MINIMALLY INVASIVE SPINE SURGERY IN THE NUEVO HOSPITAL CIVIL DE GUADALAJARA “DR. JUAN I. MENCHACA”

CIRURGIA DE COLUNA MINIMAMENTE INVASIVA NO NUEVO HOSPITAL CIVIL DE GUADALAJARA “DR. JUAN I. MENCHACA”

CIRUGÍA DE COLUMNA MÍNIMAMENTE INVASIVA EN EL NUEVO HOSPITAL CIVIL DE GUADALAJARA “DR. JUAN I. MENCHACA”

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Abstract

Objective: To describe our experience on a case series treated with minimal invasive techniques in spine surgery, with short-term follow-up and identify complications. Methods: A prospective analysis was performed on 116 patients operated on by the same team from September 2015 to June 2016. Evaluating the short-term follow-up we registered the surgical time, bleeding, complications, hospital stay, pre- and postoperatively neurological status, as well as scales of disability and quality of life. Demographic and surgical procedure data were analyzed with SPSS version 20 program. Results: A total of 116 patients with a mean age of 49.7 ± 15.7 (21-85 years) underwent surgery being 76 (65%) with lumbar conditions and 37 (32%) with cervical conditions. The most common procedures were tubular discectomies (31), tubular bilateral decompression (17), lumbar MI-TLIFs (7), and anterior cervical discectomy and fusion (35). The mean blood loss was 50.6 cc, the hospital stay was 1.7 day, pre- and postoperative pain VAS were 7.4 % and 2.3%, respectively, pre- and postoperative Oswestry (ODI) were 64.6% and 13.1%, respectively, pre- and postoperative SF-36 of 37.8% and 90.3%. There were no major complications, except for a surgical wound infection in diabetic patient and three incidental durotomies, one of these being a contained fistula, treated conservatively. Conclusions: The current tendency towards minimally invasive surgery has been justified on multiple studies in neoplastic and degenerative diseases, with the preservation of the structures that support the spine biomechanics. The benefits should not replace the primary objectives of surgery and its usefulness depends on the skills of the surgeon, pathology and the adequate selection of the techniques. We found that the tubular access allows developing techniques such as discectomy, corpectomy and fusion without limiting exposure, avoiding manipulation of adjacent structures, reducing complications and being feasible in a public hospital.

Keywords: Spine/surgery; Minimally invasive surgical procedures; Treatment outcome; Prospective studies.

Resumen

Objetivo: Describir nuestra experiencia en una serie de casos tratados por técnicas mínimamente invasivas de cirugía de columna, con seguimiento a corto plazo y identificar complicaciones. Métodos: Realizó-se análise prospectiva de 116 pacientes operados pela mesma equipe, de setembro de 2015 a junho de 2016. Avaliando o acompanhamento a curto prazo, foram registrados tempo cirúrgico, hemorragia, complicações, estadia hospitalar, estado neurológico pré e pós-operatório, além de escalas de incapacidade e qualidade de vida. Os dados demográficos e sobre o procedimento cirúrgico foram analisados com o programa SPSS versão 20. Resultados: Um total de 116 pacientes com média de idade de 49,7 ± 15,7 (21 a 85 anos) foram operados, sendo 76 (65%) com afecção lombar e 37 (32%) com afecção cervical. Os procedimentos mais comuns foram discotomias tubulares (31), descompressão bilateral tubular (17), MI-TLIF (7) lombares, e artrodese anterior (35). O sangramento médio foi de 50,6 cm³, o tempo de hospitalização foi 1,7 dia, a escala EVA pré-cirúrgico foi 7,4 e a pós-cirúrgico 2,3, Oswestry (ODI) pré-cirúrgico de 64,6% e pós-cirúrgico de 13,1%, SF-36 pré-cirúrgico de 37,8% e pós-cirúrgico de 90,3%. Não houve grandes complicações, exceto uma infecção da ferida cirúrgica em paciente diabético e três duralotomias incidentais um dos pacientes com fistula, uma delas contida, tratada de modo conservador. Conclusões: A tendência atual da cirurgia minimamente invasiva tem sido justificada em vários estudos sobre neoplasia e doenças degenerativas, preservando as estruturas da biomecânica da coluna vertebral. Os benefícios não devem substituir os objetivos primários e sua utilidade depende das habilidades do cirurgião, da patologia e do uso seletivo das técnicas. Constatamos que o acesso tubular permite desenvolver a técnica de discotomia, fusão e corpectomia sem limite de exposição, evitando manipulação de estruturas adjacentes, reduzindo as complicações e sendo viável em hospitais públicos.

