

CASE REPORT

The hemostatic power of fat: An effective, inexpensive, and biocompatible method to achieve hemostasis in cardiac surgery

Yağın hemostatik gücü: Kalp cerrahisinde hemostazı sağlayabilmek için etkili, ucuz ve biyouyumlu bir yöntem

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Summary– Postoperative bleeding with its important socioeconomic cost is associated with an increased morbidity and mortality. It causes hemodynamic instability, increases blood loss, and multiplies the number of transfusions required. Especially in vascular or aortic surgery, postoperative bleeding can become a life-threatening complication due to anticoagulant or antiaggregation preoperative status or postoperative coagulation dysfunction after a high level of heparinization. Presently described is the case of a patient who underwent an aortic valve and ascending aorta replacement. A simple but effective method to achieve hemostasis, designed particularly for aortic surgery and the use of Dacron grafts, is presented. No residual adherence or contraindications exist, and it can potentially be applied to any kind of surgical process. This method offers a cheap, biocompatible, and highly effective means to achieve complete hemostasis without the use of extra sutures, or expensive synthetic or allogeneic hemostatic agents or sealants.

Postoperative bleeding is one of the main complications that can occur after any surgical procedure. It increases morbidity and mortality, and also has an important socioeconomic cost. Bleeding after surgery causes hemodynamic instability, increases blood loss, and multiplies the number of transfusions required.^[1,2]

A quick reduction of the hemorrhage and minimization of intraoperative bleeding is vital to the patient's prognosis. Optimization of coagulation,

Özet– Ameliyat sonrası kanama önemli sosyoekonomik maliyeti ile birlikte artmış morbidite ve mortalite ile ilişkilidir. Hemodinamik dengesizliğe sebep olur, kan kaybını ve gereken kan nakli miktarını artırır. Özellikle de vasküler veya aort cerrahisinde ameliyat sonrası kanama, ameliyat öncesi antikoagülan veya antiagregasyon durumu ve yüksek heparinizasyondan sonra meydana gelen ameliyat sonrası pıhtılaşma bozukluğu sebebiyle hayati tehlike oluşturan bir komplikasyon haline gelebilir. Bu yazıda aortik kapak ve asendan aort replasmanı yapılan bir hasta tanımlandı. Bu çalışma ile hemostazı sağlamak amacıyla özellikle de aort cerrahisi ve Dacron grefti kullanımı için belirlenen basit ama etkili bir yöntem sunuyoruz. Herhangi bir artık aderans veya kontrendikasyon görülmemekle birlikte potansiyel olarak her türlü cerrahi işlem için uygulanabilir. Bu yöntem, ekstra sütürlerin, sentetik veya allogeneik ve pahalı hemostatik veya dolgu ajanlarının kullanılmasını engelleyerek tam hemostaz sağlamak için ucuz, biyouyumlu ve oldukça etkili bir stratejidir.

the prevention of coagulopathy, and the use of specific surgical techniques can reduce procedure time, decrease the requirement for transfusions, improve surgical and postoperative outcomes, and improve patient recovery overall. Effective preoperative, intraoperative, and postoperative strategies to preserve blood and prevent anemia play a key role in this aim. Especially in vascular surgery and cardiac surgery of the great vessels, postoperative bleeding is a preva-

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lent condition that is considered a life-threatening complication. Some causes include the high degree of heparinization required for vascular surgery and to establish extracorporeal cardiopulmonary bypass in cases of aortic surgery. The postoperative coagulopathy associated with extracorporeal circulation and the more-than-frequent preoperative platelet dysfunction and anticoagulation status seen due to preoperative antiaggregation and anticoagulation therapy are also key points in this issue.^[1-3]

CASE REPORT

A 55-year-old male patient, who was a smoker with a previous history of hypertriglyceridemia, was diagnosed with severe aortic regurgitation and a dilated ascending aorta. The patient underwent elective cardiac surgery for aortic and ascending aorta replacement

using a size 27 of Carbomedics Carbo-Seal Valsalva (LivaNova, PLC, London, England) ascending aortic prosthesis. The surgical strategy included the implantation of a cannula for coronary reperfusion and deaeration through the Dacron graft. However, bleeding at the insertion point of this cannula through the graft is common, and is often difficult to manage. A small ball of fat was attached to the hole using the suture previously placed during the insertion of the aortic cannula for antegrade cardioplegia infusion. Hemostasis was successfully and easily achieved (Fig. 1).

