

Bladder Exstrophy Iliac Osteotomies: 3D Modeling Comparative Analysis Of Current Approaches' Impact On Intrapelvic Volume and Acetabular Version

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INTRODUCTION: Introduction: Bladder Exstrophy is a rare congenital ventral wall defect often surgically corrected with an iliac osteotomy to allow for urologic repair and correct acetabular retroversion due to pubic symphysis diastasis. There are three common approaches described for pelvic osteotomy: superior to anterior inferior iliac spine (anterior), superior to the anterior superior iliac spine (oblique), or over the posterior ilium iliac (posterior). However, there is no consensus on which approach maximizes intrapelvic volume for urologic repair and acetabular version for gait abnormality correction while closing the pubic symphysis. This study used three-dimensional modeling to investigate changes in intrapelvic volume and acetabular version for each approach.

METHODS: Methods: A bladder exstrophy model was used to create a virtual, 3D model. After virtual osteotomies, volumetric and vector analysis were to determine intrapelvic volume and acetabular version respectively.

RESULTS: Results: Intrapelvic volumes measured 462.20 cm³ pre-operatively and post-operatively, measured 373.25 cm³ for the anterior, 395.35 cm³ for the oblique, and 437.96 cm³ for the posterior approaches. The postoperative osteotomy gap was around 1.7cm for the anterior approach and around 2.3cm for the posterior and oblique approaches. The acetabulum was corrected by 18.65, 14.42, and 18.15 degrees of anteversion at a rate of 10.99, 6.42, and 7.63 degrees per cm osteotomy gap for the anterior, oblique, and posterior approaches respectively.

DISCUSSION AND CONCLUSION: Conclusions: The posterior osteotomy maximized intrapelvic volume while also anteverting the acetabulum to a similar degree as the anterior osteotomy albeit over a larger osteotomy gap. Therefore, the posterior osteotomy may require more osteogenesis than other approaches but could be superior for urologic repair, minimize risk of soft tissue complications, and still correct acetabular retroversion: resulting in superior clinical outcomes.

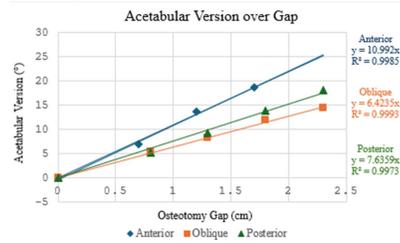
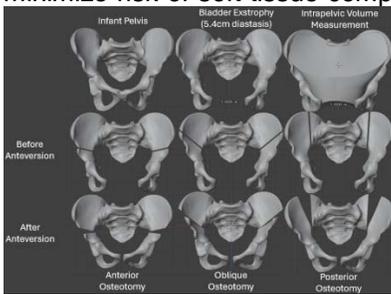


Table 1: Summary Data

	Anterior	Oblique	Posterior
Intrapelvic Volume (cm ³)	373.25	395.35	437.96
Final Acetabular Version (°)	18.65	14.42	18.15
Final Osteotomy Gap (cm)	1.7	2.3	2.3
Acetabular Version per cm Gap (°/cm)	10.99	6.42	7.64