A Case of Embolism due to a Floating Thrombus Migrating from the Left Atrial Appendage to the Ostium of the Celiac Artery

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The present case was a 70 year-old dialysis patient who had experienced a prior cerebral infarction following atrial fibrillation. Her shunt suddenly occluded during dialysis, and she was transferred to our hospital. Transesophageal echocardiography revealed a floating, ball-like thrombus in the left atrial appendage (LAA). After thrombectomy in the shunt, acute thrombi were extracted. Despite anticoagulant therapy, the ball-like thrombus in the LAA did not dissipate and instead continued to enlarge. We planned surgical intervention involving a left atrial appendectomy without cardiopulmonary bypass through a left thoracotomy. However, her thrombus disappeared out of the LAA when she was intubated in the operating room. Her surgery was, therefore, stopped, and extubation was carried out. A computed tomography (CT) scan showed that the embolism had moved to the ostium of the celiac artery. Incidentally, this celiac artery had already been obstructed, and her inferior mesenteric artery had been the main supply of blood flow to the intestine, explaining why she had not developed intestinal ischemia. We continued anticoagulant therapy with warfarin. Follow-up CT studies were conducted at the outpatient clinic. However, the patient died due to a wide cerebral infarction before the 6-month checkup.

Keywords: floating thrombus, atrial fibrillation (AF), left atrial appendage (LAA), nonvalvular atrial fibrillation (NVAF)

INTRODUCTION

Cerebral infarction in patients with atrial fibrillation (AF) may vary from clinically silent to catastrophic. The incidence of AF increases with age. Not only AF with valvular heart diseases, but also nonvalvular atrial fibrillation (NVAF), represents causes of embolic stroke. In addition, the left atrial appendage (LAA) is a common source of cardiac thrombus formation and systemic embolism. It is a ‘blind’ rod-shaped pouch that may promote hemostasis. However, there is little information available about the incidence of thrombus in the LAA with NVAF in noncerebral acute arterial occlusion. We herein report a case of embolism due to a floating thrombus that migrated from the LAA to the ostium of the celiac artery in a dialysis patient with NVAF.

CASE REPORT

A 70 year-old female was transported to an emergency hospital with a complaint of pain in the left upper arm on the side of the shunt at the time of dialysis. The shunt sounds had already disappeared. The patient’s history revealed that she had been taking warfarin since she had cerebral infarction with AF at 50 years of age. On admission to our hospital, her temperature was 36.0°C, her blood pressure was 120-/65Torr, and her heart rate
was 90/min irregular rhythm. The hematological data indicated both anemia and compromised renal function that were as follows: Hb 9.2 g/dl, BUN 55.3 mg/dl, Crea 8.91 mg/dl. The results of biochemical tests of liver function and inflammatory reactions were within normal limits. However, taking warfarin was insufficient anticoagulation therapy since her PT-INR was 1.00. The chest and abdominal X-rays showed no abnormal findings. Ultrasonic arteriography on the shunt side showed the presence of an embolism in the bifurcation of the left brachial artery. Transthoracic ultrasonic cardiography revealed that her cardiac function was good without valvular dysfunction. Her AF was NVAF, but no thrombus in the cardiac chamber was noted. We then performed transesophageal echocardiography to detect the origin of the embolism, which revealed a ball-like floating thrombus in the LAA. Ultrasonic arteriography on the shunt side showed the presence of an embolism in the bifurcation of the left brachial artery. Ultrasonic arteriography on the shunt side showed the presence of an embolism in the bifurcation of the left brachial artery. Enhanced computed tomography (CT) scan also illustrated the presence of a thrombus in the LAA and left upper artery without the involvement of other sites (Fig. 1a and 1b). We speculated that the embolism from the surface of the left atrial appendage thrombus suddenly occluded her shunt.

