Restoring the Severed Breast and Chest following Seat Belt Trauma

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Summary: In this article, we presented 2 cases of rare clinical presentation of 3-point lap-diagonal seat belt injuries and provided a brief overview of the spectrum of the associated deformity and morbidity. Both of our patients presented in a delayed fashion during the subacute period at 12 and 4 months, respectively, following their traumatic seat belt injuries, which improved with surgical intervention. Ideally, these injuries should be repaired during the subacute period once any life-threatening injuries have been addressed, because seat belt-restraint injuries may otherwise lead to chronic pain, functional loss, and physical deformity. (Plast Reconstr Surg Glob Open 2020;8:e2849; doi: 10.1097/GOX.0000000000002849; Published online 21 May 2020.)

INTRODUCTION
Seat belts have been shown to reduce the risk of serious injury to passengers and automobile drivers by >50% and the risk of fatal injury by 63%–67%. Unlike passive forms of restraints such as airbags, 3-point lap-diagonal seat belts dynamically hold individuals in their seats, thereby preventing them from catapulting forward and sustaining fatal injuries. However, due to the nature of the blunt force they can deliver to the neck, chest, or abdomen, seat belts injuries—when they occur—have been associated to specific laceration and contusion patterns and morbidity. Here, we discuss 2 cases of seat belt–related breast/chest injuries referred to our plastic surgery clinic for treatment, as well as a brief overview of the spectrum of deformity and morbidity associated with 3-point lap-diagonal seat belts.

CASE 1: FEMALE BREAST INJURY
A 53-year-old woman with a history of symptomatic macromastia presented with a recently acquired breast deformity and pain in her right breast. Approximately a year earlier, she was the driver of a motor vehicle involved in a collision and suffered an extensive right breast hematoma as a result of a traumatic seat belt injury. A computed tomographic scan of her chest demonstrated a large hematoma involving most of her right breast. She subsequently developed a painful scar and hyperpigmented, oblique cleft along with a size discrepancy between her 2 breasts (Fig. 1A). She presented to us wishing to address her deformity but was not experiencing pain in the affected area.

A right breast reduction was performed with modifications to excise an oblique horizontal cleft of skin and scar tissue including residual encapsulated hematoma, fat, and glandular necrosis. Consequently, we designed a modified dermo-glandular inferior pedicle and performed a standard left side inferior dermo-glandular pedicle reduction. The postoperative course was complicated by minor delayed healing of her inferior incisions, but overall led to an improvement of her deformity (Fig. 1B).

CASE 2: MALE BREAST AND PECTORALIS MAJOR AVULSION
A 47-year-old man was a passenger in an automobile during a collision and sustained a seat belt injury across his left chest wall. He presented with a resultant symptomatic deformity and functional deficits following left pectoralis major (PM) muscle tear, with 2 underlying rib fractures (Fig. 2A). He developed significant swelling of this site and a resolving ecchymosis consistent with a large hematoma. He subsequently developed increasing pain of the left chest wall that did not remit, which prevented him from performing manual labor. He initially did not wish to have any surgical treatments and was ultimately evaluated by orthopedic surgery following the accident and offered no treatment.

Approximately 4 months following the injury, he presented to plastic surgery for an attempted repair of the muscle laceration. A computed tomographic scan done at the time of the initial injury showed a complete left medial PM tear with muscle remnant retracted laterally. Magnetic
resonance imaging findings completed in the subacute period were consistent, with scarred soft tissue overlying a rupture through the majority of the medial muscular belly of the left PM sternal head, with lateral retraction and associated Morel-Lavallee lesion consistent with residual hematoma of the chest wall.

