A Retrospective Clinical Study of 640 Scoliosis Treated by Posterior Segmental Rachisynthesis

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ABSTRACT
This is a retrospective study of 640 patients with scoliosis who underwent surgery in Pediatric Orthopedic Department of Central Emergency Hospital for Children “Grigore Alexandrescu” Bucharest and also in the private hospitals “Regina Maria” “Sanador” in a 14 years period between 1999 and 2012. The study relates to the cases of scoliosis treated by segmental rachisynthesis by posterior approach, but also includes some cases in which the posterior and the anterior approach were combined. The patients were between 6 and 44 years old and most of them were female (82%). We used different techniques of rachisynthesis such as: SCS (Spinal Clip System), Moss-Miami, XIA, CD-Legacy, USS II. Regarding etiology, 93,12% of scoliosis were idiopathic forms, 2,03% congenital, 1,09% in patients with Recklinghausen disease, 1,09% in Marfan syndrome, 0,94% in cerebral palsy, 0,63 % in both spinal amyotrophy and posttraumatic and 0,47 % in muscular dystrophies. According to topographic form, 37,66 % were double thoracic and lumbar scoliosis, 29,06 % thoracic scoliosis, 18,28% thoracolumbar, 13,12 % lumbar, 1,25 cervicothoracal and 0,63 % triple curve scoliosis.

Key words: scoliosis, segmental rachisynthesis

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INTRODUCTION

Although the scoliosis has in Romania relatively the same incidence as in most of the European countries, it is usually late diagnosed, when the Cobb angle has significant values.

Since 2010, Romania has a program of screening and early treatment of spine deformities funded by The Ministry of Health.

In a 14 years period in Pediatric Orthopedic Department of Central Emergency Hospital for Children “Grigore Alexandrescu” Bucharest and also in the private hospitals “Regina Maria” and “Sanador” were examined and diagnosed 14,853 patients with scoliosis.

The segmental rachisynthesis by posterior approach is the golden standard in surgical treatment of scoliosis. Before 1999 in our clinic we performed Harrington technique, but those cases were not included in in this study.

Other surgical techniques used besides the posterior rachisynthesis were: muscle detachment followed by bracing or casting, thoracoplasties, posterior vertebral arthrodesis (such cases are not in the study).

MATERIAL AND METHOD

For the preparation of the study we selected 640 cases of scoliosis who underwent surgery between 01.01.1999 and 31.12.2012.

For each patient we recorded: age, gender, curve pattern according to Lenke, surgical technique, pre and post operative Cobb angle, early and late postoperative evolution and complications.

The follow up period ranged between 3 months and 13 years, with an average of 6,5 years.

RESULTS

Of 640 patients, 82 % were female and 18 % were male.

Distribution of cases by etiology:
- Idiopthic ...................................................... 93,12%
- Congenital ..................................................... 2,03%
- Recklinghausen ........................................... 1,09%
- Marfan ......................................................... 1,09%
- Cerebral palsy ................................................ 0,94%
- Spinal amyotrophy ....................................... 0,63%
- Posttraumatic.............................................. 0,63%
- Muscular distrophies ................................. 0,47%

Distribution of cases by surgical technique
We used several types of segmental spinal instrumentation: SCS, Moss-Miami, CD-Legacy, XIA, USS II. The choice of the technique was circumstantial and dependent on the experience of surgical team and the availability of the implants (fig. 1, 2, 3).

Of 640 cases, surgical techniques were:
- SCS ............................................................ 45,93%
- USS II ........................................................ 23,91%
- CD-Legacy .................................................. 19,22%
- Moss-Miami ............................................... 10,47%
- XIA ......................................................... 0,47%
Complications and incidents
Intraoperative complications:
- high blood loss ...................................... 2 (0.31%)
- transverse process fracture ................. 7 (1.09%)
- hook pulled out ............................... 6 (0.93%)
- injury of the dura ............................. 3 (0.47%)
Postoperative complications
- pseudarthrosis ................................. 6 (0.93%)
- 1 rod breakage ............................... 9 (1.40%)
- 2 rod breakage ............................... 3 (0.47%)
- screw breakage .............................. 11 (1.71%)
- implant migration ......................... 2 (0.31%)
- implant rejection ......................... 5 (0.78%)

General considerations
In the vast majority of cases, posterior rachisynthesis was performed when curve magnitude was over 50 degrees, but in some forms with significant progression of the curve, the surgery was performed for Cobb angle over 40 degrees.

The average time of surgery was 310 minutes, but in cases when bone grafts were used (stored in liquid nitrogen vapors at -196 degrees Celsius) it was 30 minutes shorter.

The average intraoperative blood loss was 720 ml, but in most of the cases blood loss was recovered using the cell-saver.

The patients were admitted in the Intensive Care Unit for one or two days post surgery, the drainage was removed after 3 days postoperatively and the mobilization of the patient began.

The patients were discharged after 6 days and they were allowed to return to their social activities after 30 days.

Table 1. Frontal plane correction

<table>
<thead>
<tr>
<th></th>
<th>Primary curve</th>
<th>Secondary curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-op</td>
<td>79.5° (35-140)</td>
<td>43.2° (8-78)</td>
</tr>
<tr>
<td>Bending</td>
<td>52.6° (26-86)</td>
<td>16.6° (0-42)</td>
</tr>
<tr>
<td>Correction</td>
<td>33.8%</td>
<td>61.57%</td>
</tr>
<tr>
<td>Post-op</td>
<td>28.4° (4-68)</td>
<td>12.7° (0-28)</td>
</tr>
<tr>
<td>Correction</td>
<td>64.27%</td>
<td>70.6%</td>
</tr>
<tr>
<td>Follow-up</td>
<td>32.6° (7-76)</td>
<td>14.9° (3-31)</td>
</tr>
<tr>
<td>Correction</td>
<td>59%</td>
<td>65.5%</td>
</tr>
<tr>
<td>Loss of correction</td>
<td>4.2°</td>
<td>2.2°</td>
</tr>
</tbody>
</table>

The curve correction was achieved by in situ remodeland or by derotation, depending of the technique.

In order to obtain an optimal correction, we performed multiple arthrotomies and osteotomies in cases of rigid scoliosis and in cases of severe curves.

One important goal for us was to maintain the sagital alignment of the spine. This is an example of preoperative x-ray (Fig. 4) and postoperative x-rays showing correction in frontal (Fig. 5) and sagital plane (Fig. 6).

The patients started physical therapy 3 month
post surgery.

The cases of implant rejection had fistulas that did not healed with local surgical treatment or antibiotherapy, but only by complete removal of the implants. In the 5 cases of implant intolerance, the fistulas occured in a 3 to 11 years postoperative period.

CONCLUSIONS

- Most of the patients were female - 82%.
- The most frequent etiologic form was idiopathic scoliosis (93, 12 %), followed by congenital scoliosis (2,03%) and other forms of scoliosis (all with very small percentage).
- Most scoliosis who underwent surgery were double thoracic and lumbar ones (37,66%).
- The optimal age for surgery was 13-15 years for female patients and 15-17 for male patients with Risser sign grade above 1.
- For the adult and the adolescent patients, the age of surgery was the age of scoliosis detection.
- Only the stainless steel rod and screw broke.
- Curve correction was determined mainly by the flexibility of the spine, the age of the patient, the surgical team experience and less by the surgical technique.