

Does Application of a Pelvic Binder Affect the Sensitivity of Computed Tomography for Detecting Pelvic Ring Injuries?

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Background/Purpose: Placement of a pelvic circumferential compression device (PCCD) in the setting of an unstable pelvic ring injury is a well-accepted component of Advanced Trauma Life Support guidelines. These devices are effective in decreasing pelvic volume by reducing anterior and posterior ring injuries. Theoretically this could alter our ability to recognize the injury on radiographs and CT scans. The aim of this study was to determine how and when pelvic ring injuries might be obscured by the application of a pelvic binder, and to identify those patients at risk for missed injuries.

Methods: An IRB-approved retrospective study was performed using the data from a Level I and Level II trauma center database for pelvic ring injuries. The database included 867 patients with pelvic ring injuries. Inclusion criteria were a significant pelvic ring injury that first had an AP pelvic radiograph followed by application of a pelvic binder, followed by a CT scan, then an examination under anesthesia (all had operative fixation). Exclusion criteria were pelvic binders placed prior to radiographs, after CT scans, inadequate radiographs, timing of pelvic binder not documented, or inadequate examination under anesthesia. We identified 43 patients who met the criteria. They were classified separately by both a senior orthopaedic resident and a fellowship-trained orthopaedic traumatologist using the AO/OTA classification system. All patients had a fluoroscopic examination under anesthesia at the time of definitive fixation. To determine the sensitivity of CT imaging, we defined a false negative as any OTA type B or C injury that was occult on CT but noted in either of the other modalities. To determine sensitivity of initial radiographs, a false negative was any injury that was occult on radiographs, but noted using either of the other modalities.

Results: The sensitivity of CT with pelvic binder in place was 83.7%. The CT scan yielded a less diagnostic classification in 7 patients when compared with the initial trauma radiograph, which was verified on the fluoroscopic examination under anesthesia. The sensitivity of initial trauma radiograph alone when compared to the combination of CT scan with binder and examination under anesthesia was comparable at 79.1%.

AO/OTA XR	AO/OTA CT	EUA
61-C1.2a2c5	No injury noted	Bilateral SI joint widening
61-B1.1c5 (right)	61-B1.1c4 (right)	Bilateral SI joint widening
61-C1.2a3c5	61-B1.1c5	Vertical instability
61-B3.1(1)c5	61-B1.1c4	Right SI widening
61-C1.2a1c4	61-B2.2c10	Vertical instability
61-B1.1c8 (right)	61-B1.1c8 (left)	Bilateral SI joint widening
61-C2.2a2b1.1c5	61-B3.1(1)c5	Right SI widening

XR = radiograph, EUA = examination under anesthesia, SI = sacroiliac.

Conclusion: The placement of a pelvic binder has the potential to mask the severity of some pelvic ring injuries when relying only on CT for diagnosis. This was particularly true for open book–type injury patterns. A pre-binder AP radiograph may be diagnostic in these situations. Fluoroscopic examination under anesthesia is an essential adjunct when a binder is placed prior to the start of any imaging.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an “off label” use). For full information, refer to page 600.