

Research Article

Improvement of Life After Scoliosis Surgery: Assessment Using the SRS-30 Questionnaire

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Abstract

Citation: Sadagatullah AN, et al. Improvement of Life After Scoliosis Surgery: Assessment Using the SRS-30 Questionnaire. J Ortho Sci Res. 2024;5(2):1-7.

<https://doi.org/10.46889/JOSR.2024.5202>

Received Date: 08-05-2024

Accepted Date: 28-05-2024

Published Date: 05-06-2024



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Introduction: Idiopathic scoliosis is a complex three-dimensional deformity of the spinal column. Adolescent Idiopathic Scoliosis (AIS) is the most common type affecting healthy young individuals. Psychological well-being of these young group of patients has been area of concern when managing these patients. Aim of this study was to assess quality of life in patient undergoing corrective surgery for AIS using the SRS-30 questionnaire.

Methodology: A cross sectional study of all patients that underwent deformity correction surgery for AIS from January 2016 till December 2019 was done. Patient had to be followed up for over 1 year. Only patient with idiopathic adolescent scoliosis were included. Radiographic measurements of the Cobb angle preoperative and postoperatively were obtained from medical records of the patient. Patients were then given the SRS-30 questionnaire.

Results: 24 patients were recruited in this study based on the inclusion and exclusion criteria. The median preoperative Cobb angle was 63.0 (19.90), while post operatively it was 18.0 (11.25) with a percentage of correction of 68.0 (17.5). The average total SRS score is 4.20 (0.38). Using the Spearman's Rho correlation analysis there was a significance and moderately positive correlation between the satisfaction with management domain scores and the percentage of Cobb's Angle correction.

Conclusion: In this study, the average total SRS score was 4.2 (0.38) indicating a favorable outcome in terms of quality of life in patient undergoing scoliosis surgery.

Keywords: Adolescent Idiopathic Scoliosis; Scoliosis Surgery; Cobb's Angle Correction

Introduction

Idiopathic scoliosis is a complex three-dimensional deformity of the spinal column. Adolescent Idiopathic Scoliosis (AIS) is the most common type affecting healthy young individuals. The spine is affected in all three planes and diagnosis is confirmed on standing radiograph of the spine when the frontal curvature surpasses ≥ 10 degrees as measured according to the methods described by Cobb (Cobb angle) [1,2].

Commonly patients are diagnosed in the school setting by means of regular medical checkup and visits to school. They are then referred to the hospital for workup. As the term suggests it is disease of unknown cause and as such other causes must be ruled out namely, neuromuscular disease and congenital malformations. Smaller curves have little functional consequences and patients tend to lead a normal life as the deformity is barely noticeable [3,4].

However, progression of the curves may result in several pronounced body deformities, uneven shoulders and asymmetric waistline that subsequently leads to damaged body self-image and mental health, pain, spinal degenerative changes, several

limitations in activities of daily living and in severe cases disturbed pulmonary function. It affects them during the development of their psychological maturity and therefore may have a lasting effect. Patients with idiopathic scoliosis have been shown to have a negative effect on quality of life. Larger curve deformities also appeared to be associated with poor lung function [1,3,5]. Surgical reduction of deformity may be required to improve cosmesis and self-image while improving pulmonary function, relieving pain and preventing curve progression. It is shown that scoliosis causes mental dysfunction and psychological problems in the patient and family not in accordance with the severity of the physical or radiological findings. The objective success of surgery does not correlate with the subjective satisfaction of the patient because the perception of appearance differs from the surgeon and patients [2,6,7,8].

Current data shows no difference in quality of life in untreated and braced/surgically treated patients, but these data is limited to smaller curves. Surgery is reserved for patient with larger curves (>40 degrees to 60 degrees measured with Cobb angle on radiograph). Fig. 1 illustrate a case where the Cobb angle was surgically corrected. Both surgical and brace treatments for idiopathic scoliosis could be considered success from a health-related quality-of-life point of view in adulthood [3,6,7]. A case of an operated case and its result is illustrated in Fig. 1-3.

The Scoliosis Research Society (SRS) questionnaire has been a valuable tool in determining subjective outcomes and quality of life in scoliosis patients undergoing treatment. The SRS-30 questionnaire is the latest one version released by the SRS (during this study period). It combines the previous versions of the questionnaires with emphasis on self-image and mental health of patients. The questionnaire has 30 questions with 5 components which are function/activity, pain, self-image, mental health and satisfaction with management. It has been used to assess patient satisfaction and health related quality of life of scoliosis patients before and after surgery as well as after long term follow up [2]. Very few studies had been found using the latest SRS-30 questionnaire for evaluation of quality of life.

