Is the Iliac Cortical Density Similarly Positioned in the Developing Pelvis?

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Purpose: The iliac cortical density (ICD) is a critical fluoroscopic landmark for pelvic percutaneous screw placement. It is unclear whether the classic ICD landmark is located similarly in the developing pelvis. Our purpose was to evaluate the ICD in pediatrics, and quantify the diameter of osseous pathways for three screw trajectories: iliosacral (IS) at S1 and transiliac-transsacral (TSTI) at S1 and S2 with respect to age and pelvic dysmorphism.

Methods: 267 consecutive pelvic CT scans in children aged 0-16 years were analyzed. ICD and S1 vertebral heights were measured at multiple regions along S1. Their height and corresponding ratios, as well as osseous screw corridor dimensions, were compared between age groups and by dysmorphic status.

Results: In the non-dysmorphic pelvises, S1 height, ICD height, and the ICD to S1 height ratio increased across age groups for all locations (P<0.001) (Fig. 1). All three screw pathway diameters increased with age (P<0.001). In the dysmorphic group, there was no increase in ICD to S1 height ratio with age. Except for the age 0-2 group, the ICD to S1 height ratios were significantly larger in the non-dysmorphic group. In the dysmorphic group, S1 TSTI pathway remained narrow with age while IS at S1 and TSTI at S2 had a significant increased diameter with age (P<0.001).

Conclusion: The ICD is a useful fluoroscopic landmark for percutaneous screw placement in the pediatric pelvis. For non-dysmorphic pelvises, the ICD to S1 height ratio, as well as osseous corridors for IS, TSTI at S1, and TSTI at S2 screw trajectories increase significantly with age. In dysmorphic pelvises, there is no significant improvement in the S1 TSTI corridor despite increased age and growth. The margin for safe screw placement in S1 is smaller for younger and dysmorphic pelvises.