

COMPARISON OF THE RESULTS OF COTREL-DUBOUSSET AND SUBLAMINAR WIRE FIXATION METHODS FOR THE TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS: MINIMUM 5 YEARS FOLLOW-UP

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SUMMARY:

Objective: At least 5 – year follow up results of adolescent idiopathic scoliosis, those were treated using Cotrel- Dubousset instrumentation (CDI) and Luque sublaminar wiring methods were reviewed with retrospective cohort study. Results of these two cohorts were compared.

Methods: Twenty nine patients contain two cohorts were included in the study. Fourteen of patients were treated using CDI and fifteen were treated with Luque sublaminar wiring method. Mean age at the time of surgery was 15.3 years in CDI group and 17.7 for sublaminar wire group. Preoperatively primary curves were measured using Cobb method, revealing a mean of 49.9 degrees for CDI group and 56.4 degrees for sublaminar wire group. At the end of follow up period, mean Cobb value was 15.6 for CDI group and 19.7 for sublaminar group.

Results: Statistical analysis of the results revealed that there is no statistical difference between these two methods at follow up ($p>0.05$). During follow up period, for two patients in CDI group pull-out of proximal hook were encountered. In one of these patients revision was performed.

Discussion: From aspects of correction of deformity and maintenance of correction, comparison of CDI and sublaminar wiring method showed that there is no difference between these two methods at the end of follow up period.

Key words: Idiopathic scoliosis, sublaminar wire, hook system.

ÖZET:

Amaç: Minimum 5 yıllık takibe sahip, cerrahi tedavileri için Cotrel – Dubousset enstrümantasyonu ve Luque sublaminar telleme sistemi kullanılan iki grup idiyopatik skolyoz hastasının sonuçları retrospektif olarak değerlendirildi ve sonuçları karşılaştırıldı.

Metot: Bu çalışma 29 idiyopatik skolyoz hastayı içermekte olup, bu hastalardan 14'ü CDI ve 15'i Luque sublaminar telleme ile tedavi edilmişti. CDI ve Luque sublaminar telleme grubunda sırasıyla ortalama yaşları 15.3 ve 17.7, preoperatif Cobb açıları 49.9 ve 56.4 derece idi. Son kontrolde Cobb açılarının sırasıyla 15.6 ve 19.7 dereceye indiği belirlendi.

Results: İki grup preoperatif, postoperatif ve son kontroldeki değerler açısından istatistik olarak farklı olmadığı belirlendi ($p > 0.05$). Takipte CDI uygulanan 2 hastada proksimal hooklarda çıkma saptandı ve 1 hasta revizyon cerrahi gerektirdi.

Discussion: Bu sonuçların ışığında CDI sistemi ile sublaminar tellemenin skolyotik deformitenin düzeltilmesinde ve korreksiyonun korunmasında benzer etkide olduğu saptandı.

Anahtar Kelimeler : İdiyopatik skolyoz, sublaminar telleme ve hook sistemleri.

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INTRODUCTION:

Cotrel-Dubousset instrumentation (CDI) corrects the three-dimensional scoliotic deformity by using derotational maneuver⁽⁸⁾. However, some investigations had shown that derotational force of CDI system is transferred to the neutral vertebra resulting imbalance and decompression problems^(12,14). Therefore sublaminar wiring and translation that used by Luque have been repopularized⁽⁵⁾.

In this study, we reviewed retrospectively at least 5-year follow up results of adolescent idiopathic scoliosis; those were treated using Cotrel-Dubosset instrumentation and sublaminar wiring with translation method. The results of preoperative and last control frontal Cobb's angles of these two methods were compared.

METHODS:

Total twenty-nine patients contains two different homogenous cohort were included in the study. In first cohort, there were fourteen of patients which treated with CDI system (Texas Scottish Rite Hospital System "TSRH") (Figure 1). In second cohort, there were fifteen patients which treated with Luque sublaminar wiring method (Isola Spinal Instrumentation) (Figure-2).

Mean age at the time of surgery was 15.3 years in CDI group and 17.7 for sublaminar wire group. 12 of the patients in CDI group and 13 of the patients in sublaminar wiring group were female. Preoperatively primary curves were measured

using Cobb method on coronal plane, revealing a mean of 49.9 degrees for CDI group and 56.4 degrees for sublaminar wire group. At the end of follow up period, mean coronal plane Cobb value was 15.6 degrees for CD group and 19.7 degrees for sublaminar group (Table-1).

