References

Early postoperative left atrial thrombosis in a biatrial orthotopic heart transplant recipient successfully treated by intravenous heparin

Bagriyal ortotoplip kalp nakil alıcısında intravenoz heparin ile başarılı tedavi edilmiş erken postoperatif sol atriyal trombus

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Introduction
Thrombus formation and spontaneous echocontrast (SEC) within the left atrium (LA) are harmful intermediate to long term complications of the standard orthotopic heart transplantation (OHT) (1). We present an OHT recipient with extremely mobile multiple LA thrombi diagnosed early after the operation by transthoracic echocardiography (TTE) and treated successfully without thrombectomy.

Case report
A 24-year-old man, with a history of idiopathic dilated cardiomyopathy, underwent OHT by the biatrial anastomosis approach. During the operation, the patient was given 800 mg protamine and 3 units of whole blood. After that, he had no hemorrhagic complication and no need for any other coagulation factor. A large pericardial effusion developed immediately after the operation for which close clinical and echocardiographic studies. Control TEE on the 5th day of active heparinization showed a completely clear LA (Fig. 2) without any increase in the pericardial effusion and the patient did not suffer any embolic complication. Meanwhile repeat biopsies did reveal no rejection.

Discussion
Stasis within the atria due to enlarged cavities and prominent sutures, electrical discordance (2), atrial arrhythmias, LV dysfunction, increased platelet aggregation (3), acute rejection (4) and the surgical technique itself (1) are considered as predisposing factors for thrombus formation. The

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prevalence is reported to be higher in standard OHT recipients. In a series of 95 patients, SEC was present in 57% and 5%, and LA thrombus was present in 27% and 0% of standard and bicalveal OHT recipients respectively (1). As thrombi have a tendency to be localized on the LA suture line (1), good approximation of donor and recipient atrial cuffs for complete coaptation of the endothelial surface is crucial to avoid nonendothelialized nidus that can promote thrombus formation. Inverted and protruding nonendothelialized margins from where subendothelial collagen is exposed to blood can activate platelets and the intrinsic coagulation pathway.

Our case is important in two aspects: 1) LA thrombi can complicate not only the intermediate to late postoperative course but also the early postoperative course and 2) early detection is important to achieve a successful dissolution with intravenous heparin. There is no consensus as to when these patients should be screened by TEE and which strategy should be adopted to prevent thromboembolic complications (1, 5). Riberi et al. (6) reported 15.2% rate of systemic embolism 21 days to 12 years after standard OHT and 5% after bicalveal OHT with an increasing incidence over time. Patients with intracardiac thrombus are usually asymptomatic and diagnosed incidentally during routine echocardiographic examination late after the surgery (1, 2). In contrast to the data from the literature, our case points out that intracardiac thrombi may complicate the course from the earliest days after the OHT.

The use of thrombolytic agents despite providing rapid resolution of thrombi may be harmful with potential embolic and hemorrhagic complications in the postoperative period. Warfarin on the other hand leads to stabilization and gradual dissolution of thrombi over the weeks and months. Nevertheless, its use is challenging considering the urgent need for biopsy in allograft recipients. Also low dose aspirin therapy is not sufficient to inhibit platelet activation in transplant recipients (3). On the other hand, although surgical removal of the fresh LA thrombi seems to be the most widely adopted approach, it is associated with an increased risk of intraoperative embolization. Therefore, intravenous heparin, as in this case, appears as a safe and effective alternative therapy for intracardiac fresh thrombi detected early after OHT.

**Conclusion**

Although unexpected, prominent LA thrombi may occur in the early postoperative period of cardiac transplantation. We suggest that intravenous heparin therapy may be the best option in the early postoperative period and antiplatelet agents more potent than aspirin can be administered thereafter, if there are special concerns about increased risk for thrombus formation and no risk for hemorrhage. Recommendations on routine anticoagulation during the post operative period cannot be rationally based on observation of one patient but close TTE follow-up, as a non-invasive and reliable tool, is useful to detect intracardiac thrombi in the immature state when intravenous heparin can be effective for treatment.

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**References**