Descritores: Coluna vertebral/cirurgia; Procedimentos cirúrgicos minimamente invasivos; Resultado do tratamento; Estudos prospectivos.
INTRODUCCIÓN

Minimamente invasiva cirugía de columna causa la menor posible agresión a las estructuras del paciente, lo que conduce a menores complicaciones y a menores estancias hospitalarias. En general, los objetivos de la cirugía de columna son la recuperación de la función y la calidad de vida del paciente.1-2,11,16-18

El particular carácter de la cirugía de columna requiere avances en la cirugía con el menor daño posible. Este es el caso de los procedimientos que involucran la suspensión de la musculatura paraspinal, en contraste con técnicas minimamente invasivas, a menudo se limitan tan poco como sea posible las exposiciones, evitando la manipulación de estructuras adyacentes, disminuyendo complicaciones y siendo factible en un hospital público. No deben reemplazar los objetivos primarios y su utilidad depende de las habilidades del cirujano, la patología y el uso selectivo de las técnicas. Encontramos que el acceso tubular permite la cirugía de discotomía, fusión y corpectomía sin limitar la exposición, evitando la manipulación de estructuras adyacentes, disminuyendo complicaciones y siendo factible en un hospital público.

MÉTODO

Presentamos un estudio de series con 116 pacientes con diferentes patologías que se resolvió usando técnicas minimamente invasivas, con el objetivo de evaluar los resultados a corto plazo y a largo plazo. Pacientes tratados durante el período de septiembre de 2015 a junio de 2016, en el Hospital Civil de Guadalajara “Dr. Juan I. Menchaca”. Los procedimientos más comunes fueron laminectomías tubulares (31), descompresión bilateral tubular (17), MI-TLIF (7), lumbares; discectomía y artrodesis anterior (35). El promedio de sangrado fue 50,6 cc, estancia hospitalaria 1,7 días, escala EVA prequirúrgica 7,4 y posquirúrgica 2,3, Oswestry (ODI) prequirúrgico 64,6% y posquirúrgico 13,1%, SF-36 prequirúrgico 37,8% y posquirúrgico 90,3%. No hubo complicaciones mayores, excepto una infección de herida quirúrgica en paciente diabética y 3 durotomías incidentales, una de estas con fistula contenida, de manejo conservador. Conclusiones: La tendencia actual de la cirugía minimamente invasiva se ha justificado en múltiples estudios en patología tumoral y degenerativa, con la conservación de estructuras para biomecánica de la columna. Los beneficios no deben reemplazar los objetivos primarios y su utilidad depende de las habilidades del cirujano, la patología, y el uso selectivo de las técnicas. Encontramos que el acceso tubular permite la cirugía de discotomía, fusión y corpectomía sin limitar la exposición, evitando la manipulación de estructuras adyacentes, disminuyendo complicaciones y siendo factible en un hospital público.

RESULTADOS

De los 116 pacientes que underwent spine, surgery using minimally invasive techniques, 60 (51%) were women. The average age of the patients was 49.7 + 15.7 (21-85). Of the 116 procedures, 76 (65%) were in the lumbar spine: discectomy by tubular approach (31 cases), bilateral decompression of lumbar spinal stenosis by tubular approach (17 cases), interlaminar decompression of a narrow canal using the Hatta technique (3 cases), reinforcement of vertebral bodies with bone cement via kyphoplasty or percutaneous spinal fusion without most of its inconveniences of unnecessary damage to adjacent tissues. This is why the benefits obtained from minimally invasive techniques are not limited only to the size of the incision, but also to a less painful postoperative period and the possibility for the patient to return more rapidly to their day-to-day life.2,11
**Figure 1.** Advantages of minimally invasive spine surgery.

In our case series, most of the surgeries were performed via anterior, lateral, and posterior tubular approaches to the spine, principally in the cervical and lumbar regions, to treat everything from disc extrusions to tumor resections and corpectomies, with outcomes similar to those found in the literature, achieving the objectives of spine surgery, reducing the rate of complications, with a shorter hospitalization, which, in a public hospital, is favorable towards the scheduling of elective surgery and wait times. (Figures 2, 3, and 4)

Within our case series, besides degenerative pathologies such as the MI-TLIF procedures, (Figure 5) the resection of a lumbar teratoma via mini-open approach was also possible, without the development of complications, with adequate exposure, a reduction in bleeding, and a shorter hospital stay. (Figure 6)

The most common procedure in our series was the lumbar tubular discectomy, for which a recent double-blind study reported results similar to those of conventional microdiscectomy and concluded that neither technique was superior to the other.19,20

Among our complications, incidental durotomy, which is reported as rare in these procedures, occurred in 2.5%. In a large cases series it was reported as 1.6%,21 its closure being difficult due to the manipulation of the instruments in tubular approaches. 22 We managed them using hemostatic sponges, fibrin glue, and adequate closure of fascia and skin, with rest for two days. Because of the minimally invasive nature, closure of the soft tissues over the defect without dead space is sufficient to prevent the development of an external cerebrospinal fluid fistula as reported by Shibayama.23

### Table 1. Minimally invasive spinal procedures at the Nuevo Hospital Civil de Guadalajara “Dr. Juan I. Menchaca” (Sep 2015 to Jun 2016).

