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Shoulder Balance and Scoliosis: The Unresolved Issue

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ABSTRACT

Background Data: The main indication of surgery in patients with AIS is better function and cosmesis. Shoulder balance should be considered amongst cosmetic parameters that are strongly associated with patient satisfaction after surgery in patients with AIS. Proper correction of the main and proximal thoracic curves in conjunction with horizontalization of upper instrumented vertebra (UIV) is supposed to promote shoulder balance. In other words, better correction of radiological parameters should promote clinical shoulder balance; however, this is not always observed.

Purpose: Determining which of the following radiological measures correlate significantly with postoperative clinical shoulder balance: T1 tilt, UIV tilt, clavicle rib intersection angle, and degree of proximal thoracic curve correction.

Study Design: Retrospective clinical case cohort study.

Patients and Methods: The study included 20 patients of AIS operated for correction by pedicle screw instrumentation. There were 13 females and 7 males. The mean age at the time of surgery was 14±2.4 years with a range from 11 to 18 years. Mean preoperative Cobb angle of the major curve was 76.1±21.7° corrected to a mean postoperative Cobb 28.2±14.2°. Correction percentage of the major curve was 63.1±14.2%. The data obtained from high resolution back view photographs (to assess clinical shoulder balance) and whole spine X-ray films taken within the first year of follow-up period (to assess radiological measures related to shoulder balance) were retrospectively evaluated. Outcome measures: clinical shoulder balance was correlated with 4 radiological parameters, namely, proximal thoracic curve correction percentage, T1 tilt, UIV tilt, and clavicle-rib intersection angle. Measurements were done by Surgimap software version 2.2.12 (Nemaris, Inc.,US, https://www.surgimap.com).

Results: A weak positive correlation was found between postoperative shoulder balance and UIV tilt (r)=0.242, P=0.305, and a very weak negative correlation was found between postoperative shoulder balance and proximal thoracic curve correction percentage (r)=-0.027, P=0.910. A moderate positive correlation but statistically nonsignificant was found between postoperative shoulder balance and T1 tilt (r)=0.440, P=0.052, and a statistically significant positive correlation was found between shoulder balance and clavicle rib intersection angle (r)=0.567, P=0.009.

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Conclusion: Horizontal UIV combined with proper correction of the main and proximal thoracic curves does not necessarily promote clinical shoulder balance. However, a moderate positive correlation exists between T1 tilt and shoulder balance, and a significant positive correlation exists between clavicle rib intersection angle and clinical shoulder balance. How to control those parameters remains unclear. (2018ESJ126)

Keywords: shoulder balance; AIS scoliosis; spinal instrumentation; pedicle screw fixation

INTRODUCTION

The main goal of surgical treatment in adolescent idiopathic scoliosis (AIS) is to improve function and cosmesis. This could be achieved via 3D maximum permanent correction of the deformity in order to halt curve progression, while leaving as many mobile segments as possible in the lumbosacral spine, in addition to balance the trunk.[5,23] Recommendations have been developed from King et al.[10] in 1983 to Lenke et al.[14] in 2001 to facilitate selecting the curves and the vertebral levels to be included in the fusion mass. Distally, surgeons focus on selecting levels that optimally correct the deformity and result in maximum lumbar flexibility. Proximally, the primary concern is to select the level that will achieve maximum deformity correction and fulfill well-balanced shoulders.[16] Lenke's classification recommended fusion of the structural proximal thoracic curve.[7,14]

The correction of the main thoracic curve while leaving a structural upper thoracic curve may lead to postoperative clinical shoulder imbalance. Others suggested instrumenting the upper thoracic curve according to the clavicular angle, the patient's preoperative shoulder balance, or T1 tilt.[11,15,18] In spite of these suggestions, authors found a discrepancy between radiographic and clinical shoulder balance; as in many cases, correction of radiological parameters related to shoulder balance may not guarantee well-balanced shoulders.[18]

In this study, we present the results of correlation between radiographic shoulder balance and clinical shoulder balance.

PATIENTS AND METHODS

At Alexandria main university hospitals, 20 patients who had adolescent idiopathic scoliosis had one stage or staged posterior surgery for correction of their deformities using modern instrumentation. These included 13 females and 7 males. The mean age at the time of the operation was 14±2.4 years with a range from 11 to 18 years. Patients included in the study were only patients with adolescent idiopathic scoliosis of different Lenke types except Type V and who were followed up for one year or more. Cases of congenital kyphoscoliosis and other causes of secondary scoliosis were excluded from the study.