Herein, a simple and highly effective method to accelerate the clotting process during cardiac and vascular surgery, but especially designed for aortic surgery, is described. A small ball of subcutaneous fat is released from the mediastinum or the pericardium. It is applied over the bleeding aortic hole and fixed

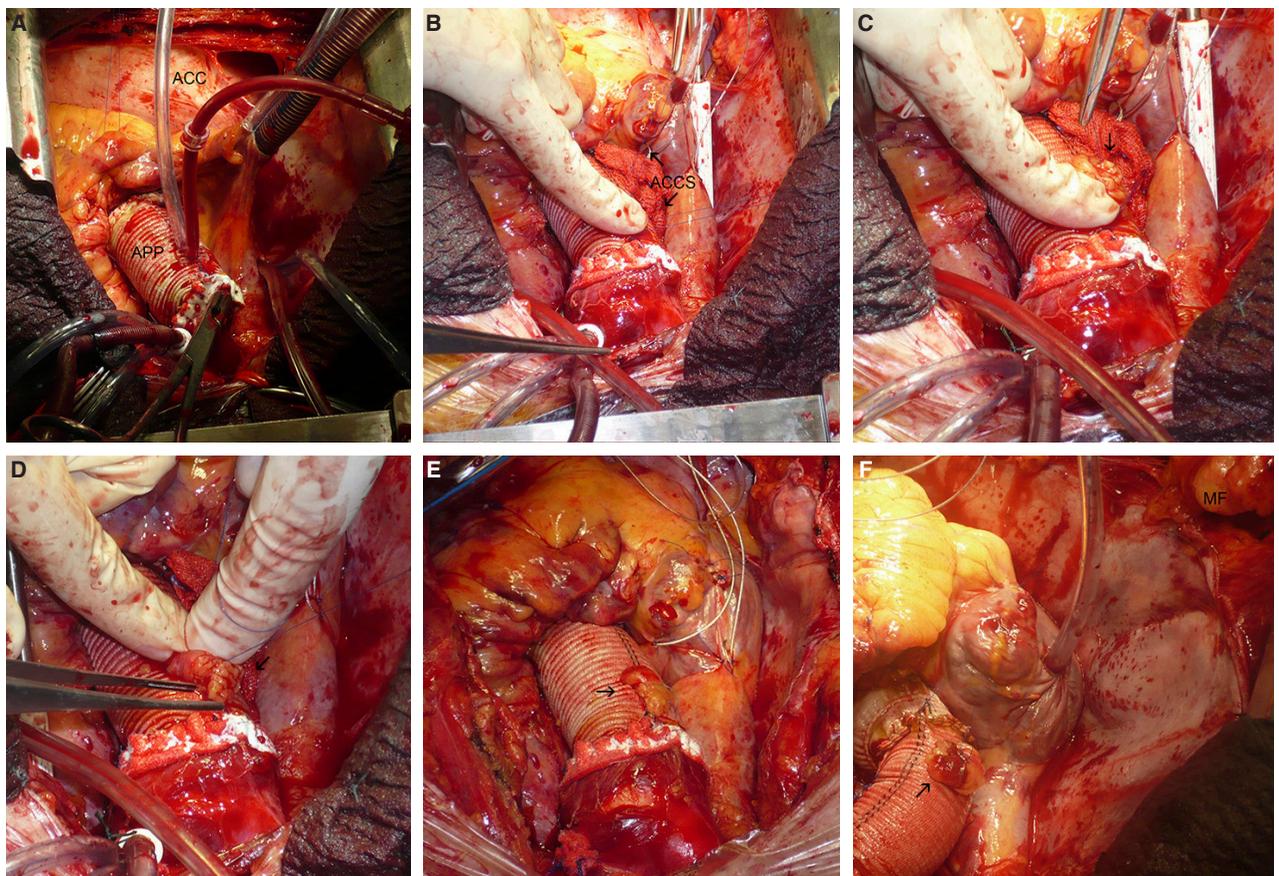


Figure 1. The fat ball hemostatic technique. **(A)** Intraoperative view of aortic surgery. Antegrade cardioplegia catheter (ACC) placed over ascending aorta prosthesis (AAP). **(B)** Retrieval of the ACC and digital control of aortic bleeding through the catheter puncture. **(C, D)** Placement of a small piece of fat under the polypropylene suture used to fix the ACC. The fat is fixed to the prosthesis with knots. **(E)** The final result with complete control of aortic bleeding. **(F)** Additional postoperative image.