For our repair, a left PM muscle block was performed under ultrasound guidance. The rupture was approached through an inframammary incision. A thick capsule containing approximately 50 mL of seroma consistent with the previous magnetic resonance imaging findings of Morel-Lavallee lesion and laterally retracted scarred PM muscle were encountered and excised completely to free the remaining healthy muscle. Nonviable muscle was debrided and 2 planes of dissection both anterior and posterior to the muscle were completed to allow adequate advancement and approximation of the PM edges as well as overlying breast tissue. The muscle repair was completed with interrupted figure-of-eight 0 Ethibond sutures placed at 1 cm intervals and temporarily tensioned with hemostats. Following muscle repair, the remaining glandular and subcutaneous tissues were then repaired in a layered fashion and drains were placed. The postoperative course was uneventful. On 4-month follow-up (Fig. 2B), he described a significant reduction in pain from a 6–7 to a 3 out of 10 (10 being severe). His range of motion had improved, but he complained of some restricted range of motion, particularly with arm abduction.

Fig. 1. A female driver presented with severe right breast injury. Preoperative picture (A) showing deformity following seat belt injury and postoperative picture (B) after surgical intervention.

Fig. 2. A male passenger presented with severe left chest wall injury. A, Preoperative picture showing deformity following traumatic left PM muscle tear resulting from a seat belt injury during motor vehicle collision. B, Results at 4 months postoperative.
Table 1. Spectrum of Typical Seat Belt Injury–related Morbidity in Adults

| Severity of Injury | Seating Position | RFQ |
|--------------------|------------------|-----|
| Mild               | Moderate         | Severe         |
| Head and neck      |                  |                |
| Chance-type fracture | –               | –              | Cervical fracture | R >> F | ++ |
| Chest              | –                | –              | Female breast avulsion | F > R | + |
| Chest wall trauma  | –                | –              | Pectoralis major rupture | F > R | + |
| Abdomen            | –                | –              | Thoracic fracture | R >> F | ++ |
| “Seat belt sign”   | Abrasion or ecchymosis secondary to overlying lap belt | More severe abrasion secondary to overlying lap belt | – | F > R | ++++ |
| Chance-type fracture | –    | –              | Lumbar fracture | R > F | ++ |
| Bowel injury       | Compression of abdominal wall and viscera; increased intra-abdominal pressure | Severe laceration of stomach, colon, or small intestine | – | F > R | ++ |
| Splenic laceration | –                | +              | –              | F > R | + |
| Hepatic laceration | –                | ++             | –              | F > R | + |
| Pelvic and others  | –                | +              | –              | F > R | + |

F, front; R, rear; RFQ, relative frequency of particular injury in comparison to spectrum of injuries noted across several studies.

SPECTRUM OF SEAT BELT–ASSOCIATED MORBIDITIES

Seat belt–related injuries, often termed “seat belt syndrome” are a spectrum of injuries involving the chest wall that includes soft tissue injury, clavicular and rib fractures, mesenteric tears, and potential hollow viscus perforations. Skin abrasions and bruising often occur on the surface, and the overall extent of injuries is linked to the degree of restraint from the 3-point lap-diagonal seat belts (Table 1). However, several factors do play a significant role in determining the severity of the injuries sustained from a 3-point lap-diagonal seat belt such as the velocity of the collision and the passenger location.

Reported female breast injuries from 3-point lap-diagonal seat belts have ranged from mild avulsion, recovering completely with conservative breast care, to moderate injuries associated with intramammary hematoma and fat necrosis as seen in our patient, to complete separation of the breast from the chest wall requiring emergency mastectomy. In rare cases, it can also cause damage to mammary implants. In men, seat belt–related chest injuries have been underreported in the literature, with the first published case dating back to 2008, describing a PM rupture. This pattern of PM rupture is a rare occurrence. More commonly, rupture of the PM tendon occurs in male athletes and is often described as an avulsion of the tendinous insertion from the humerus. It is also important to point out that specific patterns of injury such as the ones seen in our 2 cases reflect trauma sustained as a result of a 3-point lap-diagonal seat belt injury. In contrast, intra-abdominal injuries such as mesenteric tears were more prevalent when 2-point restraints were the predominant passive restraint used in American automobiles.

PATIENT CONSENT STATEMENT

The authors declare that they obtained the patient’s consent for the inclusion of his photograph in the article.

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