All patients had high resolution posterior photographs (by high resolution cameras, within 2 meters from the patient, including head, neck, trunk, and proximal lower limbs, JPEG image) and whole spine X- ray films taken preoperatively and within one year postoperatively. All the measurements were done using surgimap® software version 2.2.12. (Nemaris, Inc., US, https://www.surgimap.com). By convention, when the right shoulder is elevated, it received positive values and left shoulder elevation received negative values; also, this was applied to all other radiological parameters except percentage of proximal thoracic curve correction. Clinical shoulder balance was defined as the angle from one acromion to the other as referenced from the horizontal line[25] (Figure 1). T1 tilt was defined as the angle between a line parallel to the upper end plate of T1 and the horizontal line[24] (Figure 2). UIV tilt was defined as the angle between a line parallel to the upper end plate of the upper instrumented vertebra and the horizontal line[12] (Figure 3). Clavicle rib intersection angle was

defined as the angle between 2 lines: the first line is drawn between the intersection points of the superior border of the clavicle and the first ribs on each side and the second line is the horizontal[25] (Figure 4). Cobb method was used to measure major structural and proximal thoracic curves (Figure 5).

Statistical Analysis

Statistical analysis was conducted to find a correlation between clinical and radiological shoulder balance (T1 tilt, UIV tilt, clavicle rib intersection angle, and proximal thoracic curve correction %). Data were fed to the computer and analyzed using IBM SPSS software package version 20.0 **(**Armonk, NY, IBM Corp**).** The Kolmogorov-Smirnov, Shapiro, and D'agstino tests were used to verify the normality of distribution of variables; Spearman's coefficient *r* was used to correlate between quantitative variables. Correlation is an effect size and the strength of the correlation is described using the absolute value of *r*. Significance of the obtained results was judged at the 5% level.

RESULTS

The study included 20 patients, 13 females and 7 males. The mean age at the time of surgery was 14±2.4 years with a range from 11 to 18 years. The main thoracic curve was the major structural curve in all cases except one case (Table 1). Various types of Lenke classification were included except for Lenke 5, where we had 6 patients categorized as Lenke 1, 1 patient as Lenke 2, 5 patients as Lenke 3, 7 patients as Lenke 4, and 1 patient as Lenke 6. Mean preoperative Cobb angle of the major curve was 76.1±21.7 (range 50.0–125°) corrected to a mean postoperative Cobb 28.2±14.2 (range 10-65°). Average correction percentage of the major curve was 63±14.2 (range 23.5–84.8%) (Figure 6). Mean preoperative proximal thoracic curve Cobb was 28.2±13.6 (range 2.0 – 51.0 °) that was corrected to a mean of 14.2±8.6 (range 0.8-28.8°) (49.4±19.0 % correction rate). D3 was the most common UIV in 50% of cases followed by D2. Choice of UIV level was dependent upon two factors, namely, preoperative shoulder status and the structural characteristics of the proximal thoracic curve (structural proximal thoracic curve usually was included in the fusion mass). A weak positive correlation was found between postoperative shoulder balance and UIV tilt (the angle between a line parallel to the upper end plate of the upper instrumented vertebra and the horizontal line) (r)=0.242, P=0.305; also, a very weak negative correlation was found between postoperative shoulder balance and proximal thoracic curve correction % (r)=-0.027, P=0.910. A moderate but statistically nonsignificant positive correlation was found between postoperative shoulder balance and T1 tilt (the angle between a line parallel to the upper end plate of T1 and the horizontal line) (r)=0.440, P=0.052, and a statistically significant positive correlation was found between shoulder balance and clavicle rib intersection angle (the angle between 2 lines: the first line is drawn between the intersection points of the superior border of the clavicle and the first ribs on each side and the second line is the horizontal) (r)=0.567, P=0.009 (Table 2, Figure 7-10).

Table 1. Patients' demographic and radiological characteristics within one year of follow-up.

Sex	Age	Lenke type	MC Preop Cobb	MC Postop Cobb	Postop shoulder balance	UIV level	UIV tilt	T1 tilt	CRIA	PTC correction %
F	16y	4CN	90	50	1.3	D3	8.3	4.5	-1.7	42.77
M	15y	3A+	89	21	-1.5	D2	-9.5	-5	-6.1	51.85
M	15y	1AN	60	30	-6	D3	00	-5.7	-5.4	20.45
F	18y	1A+	50	10	1	D2	3.7	3.7	0.8	67.99
F	16y	4CN	85	30	-2.9	D2	11	8.1	3.4	65
F	16y	2AN	56	20	00	D3	00	-3.1	00	40.79
M	11y	1AN	76	20	-3	D3	11.5	3.3	00	75.1
F	13y	1AN	82	26	-5.5	D2	17.9	10.7	1.5	33.96
F	12y	4BN	125	53	-7.5	D2	-5.8	-8.9	-3.8	43.11
F	15y	6CN	66	10	-3.7	D3	00	00	-4.2	25
M	11y	4C+	111	24	-8.2	D3	-3	-9.5	-6	59.8
F	15Y	3C+	85	65	-1.2	D3	12.8	10.7	2.8	46.97
F	13Y	4CN	50	24	-0.5	D3	00	00	00	63.64
M	16y	3BN	55	21	3.9	D5	13.2	10.5	7.3	22.73
F	12y	4C+	78	38	-3.9	D4	14.2	-7.4	-1.6	34.1
F	11y	4CN	112	39	-3.4	D3	6.3	3.7	-3	45.84
F	13y	3BN	75	20	-5	D4	7	00	-2.7	68.88
F	16y	1AN	60	21	00	D3	6.1	-9.7	00	31.14
M	18y	3CN	60	20	-3.7	D4	-7.5	-11	-6.9	90.83
M	18y	1AN	57	22	0.9	D2	7.1	5.4	6.8	57.62

MC: major curve; CRIA: clavicle rib intersection angle; PTC: proximal thoracic curve.

