Introduction and Background
Stability in open book pelvic ring injuries is of major diagnostic and therapeutic concern. On trauma radiographs, 2.5 cm of symphysis pubis separation has previously been considered the threshold for stability. This is because it has been previously reported that the anterior sacroiliac ligament becomes disrupted at 2.5 cm. However recently this 2.5 cm mark has been questioned. In addition to the amount of gapping when the anterior SI ligament is torn, the pelvis’ ability to recoil must be factored in. For once the deforming force is removed from the pelvis, the pelvis will recoil, and this recoiled distance will be more reflective of what is seen on a trauma AP pelvis radiograph. This study looks at the legitimacy of the 2.5 cm mark. Furthermore, we showed that the pelvis is able to recoil a great degree from the pelvis, the pelvis will recoil, and this recoiled distance will be more reflective of what is seen on an AP pelvis radiograph. This study looks at the legitimacy of the 2.5 cm mark.

Materials and Methods
Eleven embalmed cadaveric pelvises and three fresh frozen pelvises were stripped of their soft tissues (save the ligaments) and placed onto a custom rig. The symphysis pubis ligaments were then cut, the pubic body was attached to a steel cable via a modified T bracket, and the hemipelvis was incrementally opened quickly via the pull of a heavy weight. The relationship between symphysis gap under tension and after recoil is displayed graphically to the left.

Discussion
This study shows that though the average amount of symphysis pubis separation at the time of anterior sacroiliac ligament disruption is 2.7 cm (SD ±1.1) often the pelvis’ ability to recoil is factored in, which would more accurately represent what would be seen on presentation in the emergency room, the distance the symphysis pubis is gapped is 0.9 cm (SD ±0.5). This is much less than the 2.5 cm mark. Furthermore, we showed that the pelvis is able to recoil a great degree from simulated anteroposterior compression pelvic ring injuries, even when stripped of its soft tissues, and after the anterior sacroiliac ligaments are disrupted. Graphically depicting the initial symphysis pubis separation vs. after recoil will give the treating physician a better understanding of the extent of the initial injury given the symphyseal separation on initial radiographic evaluation.

Results
For all specimens, the average pubic symphysis separation at which an initial tear was seen in the anterior SIIL was 2.7 cm (SD ±1.1). After the pelvis recoiled the distance was only 0.9 cm ±0.5. The relationship between symphysis gap under tension and after recoil is displayed graphically to the left.

References

Photograph of a pelvis being tested in the rig.

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