MF: Mediastinal fat. Arrow: Fat applied over the hole in the Dacron AAP made to infuse antegrade cardioplegia or aspirate air from the ascending aorta.

in place with the same suture used to fix the cannula. Then the suture is knotted. This simple maneuver is efficient and secure, and no additional sutures are necessary (Fig. 1). This report is an explanation of a simple intervention that makes the rapid control of aortic bleeding feasible.

This technique is intended to minimize bleeding and the length of time to reach hemostasis, while avoiding the effects of systemic medications, the unnecessary use of synthetic topical hemostatic agents or sutures, which can compromise the final result of surgery, and to reduce the need for blood and transfusions. The method has been used in a total of 100 patients who underwent aortic surgery, and it was effective and sufficient in all cases when used with this original aim.

DISCUSSION

The need for safe and efficacious hemostatic agents is a significant surgical objective. A wide range of agents have been developed to achieve hemostasis. The use of topical hemostatic, sealant, and adhesives agents in order to secure suture lines has expanded. The primary differences between these 3 categories include composition, immunogenicity, the mechanism of action, adherence power, ease of application, and cost. The proper selection of these agents can minimize intraoperative bleeding. The optimal use, based on the location of surgical bleeding and the amount and extent of the hemorrhage, will have a great influence on the patient's clinical outcome.^[2,3]

Adipose tissue, commonly known as fat, is one of the main types of connective tissue. It is usually located around organs or beneath the skin as subcutaneous fat. Mainly, adipose tissue functions as a store of energy for the organism. However, it has also been recognized as an endocrine organ, able to produce hormones and cytokines. Composed mostly of adipocytes, it also contains fibroblasts, and immune and endothelial cells. One component of adipose tissue is the tissue factor known as thromboplastin, which has a recognized hemostatic power. Procoagulant activity of adipose tissue has been reported previously in both *in vitro* and *in vivo* studies.^[4]

In our experience in cardiac and vascular surgery, and especially aortic-related procedures, achieving complete hemostasis can be challenging. The method described is particularly designed for ascending

aorta replacements or techniques where the use of a Dacron prosthesis and sutures (as in aortic abdominal aneurysms) can frequently lead to bleeding that is difficult to control. In the particular case of ascendant aortic surgery, an antegrade cardioplegia catheter is inserted in the Dacron ascending aortic prosthesis. It allows for the simultaneous delivery of antegrade cardioplegia and aspiration of air from the left heart. The insertion point of the catheter through the Dacron graft it is sometimes a challenging point for hemostasis. Withdrawal of this cannula usually requires several sutures over the Dacron graft surface, with or without Teflon pledgets. The necessity of applying these additional sutures can occasionally exacerbate the bleeding.

We propose the use of this simple, cheap, biocompatible, and highly effective hemostatic method for vascular surgery, especially aortic procedures. It can avoid the necessity of additional sutures, and the use of expensive, synthetic hemostats or more complex procedures to achieve hemostasis. No contraindications have been suggested, other than the presence of intense bleeding beyond the capacity for success. Another significant positive aspect of this procedure is its reversibility. Application does not create distortion of tissues, as occurs with the use of a sealant or hemostatic biological products that increase adherence in future reoperation and additional procedures, which are usually difficult.

Though it was primarily designed for aortic surgery, the "hemostatic fat ball technique" is applicable in all types of surgery and bleeding. The fat ball does not always require fixation with a suture. The simple application of fat over the bleeding surface is enough to control bleeding without additional procedures. Infinite possibilities arise for this method to have a key role in implementing effective strategies for clotting and bleeding control in any location where bleeding is patent and the application of an additional suture can be compromising. Furthermore, it decreases patient exposure to allogeneic agents, and is an economically profitable strategy in comparison with the costs associated with hemostatic and sealant products.

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