The patient underwent an emergency thrombectomy for her left arm under local anesthesia. The arterial flow was recanalized immediately after red thrombi were extracted. Both the operative findings and thrombi indicated that they were fresh. Next, we planned to extract the ball-like thrombus in the LAA. We judged that using cardiopulmonary bypass would be high-risk based on her generally poor condition due to that fact that she had a more than 20 year dialysis history and disuse syndrome following an old cerebral infarction. Therefore, conservative treatment was started, and the progress of the LAA thrombus was monitored intensely. We controlled her APTT ranged 60 to 90 using heparin, because we did not use warfarin at the moment, for prevention of emergent surgical bleeding. However, the size increased slightly for three days, and the ball-like thrombus was still moving in the LAA. Because the risk associated with the embolism increased, we decided to perform excision of the LAA, including the thrombus, under a left thoracotomy without the patient on cardiopulmonary bypass.

On the fourth admission day, she was ready for the operation. Under general anesthesia, she was intubated, and an esophageal echo probe was inserted. The patient was placed in the head-down position to insert the central venous line in the right jugular vein. At that time, the
A Case of Embolism due to a Floating Thrombus

Echo probe indicated that the moving ball-like thrombus had disappeared out of the LAA. There was no thrombus image in any of the cardiac chambers. We immediately awoke the patient from anesthesia, and she was extubated in the operating room without any abnormal neurological findings. An enhanced CT scan was conducted to identify the new location of the embolism. While the ball-like thrombus had been a lump, it was identified in the ostium of the celiac artery in the abdominal aorta (Fig. 2a–2d). Coincidentally, the celiac blood flow was not significant, and it was supported by collateral circulation from a developed inferior mesenteric artery. In short, because the ostium of the celiac artery was already stenosed, and the superior mesenteric artery had occluded, non-intestinal tract ischemia was caused by this embolism. While surgical and catheter intervention were also taken into consideration, we continued conservative medical therapy. It was concluded that if this ball-like thrombus had been carried lower, it would have been easy to perform thrombectomy of the leg. A seventh day follow-up enhanced CT scan showed the same position of the embolism and no abnormality of the intestinal circulation. After controlling her anticoagulation with warfarin ranging PT-INR from 2.0 to 3.0, the patient was discharged from the hospital without complications.

Although warfarin management was continued in the dialysis hospital, the patient died of an extensive cerebral infarction six months later.

Fig. 2 (a) Enhanced CT showed no thrombus in the LAA. (b) It also displayed the ostium of the celiac artery. (c) 3-D CT illustrated the position of the embolism. (d) showed the stenosis of the ostium of the celiac artery at the time of admission without thromboembolism.

LAA: left atrial appendage
It has been reported that 90% of LAA thrombi in patients with NVAF are accepted in the left atrium.\(^1\) The structure of the LAA is a rod-shaped pouch that may have stagnant blood flow, leading to hemostasis.\(^1\) Abe et al.\(^4,5\) reported that LAA thrombi could be classified into three types: the mobile ball type, fixed ball type, and mountain ball type. The mobile ball type is associated with an especially high risk of embolism. The present case had a ball-like floating embolism, which belongs to the mobile ball type. However, why the thrombus lodged on the orifice of the celiac artery with decreased flow, mainly supplying blood flow to the splanchnic organs came from inferior mesenteric artery? One of our speculations was that since it was the first branch that came out in the main artery before vessel bending due to arteriosclerosis, it would arise a certain turbulent flow there.

The optimal medical intervention for the treatment of such cases is still controversial. There have been various recent reports about LAA excision.\(^6,7\) These reports insisted that both decreased atrial contraction and secretion of human natriuretic peptide might not play important roles just after left appendectomy. Various methods for performing a left atrial appendectomy were reported.\(^6,7\) We had often closed the LAA using tobacco sutures inside of the left atrium, or double ligation outside of the LAA. However, a risk of a residual leak flow was associated with these methods, and was considered to thrombosis in those reports.\(^8-10\) Therefore, the surgical technique, as well as the catheter device, should be carefully considered when developing a standard treatment for left appendectomy with AF. At present, the existing data suggest that left atrial appendectomy is a suitable operation for preventing LAA thrombus and decreasing the risk of cerebral infarction.

The death of this patient seemed to be caused by the thrombus recurred at the LAA due to poor control of the coagulation system. Consequently we highly illustrated that floating thrombus in the LAA should be considered for emergent operation firstly instead of the very strictly limited cases.

**References**