Table 2. Correlation of postop shoulder balance with UIV tilt, T1 tilt, clavicle rib intersection angle, and proximal thoracic curve correction % within one year of follow up (N=20).

Parameters	Postop shoulder balance	
	r_s	P
UIV tilt	0.242	0.305
T1 tilt	0.440	0.052
Clavicle rib intersection angle	0.567*	0.009*
Percentage of correction (PTC)	-0.027	0.910

r_s: Spearman's coefficient (strength of correlation).

*: Statistically significant at P≤0.05.

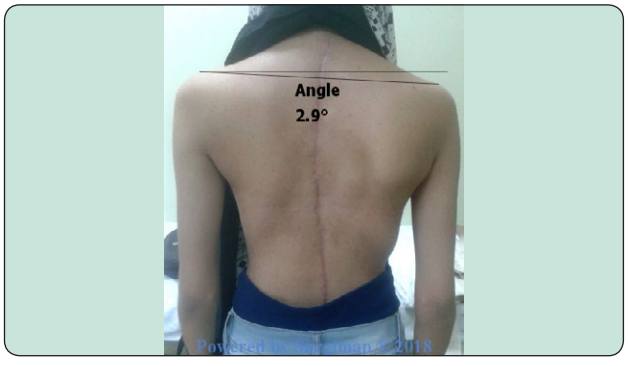

Figure 1. Clinical shoulder balance was defined as the angle from one acromion to the other as referenced from horizontal line.

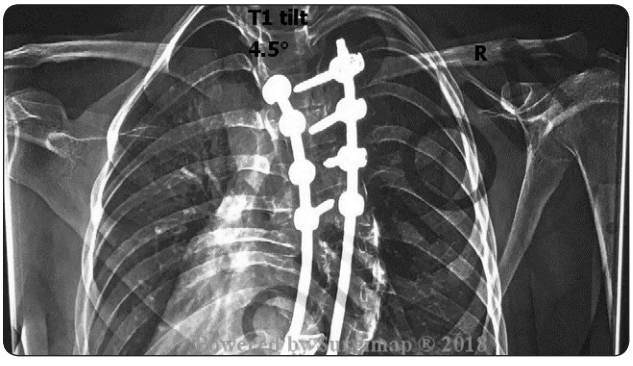

Figure 2. T1 tilt was defined as the angle between a line parallel to the upper end plate of T1 and the horizontal line.

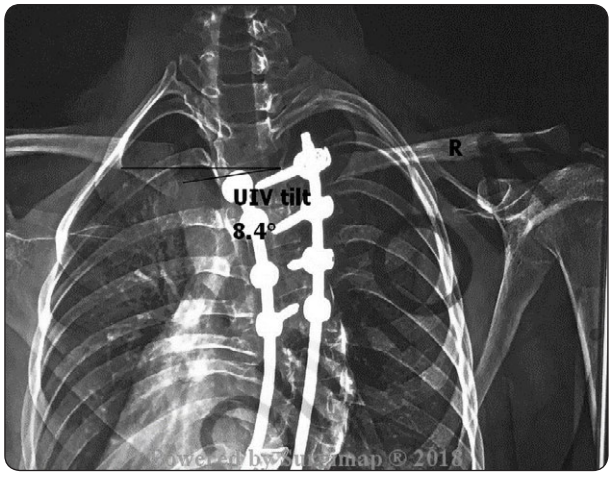

Figure 3. UIV tilt was defined as the angle between a line parallel to the upper end plate of the upper instrumented vertebra and the horizontal line.

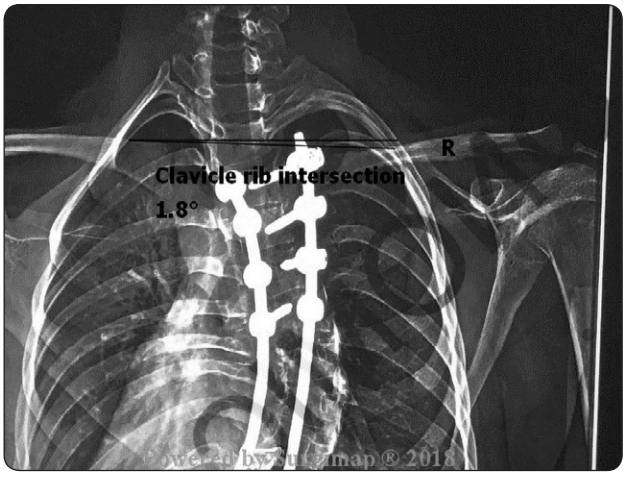

Figure 4. Clavicle rib intersection angle was defined as the angle between 2 lines, the first line is drawn between the intersection point of the superior border of the clavicle and the first ribs on each side and the second line is the horizontal.

