



Auto-Tamponade Sternal Wire System

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OVERVIEW

A device which increases the strength of a sternal closure

- Plugs cannulated over the sternal wire about the anterior and posterior sternal tables
- Results in decreased erosion of sternal wires through bone and decreased needle hole bleeding

BACKGROUND

The median sternotomy is the preferred option for cardiac surgical operations and is performed over 700,000 times annually in the United States. Sternal closure most commonly involves fixation with steel wire because of its low cost and simplicity. Sternal wires are attached to steel needles which are driven through the sternum before they are twisted together to close the sternum. The trauma caused by the wire passing through the sternal bone and parasternal soft tissues can create needle hole bleeding, which occurs in 5% to 9% of cases and is one of the main reasons for reoperation.

Sternal needle hole bleeding may be addressed by placing sutures around each of the areas of hemorrhage, but this is a time consuming and unpleasant task. Alternatively, a surgeon may use a hemostatic agent like thrombin to diminish the risk of bleeding, with mixed results. Use of standard sternal wires can result in erosion of wire through the sternal bone, resulting in separation of the sternal halves which can lead to an unpleasant sensation of 'sternal clicking' or, worse, to partial or total separation of the sternum, and, frequently, to infection. This requires re-operation.

INNOVATION

University of Michigan researchers have created a device that decreases sternum needle hole bleeding after a sternotomy, thereby lessening the intraoperative use of blood products,

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Category

Medical Devices
Life Sciences

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decreasing time in the operating room, and diminishing the need for re-operation. The researchers propose a sternal wire that incorporates a stiff plug that abuts the posterior surface of the sternum and which is pulled firmly against the needle hole when the wires are tightened prior to closure.

This novel sternal closure wire system mitigates complications associated with wire needle hole bleeding, diminishes sternal wire erosion, and counteracts insufficient sternal construct stiffness. The plugs serve to tamponade bleeding without the need for the excessive use of suture ligation, cautery, hemostatic agents, or bone wax. Sternal wires are augmented with grommet-like plugs that tamponade needle hole bleeding and which distribute the force of the sternal wire over a larger surface area of bone and soft tissue, thus reducing the tendency for the wires to erode. One plug should be used for each needle hole.

The use of this device requires just over two minutes of additive procedure time compared to sternal wires, far less than the estimates of up to twenty minutes spent inspecting and managing needle holes during a cardio thoracic procedure. This approach leads to a profound decrease in adverse events and costs associated with increased operating room time, subsequent re-operation episodes, and complications associated with sternal separation and infection.