## Asymmetric Sacral Dysmorphism: Prevalence and Impact on Surgical Planning

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**Purpose:** Proper iliosacral screw placement requires an understanding of sacral morphology and recognition of sacral dysmorphism. Although the characteristics of sacral dysmorphism have been well-described, the presence and relevance of asymmetric dysmorphic features have not been previously characterized. This study aims to determine the prevalence and surgical relevance of asymmetric sacral dysmorphism.

Methods: A retrospective review was conducted of patients presenting to an academic Level I trauma center between January 2023 and July 2024. Inclusion criteria were patients between age 18 and 85 years with a surgical pelvic ring injury and a thin-cut pelvis CT (≤2.0 mm) with 3D reformats. Sacral dysmorphism was defined by the inability to place a transiliac-transsacral screw in the upper sacral segment. Asymmetry was assessed by evaluating side-to-side differences in neuroforaminal height, upper sacral segment pathway obliquity, and anterior-posterior pathway width.

**Results:** Of 228 patients evaluated, 118 (51.7%) demonstrated sacral dysmorphism. Among patients with dysmorphism, 35 (29.6%) exhibited at least one feature of asymmetry. The asymmetric group included 19 females and 16 males, with an average age of 42.1 years (range: 16–91 years). Asymmetric features included differences in neuroforaminal height, upper sacral segment pathway obliquity, and pathway width (see figure).

**Conclusion:** Nearly 30% of patients with sacral dysmorphism demonstrate asymmetric features, which can impact surgical planning. Recognition of asymmetric sacral dysmorphism is important for proper execution of posterior pelvic fixation.

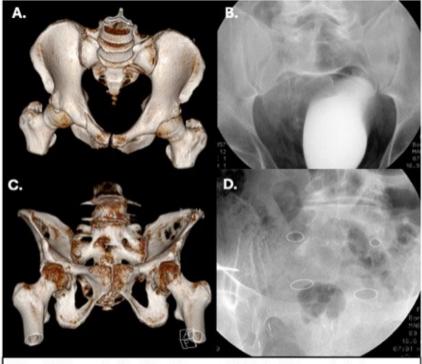


Figure 1: 3D reconstructions (A) and fluoroscopic inlet view (B) demonstrating asymmetric upper sacral segment anterior cortical densities representing variations in pathway obliquity. 3D reconstructions (C) and fluoroscopic outlet view (D) illustrating asymmetric neuroforaminal heights and morphology.