AB018. Surgical stabilization of chest wall fractures

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Abstract: Chest wall fractures affect more than 350,000 people in the US annually. They can result in severe pain, deformity, flail chest, respiratory failure, and permanent respiratory insufficiency. Traditionally, they were largely treated conservatively. However, pain control is not effective and the patient risks suffering from prolonged respiratory failure and permanent deformity. In the last 10 years, surgical stabilization of chest wall fracture has started to gain acceptance and has become more popularized. Advantages of surgical stabilization include but are not limited to rapid and significant pain control, correction or prevention of chest wall deformity, earlier improvement of lung function, decreased need of tracheostomy, reduction in time on the ventilator, reduced length of ICU and hospital stay, and early return to normal functional life. There are at least 4 commercially available chest wall fracture fixation systems. In general, they share very similar design in form of semi-rigid fixation, anterior plating, being low-profile, made from titanium, easily shapeable, and using locking screws. They employ orthopedic AO principles such as: anatomic reduction, stable fixation, preservation of blood supply, and early active mobilization. These stabilization devices are made of titanium which has the following advantages. They are very stable and can remain in the body for an indefinite period of time. There have good pliability and allow excellent and precise adaptation to the contour of the ribs. They have minimal rebound after bending. Allergic reaction is rare. They have little interference with CT or MRI. Despite recent advances, surgical stabilization of chest wall fractures has not been applied to the fullest extent. In general, indications for surgical stabilization include: all flail chest, multiple severely displaced fractures, or failure of non-operative treatment. Recommended timing of surgery is early, preferably within 72 hours. Surgical approach in general is open exposure employing muscle-sparing technique as much as possible. Incision should be individualized and based upon the fracture pattern. Isolated thoracoscopic repair has been reported. Not every rib fracture needs to be fixed. In general, repair of ribs 1, 2, 11, and 12 does not confer additional benefit, except in marked displacement, vascular impingement, or localized refractory pain. Fractures within 2.5 cm of the transverse process pose technical challenge in applying the proximal portion of the plates. Fractures within 2.5 cm of the costal cartilage may be repaired by fixation to either the cartilage or sternum. Rib fractures should be repaired sequentially, and not in an "every other" fashion. In patients with multiple fractures series (flail chest), both fracture lines should be stabilized wherever possible. Fracture gaps >10 mm should not be bridged using only a plate. Bone grafting should be considered when there is >10 mm rib length missing. Autologous graft and commercially available, non-autologous grafts are equally effective for this purpose. The author has witnessed many patients recovered much faster after surgical stabilization of chest wall fractures and hope more awareness will result in more patients deriving the benefits of these techniques.

Keywords: Surgical stabilization; chest wall fractures

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