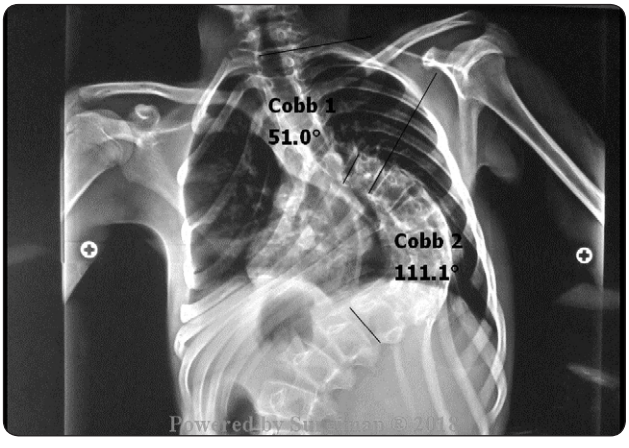

Figure 5. Cobb method was used to measure major structural and proximal thoracic curves.

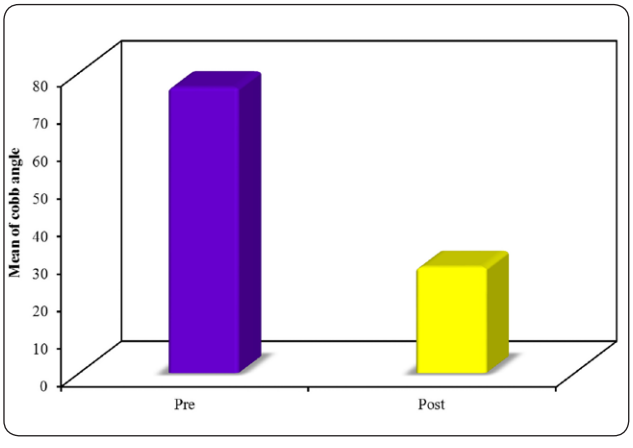

Figure 6. Average correction percentage of the major curve was 63% within one year of follow-up.

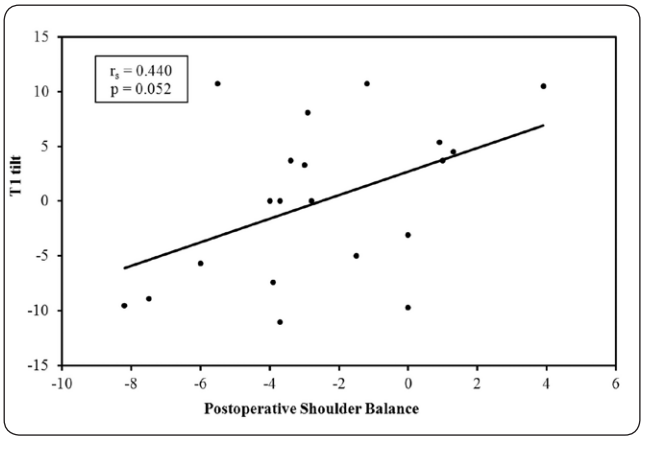

Figure 7. Correlation between one-year postop shoulder balance and T1 tilt (N=20).

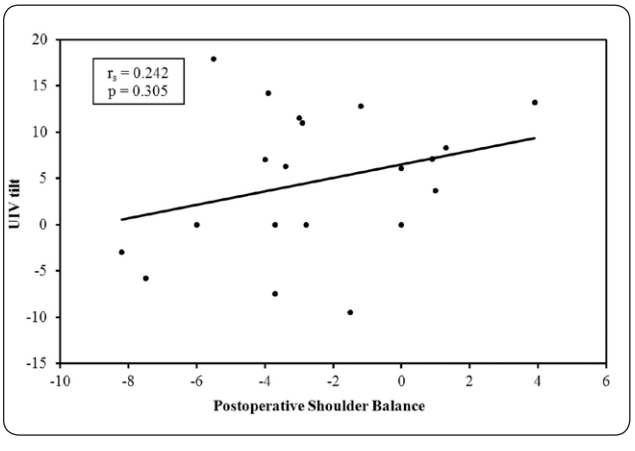

Figure 8. Correlation between one-year postop shoulder balance and UIV tilt (N=20).

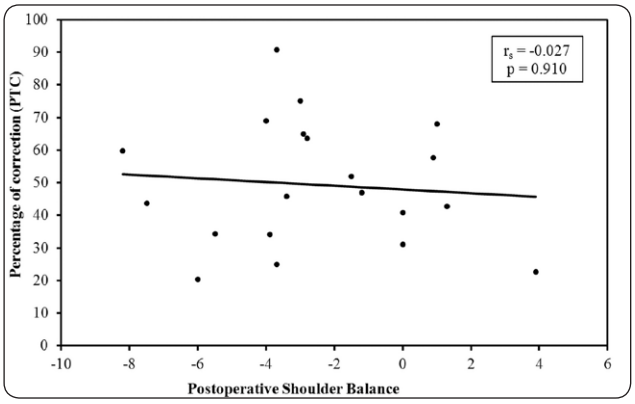

Figure 9. Correlation between postop shoulder balance and percentage of correction (proximal thoracic curve, PTC) (N=20).

