (black arrow).

nary vein and the left lower pulmonary vein were performed. Between the procedures, we conducted a high-frequency stimulation test for finding ganglionated plexi. Sutures were placed after chest tube insertion. On the left side, ports were placed in the same positions, and ablations were performed in the same order as on the right side after dividing Marshall's ligament (Fig. 1). A left atrial auricle resection was then performed using an Echelon Flex 60 articulating endoscopic linear cutter (Ethicon Endo-Surgery Inc., Cincinnati, OH, USA). Upon confirmation of the conversion to sinus rhythm, the patient was transferred to the intensive care unit. He was then transferred to the general ward on postoperative day 1 and discharged from the hospital on postoperative day 6. During this 6-day postoperative period, the sinus rhythm was maintained continuously. Six months later, the sinus rhythm was seen on the 24-hour Holter monitor; the patient showed none of the earlier symptoms, and therefore, amiodarone and warfarin were stopped. The patient is currently being followed as an outpatient, and his sinus rhythm has been well maintained as seen on the last electrocardiogram at the 8 month follow-up.

DISCUSSION

Atrial fibrillation is the most common chronic cardiac arrhythmia and has an increasing prevalence that is associated with patient age. Although the prevalence is less than 1% in those under the age of 60 years, 3.8% of those over the age of 60 years and approximately 9% of those over the age of

80 years have atrial fibrillation [1]. In addition, almost 25% of those over the age of 40 years are at the risk of developing atrial fibrillation later in life [2]. Atrial fibrillation decreases the quality of life and is closely related to heart failure. Additionally, patients with atrial fibrillation have a five-fold higher risk of stroke than those without atrial fibrillation. These increased heart failure and stroke risks result in an increased mortality among those with atrial fibrillation.

Although antiarrhythmic drugs are used as the initial treatment of paroxysmal atrial fibrillation, RFCA is used in patients who fail to respond to medical therapy and results in significantly better outcomes and reduced recurrence rates in comparison to alternative antiarrhythmic drug therapies [3]. However, the success rates of RFCA in patients with persistent or permanent atrial fibrillation are drastically reduced. An additional treatment for atrial fibrillation is the Cox maze operation, which has high success rates but requires a highly invasive approach with median sternotomy. As such, it is generally performed concurrently during surgery for a different cardiac problem. Recently, after the development of the initial thoracoscopic approach by Wolf et al. [4], minimally invasive surgical ablation using a thoracoscope on a beating heart has been performed with increasing frequency [5].

In older patients with ASD, atrial fibrillation is frequently seen due to longstanding right atrial dilation and stretch. According to prior publications, 52% of ASD patients over the age of 60 years have atrial fibrillation [6]. In the presented case, the patient had ASD and paroxysmal atrial fibrillation, which became more persistent following ASD device closure. According to the current guidelines, surgical ASD repair and the maze operation must be performed in ASD patients with atrial fibrillation [7]. However, in this case, device closure and a totally thoracoscopic ablation were performed, resulting in an effective treatment for both ASD and atrial fibrillation.

ASD closure and the maze operation are surgical procedures that can be performed safely. However, open heart surgery is still one of the most invasive surgical procedures and can be a traumatic experience for the patient. This case study suggests that ASD device closure and totally thoracoscopic ablation be implemented as an effective treatment method for

such patients.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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