SCIENTIFIC LETTER

PITFALLS OF ROBICSEK'S PROCEDURE: SAFEST AVANT-GARDE ALTERNATIVES TO REDUCE STERNUM SURGICAL COMPLICATIONS

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ABSTRACT

Robicsek's technique is a surgical methodology mainly used for sternal dehiscence, stabilization of the chest wall, and maintaining respiratory dynamics. Returning to an infected and anatomically altered scenario after cardiac surgery fosters a high risk of rupture, tears of previous repairs, and vascular bypasses. Classically, the dense adhesion of the left internal mammary artery to the posterior plate of the sternum makes the dissection of half of the fractured and dehisced sternum a prone situation for transection avulsion of the artery conduit, requiring ligating the most critical bypass to the heart. Our proposal brings a solid and safe surgical alternative to avoid dealing with the dangerous situation of dissecting the posterior sternum to perform Robicsek's procedure.

Keywords: *Robicsek's technique, sternum infections avulsion, dissecting sternum.*

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HOW TO DO IT?

Faced with the challenges of sternum infections, we frequently refer to the work of Dr. Francis Robicsek. His contributions to the sternum armamentarium surgical management have been a cornerstone in treating sternal bone dehiscences and infections and have favorably enhanced and guided our cardiothoracic surgery techniques. Nevertheless, Robicsek's procedure is not always suitable because of the patients' peculiar anatomical variabilities, complex adhesions, particular infections, previous surgical procedures, and unique fractures[1, 2].

During Robicsek's technique closure, our main concern -particularly during vascular graft surgeries- is the right ventricle, but even aware of this, oodles of different calamities take place. For example, when a patient has had a left internal mammary artery (LIMA) graft into the left anterior descending artery (LAD), we have wistfully identified the LIMA densely adhered to the posterior sternum in the left upper sternal manubrium area[3]. Conjointly, in these cases, the vessel has ended up easily damaged without chance of repairment, massively bleeding, and requiring an urgent need to ligate the artery to save the patient's life. After this event, the bypass graft is lost, and nothing can be done to fix it.

Considering this, we grew concerned about how to tackle these drawbacks and decided to work in an alternative to Robicsek's procedure. As a result, we started using Zimmer Biomet's SternaLock Blu™ and SternaLock 360™ (supplied by Surgical Solutions, Guaynabo, Puerto Rico)[4]. The SternaLock Blu™, a sternal closure system, comprises plates, screws, and three stainless steel wires. At the same time, the top-of-the-line SternaLock™ 360 only includes three plates and a titanium ribbon that exclusively helps patients with osteoporosis and osteopenia[1]. Thenceforth, we have experienced a decrease in thoracic infections and a lower rate of sternal bone dehiscence. An example of the SternaLock Blu™ efficacy is a patient who underwent a full sternotomy, three coronary artery bypass graft insertions, and an aortic valve replacement (*Image 1*). A week before discharge, despite an adequate recovery, the patient had a complete atrioventricular blockage and twenty-three resuscitation events. Thankfully, not only was this fixed with a permanent pacemaker, but the sternum was fully intact after compressions.

Through the Zimmer-Biomet thoracic tools, we have also created other approaches to stabilize the patient's sternums. After cleaning and debriding infected/dehisced sternums, we have developed a "fracture-stabilization" technique by using the ribs alongside SternaLock Blu™ (*Image 2*). Mainly used in patients unsuitable for wires or SternaLock Blu™ closure, and with the concern of iatrogenic injury to the LIMA, we decided to reduce injuries and avoid

