SURGICAL TREATMENT OF SCHEUERMANN´S DISEASE BY THE POSTERIOR APPROACH. CASE SERIES

ABSTRACT

Objective: To describe the results of surgical treatment of Scheuermann's disease by the posterior approach. Method: A descriptive, retrospective, longitudinal study in which patients with Scheuermann's disease, treated surgically by the posterior approach at the Hospital de Traumatología y Ortopedia "Lomas Verdes" IMSS. The Cobb method was used to measure the kyphosis in all the patients, of T5-T12. The surgical technique used was vertebral shortening by the Ponte osteotomy technique, at the apex of the deformity, accompanied by transpedicular instrumentation and posterior arthrodesis. Results: Five patients were included; three men and two women, with an average age of 16.6 years. The initial average kyphosis was 76°, which was corrected to 42° after surgery. Blood loss was 590 ml, with a surgery time of 3 hours. Three patients were submitted to neurophysiological monitoring. No neurological lesion was found. There was no loss of correction at 6 months of evolution. Conclusions: The vertebral shortening technique with posterior instrumentation eliminates the use of the anterior approach to release the anterior longitudinal ligament. Osteotomies by the Ponte technique make the spine more flexible, and together with pedicular instrumentation, correct the deformity and preserve the correction over time.

Keywords: Scheuermann's disease; Kyphosis/surgery; Arthrodesis; Osteotomy.
INTRODUCTION

Scheuermann’s disease, also known as juvenile kyphosis, is a structural vertebral deformity that causes hyperkyphosis at the thoracolumbar level, due to the development of vertebral wedging during adolescence. It occurs in 0.4 to 0.8% of the population. Its exact etiology is not known, but a hereditary correlation has been found.

Although the normal range of thoracic kyphosis varies, the Scoliosis Research Society defines the normal range as 10-40 degrees of kyphosis between T5 and T12.

Wenger describes two types of juvenile kyphosis: the classic thoracic form, type 1, and the atypical thoracolumbar form, type 2. In type 1 juvenile kyphosis, the apex is usually between T1 and T8, and there are three or more vertebras wedged more than 5 degrees. Type 2 thoracolumbar form has more irregularities, such as a decrease in the intervertebral spaces and anterior Schmorl’s nodes.

The usual symptom is dorsal or lumbar pain, which is particularly exacerbated by exercise, certain prolonged postures, or lifting heavy objects. The aesthetic deformity is another factor that prompts the patient to seek medical attention, although this is often delayed because the parents initially believes the problem to be postural.

The most commonly used diagnostic criteria are: Wedging of more than 5° in one or more vertebras in the thoracic or thoracolumbar region, irregularity of the vertebral levels, decrease in the disc space, and kyphosis of more than 40 degrees.

The pathophysiology consists of a modification of the epiphyseal growth phenomenon of the vertebral body, with molecular factors (collagen, proteoglycans) that eventually manifest as morphological changes.

The history of the disease is usually benign. There are cases of angles of more than 100 degrees, when cardiopulmonary changes are present.

The treatment objectives are to prevent progression, correct the deformity, alleviate the pain, and improve the patient’s appearance. The management is dictated by the patient’s age, the degree of deformity, and the symptoms. Treatment of kyphosis of less than 50 degrees is based on observation, to determine the progression of the deformity until the skeleton is mature. When the angle is greater, there is substantial growth remaining, and the vertebral deformity is flexible, a back brace is usually indicated.

The criteria for indication of surgical management are: directly related neurological changes, kyphosis of more than 70 degrees, rapid progression of the curve, and pain that does not respond to conservative treatment. There are different surgical techniques for the correction; the double approach (anterior release and posterior instrumentation) and totally posterior techniques. The technique of vertebral shortening by Ponte osteotomies (also known as Smith-Petersen osteotomies) at the apex of the deformity, together with transpedicular instrumentation and posterior arthrodesis, has also been described, with good results and few complications.

MATERIAL AND METHOD

The aim of this study is to analyze the results of 5 patients with Scheuermann’s Disease treated surgically with single management via the posterior approach, in our hospital.

It is an observational, descriptive and retrospective study (Case series) carried out in the period 2013 to 2014, with a total of 12 patients diagnosed with Scheuermann’s disease, who underwent surgery during the study period.

Clinical and radiological data were recorded for each patient, together with preoperative and intraoperative data, and postoperative data for a period of 6 months, which is why only these cases were included in this review. The Cobb method was used to measure the kyphosis before and after surgery. Radiographic studies were performed during hospitalization, after the surgery, and in the 3- to 6-year follow-up.

All the patients were submitted to the same surgical technique. To increase the flexibility of the deformity, Ponte type osteotomies were carried out. This technique involves removal of the facet joints and interspinous ligaments and the ligamentum flavum in the posterior spine, to accentuate the lordosis, creating flexibility, and avoiding what was previously done by performing release of the anterior longitudinal ligament by a second approach. The osteotomies were performed in all cases, at the apical level of 3 to 6 levels, depending on each case.