Impact of the AIS on mental health in our population is not well documented. The difference in socioeconomic status as well as social background may have an impact on how patients as well as the family perceive the disease process. In Malaysia, a surgical correction for scoliosis is not always welcomed by patients or their families for the fear of complications. The purpose of this study was to assess the quality of life of patients that have undergone deformity corrective surgery for adolescent idiopathic scoliosis in a local hospital setting. It is hoped that the study will aid in counseling and convince potential patients who require the surgery based on the improvement demonstrated by the questionnaire results and publications.

Methodology

This was a cross sectional study of patients that underwent scoliosis deformity correction surgery from January 2016 till December 2019 in Hospital Sultanah Bahiyah; a hospital North to the capital of Malaysia. The sample size estimation was at least 22 patients for descriptive analysis. In all 28 patients were identified to have undergone scoliosis surgery during this period from the operative census. All age groups and gender of patient were included and the patient should have been followed up for at least 1 year post op to assess the quality-of-life following surgery. Only patients with idiopathic adolescent scoliosis were included, while other causes of scoliosis were excluded [2-4].

Radiographic measurements of the Cobb angle preoperative and postoperatively were obtained from medical records of the patient once permission was obtained from the medical records department. The same vertebral levels were used for Cobb angle measurement preoperatively and postoperatively. The percentage of Cobb angle corrected postoperatively were also measured to look for correlation with patient related outcomes [5,6].

Patients were then contacted and given the SRS=30 questionnaire to fill up. Consent was obtained from patients aged 18 and above while assent and parental consent were taken from patients below age of 18. The investigator explained to each patient regarding the questionnaire and they were given a chance to understand the questions before answering. The SRS-30 questionnaire has 30 questions with 5 components, function/activity, pain, self-image, mental health and satisfaction with management. There is also an optional branch of questions to be answered by surgically treated patients, in this study all the patients had surgery [7-10].

Spearman's Rho correlation test was used to analyze the associations between percentage of Cobb's angle correction post-operative and SRS scores. The data was analyzed using SPSS software (IBM Corp. Released 2016. IBM Statistics for Windows, Version 24.0, Armonk, NY: IBM Corp). An association with p-value less than 0.05 is considered as significant.

Results

Descriptive data was presented in Table 1 using median and Interquartile Range (IQR) due to small sample size and non-normal distribution of data. We had a total of 24 (2 males, 22 females) patients who underwent deformity correction surgery for adolescent idiopathic scoliosis in the hospital who agreed to participate in the study. The median with Interquartile Range (IQR) preoperative Cobb angle was 63.0 (19.90) degrees, while post operatively it was 18.0 (11.25) degrees with a percentage of correction of 68.0 (17.5) degrees. The SRS questionnaire scores are rated 1 to 5 from worst to best. The average total SRS score was 4.20 (IQR 0.38) which implies overall satisfaction with quality of life after surgery. For each individual domain scores were highly satisfactory (mean >4) except for the function/activity domain where there was only a moderate level of satisfaction.

Table 2 summarizes the correlation of percentage of Cobb angle correction and SRS scores. Based on the Spearman's Rho correlation analysis, comparing to the percentage of Cobb angle correction there was no significance and moderately negative correlation between the functional scores ($r = -0.33$, $p=0.12$); no significance and weak positive correlation between the pain scores ($r = 0.19$, $p=0.37$); no significance and moderately positive correlation between the self-images scores ($r = 0.31$, $p=0.14$); no significance and weak positive correlation between the mental health scores ($r = 0.07$, $p=0.76$). There was a significant and moderately positive correlation between the satisfaction with management scores and the percentage of Cobb's Angle correction ($r = 0.47$, $p=0.02$). However, there was no significant and weak positive correlation between the total mean of SRS scores and the percentage of Cobb's Angle correction ($r = 0.11$, $p=0.62$).