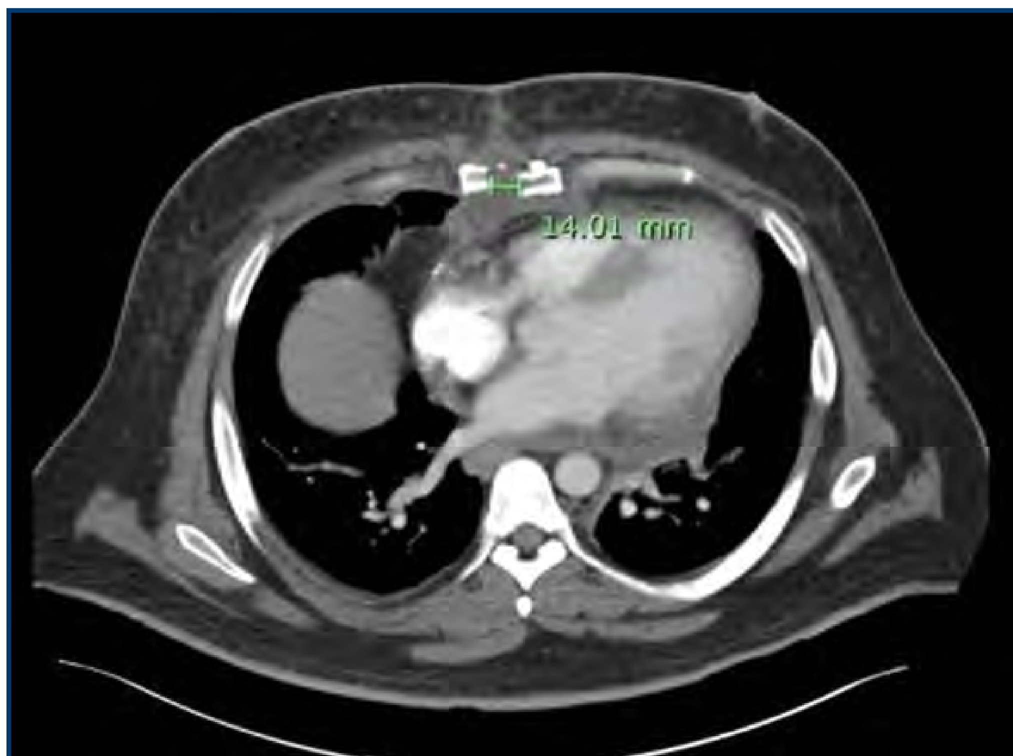

IMAGE 1. This image confirms that the patient has sternum dehiscence with fracture (measuring 14.01 mm in length), loose bone fragments in the surrounding area, mediastinitis, and fluid collection.

the usage of grafts[1, 3]. Hence, through this technique, we used Zimmer-Biomet long rib plates and inserted three plates on the anterior plane of the ribs (from cephalad to caudal), which helped the sternum to achieve complete stability and impermeability. The material's anti-septic characteristics and two intrathoracic Hemovac™ drainages in place (one anterior and one posterior to the sternum) for 28 days allow for the breastbone to heal effectively. In the six cases in which we have carried out this technique, after three weeks of drainage and antibiotics therapy, the patients were all discharged home, sternum stabilization was fully achieved, and no recurrence of infections was reported. Through this experience, we invite all cardiothoracic surgeons to embrace these advances since they will allow us to grow and enhance that patient's management. Even though Robiseck's closure will remain in our armamentarium, we have proved that this sophistication is another effective way to approach our cardiothoracic patients.

Declarations
The authors declare no conflict of interest.

IMAGE 2. Initial remanent of SternaLock Blu™ closure system (red circle) and rib plates across sternum (blue arrows) for apposition of sternal bone fracture and dehiscence.

REFERENCES

1. De Loos, E. R., Andel, P. C. M., Daemen, J. H. T., Maessen, J. G., Hulsewé, K. W. E., & Vissers, Y. L. J. (2021). Safety and feasibility of rigid fixation by SternaLock Blu plates during the modified Ravitch procedure: a pilot study. Journal of Thoracic Disease, 13(5), 2952–2958.

2. Ozden, Y., Ozcelik, S., Bastopcu, O. M., Ozden, S., Kisa, U., & Kuplay, H. (2023). Tradition or Innovation in Sternal Dehiscence Repair: Robicsek Versus Titanium Plate. Sisli Etfal Hastanesi tip bulteni, 57(1), 124–129. https://doi.org/10.14744/SEMB.2022.73454.

3. Rodríguez Lorenzo, P., Fernández Martínez, B., Pérez Alba, M., Ramírez Jaén, C., Meana Morís, A. R., & Pérez Méndez, C. (2023). Primary sternal osteomyelitis. Osteomielitis primaria de esternón. Archivos argentinos de pediatria, e202201449. Advanced online publication. https://doi.org/10.5546/aap.2022-01449.eng.

4. Silverborn, M., Heitmann, L. A., Sveinsdottir, N., Rögnvaldsson, S., Kristjansson, T. T., & Gudbjartsson, T. (2022). Non-infectious sternal dehiscence after coronary artery bypass surgery. Journal of Cardiothoracic Surgery, 17(1), 249. https://doi.org/10.1186/s13019-022-02015-1.