Expert's comment concerning Grand Rounds case entitled “Anterior, thoracoscopic-assisted reduction and stabilization of a thoracic burst fracture (T8) in a pregnant woman” (by Klaus John Schnake, Matti Scholz, Andreas Marx, Reinhard Hoffmann, Frank Kandziora)

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The author describe a case of a 24-year-old woman in the 19th week of an uncomplicated pregnancy who was involved in a motorcycle accident as the accompanying pillion rider. She complained of thoracic back pain and radiographs revealed a burst fracture of T8 and a compression fracture of T5. The burst fracture at T8 manifested with local kyphosis of 20° with mild narrowing of the spinal canal and no posterior ligamentous disruption. Both endplates were involved; so it was classified as an AO type A3.3. The compression fracture at T5 was mildly wedged and described as AO type A1.2. Ultrasound examination of the fetus was reported as normal.

The initial treatment plan was pharmacological with Fentanyl Transdermal Therapeutic System (TTS) 25 µg/h for 5 days, plus ibuprofen and paracetamol. The patient continued to complain of pain severe enough to limit mobilization, so surgical treatment was performed.

In the lateral position under general anesthesia (rapid sequence induction), the patient underwent a minithoracotomy with thoracoscopic assistance, T8 corpectomy, tricortical iliac crest graft reconstruction and lateral plate fixation.

The postoperative course was uneventful: The patient went on to deliver a healthy baby at term and radiographs showed no loss of reduction at 12 months follow-up.

The author should be commended for performing a complex operation under highly guarded conditions. Trauma including spine fractures during pregnancy can be very stressful for both the patient and the treating physicians. Especially when considering an operative approach, concerns regarding radiation exposure, pain management, anticoagulation, anesthesia and its effect on both the mother and the fetus are present. Patients who suffer orthopaedic trauma during pregnancy are at increased risk of preterm birth, placental abruption and perinatal mortality [1].

Rationale for treatment and evidence based literature debate

Operative treatment in a pregnant patient

Literature exists describing both non-surgical as well as surgically successful treatment of orthopaedic trauma during pregnancy [1–3]. Lenarz et al. [4] produced a case report of the treatment of a burst fracture of T12 and an

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incomplete neurological deficit in a woman 17 weeks pregnant. Through a lateral approach—a lead drape was placed over the pelvis of the patient—a twelfth vertebral corpectomy and spinal canal decompression were performed and the space reconstructed with a carbon fiber cage, local bone graft, and anterior lateral instrumentation.

General anesthesia for the pregnant patient is well tolerated using the agents described: Dimenhydrinate suppresses vomiting, and rapid sequence induction using Propofol, Rocuronium bromide and Sufentanil is recommended. Fenoterol is used to help maintain relation of the uterus. Sevofluran and Sufentanil maintain the anesthesia, although both agents will be found in the fetal circulation to some degree, and may require monitoring.

An anterior surgical approach in the lateral decubitus position is considered the best option for positioning the mother and fetus as well as providing direct visualization of the injured spine.

Exposure of the fetus to radiation is an obvious concern when considering surgery. This can be minimized with lead draping of the pelvis and limited fluoroscopy. Teratologic effects from radiation are most common during the first trimester, thus rendering the timing of this case somewhat safer [4].

Operative treatment of a thoracic burst fracture

A great deal of literature exists that support the conservative or non-operative choice for treatment of a thoracic or lumbar burst fracture that is stable and without neurological deficit [5–7]. The TLICS classification system recently introduced also recommends that stable burst fractures can usually be treated without surgery [8]. This fracture, however, has the appearance of a coronal split component, one which due to the interposition of soft tissue, can often lead to a painful pseudarthrosis or non-union, and may be one of the exceptions to the treatment algorithm. Many authors will consider surgery for a coronal split fracture even without posterior ligamentous disruption or neurological deficits [9–11].

Anterior thoracoscopic stabilization

Both thoracoscopic and video-assisted mini-open approaches have gained some popularity for treating thoracic fractures [12–14]. Stand-alone plating, such as in the case illustrated, will be successful in many situations, but can be supplemented with posterior pedicle screw instrumentation if needed. Although the learning curve can be steep and technical difficulties may exist, purported advantages include lessened morbidity from the exposure, reduced blood loss, and improved cosmetics. Although fractures from the upper thoracic spine to the mid lumbar area can be

treated in this fashion, given the intrauterine pregnancy, it is best if the diaphragm is left intact and the abdominal cavity left alone [4].

Personal preference

My personal preference in any fracture that is neurologically intact and stable from a ligamentous standpoint is to treat non-surgically as much as possible. Whether using a cast, a molded orthosis, or no bracing at all, excellent results have been described by many authors. I have a certain degree of reservation about electing to proceed to the operative theatre after only 4 or 5 days of observation, but if lack of progress was of such concern, surgery could be considered. I would be much more comfortable making that decision if there was a neurological deficit to address [4]. On the other hand, the coronal split nature of the fracture does lend itself more to considering a surgical approach than the standard burst or compression fracture would. I agree with the choice of an antero-lateral thoracic approach as it gives direct visualization of the fracture, affords short segment instrumentation, decompression, if necessary, and naturally best protects the fetus and the mother. Given that, the decision of whether to proceed with thoracoscopic or a mini-open video-assisted approach or a traditional thoracotomy would depend on the surgeon's expertise and preference. The important point is to perform the procedure as expeditiously as possible, with least morbidity and radiation.

Conclusion

The author has described a case report that further validates that when indicated, careful and well-done surgery for thoracolumbar fractures can be quite successful in the pregnant individual. It would appear that the most appropriate time for surgical treatment would be the second trimester, considering the pharmacologic, radiation, and gynecologic concerns of the early and late trimester. An antero-lateral approach in the lateral decubitus position appears to be safe, with little morbidity, and produces quite reasonable results.

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