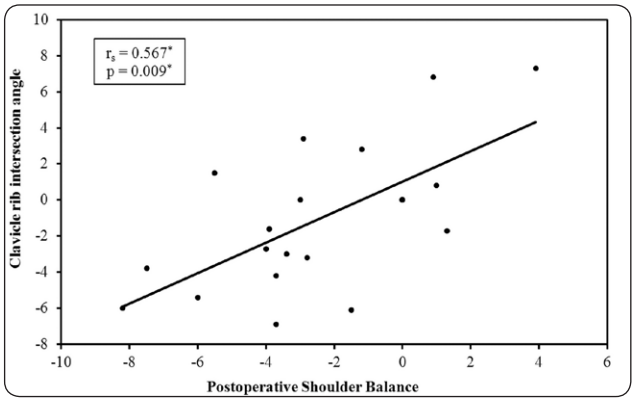

Figure 10. Correlation between one-year postop shoulder balance and clavicle rib intersection angle (N=20).

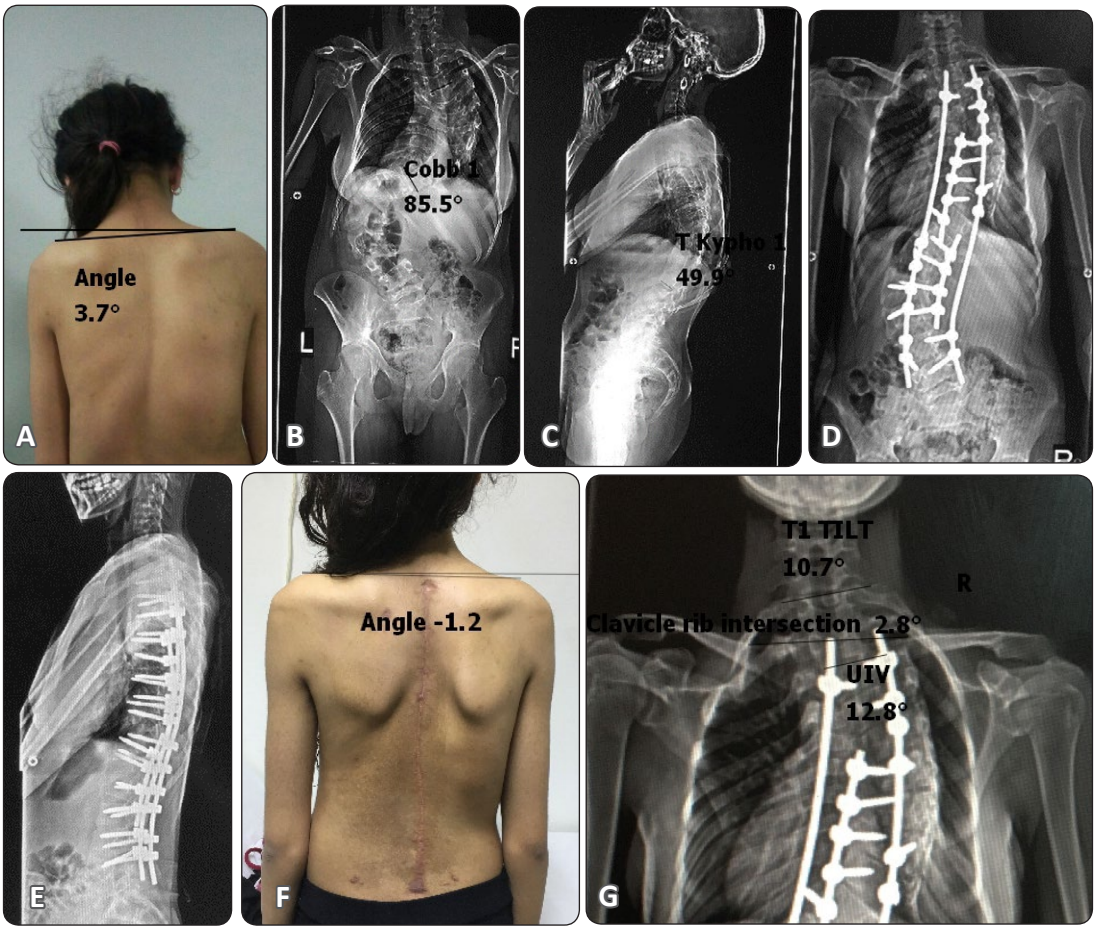

Figure 11. (A) 15-year-old female patient with AIS presented with elevated Rt shoulder. (B) Posteroanterior X-ray showing double major curve with major structural curve Cobb angle of 85 degrees and C lumbar modifier. (C) Lateral view X-ray showing thoracic hyperkyphosis. (D) One-year postop X-ray with satisfactory radiological correction. (E) One-year postop lateral X-ray showing sagittal balance. (F) One-year postop shoulder balance showing well-balanced shoulders with slightly elevated Lt shoulder. (G) One-year postop X-ray focusing on three radiological parameters. UIV is not horizontal although the patient has a well-balanced shoulder. T1 tilt and clavicle rib intersection angle are more correlated with clinical shoulder balance.

