Sternal wire-grip: a new device in the surgical armamentarium†

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Abstract
We describe a new wire-grip that enhances the surgeon’s grip on sternal wires and facilitates their tightening with minimal risk of slips. This wire-grip should protect against operating room personnel injury during sternal re-approximation.

Keywords: Surgical equipment • Sternum • Wound closure

INTRODUCTION
Median sternotomy remains the mainstay of cardiac surgical procedures, and wire closure is the most widely used method of sternal re-approximation. It is important for the surgeon to have an adequate grip on the wire he is utilizing, and this has conventionally been done using Kocher clamps for this purpose. Yet, these clamps tend to crowd the operative field and may cause problems with glove tearing, either by un-intentional clamp release or by portions of wires that stick out [1].

We present here a new wire-grip that was developed to facilitate safe sternal closure and to prevent from potential complications.

TECHNIQUE
The wire-grip described here (Geister® Medizintechnik GmbH, Tuttlingen, Germany) is a T-shaped device that consists of a narrow hollowed shaft and a horizontal handle. A hollowed lever is mounted at the centre of the handle and has a serrated outer surface to prevent slippage (Fig. 1).

When the wire-grip is used, the free end of the wire is simply inserted through the tip of the device and passed across the shaft and extended lever until it stops at its blind end. The lever is then rotated 180° towards the tip of the device, thereby bending the wire completely on itself. Traction on the wire causes the lever to shift towards the tip of the device and to lock its tip in a dedicated groove (Fig. 2, Supplementary material, Video 1). In this way, the device grasps the wire firmly, and increasing traction on the wire augments the force that is applied on the lever-lock and increases its security. After use, wire remnant can be removed from the wire-grip by releasing the lock and extending the lever. The entire wire-grip is made of chrome and is autoclavable.

The wire-grip was designed by the author and is manufactured and marketed by Geister® Medizintechnik GmbH. German patent application was filed by Mohammad Bashar Izzat and Carsten Geister. The author had full control of the design of the study, methods used, outcome measurement, analysis of data and production of the written report.

CLINICAL EXPERIENCE
After completing appropriate evaluations and obtaining informed consents, 20 consecutive adult patients underwent a variety of cardiac surgical procedures through median sternotomy incisions. In each instance, median sternotomy was closed with eight No. 6 surgical stainless steel wires. Successive pairs of wire-grips with interposed wires were used to re-approximate the sternum and to initiate wire twisting. Excess wires were removed, the remaining wires were tightened with a heavy needle holder and soft tissues were sutured routinely.

We did not experience a significant learning curve with the device and found its overall size and weight to facilitate wire manipulation. There were no incidents of unintentional wire release, glove disruption or personnel skin puncture from wire ends, or any other complication secondary to use of the device. A single set of wire-grips was repeatedly re-sterilized and used for all patients in this group. The functional attributes of wire-grips remained constant throughout the study, and no significant wear was detected on close inspection of the devices.

COMMENT
Sternal wire closure is frequently associated with operator glove disruption and skin puncture, with the potential risk of disease transmission to both patients and surgeons, deep sternal wound infection and the resultant morbidity and mortality. The significance of this concern is clearly reflected by the range of specialized surgical instruments and techniques that have been developed to alleviate these potential problems [2–4]. Our previous practice was to use Kocher clamps for this purpose, where the wire is placed at a right angle then wrapped around the tip of the clamp to avoid its un-intentional release. Nevertheless, these clamps tend to crowd the operative field, and we have frequently encountered problems with glove tearing by wire ends that stick out.

The wire-grip described in this article has several advantages. It enhances the surgeon’s grip on the wire and eases tightening
of sternal wires with minimal risk of slips. Wire end protrusion is eliminated, and this may protect against operating room personnel injury. Moreover, the new wire-grip can be used for wires of various diameters.

The sternal wire-grip has proved to be a very useful adjunct to the wire closure of the sternum, and it should prevent from potential complications.

SUPPLEMENTARY MATERIAL

Supplementary material is available at ICVTS online.

Conflict of interest: The author discloses that he has a financial relationship with Geister Medizintechnik GmbH.

REFERENCES


Figure 1: Close-up view of the wire-grip demonstrating the T-shaped handle and the serrated lever in the locked position.

Figure 2: Mechanism of action of the wire-grip. (a) The free end of the wire is inserted through the tip of the device and passed across the shaft and lever. (b) The lever is rotated towards the tip of the device. (c) Traction on the wire shifts the lever towards the tip of the device and locks its tip in a dedicated groove (d).

Video. Mechanism of action of the wire-grip.