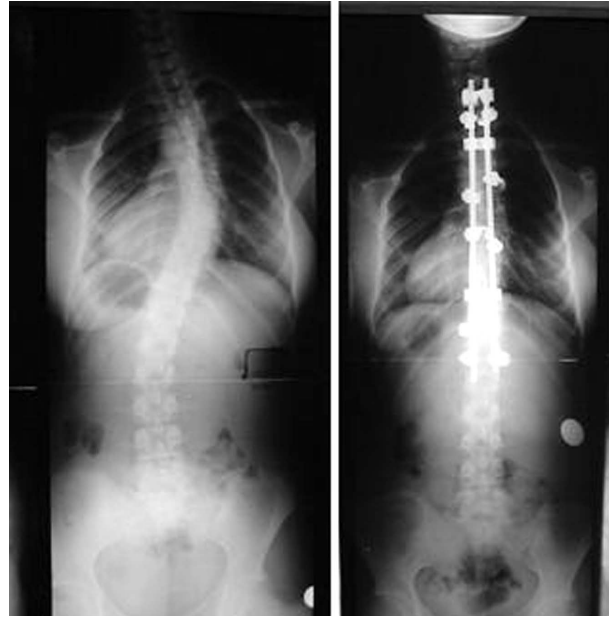


Figure 1: Fourteen year old girl with King Type II curve preoperative (a) and postoperative (b) radiographs were shown. The correction was achieved by derotation maneuver using TSRH system.

The mean of correction between two groups was analyzed by using student's t-test. The statistical analyses were conducted by using SPSS 12.0 software.

Table-1. The mean age, pre and postoperative frontal Cobb angles of the major curve and the mean follow-up period of both CDI and Sublaminar wiring groups.

GROUPS	AGE (YEARS)	PREOP (DEGREES)	POSTOP (DEGREES)	FOLLOW-UP (YEARS)
CDI	15.3	49.9	15.6	9.43
SUBLAMINAR	17.7	56.4	19.7	8.27



Figure 2: Twelve year old female with a thoracic scoliosis King type II preoperative (a) and postoperative (b) radiographs were shown. The correction was achieved by Isola sublaminar wire technique.

RESULTS:

There were no statistical difference between CDI and sublaminar wiring groups for mean age and the degree of deformity at the beginning of the study. Correction of coronal plane major curves for CDI and sublaminar wiring was found to be 68,7 % and 65,1 % respectively. Statistical analysis of the deformity correction degree, revealed that there is no statistical difference between these two methods at the end of the follow up period ($p>0.05$). During follow up period, for two patients in CDI group pull-out of proximal hook were encountered. For one of these patients revision was considered to correct the deformity because fusion was not achieved.

DISCUSSION:

The main difference between CDI and sublaminar wiring is that the correction of the spinal deformity was achieved by derotation of the rod for the CDI system and translation of the spinal column for the sublaminar wiring system⁽⁵⁾.

It was proposed that imbalance and decompensation arises because of transmission of derotational effect on healthy vertebral column^(5,12). The decompensation problems of CDI system an old alternative method was repopularized by Asher by translating the spinal column deformity with Isola system using alternatively hooks or sublaminar wires^(1,5). Gondo and Asher reported that the Isola spinal instrumentation system does not cause decompensation problems⁽⁹⁾. In current study we did not observe significant decompensation problem when we compare two groups. We had seen two proximal hook failures which have also been reported by Richards in the literature in CDI group⁽¹³⁾. In these two cases curves were not flexible.

In a recent study compares the instrumentation systems for scoliosis correction, Luk et al, reported that the amount of correction achievable is largely determined by the inherent character of the curve (flexibility) rather than the surgical technique or instrumentation (TSRH, CD-Horizon, Moss-Miami and ISOLA) used. This conclusion is the same with our study⁽¹¹⁾.

In this study the percentage of correction is comparable with the literature^(2-4,6-7). Benli et al suggested that satisfactory correction rates have been obtained in both sagittal and frontal planes with multifilament, titanium, and double crimp sublaminar wire augmented third generation instrumentation systems⁽⁴⁾. No decompensation and imbalance have been observed and in the last examination a totally balanced or balanced vertebral column has been obtained in all patients. In a recent study, Cheng et al stated that, apical sublaminar wire and pedicle screw instrumentation both offer similar major curve correction with similar fusion lengths without neurological problems in the operative treatment of idiopathic scoliosis⁽⁷⁾. Although more expensive, pedicle screw constructs had significantly less

blood loss and slightly shorter fusion lengths than the sublaminar wire constructs.

There is an important issue for using sublaminar wiring technique. Titanium wire is not available in the Isola System. This restricts the surgeon's demands. Therefore there is no way to use titanium implant for special situations in Isola sublaminar wiring system.

From aspects of correction of deformity and maintenance of correction, comparison of CDI and sublaminar wiring method showed that there is no significant difference between these two methods at the end of follow up period. Authors found that, both instrumentation techniques are efficient but sublaminar wiring is cheaper than multihook or pedicle screw systems.

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