MySpine Screw Placement Guides  
in Deformity cases

PROF. CLAUDIO LAMARTINA, DR. RICCARDO CECCHINATO
Unique Anatomies
Patient-Matched Solutions
MySpine Screw Placement Guides in Deformity cases: A case report.

PROF. CLAUDIO LAMARTINA, DR. RICCARDO CECCHINATO
IRCCS Istituto Ortopedico Galeazzi, Milano (Italy)

PATIENT HISTORY

<table>
<thead>
<tr>
<th>Age</th>
<th>39 years</th>
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<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td>BMI</td>
<td>30 (80kg,163cm)</td>
</tr>
<tr>
<td>Smoker</td>
<td>Yes</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Congenital scoliosis at 10 years old</td>
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<tr>
<td>Treatment</td>
<td>Conservative treatment</td>
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</tbody>
</table>

39 year-old man with progressive thoracic and low back pain, he was diagnosed at the age of 10 with a congenital scoliosis (Figure 1).

Patient’s physical examination revealed a thoracolumbar kyphosis with a right hump and asymmetry of the trunk. No neurological deficits were observed.

Figure 1. Clinical and radiographic images of a 39 year-old man demonstrating a thoracolumbar deformity
PRE-OP INFORMATION

Pre-operative full-standing x-rays examination (*Figure 1*) showed a thoracolumbar scoliosis with apex in L2 of 62 degrees and a thoracolumbar kyphosis of 49 degrees. A CT scan of the thoracolumbar region demonstrated a congenital deformity with L1 hemivertebra and L2 malformation (*Figure 2*).

*Figure 2.* Coronal CT of the thoracolumbar junction (on the left) showing a L1 congenital hemivertebra. The 3D reconstruction on the right highlights the deformity and the associated L2 malformation.
SURGICAL STRATEGY

Posterior T9-L4 fusion with MySpine screw placement guides and Medacta MUST polyaxial pedicle screws. An L1-L2 asymmetric pedicle subtraction osteotomy (PSO) was performed to remove the hemivertebra and allow a correction of the coronal and sagittal deformity.

To preserve post-operative lower lumbar movement, in the absence of L4-S1 disc degeneration, the chosen lower instrumented vertebra was L4.

After the procedure, the surgical bed was folded in lordosis to restore a flat thoracolumbar junction through the closure of the osteotomy.

Titanium 5.5mm rods were then connected to screws to correct the spine shape on both planes.

MySpine patient-technology is based on a pre-operative low-dose CT scan and a 3D reconstruction method.

Through accurate 3D pre-operative planning, the surgeon can set all of the pedicle screw positioning parameters and decide which will be the final target according to the selected surgical strategy (Figure 3).

Peri-operatively awls, pedicle probes and screwdrivers are guided into the corresponding pedicles using the MySpine.

*Figure 3. MySpine pedicle screw placement guides. A) Awl insertion, B) probe insertion, C) Pedicle screw positioning through the guides.*
OUTCOMES

Post-operative, full-standing x-rays showed a complete coronal and sagittal correction of the deformity (Figure 4). The thoracolumbar pre-operative kyphosis of 67° was reduced to a value of 6°, with a complete disappearance of the thoracolumbar hump. With the reduction of the deformity, the compensating lumbar hyper-lordosis also decreased to a value of -39° and the thoracic region increased its kyphosis to 18° (Tab 2). Lumbar lordosis decreased postoperatively because the patient had no more need to compensate the pre-operative thoracolumbar junction kyphosis. The position of the hardware was checked post-operatively with a low dose CT scan, and no screw malpositioning was observed. The patient was walking on the second post-operative day and is pain free at 1 year follow-up.

Figure 4. Post-operative clinical (anteroposterior and lateral view) and full-standing x-ray (anteroposterior and lateral radiographs) showing the T9-L4 instrumentation performed by the MySpine technique.
### Pre-operative and Post-operative Spino-Pelvic Parameters - Tab 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-op</th>
<th>Postop</th>
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<tbody>
<tr>
<td>PI (Pelvic Incidence) [°]</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>PT (Pelvic Tilt) [°]</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>SS (Sacral Slope) [°]</td>
<td>28</td>
<td>29</td>
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<tr>
<td>LL (Lumbar Lordosis L1-5) [°]</td>
<td>-83</td>
<td>-39</td>
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<td>TLK (Thoracolumbar kyphosis) [°]</td>
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<td>TK (Thoracic Kyphosis T3-12) [°]</td>
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<td>18</td>
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<tr>
<td>Cobb (T4-T12) [°]</td>
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<td>38</td>
</tr>
<tr>
<td>Cobb (T12-L4) [°]</td>
<td>25</td>
<td>14</td>
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AUTHORS' DISCUSSION