DISCUSSION

Shoulder balance is an essential cosmetic factor to be considered when planning a surgery to correct any scoliotic deformity. Factors that contribute to the clinical aspects of shoulder balance are not completely understood. In addition, shoulder balance can be divided into 'medial' and 'lateral'. Medial shoulder balance is correlated with the T1 tilt, trapezial prominence, and neck tilt.[17,6,12] Lateral shoulder balance (also called clinical shoulder balance) correlates with RSH (radiographic shoulder height difference), CHD (coracoids height difference), CRID (clavicle rib intersection difference), and CA (clavicular angle).[1,11,12] Evaluation of shoulder balance by radiological parameters is typically met with tremendous challenges due to generally less than moderate correlation between radiological and clinical parameters.[23,2 The] anatomy of the shoulder enables us to comprehend this discrepancy. The spine and the shoulder are not attached to each other directly. Alternatively, there is a direct contact between the spine and the ribs, which then loosely connect with the scapula.[24] Lee CS et al.[13] have conducted a narrative review in order to assess the problems related to the selection of fusion levels in patients with adolescent idiopathic scoliosis and have found that postoperative shoulder imbalance is one of the major controversial issues facing spine surgeons when planning to correct spine deformities, with a weak correlation between clinical and radiological views. Furthermore, there are no guidelines considering surgical techniques, fusion levels, and other risk factors related to postoperative shoulder imbalance.[22]

In this study, we have investigated four different radiological parameters in relation to clinical shoulder balance, namely, UIV tilt, T1 tilt, clavicle rib intersection angle, and proximal thoracic curve correction %. Many UIV selection systems had been proposed by many authors in an attempt to obtain well-balanced shoulders.[21,19,8,24] Nevertheless, all of these UIV selecting systems do not guarantee postoperative well-balanced shoulders.[4] Likewise, leveling the upper thoracic spine does not mean well-balanced shoulders postoperatively.[1,12] Consistent with the literature, we had found a weak positive correlation between UIV tilt and clinical shoulder balance (r=0.242, P=0.305).

Postoperative shoulder balance is one of the factors that influence extending the fusion up to the upper thoracic region with subsequent inclusion of the proximal thoracic curve within the fusion construct.[1] The Lenke classification recommended the inclusion of structural proximal thoracic curve within the region of fusion.[14,7] Li M et al.[15] believe that fusing a main thoracic curve while leaving a structural upper thoracic curve unfused may lead to shoulder imbalance. Kuklo TR et al.[11] and Qiu XS et al.[18] have proposed correcting the upper thoracic curve according to clavicular angle, T1 tilt, or the patient's preoperative shoulder level. However, a very weak negative correlation was found between proximal thoracic curve correction % and postoperative shoulder balance (r=-0.027, P=0.910).

Bago et al.[3] and Ilharreborde B et al.[9] believe that the T1 tilt has the poorest correlation with shoulder balance when compared to other radiographic parameters. Amir D et al.[1] found that trapezial prominence was affected by leveling T1 and by upper thoracic curve correction. Sarwahi et al.[20] conducted a retrospective case-controlled study on 195 AIS patients followed up to a minimum of one year aiming to assess the factors responsible for well-balanced shoulders and found that T1 tilt is one of the predictors of well-balanced shoulders. Despite being statistically nonsignificant, our findings have revealed a moderate positive correlation between T1 tilt and shoulder balance (r=0.440, P=0.052).

Clavicle rib intersection angle in this study is a modification of the clavicle-rib cage intersection distance described by Bago et al.[3] and modified to be an angle rather than a distance for more consistency and accuracy, as angles could be standardized for comparison and not affected by the size of X-ray films from different centers. Bago et al.[3] have proved a strong relationship between clavicle-rib cage intersection distance and shoulder balance. Qiu XS et al.[18] have found that clavicle-rib

intersection distance had the highest correlation coefficient on correlation between cosmetic parameters and radiological parameters related to shoulder balance. Clavicle-rib intersection angle was also described in the literature by Yang et al.[25] as an angle rather than a distance and they have found a statistically significant correlation between clavicle rib intersection angle and clinical shoulder balance. Our results were consistent with Bago et al.[3], Qiu XS et al.[18], and Yang et al.[25], as we have found a statistically significant correlation between clavicle rib intersection angle and clinical shoulder balance (r=0.567, P=0.009) (Case Illustration Figure 11 A-G).

The study of different radiological factors that may affect postoperative shoulder balance in this study had failed to find a strong correlation between three different factors of radiological shoulder balance and cosmetic shoulder balance with subsequent patient satisfaction. The controversial nature of postoperative shoulder balance and its correlation with radiological findings warrants further studies.

