

Seat belt breast injury: a reconstructive approach to managing unilateral bisected breast deformity

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SUMMARY

Seat belt breast deformity can result in significant aesthetic, functional and psychosocial sequelae. Although seat belt breast deformity is well documented, there is a lack of literature describing their reconstructive management. We describe the surgical management of a 63-year-old woman presenting with stage 2b seat belt breast deformity, who underwent scar revision, repositioning of the nipple–areola complex and contralateral breast reduction using Wise-pattern incisions based on superior pedicles. She made an excellent recovery with an improved aesthetic result.

BACKGROUND

The WHO estimates there are 1.35 million deaths per year from road traffic accidents. In the UK, in 2019 there were 89 331 casualties and 736 fatalities from car-related road traffic incidents.^{1 2} The introduction of seat belt legislation in February 1983 has led to a marked reduction in road traffic accident-related mortality. However, it has also led to an increase in a specific pattern of blunt trauma known as ‘seat belt syndrome’.³ The exact incidence of seat belt trauma is unknown and often under-reported. Seat belt syndrome injuries range from soft tissue injury of the torso, sternal fractures, spinal injuries and perforation of abdominal viscera. To date, a total of 47 patients with seat belt-related breast trauma have been described in the literature. These cases cover a wide spectrum of presentations ranging from mild injuries to severe and life-threatening injuries.

Soft tissue trauma from seat belt syndrome results from rapid decelerating and compressive shearing forces applied to the torso. A range of factors can influence the degree of soft tissue injury including speed of travel, air-bag deployment, body habitus, and the speed of deceleration.

Seat belt breast deformity occurs when powerful decelerating forces thrust the torso against a rigid overlying seat belt. This can result in significant deformity where the breast soft tissues are split along the oblique axis of the seat belt. It can also result in functional sequelae where the lactiferous ducts are transected.⁴ Seat belt breast injuries have been predominantly described in women however there are reported cases affecting men.⁵

CASE PRESENTATION

A 63-year-old woman presented with a right bisected stage 2b breast deformity. She was a front seat passenger in a head-on road traffic accident in 2013. At the time of collision, she was wearing a



Figure 1 Right-sided breast deformity showing a deep vertical cleft and near total nipple–areola complex inversion (front view).

three-point lap-diagonal seat belt. She subsequently sustained a closed blunt trauma seat belt injury to her right breast. There were no open wounds at the time of injury, only local swelling and extensive bruising. Eight days post injury she developed sharp, stinging pains in her right breast that lasted approximately 2 weeks. Over the course of the



Figure 2 Right-sided breast deformity showing a deep vertical cleft and near total nipple–areola complex inversion (lateral view).



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Figure 3 Postoperative appearance of the reconstructed right breast (front view).



Figure 4 Postoperative appearance of the reconstructed right breast (lateral view).

following few months she developed volume shift in the lateral cranial area and into the right axilla with severe indentation and inner scarring. A deep vertical cleft formed through the right breast meridian resulting in bisection of the breast tissue and near total inversion of the right nipple–areola complex (NAC). Breast asymmetry was magnified by a large pendulous contralateral left breast (figures 1 and 2).

In addition to her breast injury she sustained left hand fractures requiring open reduction internal fixation and a traumatic abdominal hernia, repaired 3 years later via a laparoscopic approach.

The resulting breast deformity had led to a significant impact on the patients' quality of life. Following consultation with her general practitioner she was referred for assessment under the plastic surgery team with a view to performing reconstruction.

INVESTIGATIONS

Clinical photographs were taken preoperatively and postoperatively.

Annual mammographic screening following trauma has not identified any concerning features of malignancy.

TREATMENT

In 2020, almost 7 years postinjury she underwent scar revision, repositioning of the right NAC, contralateral left breast superior pedicle breast reduction and excision of lipoma in the right upper chest.

Under general anaesthetic, standard Wise pattern breast reduction incisions were made with superior pedicles planned on both sides. Intraoperative findings revealed extensive scarring along the medial aspect of the right breast with tethering of the NAC to underlying soft tissue. The scarring was released, and the NAC was repositioned on its superior pedicle. Bright red bleeding from the edges of the NAC was observed following completion of the scar release.

