

Clavicle chest cage angle difference

CCAD is a novel predictor of postoperative radiographic shoulder imbalance in AIS. However, radiographic shoulder balance does not always correspond to cosmetic shoulder balance.

Forty-four Lenke I AIS patients treated with posterior spinal fusion with a minimum 2-year follow-up were analyzed. Shoulder height difference (SHD) and CCAD were measured on anteroposterior standing radiographs. The inner shoulder height (SHi) and the outer shoulder height (SHo) were measured using the patients' photographs. The patients' satisfaction and the surgeons' fulfillment were evaluated using a questionnaire. A receiver operative characteristic curve analysis was performed to explore the threshold values of preoperative CCAD in the prediction of the final follow-up radiographic shoulder imbalance, patients' satisfaction, and surgeons' fulfillment.

At the final follow-up, the preoperative CCAD was significantly greater in patients with unbalanced shoulders ($\text{SHD} \geq 1\text{ cm}$). For cosmetic shoulder balance at the final follow-up, there was no significant difference in preoperative CCAD between Group 1i ($\text{SHi} \geq 1\text{ cm}$, $n=14$) and Group 2i ($\text{SHi} < 1\text{ cm}$, $n=30$), and the preoperative CCAD was also similar between Group 1o ($\text{SHo} \geq 1\text{ cm}$, $n=17$) and Group 2o ($\text{SHo} < 1\text{ cm}$, $n=27$). For patients' satisfaction and surgeons' fulfillment, the preoperative CCAD was significantly greater in patients with unsatisfied outcomes. The threshold value of preoperative CCAD to predict the final follow-up radiographic shoulder imbalance, patients' satisfaction, and surgeons' fulfillment was 5.5° .

CCAD is a good radiographic predictor for postoperative radiographic shoulder imbalance in Lenke I AIS patients. Moreover, it is also associated with the patients' satisfaction and surgeons' fulfillment postoperatively. However, CCAD cannot predict postoperative cosmetic shoulder balance ¹⁾.

Postoperative shoulder imbalance was observed in 25% of the surgically treated adolescent patients. The CCAD and AVR of the main thoracic curve were independent risk factors for postoperative shoulder imbalance in surgically treated patients with adolescent idiopathic scoliosis. The significant correlation between CCAD and postoperative shoulder imbalance seen in this study strongly suggests that the relationship of the shoulder girdle and chest cage has a role in maintaining shoulder balance ²⁾.

¹⁾
Han X, Liu Z, Qiu Y, Sha S, Yan H, Jin M, Zhu Z. Clavicle Chest Cage Angle Difference: Is It a Radiographic and Clinical Predictor of Postoperative Shoulder Imbalance in Lenke I Adolescent Idiopathic Scoliosis? *Spine (Phila Pa 1976)*. 2016 Sep;41(17):1346-54. doi: 10.1097/BRS.0000000000001521. PubMed PMID: 26909841.

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Yagi M, Takemitsu M, Machida M. Chest cage angle difference and rotation of main thoracic curve are independent risk factors of postoperative shoulder imbalance in surgically treated patients with adolescent idiopathic scoliosis. *Spine (Phila Pa 1976)*. 2013 Sep 1;38(19):E1209-15. doi: 10.1097/BRS.0b013e31829e0309. PubMed PMID: 23759803.

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