The main limitations of this study are the relatively small number of patients and the diversity of curve patterns included; however, future studies including larger number of patients and targeting specific curve patterns could be performed.

CONCLUSION

Leveling the upper thoracic spine (horizontal UIV) combined with proper correction of the main and proximal thoracic curves has a weak impact on postoperative clinical shoulder balance. However, a moderate correlation exists between T1 tilt and postoperative shoulder balance, and a significant correlation exists between clavicle rib intersection angle and clinical shoulder balance. How to control those parameters remains unclear. Further evaluation of a larger sample size is needed.

REFERENCES

1. Amir D, Yaszay B, Bartley CE, Bastrom TP, Newton PO: Does Leveling the Upper Thoracic Spine Have Any Impact on Postoperative Clinical Shoulder Balance in Lenke 1 and 2 Patients? Spine (Phila Pa 1976) 41(14):1122-1127, 2016
2. Asher MA, Burton DC: Adolescent idiopathic scoliosis: natural history and long term treatment effects. Scoliosis 1(1):2, 2006
3. Bago J, Carrera L, March B, Villanueva C: Four radiological measures to estimate shoulder balance in scoliosis. J Pediatr Orthop B 5(1):31-34, 1996
4. Bjerke BT, Cheung ZB, Shifflett GD, Iyer S, Derman PB, Cunningham ME: Do Current Recommendations for Upper Instrumented Vertebra Predict Shoulder Imbalance? An Attempted Validation of Level Selection for Adolescent Idiopathic Scoliosis. HSS J 11(3):216-222, 2015
5. Cassar-Pullicino VN, Eisenstein SM: Imaging in scoliosis: what, why and how? Clin Radiol 57(7):543-562, 2002
6. Chan CY, Chiu CK, Kwan MK: Assessing the Flexibility of the Proximal Thoracic Segments Above the "Potential Upper Instrumented Vertebra" Using the Cervical Supine Side Bending Radiographs in Lenke 1 and 2 Curves for Adolescent Idiopathic Scoliosis Patients. Spine (Phila Pa 1976) 41(16):E973-980, 2016
7. Cil A, Pekmezci M, Yazici M, Alanay A, Acaroglu RE, Deviren V, et al: The validity of Lenke criteria for defining structural proximal thoracic curves in patients with adolescent idiopathic scoliosis. Spine (Phila Pa 1976) 30(22):2550-2255, 2005
8. Elfiky TA, Samartzis D, Cheung WY, Wong YW, Luk KD, Cheung KM: The proximal thoracic curve in adolescent idiopathic scoliosis: surgical strategy and management outcomes: Global Spine J 1(1):27-36, 2011
9. Ilharreborde B, Even J, Lefevre Y, Fitoussi F, Presedo A, Souchet P, et al: How to determine

the upper level of instrumentation in Lenke types 1 and 2 adolescent idiopathic scoliosis: a prospective study of 132 patients. J Pediatr Orthop 28(7):733-739, 2008