Simultaneous left breast reduction was performed to achieve symmetry and a well-encapsulated lipoma was removed via a longitudinal excision over the right upper chest (figures 3 and 4).

OUTCOME AND FOLLOW-UP

She made an excellent postoperative recovery with no immediate or late complications. She was discharged from hospital on the same day of surgery with instruction to wear a sports bra for 6 weeks.

Table 1 Severity, investigation and management of seat belt breast injury (modified from Teo and Song classification)⁷

Severity	Presentation	Investigations	Management
Stage 1a	Immediate with bruising and pain	Chest X-ray ± USS, trauma assessment	Dress/close wounds Capsulotomy ± implant exchange
Stage 1b	Immediate with expanding breast	CT scan ± contrast angiogram, trauma assessment	Resuscitation, consider arterial embolisation ± blood transfusion
Stage 2a	Late with tender or palpable lump	Triple assessment	Consider reconstruction with lump excision Breast cancer surveillance
Stage 2b	Late with structural change	MRI + triple assessment	Consider reconstruction, scar revision ± NAC repositioning ± contralateral breast reduction. Breast cancer surveillance

NAC, nipple–areola complex; USS, Ultrasound.

Table 2 Complications of seat belt breast injuries and associated investigation and management^{5–8}

Complications	Investigations	Management
Expanding haematoma	Contrast CT angiogram	Resuscitation ± blood transfusion Consider urgent embolisation ± surgical haemostasis
Lactiferous duct injury	Ultrasound ± MRI	Aspiration ± drain insertion ± medication to suppress lactation
Fat necrosis	Clinical assessment	Conservative ± excision
Breast lump	Triple assessment	Consider excision ± reconstruction
Implant rupture	Ultrasound ± MRI	Capsulotomy ± implant removal or exchange
Pectoralis major rupture	Ultrasound ± MRI	Consider surgical tendon repair and physiotherapy
Morel-Lavallée lesion	Ultrasound ± MRI	Drainage ± capsule debridement and resection

At review in clinic 3 months postoperatively she reported no pain or issues with her breasts. She was subsequently discharged from clinic with no further follow-up.

DISCUSSION

In 2007 Majeski classified breast injuries from seat belt blunt trauma. Injuries were broadly categorised 1–4 from mild to severe. Where class 1 included small breast lumps following trauma and class 4 involved breast avulsion injury.⁶ In 2014 Song *et al* updated this classification to a four-tier system based on timing of presentation (early or late), presence of bruising, presence of an expanding swelling and presence of a cleft deformity.⁷ [table 1](#)

A late presentation, defined as more than 3 weeks postinjury, with a cleft deformity typically provides a more complex reconstructive challenge. These injuries are also associated with a higher rate of breast cancer following triple assessment (17.2%).

For this reason, it is currently recommended that all patients with 2b or significant seat belt breast deformity should receive close monitoring for developing breast cancer. Monitoring should be with annual mammography and triple assessment if a new mass is identified.⁷

Stage 2b breast deformity provides a significant reconstructive challenge in restoring natural breast contour, repositioning of the NAC and restoration of the infra-mammary fold.

A modified Hall-Findlay type mastopexy has been described by Paddle *et al* with good aesthetic results when managing a bisected stage 2b breast deformity.⁸ Teo *et al* described a similar approach whereby the edges of indentation were incised and

de-epithelised. The NAC was subsequently raised on a superolateral pedicle while superomedial and inferolateral pillars were created and mobilised to close the defect.⁹

Due to the wide range in presentation of blunt breast deformity, there is no current adopted standard of reconstruction. Cases should be assessed on an individual basis where realistic targets are set, taking into account the degree of deformity, patient expectation, surgical expertise and patient factors including comorbidities and body habitus ([Table 2](#)).

Learning points

- ▶ Severe seat belt breast deformity has a high association with breast malignancy.
- ▶ Close monitoring with annual mammographic screening is advised for seat belt breast deformity.
- ▶ Severe bisected breast deformity can be reconstructed via scar release and nipple–areola complex repositioning.
- ▶ Reconstruction of seat belt breast deformity is associated with improved quality of life.

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