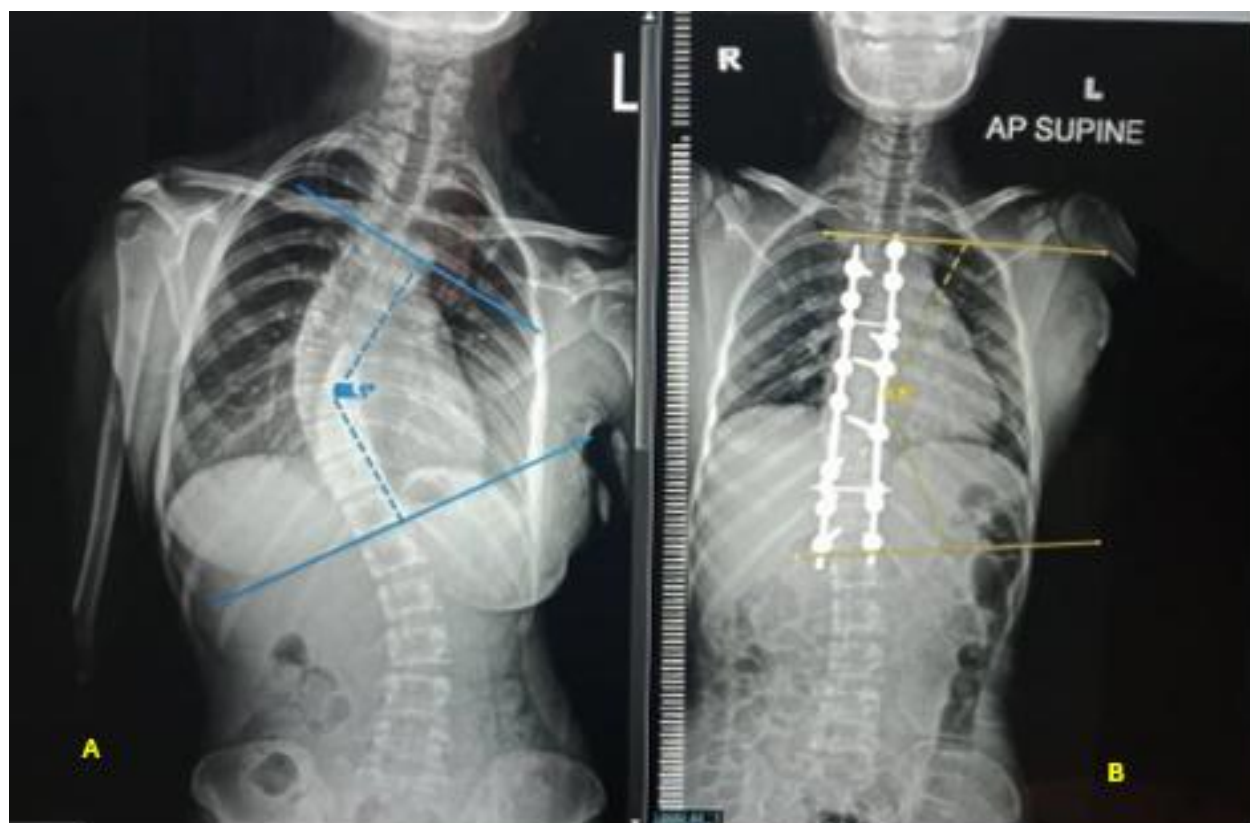


Figure 1: A and B shows radiograph images of Cobb angle correction following surgery.



Figure 2: C and D shows pre-operative and post-operative correction of the hump.



Figure 3: E and F shows pre-operative and post-operative correction of the Scoliosis curve.

Variables		Median (IQR)
Cobb Angle		
	Pre	63.0 (19.90)
	Post	18.0 (11.25)
Percentage of Cobb Angle Correction		68.0 (17.5)
Quality of Life		
	Function scores	3.80 (0.55)
	Pain scores	4.50 (0.48)
	Self-Image scores	4.40 (0.75)
	Mental Health Scores	4.40 (0.75)
	Satisfaction Scores	4.30 (0.70)
	Mean total SRS Scores	4.20 (0.38)

Table 1: Summary of Radiographic and SRS findings (n=24).

Variables		Percentage of Cobb Angle Correction	
		Spearman's Rho, r	p-value
Quality of Life	Function scores	-0.33	0.12
	Pain scores	0.19	0.37
	Self-Image scores	0.31	0.14
	Mental Health Scores	0.07	0.76
	Satisfaction Scores	0.47	0.02*
	Mean Total SRS Scores	0.11	0.62

Table 2: Correlation between Percentage of Cobb Correction and Quality of Life Scores (n=24).

