posteriorly as a result of direct compression injury to the anterior chest, and type II, in which the body of the sternum is anterior in relation to the manubrium and is caused by hyperflexion injury of the torso, occurring together with deceleration. The force is transmitted to the sternum through the clavicles, the chin, and the upper 2 ribs.⁴

We recommend operative immobilization of the joint (not necessarily anatomically perfect reduction) through a small incision as described above in symptomatic children with TMSD to relieve pain and prevent further deformity. The joint remodels itself in a growing child. Various operative procedures using plates, wire loops, Kirschner wires, or poly-p-dioxanone loops have been described in the literature.³⁻⁵ We routinely use polypropylene for sternal closure after cardiac surgery. This may obviate some of the technical challenges and complications with the use of plates and wires, cosmetic concerns of larger incisions, and the need for a redo operation to remove the implant.

The authors acknowledge the services of Drs Provenzano, Singappuli, Justo, and Colen, and all the other medical and nursing staff involved in the care of our patient.

John Santosh Kumar Murala, MBBS,
MS, MCh
Graham Nunn, MBBS (Hon), FRACS
The Department of Pediatric Cardiac
Surgery

Mater Children's Hospital, Raymond
Terrace
South Brisbane, QLD, Australia

References

1. Irani AI, Lee TY, Estrera AL, Safi HJ. Repair of a traumatic sternal deformity. *J Thorac Cardiovasc Surg.* 2008;136:1371-2.
2. Wada A, Fujii T, Takamura K, Yanagida H, Matsuura A, Katayama A. Sternal segment dislocation in children. *J Pediatr Orthop.* 2002;22:729-31.
3. Nijs S, Broos PLO. Sternal-manubrial dislocation in a 9-year old gymnast. *Acta Chir Belg.* 2005;105:422-4.
4. Thirupathi R, Husted C. Traumatic disruption of the manubriosternal joint. *Bull Hosp Jt Dis.* 1982;42:242-7.
5. Lemaitre J, Koriche CH, Massard G, Wihlm JM. Manubriosternal disjunction a new approach for surgical repair. *Acta Chir Belg.* 2004;104:593-5.

doi:10.1016/j.jtcvs.2009.01.029

Reply to the Editor:

We read with interest the letter by Dr Murala and associates¹ on the repair of a manubriosternal fracture and would like to thank the authors for their comments regarding our recent publication on repair of traumatic sternal deformities. We also thank the editors for the opportunity to respond to the letter by Dr Murala and associates. We reported the possible morbid consequences of nonoperative management of sternal fractures when associated with multiple trauma. In our research of the subject, we also found multiple methods described for treatment of this entity, ranging from

nonoperative "conservative" management to various open surgical methods. Richardson and colleagues in 1975² described the concept of early operative repair for traumatic sternal deformities.² Our strategy has evolved over time and is now much more aggressive toward early surgical intervention. We currently favor the concept of early surgical fixation, with or without bone grafting as necessary. The method of fixation depends on the particular clinical situation and may range from simple suture, as used by Dr Murala and associates, to rigid titanium plates and screws as we described. Our bias also favors anatomic correction of the deformity in distinction to Dr Murala's commentary. It is our belief that this aggressive approach will avoid the late complications of chronic nonunion of the sternum and the associated morbidities.

Adel Irani, MD
University of Texas Medical School
Houston
Cardiothoracic and Vascular Surgery
Houston, Tex

References

1. Murala JSK, Nunn G. Management of traumatic manubriosternal dislocation in children [letter]. *J Thorac Cardiovasc Surg.* 2009;138:517-8.
2. Richardson JD, Grover FL, Trinkle JK. Early operative management of isolated sternal fracture. *J Trauma.* 1975;15:156-8.

doi:10.1016/j.jtcvs.2009.04.033