Complex deformity surgeries are demanding procedures that often require spinal osteotomies. Screw malpositioning in this kind of surgery can be very common reaching up to 30% of misplaced screws, being a potential source of severe complications for the patient. Vessel damage and neurological lesions due to improper screw positioning are widely described in literature. Some papers underline that the complexity of the surgery and the experience of the surgeon can impact on the accuracy of pedicle screws implants [1-3]. In this case, to reduce the risk of misplaced pedicle screws, Medacta MySpine patient-matched technology has been selected to help the surgeon in the critical step of pedicle screw implantation using tailored guides [4,5], especially in the apical region of the deformity. The pre-operative CT scan was used to craft guides for each level and that also allow correct implantation in the pedicles adjacent to the osteotomy. This technology can be a valid aid for surgeons in complex cases where posterior instrumentation and fusion are required, as for extreme vertebral rotation in adolescent scoliosis cases or abnormal anatomy in congenital cases. Through the dedicated low-dose CT scan protocol and very limited intra-operative fluoroscopies, MySpine represents a safe alternative for both patients and OR staff in comparison with the free-hand technique and conventional navigated technologies. Correct implantation of the hardware can obviously decrease the rate of related complications, improving the outcomes of these complex surgeries.
References

Medacta International is a **Swiss company** developing, manufacturing and distributing orthopaedic and neurosurgical medical devices worldwide.

Medacta was founded in 1999 with a vision of redefining better through innovation for people needing joint and spine replacement.

Through medical education, our innovation leads to better results for both patients and the healthcare system in terms of efficiency and economic savings.

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HEADQUARTERS
Medacta International SA
Strada Regina - 6874 Castel San Pietro - Switzerland
Phone +41 91 696 60 60 - Fax +41 91 696 60 66 - info@medacta.ch

REPRESENTATIVE
Switzerland - Frauenfeld
Gewerbestrasse 3 - 8500 Frauenfeld
Phone +41 (0) 848 423 423 - Fax +41 (0) 848 423 424 - info@medacta-swiss.ch

SUBSIDIARIES
Australia - Medacta Australia PTY.LTD
Unit A1, 16 Mars Road - Lane Cove - NSW 2066
Phone +61 (2) 94202944 - Fax +61 (2) 94202578 - info@medacta.com.au

Belgium - Medacta Belgium B.V.B.A./S.P.R.L.
5a Rue de la Maîtrise - 1400 Nivelles
Phone +32 (0) 67 555 482 - Fax +32 (0) 67 555 483 - info@medacta.be

Canada - Medacta Canada Inc.
31 McBrine Drive, Unit 11- N2R 1J1 - Kitchener, Ontario
Phone +1 519 279 1934 - Fax +1 519 279 1938 - info@medacta.ca

China - Medacta China
Room 610, Building 1, No. 363 Changping Road - Shanghai, China
info@medacta.cn

France - Medacta France SAS
6 Rue du Commandant d’Estienne d’Orves - Parc des Chanteraines - 92390 Villeneuve - La Garenne
Phone +33 147 39 07 22 - Fax +33 147 39 73 17 - info@medacta.fr

Germany - Medacta Ortho GmbH
Jahnstrasse 86 - D - 73037 Göppingen
Phone +49 (0) 7161 50 44 30 - Fax +49 (0) 7161 50 44 320 - info@medacta.com

Italy - Medacta Italia Srl
Via G. Stephenson, 94 - 20157 Milano
Phone +39 02 390 181 - Fax +39 02 390 00 704 - mail@medacta.it

Japan - Medacta Japan CO. LTD
Chichibuya Bldgs. 2F 3-7-4 Kojimachi, Chiyoda-ku, Tokyo 102-0083
Phone +81 (0) 3 6272 8797 - Fax +81 (0) 3 6272 8798 - info@medacta.co.jp

Spain - Medacta España SLU
Avda de las Jacarandas - 2 - Edificio CREA Oficina 631- 46100 - Burjassot
Phone +34 (0) 963 484 688 - Fax +34 (0) 963 484 688 - info@medacta.es

UK - Medacta UK Limited
16 Greenfields Business Park - Wheatfield Way - Hinckley - Leicestershire - LE10 1BB
Phone +44 (0) 1455 613026 - Fax +44 (0) 1455 611446 - info@medacta.co.uk

USA - Medacta USA, Inc.
1556 West Carroll Avenue - Chicago - IL 60607
Phone +1 312 878 2381 - Fax +1 312 546 6881 - info@medacta.us.com

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