Discussion

Deformity correction surgery for AIS is usually reserved for patients with Cobb angle more than 40 degrees. It has been established that curves more than 50 degrees have a tendency to progress at a rate of 1 degree a year after skeletal maturity. Severe curves can lead to restrictive lung disease and may have life threatening consequences. Besides that, patients also have trouble in terms of daily activities, participation in school or social activities, mental health, self-confidence and self-image. This makes cosmesis an important aspect of deformity correction surgery and its impact on the mental health of the patient is undeniable. However, cultural and socioeconomic differences in our population differ from data we have from studies conducted abroad. The SRS questionnaire has become a useful tool to assess the patient's quality of life post operatively [1,2,6,10].

Danielsson AJ, et al., in 2001, published a paper where a consecutive series of patients with adolescent idiopathic scoliosis treated with brace or surgery between 1968 and 1977, were followed up for at least 20 years after completion of treatment and assessed with quality-of-life questionnaires. Results were matched with a control group of same sex and age group. It was found that psychological well-being in AIS patients was quite good when compared to the general population. Even the physical function is equal except in a minority of patients. However, they did display a lower cosmetic well-being compared to the general population [3].

In this study the mean values of SRS scores for each domain were; 3.9 for function domain, 4.5 for pain, 4.4 for self-image, 4.4 for mental health and 4.3 for satisfaction. Generally, the patients were highly satisfied with total scores of 4.2. Ghandehari H, et al., in 2015, evaluated patient outcome and satisfaction after surgical correction of AIS by enrolling 135 patients undergoing surgery into their study and obtained pre and postoperative X-rays. The patients were followed up for 2 years and at the end of treatment SRS-30 questionnaires to assess patient satisfaction. He reported that greater radiographic angle corrected correlated with higher satisfaction SRS-30 scores. Cosmesis was the most important factor affecting patient satisfaction [2]. Spinal fusion surgery reduces the mobility of the spine and is an expected morbidity in deformity correction surgery of scoliosis. Possibly due to this, patients may experience poorer functional outcome in terms of their daily activities. It is noted from this study that greater curve

correction had a negative correlation with functional scores, but they were not statistically significant. This can be explained by reduced spine mobility making it difficult for the patients to perform their daily activities with ease and participate in sports or more physically demanding activities [3,6,7]. Pain was addressed well post operatively in all patients. Most patients were pain free at rest and it was well controlled on exertion without the need for analgesia. Self- image and mental health scores were generally good in all patients. School peer teasing affected most their self-confidence and self-image at first. Post operatively it clearly improved patient outcomes in these two domains. Patient satisfaction was indeed good and most were willing to undergo the same treatment if they had the same condition again. There was a positive correlation between greater curve correction and overall satisfaction of patients which was statistically significant.

Most studies show satisfactory outcomes after surgery in scoliosis [2,3]. Some studies have shown little difference in terms of quality of life in patients treated operatively and nonoperatively but the degree of Cobb angle at presentation was not mentioned [6]. The small sample size of patients in our study was a limitation of the study. It is understandable as our patients refuse the surgery hence the patients recruited were low. The use of SRS questionnaire is also uncommon in our practice. Due to this, evaluation of patients becomes an issue, in terms of the difference preoperatively and postoperatively as well as during subsequent follow up. We suggest this study to be expanded with inclusion of more centers in Malaysia to get a larger picture of the effectiveness and impact on quality of life after surgical correction of scoliosis. The SRS-30 score should be used as a standard assessment for all patients undergoing scoliosis surgery in the country, The improvement of Quality of life using the questionnaire could be used as a tool for data. The encouraging parameter may convince skeptical patients who require surgery in our country.

Conclusion

In this study, the average total SRS score was 4.2 (0.38) indicating a favorable outcome in terms of quality of life in patients undergoing scoliosis surgery in our center. Despite showing poor function scores, compared to other studies overall satisfaction with surgery was good. There was also a positive correlation between a greater percentage of curve correction and satisfaction post operatively. It cannot be denied that surgery has a favorable impact on the quality of life of patients with adolescent idiopathic scoliosis.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Compliance with Ethical Standards

Funding: This study was not funded by any organization. It was part of the fulfillment for graduation of the Author Kishanraj Karthikesan for the degree of Master of Medicine (Orthopaedic) awarded by University Sains Malaysia.

Conflict of Interests

The authors declare that there is no conflict of interest for this paper.

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