

A New Practical Alternative for the Control of Sternal Bleeding during Cardiac Surgery: Ankaferd Blood Stopper

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ABSTRACT

The control of sternal bleeding during cardiac surgery can sometimes be a challenging and time-consuming problem for surgeons. Several alternatives for the control of sternal bleeding are on the market. Bone wax is a well-known alternative used by many cardiac surgeons for the control of bleeding. It is effective and cheap; however, it inhibits ossification of the sternum and can cause infections and sternal wound healing problems after cardiac surgery. Consequently, control of sternal bleeding without the use of bone wax requires meticulous preparation. Ankaferd Blood Stopper (ABS) (Ankaferd Sağlık Ürünleri, Istanbul, Turkey) is a unique folkloric medicinal plant extract that has been used in Turkish traditional medicine as a hemostatic agent. We present a practical alternative technique for the control of sternal bleeding during cardiac surgery with the use of ABS.

INTRODUCTION

The control of sternal bleeding during cardiac surgery can sometimes be a challenging and time-consuming problem for surgeons. Several alternatives for the control of sternal bleeding are on the market. Bone wax is a well-known alternative for the control of bleeding used by many cardiac surgeons; however, it inhibits ossification of the sternum, promotes infections, and may be responsible for wax embolization to the lung [Robicsek 1981]. Ankaferd Blood Stopper (ABS) (Ankaferd Sağlık Ürünleri, Istanbul, Turkey) is a new unique Turkish traditional medicine that has a hemostatic effect; its mechanism of action is currently unknown. We present an alternative technique for the control of sternal bleeding during cardiac surgery that uses ABS.

CASE REPORT

A 78-year-old man with unstable angina pectoris was admitted to our hospital. After urgent heart catheterization, he was referred to the cardiovascular surgery department for coronary artery bypass surgery. The patient's medical history

Received May 20, 2010; accepted June 21, 2010.

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included non-insulin-dependent diabetes mellitus, hypertension, and moderate chronic obstructive pulmonary disease. The patient had been receiving clopidogrel therapy (75 mg daily) for 18 months.

After careful anesthesia induction, a median sternotomy was performed. The edges of the skin incision, subcutaneous tissues, and particularly the sternal bone marrow showed an excessive amount of bleeding at the time. Meticulous effort was spent to control the bleeding with surgical electrocautery. ABS-soaked gauze pads (2.5 × 7 cm) were placed on each side of the sternum, with surgical towels placed above and wrapped around the gauze pads to keep them in the proper position. After 3 to 5 minutes of application, satisfactory hemostasis was achieved. An automated retractor was used to harvest the pedicled left internal mammary artery (LIMA). Meanwhile, venous conduits from the right leg were prepared. Full heparinization (activated clotting time >400 seconds) was maintained for mild hypothermic cardiopulmonary bypass that used standard cross-clamping, crystalloid cardioplegia, and side-clamping for the proximal venous graft anastomosis. The quadruple bypass procedure (LIMA to the left anterior descending coronary artery, aorta to the second diagonal branch, aorta to the second obtuse marginal branch, and aorta to the right coronary artery posterior descending branch) was performed. After complete reversal of heparin with protamine, the left pleural and mediastinal chest tubes were placed. The ABS-soaked gauze pads were removed from the sternum. Sufficient hemostasis was observed, and no additional steps or medication was required. The sternum was closed with four no. 5 sternal figure-of-eight wires (Ethicon/Johnson & Johnson, Somerville, NJ, USA) in a standard manner.

The patient's postoperative course was uneventful, and he was discharged from the hospital on postoperative day 8.

DISCUSSION

There are several possible sources of bleeding after a median sternotomy, such as wire holes, sternal bone marrow, sternal fractures, or a patient with a coagulopathy. Correction of such bleeding can be sometimes difficult and may require surgical intervention, such as the placement of U sutures or suturing around the wire holes. If the bleeding originates from the sternal bone marrow, however, the options are limited to the application of bone wax with strips of Surgicel "oxidized regenerated cellulose" (Ethicon/Johnson & Johnson), gelatin foam between the sternal edges, or the application of fibrin glue.

Sternal bone marrow hemostasis is often obtained with the application of bone wax, but there are potential side effects pertaining to sternal wound healing and the risk for infection. In the very old patient with spongiose bone, the application of bone wax might not be able to control the sternal bleeding because the osteoporotic nature of the sternum requires an excessive amount of bone wax. Furthermore, bone wax does not degrade in significant quantities within a reasonable period of time and stimulates a considerable inflammatory response, similar to a reaction to a foreign body [Allison 1994]. It has been considered to impede proper fusion after a median sternotomy and to promote microbial infections [Robicsek 1978].

The increasing number of patients with problems of sternal wound healing after cardiac surgery requires meticulous concepts for controlling sternal bleeding without the use of bone wax. One alternative to bone wax, a water-soluble bone hemostasis material called Ostene (Ceremed, Los Angeles, CA, USA) and considered inert, has been used. The compounds in Ostene are not metabolized, and they are eliminated from the body unchanged. In clinical use, Ostene has properties similar to bone wax but is approximately 10 times more expensive [Wang 2001].

Another alternative, fibrin glue, has been used to control bleeding from the sternal bone marrow after median sternotomy [Pasic 2002]. As with Ostene, however, it is also an expensive treatment alternative.

Surgicel Nu-Knit (Ethicon/Johnson & Johnson), an "oxidized regenerated cellulose," is another conventional alternative hemostatic agent that can be used safely to control bleeding from sternal bone marrow [Mair 2005].

ABS is a hemostatic agent composed of extracts from 5 different plants (*Urtica dioica*, *Vitis vinifera*, *Glycyrrhiza glabra*, *Alpinia officinarum*, and *Thymus vulgaris*) that has historically been used in Turkish traditional medicine as a hemostatic agent. It has been approved in Turkey for the management of external hemorrhage and dental surgery bleeding. Its unique local hemostatic effect takes place by promoting the very rapid (less than 1 second) formation of a protein mesh that acts as an anchor for vital erythrocyte aggregation.

It covers the classic cascade model of the clotting system without independently acting on coagulation factors and platelets [Goker 2008]. Besides its hemostatic activity, ABS has demonstrated anti-infectious and antineoplastic actions in vitro [Tasdelen Fisgin 2009].

In conclusion, as a novel indication, we believe that the administration of ABS-soaked gauze to the sternal bone marrow is a new practical alternative for the control of sternal bleeding. We presume that it prevents problems in sternal wound healing and reduces the risk of mediastinitis because of its anti-infectious characteristics. Additional trials, possibly including comparative trials with other topical hemostatic agents, are needed to clarify the role of this unique medicinal product for the control of sternal bleeding during cardiac surgery.

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