



CWIS Chest Wall Injury Summit 2023

Oral Presentation Abstract Submission

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Title of Presentation Costal Margin Injuries: Presentation, Management and Outcomes According To The Sheffield Classification

Background

Costal margin rupture (CMR) injuries are under-diagnosed and inconsistently managed, whilst carrying significant symptomatic burden. We hypothesised that systematic classification of CMR injuries would relate to injury patterns and management options.

Methods

Data were collected prospectively relating to the variants of costal margin rupture injuries presenting between 2008 and 2022 to a Major Trauma Centre in the United Kingdom. Injuries were categorised using application of the Sheffield Classification to CT scans using axial and coronal planar images and 3D reconstructions. Variables analysed included gender, age, body mass index (BMI), mechanism of injury, associated injuries, management, complications and outcomes.

Results

56 cases were identified. 12 awaiting a management decision or surgery were excluded. 42 patients were included in the study: 17 managed conservatively, and 25 underwent surgery. Compared with CMR, CMR+IH/TDIH was associated with chronic presentation ($p=0.02$), a cough/sneeze/retch (expulsive) mechanism ($p<0.001$), rupture at a lower costal cartilage (CC) level ($p<0.001$), the absence of other CC fractures ($p<0.001$), the presence of other rib fractures ($p=0.02$) and definitive management being

surgical (73% vs 37%, $p=0.02$). The CC injury in CMR+IH/TDIH tended to occur at the interchondral joint with the cartilage cephalad rather than through the cartilage ($p<0.001$). Expulsive mechanisms were associated with chronic presentation ($p=0.002$), injury at a lower CC level (9th vs. 7th, $p<0.001$), lack of other CC ($p=0.01$) but not the presence of other rib fractures ($p=0.24$) or definitive surgical management (0.11). There were no associations between either the pattern of injury or mechanism and gender or age.

The 25 patients underwent 32 operations. Five patients underwent 7 repeat procedures, two had prior surgery where CMR was not identified (one Diaphragm Rupture repair, one Surgical Stabilisation of Rib Fractures (SSRF)), one had a double layer mesh repair (DLMR) after a failed external mesh repair; one had repeat surgery after a failed IH suture repair, two had repair of residual abdominal hernia and one had external mesh removal. Outcomes of isolated CMR were compared to cases of CMR with Intercostal Hernia (CMR+IH) or Trans-Diaphragmatic Intercostal Hernia (TDIH) combined (CMR+IH/TDIH).

One polytrauma patient with CMR died from his injuries: there was no other in-hospital death. For patients undergoing surgery after acute or delayed presentation, there were 9 suture repairs, 3 extrathoracic mesh repairs, 8 DLMRs, 1 CMR suture and 7 plate/screw repairs, and associated SSRF was performed in 11. Postoperative critical care was required for 7 patients and median length of stay was 3 days (range 1-4).

Conclusion

The Sheffield Classification is associated statistically with presentation, related chest wall injury patterns, and type of definitive management. Further collaborative data collection is required to determine the optimal management strategies.