

# Is the Greater Trochanter the Ideal Freehand Landmark for the S2AI Screw Angle in the Caudal Direction? Commentary on “Extra-articular Portion of the Sacroiliac Joint—Between the Sacral and Pelvic Tuberosities: An Anatomical Guide for the S2-Alar-Iliac Screw Trajectory” by Tatara et al

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## Abstract

The author introduced a novel freehand technique for S2-Alar-Iliac screw placement Which demonstrated good clinical safety. However the optimal anatomical landmarks of the screw angle in the caudal direction have not been unified. The tip of the greater trochanter(TGT) was one of the most frequently chosen landmark in fluoroscopic or navigation guidance technique. Additional adjustments are always needed according to these studies. The freehand technique of the present study also choose the TGT as the as the landmark of the S2AI screw angle in the caudal direction, whether it also need any adjustment? We hope the author could explain more about this issue. Besides, the relationship between TGT and the sacral iliac bone is not static, which will make the reliability of the pre-surgery navigation software simulation doubtful.

## Keywords

free-hand, S2AI screw, spinopelvic fixation, anatomical landmark

The concept of the S2-alar-iliac (S2AI) screw was developed approximately one decade ago as an alternative method of pelvic fixation in spine surgery.<sup>2</sup> S2AI screw placement remain challenging, because of the complex three-dimensional anatomy of the sacroiliac region and surrounding neurovascular structures. Misplacement may result in catastrophic consequences. The author introduced a novel freehand technique for S2AI screw placement assisted with a guidewire using a new anatomical landmark.<sup>1</sup> In this technique, a guidewire is inserted into the ilium from the extra-articular portion of the sacroiliac joint just lateral to the ideal screw entry point toward the tip of the greater trochanter(TGT) and guides the screw trajectory. Navigation software is used preoperatively to determine the ideal S2AI screw trajectory. If the direction of the guidewire is satisfactory, all procedures of screw insertion are performed accordingly. A total of 104 S2AI screws of 52 patients who

underwent this technique were investigated. Only 4 screws (3.9%) breached dorsally. No screw-related complication was observed.<sup>1</sup>

According to our knowledge, TGT is not the only reported anatomical landmarks of the S2AI screw angle in the caudal direction. In previous studies about freehand S2AI technique of both Shillingford, J. N. et.<sup>3</sup> and Choi H.Y., et,<sup>4</sup> anterior

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inferior iliac spine(AIIS) was choose as the reference direction of S2AI, which could also offer a safe guide for the free hand placement of S2AI screws in adult patients with deformity. Several anatomical studies have confirmed the rationality of AIIS. The only drawback is its inconvenient touching in the prone position. There is no doubt TGT is more convenient to touch and locate in prone position. Traditionally, TGT was one of the most frequently chosen landmark in fluoroscopic or navigation guidance technique for S2AI screw placement, which facilitates a quick locating of a feasible screw path. However additional adjustments are always needed in these techniques. According to the surgical technique introduced by Marcus D et,<sup>5</sup> the S2AI screw trajectory was angled toward the TGT, but needed rostral to the sciatic notch by using the O-arm to avoid the inferior breach. May not be very precise, according to the 3D reconstruct image (Fig, 2 C, D) of the present article . the caudal direction of the S2AI screw and guide wire were both large extent cephalad to the TGT. Is this the adjustment after preoperative simulation? We are curious about this issue and the general rules. Secondly, the relationship between greater trochanter of the femur and the sacral iliac bone is not static, it may change with the motion of hip joint. Therefore, we are concerned about whether it is necessary to place the patient in the prone position during the preoperative CT three-dimensional assessment. If not, will the changed posture during the operation affect the accuracy of the preoperative evaluation? As risk assessment for inferior cortical breaches is the same important in S2AI screw placement. We eagerly hope that the author could explain detailly about the above questions.


### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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