

patients. We implanted a single bar in each case, to reduce the amount of permanent prosthetic material in these young patients. In the first case, we obtained excellent results, whereas in the second case, although the initial results were satisfying, a delayed rupture of the bar occurred. The rupture occurred on the left edge, at a point of minor resistance of the system (the joint), where the clip is angled to be adapted to the rib angle. It is likely that the pressure the sternum applied over the bar finally caused the rupture, favoured by the manoeuvre of angulation of the joint. Berthet *et al.* [2] described 2 cases of delayed titanium bar rupture, in his series of 19 reconstructions for chest wall tumours; in both cases, only one bar was implanted and rupture occurred at the joint. Aware of this eventuality, Wihlm *et al.* [1] implanted two bars in each patient. However, neither Wihlm *et al.* [1] nor Mier *et al.* [4] described long-term follow-up of their patients. The experiences reported in the literature are too limited to draw firm conclusions about the STRATOS™ system in PE repair. Even if a single bar may be sufficient to correct and stabilize the repaired chest wall, it is likely that two bars are needed to better distribute forces and pressures, thus reducing the risk of support rupture. Although we were concerned about the large amount of prosthetic material if 2 bars were employed, we acknowledge that this might represent a minor problem, taking into account the good titanium tolerability.

**Conflict of interest:** none declared.

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**eComment. Substernal metal support after pectus excavatum open repair**

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We read with great interest the article by Stefani and colleagues reporting long-term results of the STRATOS system for stabilizing the sternum after severe pectus excavatum (PE) open repair. This is an important contribution, since there are only 13 cases reported in the literature, although no long-term follow-up is available for them [1]. In severe asymmetric PE with abnormal curvature of the anterior arc of

ribs as shown in figure 1A of the article (chest CT-scan), we use a surgical strategy different from that described by Stefani and colleagues. After complete subperichondrial resection of the elongated/deformed cartilages and transversal wedge osteotomy across the anterior table of the upper sternum, an important step of our procedure is the correction of abnormal curvature of ribs by anterior wedge osteotomy, followed by gentle fracture of the posterior cortex. Then, the running suture of the perichondrial sheaths restores tension to the adjacent intercostal spaces, maintaining the anterior segment of ribs in an adequate position without any complementary rib osteosynthesis. Of 181 patients having undergone a PEx open repair, 15 had severe asymmetric deformity (8%). These 15 patients received additional rib osteotomy as described above, resulting in satisfactory thorax contour [2].

Another feature of our technique is sternum stabilization by means of a large (generally 20 to 22 cm long in the normal adult population) straight metal support bar (WURTZ thorax bar, Medicaex, Bagneux, France), passed substernally after minimal dissection at the level of the sixth perichondrial sheaths. The remaining parts of the bar are extrathoracic, inserted laterally anterior to the ribs and behind the muscles by means of a back and forth movement. The metal bar is then secured to the base of sternum in the midline with an absorbable suture [2]. This support reduces the risk of potential flail chest phenomenon postoperatively, and allows cartilage regeneration with osseous metaplasia in the proper position within 8 weeks. Finally, the bar is easily removed under local anaesthesia as an outpatient procedure, six months after the initial operation. The video description of this technique is currently available on the CTSNet website [3]. The WURTZ thorax bar has numerous advantages in comparison to the STRATOS system:

- (i) Placement through a significantly smaller incision (mean 13 cm long in adults).
- (ii) No fixation to the ribs causing pain or rupture as observed by Stefani and colleagues [1] most likely due to constant movements of the rib cage during the respiratory cycle phases.
- (iii) Excellent mechanical properties as we did not observe any untimely rupture or bending.
- (iv) Reduced risk for dislocation since the bar is removed at 6 months. Indeed, it has been shown that dangerous intrapericardial dislocation of hard materials used in PEx open repair is related to the time these materials are left in place, or as a consequence of delayed material rupture [4].
- (v) No re-entry for material removal with the risk of iterative complications [1].
- (vi) In the setting of concomitant cardiopulmonary bypass surgery, the use of our easily removable material inserted at the lower edge of the sternum does not impede a prompt re-entry or potential cardiopulmonary resuscitation manoeuvres if needed [5].
- (vii) Significantly lower cost of the WURTZ titanium thorax bar (€810) in comparison with the STRATOS system: €2680 for 1 bar fixed to 2 rib clips, and €5360 when 2 bars are used (priced in 2010).

Finally, the STRATOS system was found to be useful for chest wall defect reconstruction [1]. It would be interesting to see more information from large series that would allow the evaluation of the STRATOS materials in the field of PEx repair.

**Conflict of interest:** none declared.

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