

Iatrogenic risk of genital injury with retrograde anterior column screws: CT analysis

Joseph Patterson, JACOB A BECERRA, Andrew M. Duong, Haley L Nakata, Luke Ryan Lovro¹, Darryl Hwa Hwang², Nathanael D Heckmann

¹USC Orthopaedics, ²University of Southern California

INTRODUCTION:

Percutaneous retrograde fixation of anterior column and superior rami fractures of the pelvis requires instrumentation in close proximity to external genitalia, which may result in iatrogenic injury. We hypothesized that anterior column screw and guidewire trajectories which are “safe” – extra-articular from the hip and intra-osseous within the superior pubic ramus – may threaten genital structures including the clitoral body and glans clitoris in women and the spermatic cord and corpus cavernosum in males.

METHODS:

54 consecutive patients without prior pelvis pathology who received a pelvis CT with contrast between 2011-2020 were identified. Simulated screw cylinders of 5.5- and 7.0-mm diameter were fit to extra-articular and intraosseous position within the superior pubic ramus/anterior column pathway using a 3D computed tomography workstation (Synapse 3D, Fujifilm Healthcare). Screw trajectories were mapped to intra-osseous, extra-articular positions. Shortest cylinder distances to or screw/guidewire violation of the clitoral body and glans clitoris in women or the spermatic cord and corpus cavernosum in men were assessed. Washers were not simulated.

RESULTS:

The anterior column intraosseous pathway in females accommodated 87.5% of 5.5 mm and 75% of 7.0 mm; in males, 100% of 5.5 mm and 97.4% of 7.0 mm simulated screws. Direct injury to any external genital structure was observed in 63% of women with both 5.5 mm screws and 7.0 mm screws. The simulated screw trajectory contacted 12.5% of ipsilateral and 45% of the contralateral clitoral body. The glans clitoris was never injured. Direct injury to any external genital structure was observed in 65% of men with 5.5 mm screws and 68% with 7.0 mm screws. The simulated screws did not contact any ipsilateral spermatic cord but overlapped 22.4% of the contralateral spermatic cord, 0.65% of the ipsilateral corpus cavernosum, and 33.5% of the contralateral corpus cavernosum.

DISCUSSION AND CONCLUSION:

Computed tomographic modeling of uninjured pelvis suggests that “safe” extra-articular, intra-osseous trajectories of retrograde anterior column screws may threaten the clitoral body, corpus cavernosum, and spermatic cord. Limited dissection may be indicated for protection of these structures during retrograde anterior column screw placement.

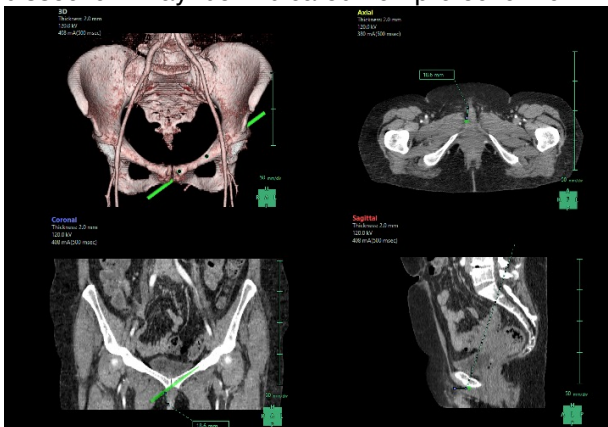


Figure 1. Female, screw contacting clitoral body with orthogonal measurement to glans clitoris

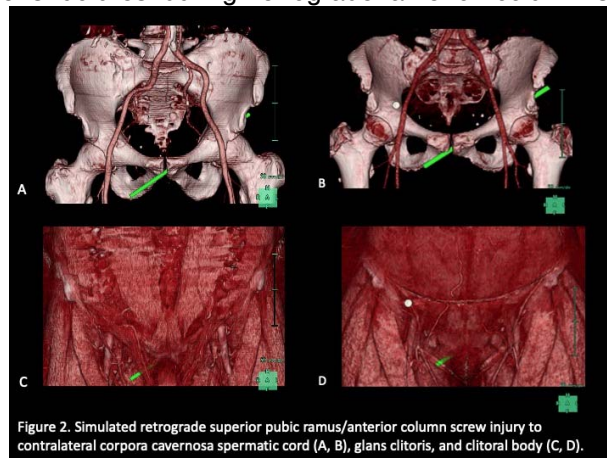


Figure 2. Simulated retrograde superior pubic ramus/anterior column screw injury to contralateral corpora cavernosa spermatic cord (A, B), glans clitoris, and clitoral body (C, D).