Posterior instrumentation was performed using the system of transpedicular screws and titanium rods. For the arthrodesis, an autologous bone graft was used, plus tricalcium phosphate. (Figure 1) A postoperative back brace was not used. Walking was indicated between 3 and 5 days after surgery. The patients were subsequently discharged to their homes.

The variables age, sex, symptoms, associated pathology, Wenger classification, initial Cobb angle (intra-observer measurement), Cobb angle after surgery, degrees corrected, and percentage degree of same, surgery time, surgical bleeding, and complications at 6 months were analyzed (infection, loss of anchorage, neurological damage, wound dehiscence).

RESULTS

Of the 12 patients with Scheuermann’s disease, five were operated on; two women and three men, with an average age of 16.6 years (14-21 years). Four patients had associated symptoms, particularly pain (lumbago and dorsal lumbago). (Table 1) The patients were classified according to Wenger’s classification. Three patients had type 1, the thoracic form, and two patients had type 2, the thoracolumbar form.

The mean initial angle was 76.14° (72.2°-80.5°). The mean postoperative angle was 42.22° (37.4°-50.1°). The mean correction was 33.22° (25.5° -41.2°), and the correction was maintained at the 6-month follow-up. (Figure 2) The mean surgery time was 218 min (210-240) with mean surgery time of 16.6 years (14-21 years). Four patients had associated symptoms, particularly pain (lumbago and dorsal lumbago). (Table 1) The mean initial angle was 76.14° (72.2°-80.5°). The mean postoperative angle was 42.22° (37.4°-50.1°). The mean correction was 33.22° (25.5° -41.2°), and the correction was maintained at the 6-month follow-up. (Figure 2) The mean surgery time was 218 min (210-240) with mean surgery time of 16.6 years (14-21 years). Four patients had associated symptoms, particularly pain (lumbago and dorsal lumbago). (Table 1) The mean initial angle was 76.14° (72.2°-80.5°). The mean postoperative angle was 42.22° (37.4°-50.1°). The mean correction was 33.22° (25.5° -41.2°), and the correction was maintained at the 6-month follow-up. (Figure 2)
A comparison was carried out using the Student’s t test for statistical analysis, comparing our results with those of a study by Hosman et al. (Table 2), in which 33 patients treated with single posterior instrumentation, and another group treated with anterior release and postoperative brace, were analyzed. Equality of variance with p = 0.9593 was found, demonstrating comparable correlation of deformity correction.

DISCUSSION

Scheuermann’s disease has been treated in different ways, and the treatment option we propose is the vertebral shortening technique with posterior instrumentation, which avoids the anterior approach for release of the anterior longitudinal ligament. Ponte osteotomies increase the flexibility of the spine and together with the pedicular instrumentation, are able to correct the deformity and maintain it over time.

Table 2. Student t statistical analyses, comparing our results with those of the study by Hosman et al. in 2003.14

<table>
<thead>
<tr>
<th>Patients</th>
<th>Age (years)</th>
<th>Sex</th>
<th>Symptomatology</th>
<th>Classification (Wenger)</th>
<th>Initial Cobb angle (degrees)</th>
<th>Postsurgical angle (degrees)</th>
<th>Correction (degrees)</th>
<th>Percentage correction</th>
<th>Surgery time (min)</th>
<th>Bleeding (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>Female</td>
<td>Lumbar pain</td>
<td>Type 1</td>
<td>80.1</td>
<td>43.3</td>
<td>36.8</td>
<td>54.06%</td>
<td>210</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>Female</td>
<td>Lumbar pain, Marfan syndrome</td>
<td>Type 1</td>
<td>72.2</td>
<td>374</td>
<td>34.8</td>
<td>51.80%</td>
<td>220</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>Male</td>
<td>Asymptomatic, Sotos syndrome</td>
<td>Type 1</td>
<td>80.5</td>
<td>39.3</td>
<td>41.2</td>
<td>48.82%</td>
<td>210</td>
<td>1200</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>Male</td>
<td>Dorsal-lumbar pain</td>
<td>Type 2</td>
<td>72.3</td>
<td>44.5</td>
<td>27.8</td>
<td>61.55%</td>
<td>240</td>
<td>500</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>Male</td>
<td>Lumbar pain</td>
<td>Type 2</td>
<td>75.6</td>
<td>50.1</td>
<td>25.5</td>
<td>66.27%</td>
<td>210</td>
<td>450</td>
</tr>
<tr>
<td>Means</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td>76.14</td>
<td>42.92</td>
<td>33.22</td>
<td>56.50%</td>
<td>218</td>
<td>590</td>
</tr>
</tbody>
</table>

1. p-value (two-tailed). 2. Hartley’s f test for equality of variance. Results from OpenEpi, Version 3, open source calculator-t_testMean.
Our results indicate that surgical correction of juvenile kyphosis using this technique results in few complications, satisfactory angular correction, and acceptable surgical times, days of hospitalization and intra-operative bleeding.

CONCLUSIONS
The management of corrective surgery of the spine requires the definition of evidence as to which is the best treatment option, particularly in diseases with low incidence involving high-risk procedures for the patient.

All authors declare no potential conflict of interest concerning this article.