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Number of surgeries</th>
<th>Complications</th>
<th>Bleeding/average</th>
<th>Hospitalization (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*One-level Tubular ACDF</td>
<td>16</td>
<td>-</td>
<td>19.52 cc</td>
<td>2.25</td>
</tr>
<tr>
<td>*Multiple-level ACDF</td>
<td>19</td>
<td>-</td>
<td>23.21 cc</td>
<td>2.0</td>
</tr>
<tr>
<td>Posterior tubular laminoforaminotomy</td>
<td>1</td>
<td>1 incidental durotomy</td>
<td>40 cc</td>
<td>2.0</td>
</tr>
<tr>
<td>Tubular laminoforaminotomy discectomy</td>
<td>1</td>
<td>-</td>
<td>120 cc</td>
<td>2.0</td>
</tr>
<tr>
<td>Lumbar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-level tubular discectomy</td>
<td>27</td>
<td>1 incidental durotomy</td>
<td>18.51 cc</td>
<td>1.22</td>
</tr>
<tr>
<td>Multiple-level tubular discectomy</td>
<td>4</td>
<td>-</td>
<td>18.75 cc</td>
<td>1.5</td>
</tr>
<tr>
<td>One-level tubular decompression</td>
<td>6</td>
<td>1 infection of the surgical wound</td>
<td>20.83 cc</td>
<td>1.0</td>
</tr>
<tr>
<td>Multiple-level tubular decompression</td>
<td>11</td>
<td>-</td>
<td>25 cc</td>
<td>1.3</td>
</tr>
<tr>
<td>One-level mini-open decompression</td>
<td>1</td>
<td>1 incidental durotomy</td>
<td>25 cc</td>
<td>1.0</td>
</tr>
<tr>
<td>Multi-level mini-open decompression</td>
<td>3</td>
<td>-</td>
<td>53.33 cc</td>
<td>2.0</td>
</tr>
<tr>
<td>Kyphoplasty (uniporal)</td>
<td>3</td>
<td>-</td>
<td>3 cc</td>
<td>1.0</td>
</tr>
<tr>
<td>Kyphoplasty (biportal)</td>
<td>2</td>
<td>-</td>
<td>1 cc</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>MI TLIF</strong></td>
<td>7</td>
<td>-</td>
<td>85.71 cc</td>
<td>2.5</td>
</tr>
<tr>
<td>Vertebroplasty</td>
<td>6</td>
<td>-</td>
<td>6 cc</td>
<td>0.42</td>
</tr>
<tr>
<td><em><strong>PLIF</strong></em></td>
<td>4</td>
<td>-</td>
<td>100 cc</td>
<td>2.0</td>
</tr>
<tr>
<td>*<em><strong>Mi LECA</strong></em></td>
<td>1</td>
<td>-</td>
<td>72B cc</td>
<td>5.0</td>
</tr>
<tr>
<td>Tumor resection by mini-open interlaminar approach</td>
<td>1</td>
<td>-</td>
<td>100 cc</td>
<td>2.0</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>4</td>
<td>50.6 cc (Average of tubular approaches only)</td>
<td>1.7 days</td>
</tr>
</tbody>
</table>

*Anterior cervical discectomy and fusion; **Minimally invasive transforaminal lumbar interbody fusion; ***Mini-open posterolateral lumbar interbody fusion; ****Lateral extracavitary approach corpectomy
CONTRIBUTION OF THE AUTHORS:
Each of the authors made significant individual contributions to the development of the manuscript. MAAR and HVS were the main contributors to the writing of the manuscript. SVEG, common knowledge, YLR, EFAG and MAAR, performed the surgeries and patient follow-up, and collected clinical data. FGJ evaluated the statistical analysis data. MAAR and HVS researched the literature, reviewed the manuscript, and contributed to the intellectual concept of the study.

CONCLUSIONS
The benefits of minimally invasive spine surgery should never override the main surgical objectives and using it depends on the abilities of the surgeon and the pathology of the patient. Selective use of the available technology can offer better outcomes.

The tubular approach to the anterior, posterior, and lateral spine allows the development of the techniques of discectomy, fusion, and corpectomy without limiting exposure and avoiding manipulation of the adjacent structures, which drastically reduces the immediate complications of conventional approaches, and performing these techniques is feasible in a public hospital.

ACKNOWLEDGEMENTS
We thank the directors of the OPD Hospital Civil de Guadalajara for promoting the development of new surgical advances to benefit patients among the medical staff of the Department of Neurosurgery.

All the authors declare that there are no potential conflicts of interest regarding this article.

REFERENCES


