Using the reciprocating saw for resternotomy

Resternotomide ileri geri hareketli testere kullanımı

Hesham Z Saleh, Jonathan Yates, Lawrence Moulton, D Mark Pullan, Brian M Fabri
Department of Cardiothoracic Surgery, Liverpool Heart and Chest Hospital, Liverpool, UK

Contrary to a prevailing practice advocating the use of an oscillating saw for sternal re-entry, some surgeons prefer using a reciprocating saw in cases of resternotomy. In this article, we describe a simple technique for resternotomy using a reciprocating saw. This technique has been used in 158 consecutive patients representing the routine resternotomy practice of two surgeons. Only one patient had a significant bleeding requiring urgent institution of cardiopulmonary bypass. No mortality related to resternotomy was seen.

Key words: Reciprocating saw; resternotomy; sternum/surgery.


Anahtar sözcükler: İleri geri hareketli testere; resternotomi; sternum/cerrahi.

Cardiac reoperations which necessitate resternotomies are associated with potential major complications. An injury to the heart, great vessels, or previously implanted patent coronary bypass grafts can lead to massive hemorrhage and/or myocardial ischemia and infarction.[1-5]

Given these potential risks, many techniques have been described to increase the safety of sternal re-entry. Most of the published reports, however, share a common view that an oscillating saw is preferable to ensure a safe procedure.[1-3] The current paradigm gaining widespread acceptance among cardiac surgeons demonizes the use of a reciprocating saw in these cases without producing much supporting evidence. Against this notion, some surgeons have been trained in the use of the reciprocating saw for this type of surgery and continue to use them. The purpose of this article is to describe the technique used to perform a safe resternotomy using a reciprocating saw.

SURGICAL TECHNIQUE
Preoperative contrast-enhanced computed tomography (CT) is only offered to patients who have previously used prosthetic patches and/or conduits involving the aorta or the right ventricular outflow tract as well as those with patent coronary bypass grafts.

Intraoperatively, following skin incision, the sternal wires are cut and removed, and blunt dissection is performed superiorly around the sternal notch with the finger. The linea alba is then divided for a few centimeters inferiorly from the xiphoid process while maintaining upward traction, and 5 to 6 cm of the retrosternal space is cleared of adhesions mostly via blunt dissection along the posterior sternal table. Prior to sawing the sternum, ventilation is stopped to allow the pleura and adjacent soft tissues to fall away from the sternum. The sternum is then divided along the previously defined midline with a reciprocating saw (Aesculap, a division of the B. Braun Melsungen AG,
Tuttlingen, Germany) from the xiphoid upwards. At this point, two technical details are crucial in order to avoid injury to the underlying structures. The first is to ensure that the saw is snugly lifted against the sternum and slightly tilted backwards. This allows the protective foot piece of the saw to further develop a safe plane retrosternally ahead of the sternal cutting and prevents the saw from cutting freely into any underlying soft tissue structures. Secondly, the saw is to be advanced in a to-and-fro motion rather than a continuous one to allow the protective foot piece of the saw to disengage from substernal adhesions, thus creating a safe pathway for sawing. Following sternal division, hemostasis is achieved along the posterior aspect of the sternum, and further dissection is carried out in the normal fashion.

DISCUSSION

The technique described was used in 158 consecutive resternotomy cases between March 2003 and April 2010, representing the practice of two surgeons who routinely use the reciprocating saw for this procedure. Their choice of the reciprocating saw was based solely on their previous training. Consequently they had a higher level of comfort with this instrument than if they had used an oscillating saw. Although many of these patients (n=68, 43.0%) were deemed to be high-risk at sternal re-entry due to multiple previous sternotomies, previous mediastinitis, patent grafts, or the need for right-sided re-entry due to multiple previous sternotomies, a patent internal mammary artery graft, or a history of mediastinal radiotherapy.[3,4] More recently, Roselli et al.[3] reviewed 1,847 resternotomy cases and recommended the routine use of the oscillating saw. However, another large retrospective series by Park et al.[4] examined 2,555 cases of sternal re-entry, but they did not specify the type of saw being used due to different preferences among the surgeons.

In cases where the aorta, right ventricle, or patent bypass grafts have become firmly adherent to the back of the sternum, an injury would likely occur whether an oscillating or a reciprocating saw was used, even with adequate experience and attention to technical details. The technical tips permitting for the safe use of reciprocating saws in resternotomies, as detailed in our operative techniques, have been previously reiterated in an published article by Diethrich[6] which narrated how the reciprocating saw was originally developed to avoid injury to the dura mater during a craniotomy.

In conclusion, the reciprocating saw can safely be used for resternotomies. Rather than advocating a particular type of saw, attention should be directed to the identification of other more important predictors of injury and the institution of preemptive protective measures.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

