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eComment. The number of sternal wires influences sternal wound outcome

Author: Haralambos Parissis

Royal Victoria Hospital, Belfast, UK

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I read with great interest the report of Kamiya and associates [1], looking into the impact of the number of simple sternal wires on the incidence of deep sternal wound infection (DSWI). The authors showed that the number of wires used has an association to DSWI, only in high-risk patients. Shaikhrezai [2] and colleagues reached the same conclusion, applied however, to every patient without identification of high-risk groups. In our practice, from February 2000 to October 2007, 120

out of 3896 cardiac surgical patients (3.02%; prospective data collection, sternal closure with 6 simple wires) developed sternal wound infections. Fifty-two patients (1.34%) developed DSWI. The incremental risk factors for development of DMWI were: insulin-dependent diabetes (OR = 3.62, CI = 1.2-10.98), preoperative Creatinine > $\mu\text{mol/L}$ or 2.27 mg/dL (OR = 3.33, CI = 1.14-9.7) and prolonged ventilation (OR = 4.16, CI = 1.73-9.98). Overall mortality for the DMWI was high at 9.3% (11 patients). Wound microbiology revealed *Staphylococcus aureus* (32%), coagulase-negative *Staphylococcus* (29.6%), methicillin-resistant *S. aureus* (MRSA) (2.3%), Vancomycin-resistant *Enterococcus* (VRE) (3.8%), Gram negative bacteria (17.5%) and other [14.8% (Anaerobes 1.2%, Fungal 4%)].

We believe that a major factor for the development of DSWI is bony instability, which is directly related to surgical technique. Therefore, over the last 3 years, I have changed my practice by routinely using at least 8 simple wires for sternal closure. Out of 375 cases that received 8 or more sternal wires the incidence of DSWI was 0.8% (3 patients). Moreover, out of this cohort, 13 patients returned to intensive care unit with the sternum open due to haemodynamic instability and underwent delayed closure after 3 $\pm$ 4 days. Only one patient in this group developed DSWI and was treated successfully with a vacuum-assisted therapy (VAC) pump.

Therefore, in conclusion, I fully agree with the above authors. I would also like to add the following technical points of great importance (together with optimal peri-operative glycaemic control) in order to eliminate DSWI:

- (1) Routine use of 8 simple wires or more: Loop wires may have a role in patients above 90 kg or a body mass index >38 kg/m² and a non-osteoporotic sternum.
- (2) If the bone is split in a paramedian osteotomy, then I would suggest reinforcement of the thinner side with a Robicsek loop or the use of a modified technique by placing a line of continuous wire sutures on either side of the sternum and tying both lines cranially and caudally to avoid strangulation of the blood supply with the closed loop.
- (3) Avoid fracturing or damaging the bone with sternal retractor: If the bone is friable and osteoporotic, we use retractors with wider blades.
- (4) We routinely repair fractures with simple wires prior to sternal wiring.
- (5) We routinely "wash out" the high-risk cases with a Vancomycin-rifampicin solution.

Finally, post-cardiac surgery sternal wound complications remain challenging. Efforts should focus on preventing sternal instability by taking into account all the aforementioned measures.

Conflict of interest: none declared

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