Comparison of Circumferential Pelvic Sheeting Versus Commercially Available Pelvic Binders on Unstable Pelvic Injuries: A Biomechanical Cadaveric Study

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Background/Purpose: Commercially available binder devices are being increasingly applied to pelvic fractures, while many advocate simply placing a circumferential sheet for initial stabilization of such injuries. Control of hemorrhage in such situations is improved by a decrease in pelvic volume, but also immobilization of the fracture. We sought to determine whether these devices would provide more stability to an unstable pelvic injury as compared to circumferential pelvic sheeting, and compare them to each other. The null hypothesis was that there would be no significant differences in stability conferred by any of the tested devices.

Methods: Unstable pelvic injuries (OTA type 61-C-1) were surgically created in five fresh, lightly embalmed whole human cadavers. The pubic symphysis, rectus attachment, pelvic floor, anterior-posterior sacroiliac ligaments, sacrospinous, sacrotuberous, and iliolumbar ligaments were sharply transected unilaterally. Electromagnetic sensors were placed on each hemipelvis on each side of the pubic symphysis. The amount of angular motion during testing was measured using a Fastrak, three-dimensional, electromagnetic motion analysis device (Polhemus Inc, Colchester, VT). Either a T-POD, Sam Sling, Pelvic Binder, or circumferential sheet was applied in random order for testing by a fellowship-trained orthopaedic traumatologist. The measurements recorded in this investigation included maximum displacements for sagittal, coronal, and axial rotation during application of the device, bed-to-bed transfer, log-rolling, and head-of-bed elevation (45°).

Results: There were no differences in motion of the injured hemipelvis during application of any of the binder devices or the circumferential sheet. During the bed transfer, log-rolling, and head-of-bed elevation, there were no significant differences in displacements observed when the pelvis was immobilized with either a sheet or any of the pelvic binder devices. In addition, there were no differences when comparing the binders to each other (all $P > 0.05$).

Conclusion: There appear to be no advantages of using one particular commercially available binder to any of the devices commercially available with regard to the amount of stability provided to the unstable pelvic ring. A circumferential pelvic sheet is more readily available, costs less, is more versatile, and is equally as efficacious at immobilizing the unstable pelvis as compared to the commercially available pelvic binders tested. We advocate the use of circumferential sheeting for temporary stabilization of unstable pelvic injuries.

See pages 99 - 147 for financial disclosure information.