Preventing Blood Loss During Application of the HEARTSTRING Proximal Seal System

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The HEARTSTRING Proximal Seal System (Guidant Corp, Santa Clara, CA) is used to avoid aortic clamping while the proximal anastomoses are sewn. To protect surgeons from spurting blood while the device is used, we use a see through plastic sheet to cover the area being operated on. This modified technique is applied whenever the system is used and allows the safe use of the device even in high-risk patients with hepatitis or human immunodeficiency virus.


The HEARTSTRING Proximal Seal System (Guidant Corp, Santa Clara, CA) is a tool to facilitate proximal anastomoses in coronary artery bypass grafting (CABG) operations by making partial aortic clamping redundant [1, 2]. The system includes an aortic punch, a delivery device, and the proximal seal.

To use the seal system, a hole is made by using a specially designed punch. After the punch has been used, the hole is quickly covered with a fingertip to prevent uncontrolled spurting of blood (Fig 1). In the next step, the proximal seal is delivered into the aorta through the hole. The delivery process has to be performed quickly to again avoid the spurting of blood. After the seal system is unfolded within the aorta, the proximal anastomosis can be performed within the sealed area. When the anastomosis is finished, the seal system is removed with a specially designed removal mechanism.

The tool is very appealing for surgeons because it eliminates the need for aortic side clamping while performing the proximal anastomoses because any aortic clamping may cause embolic events [3]. Although Guidant assures that it is possible to use the device without blood gushing through the punch hole after removal of the punch and insertion of the device, our experience has shown that this is seldom the case. We therefore developed a simple technique to protect both the surgeon and the patient from unwanted squirting of blood.

Technique

A clear see-through plastic sheet is used. We simply use the sheets that the operating instruments are wrapped in after sterilization. The sheet should be twice the size of the sternal opening. The sheet is folded once in the middle and held over the sternal opening. An approximately 2-cm-long cut is made in the sheet and placed over the planned position of the anastomosis (Fig 2A). The double-folded sheet provides a double protection against spurting blood because most of the blood hits the underside of the first layer of the sheet. The second layer

Fig 1. A finger is used to control bleeding during the use of the HEARTSTRING Proximal Seal System (Guidant Corp, Santa Clara, CA), as recommended by Guidant.
Fig 2. (A) The sheet is folded, and a cut approximately 2 cm long is made. (B) The punch is put through the sheet. (C) The seal system is put through the sheet. (D) The proximal anastomoses are performed after the sheet is removed (note the blood on the sheet).

of the sheet prevents any remaining blood from spurting into the face of the surgeon. The sheet is now put on the operating area and should cover the whole area exposed by the sternum retractor.

The following is exactly the technique described by Guidant in the product information: The left hand of the surgeon is put underneath the sheet close to the position of the punch hole (Fig 1). The punch is put through the incision and the punch hole performed in the usual technique (Fig 2B). After removal of the punch, a finger is put on the punch hole and the punch removed through the insertion. In the next step the device is placed through the opening in the sheet, the finger is removed, and the device is inserted in the aorta (Fig 2C). Only now is sheet removed, and the proximal anastomosis is performed (Fig 2D). We use this technique whenever the HEARTSTRING device is used.

The described technique protects against the spurting of blood from the aorta during the application of the HEARTSTRING Proximal Seal System (Guidant Corp). Especially the folding of the sheet before making the incision has proven itself to be very effective by adding an additional protection against spurting of blood through the incision.
Comment
The HEARTSTRING device has proven to be very helpful in on-pump and off-pump CABG operations. It reduces the risk of embolic events by avoiding aortic clamping. In our experience, however, it is not possible to prevent the unwanted spurtling of blood while using the device, particularly whilst inserting the seal system through the punch hole. Its use therefore places an additional risk on the surgeon, especially when used in emergency operations without availability of hepatitis and human immunodeficiency virus serology. In addition, if blood hits the surgeon on the face mask and drops back onto the patient, it also increases the patient’s risk of iatrogenic infection. We conclude that our modification in the use of the HEARTSTRING Proximal Seal System completely prevents both risks. It is economical, very easy to perform, and should always be done when the HEARTSTRING Proximal Seal System is used.

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References