10. King HA, Moe JH, Bradford DS, Winter RB: The selection of fusion levels in thoracic idiopathic scoliosis. J Bone Joint Surg Am 65(9):1302-1313, 1983
11. Kuklo TR, Lenke LG, Graham EJ, Won DS, Sweet FA, Blanke KM, et al: Correlation of radiographic, clinical, and patient assessment of shoulder balance following fusion versus nonfusion of the proximal thoracic curve in adolescent idiopathic scoliosis. Spine (Phila Pa 1976) 27(18):2013-2020, 2002
12. Kwan MK, Chan CY: Is there an optimal upper instrumented vertebra (UIV) tilt angle to prevent post-operative shoulder imbalance and neck tilt in Lenke 1 and 2 adolescent idiopathic scoliosis (AIS) patients? Eur Spine J 25(10):3065-3074, 2016
13. Lee CS, Hwang CJ, Lee DH, Cho JH: Five major controversial issues about fusion level selection in corrective surgery for adolescent idiopathic scoliosis: a narrative review. The Spine Journal 17:1033–1044, 2017
14. Lenke LG, Betz RR, Harms J, Bridwell KH, Clements DH, Lowe TG, et al: Adolescent idiopathic scoliosis: a new classification to determine extent of spinal arthrodesis. J Bone Joint Surg Am 83-A(8):1169-1181, 2001
15. Li M, Gu S, Ni J, Fang X, Zhu X, Zhang Z: Shoulder balance after surgery in patients with Lenke Type 2 scoliosis corrected with the segmental pedicle screw technique. J Neurosurg Spine 10(3):214-219, 2009
16. Maurice B, Jean-Marie G, Jean-Michel T: Taking the shoulders and pelvis into account in the preoperative classification of idiopathic scoliosis in adolescents and young adults (a constructive critique of King's and Lenke's systems of classification). Eur Spine J 20(10):1780-1787, 2011
17. Ono T, Bastrom TP, Newton PO: Defining 2 components of shoulder imbalance: clavicle tilt and trapezial prominence. Spine (Phila Pa 1976) 37(24): E1511-1516, 2012
18. Qiu XS, Ma WW, Li WG, Wang B, Yu Y, Zhu ZZ, et al: Discrepancy between radiographic shoulder balance and cosmetic shoulder balance in adolescent idiopathic scoliosis patients with double thoracic curve. Eur Spine J 18(1):45-51, 2009
19. Rose PS, Lenke LG: Classification of operative adolescent idiopathic scoliosis: treatment guidelines. Orthop Clin North Am 38(4):521-529, vi, 2007
20. Sarwahi V, Wendolowski S, Gecelter R, Amaral TD, Thornhill B: T1 Tilt and Clavicle Angle are the Best Predictors of Postoperative Shoulder Balance. The Spine Journal 16: S251–S337, 2016
21. Suk SI, Kim WJ, Lee CS, Lee SM, Kim JH, Chung ER, et al: Indications of proximal thoracic curve fusion in thoracic adolescent idiopathic scoliosis: recognition and treatment of double thoracic curve pattern in adolescent idiopathic scoliosis treated with segmental instrumentation. Spine (Phila Pa 1976) 25(18):2342-2349, 2000
22. Trobisch PD, Ducoffe AR, Lonner BS, Errico TJ: Choosing fusion levels in adolescent idiopathic scoliosis. J Am Acad Orthop Surg 21(9):519-528, 2013
23. Weinstein SL, Dolan LA, Cheng JC, Danielsson A, Morcuende JA: Adolescent idiopathic scoliosis. Lancet 371(9623):1527-1537, 2008
24. Yang H, Im GH, Hu B, Wang L, Zhou C, Liu L, et al: Shoulder balance in Lenke type 2 adolescent idiopathic scoliosis: Should we fuse to the second thoracic vertebra? Clin Neurol Neurosurg 163:156-162, 2017
25. Yang S, Feuchtbaum E, Werner BC, Cho W, Reddi V, Arlet V: Does anterior shoulder balance in adolescent idiopathic scoliosis correlate with posterior shoulder balance clinically and radiographically? Eur Spine J 21(10):1978-1983, 2012

الملخص العربي

توازن الكتف واعوجاج العمود الفقري، القضيه التي لم تحل

البيانات الخلفيه: يعتبر توازن الكتف من المؤشرات الرئيسية لرضا المرضى بعد التصحيح الجراحي لمرضي اعوجاج العمود الفقري المجهول السبب لليافعين. ومن المفترض ان تصحيح الاعوجاج الذي يشمل المنحنيات الصدرية الرئيسية والدانية جنبا إلى جنب مع جعل الفقره العلويه المثبته في وضع افقي يعزز توازن الكتف. بعبارة أخرى، تصحيح المعاملات الإشعاعية يعزز توازن الكتف السريري. مع ذلك، هذا لا يلاحظ دائما.

الغرض: لتحديد أي من المعاملات الإشعاعية التالية ترتبط بشكل كبير مع التوازن الكتفي السريري، ميل الفقره الظهريه الاولي، ميل الفقره العلويه المثبته، زاويه تقاطع الترقوه مع القفص الصدري و مدي تصليح منحني الصدر الداني.

تصميم الدراسه: تحليل البيانات عن طريق التقييم بأثر رجعي للبيانات التي تم الحصول عليها من 20 حالة مريض باعوجاج العمود الفقري المجهول السبب لليافعين والذين تم استعدال العمود الفقري بهم باستخدام الطرق الحديثه.

المرضي والطرق: تحليل البيانات عن طريق التقييم بأثر رجعي للبيانات التي تم الحصول عليها من الصور الفوتوغرافية عالية الدقة، والأفلام الشعاعية للعمود الفقري والتي تم عملها في غضون السنه الأولى بعد العملية الجراحية. وشملت الدراسة 20 حالة مريض باعوجاج العمود الفقري المجهول السبب لليافعين والذين تم استعدال العمود الفقري بهم باستخدام الطرق الحديثه. تم إجراء القياسات من قبل برنامج Surgimap.®

النتائج: تم العثور على ارتباط ضعيف بين توازن الكتف وكلا من: ميل الفقره العلويه المثبته ومدي تصليح منحني الصدر الداني، وتم الحصول علي ارتباط متوسط بين توازن الكتف وميل الفقره الظهريه الاولي. وهناك ارتباط ذو اهميه احصائيه بين توازن الكتف و زاويه تقاطع الترقوه مع القفص الصدري

الاستنتاج: جعل الفقره العلويه المثبته في وضع افقي (جنبا إلى جنب مع التصحيح السليم للمنحنيات الصدرية الرئيسية والدانية)، لا تعزز بالضرورة توازن الكتف. ومع ذلك هناك ارتباط اكبر بين كلا من: (ميل الفقره الظهريه الاولي وزاويه تقاطع الترقوه والقفص الصدري) والتوازن الكتفي السريري.