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ABSTRACTS

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Percutaneous posterior pedicle screw fixation in the treatment of thoracic, lumbar and thoraco-lumbar junction (T12-L1) traumatic and pathological spine fractures.

Report of 45 cases.

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This study included 45 patients with thoracic, lumbar or thoracolumbar junction (T12-L1) spine fractures who were treated between 2007 and 2011 by means of percutaneous (osteosynthesis) posterior pedicle screw and rod fixation at Neurosurgery Department of “Cardarelli” Hospital.
The population included 45 treated patients:

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<th>Patients</th>
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1) Fractures classified as type A1-A2, according to Magerl
2) Lesser than 30% stenosis of the spinal canal
3) Normal neurological examination
4) No significant retropulsion of bone fragment
All patients presenting with stenosis of spinal canal lesser then 30% have been undergone to an indirect reduction of stenosis by posterior distraction and compression that promote “ligamentotaxis”.

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Sextant system

L2 FRACTURE - Magerl A2
In four patients, presenting reduction of vertebral height, has been performed a technique combining kyphoplasty and percutaneous pedicle screw fixation.
In a case balloon kiphoplasty via a bilateral transpedicular approach and in three case via a uni-pedicular approach has been performed resulting in restoration of vertebral height. In a case the procedure was delayed.
L1 fracture due to trauma occurred two months before hospital admission. Initially managed by wearing a removable corset (CAMP C35). Persistence of severe upper back pain. A lumbar spine MRI with STIR sequence demonstrated a vertebral body compression fracture associated with kyphotic deformation of the segment. A percutaneous posterior pedicle screw and rod fixation combined with balloon kphoplasty via a uni-pedicular approach and injection of cement (polymethylmetacrylate PMMA) filling and stabilizing the vertebra was performed.
COMBINED FIXATION and KIPHOPLASTY
Delayed procedure
Two patients, with T9 and T8 fracture respectively, have been treated by percutaneous posterior pedicle screw and rod fixation one level above and one level below the injured vertebra (short implant) (Longitude system).

In the first case the dorsal fracture was due to trauma and in the second one to myeloma, in both cases there were no spinal canal invasion.
T 9 traumatic fracture

T 8 pathologic fracture

D 9

D 8
CT scans were conducted on the first day after surgery to verify the position of screws and rods.

The patients have been mobilized on the second or the third day after surgery and have been discharged with a corset on the forth or fifth day after surgery.
Follow-up examinations were performed 3 and 6 months after surgery. All patients referred a reduction of pain in dorso-lumbar region.

CT scan and x-ray did not show any radiologic signs of mobilization or failure of the implant, whereas a good fracture reduction and stabilization without secondary deformity.
Percutaneous pedicle osteosynthesis (Sextant system and Longitude system) exhibits such advantages as

- less trauma,
- reduction of blood loss,
- reduction of operative time,
- minimal damage of paraspinal muscle,
- early mobilization of the patient.
The main disadvantage of this technique is a higher radiation dose than open surgery.

The drawbacks of this method include limitation to certain types of burst fractures and to lack of deformities in the frontal plane (i.e. scoliosis).
This preliminary study suggests that percutaneous pedicle ostesynthesis (Sextant system and Longitude system) is an adequate and satisfactory procedure suitable for treating thoracolumbar fractures.

We have started using this technique also: in some cases of more complex fracture after failure of conservative treatment or in presence of elderly patients with multiple diseases and in selected cases of thoraco-lumbar metastasis.
Sextant system

L1 FRACTURE - Magerl B1
Sextant system

L1 FRACTURE - Magerl B1
L4 fracture occurred one month before hospital admission. Because of patient was affected by obesity, diabetes cardiomyopathy, hepatopathy, cryoglobulinemia and was in anticoagulant treatment, she was initially managed by wearing a removable corset (CAMP C35). Persistence of severe upper back pain. A percutaneous posterior pedicle screw and rod fixation was performed.
Vertebral metastasis at the level of L4, from lung cancer. Needle lung biopsy. Stabilization and synthesis-L3-L5 fusion with percutaneous transpedicular screws at L3 and L5 and needle biopsy.
In presence of spinal metastasis the minimally invasive spinal surgery can allow:

- to obtain a diagnosis by biopsy of the lesion percutaneously,
- to improve the pain,
- to preserve function by stabilizing the unstable segment
- to start quickly adjuvant treatment of the primary lesion (radiotherapy, chemo-therapy).
Combined fixation and kiphoplasty allows to achieve restoration of vertebral height. Therefore it should be offered, when indicated, to the patients suffering from vertebral fractures.

Additional advantages are the possibility of reducing the number of fused levels (shorter instrumentations), and to perform a 360 degree stabilization-remodeling through a single posterior approach.
Percutaneous fixation combined with balloon Kyphoplasty can be an effective alternative in selected cases of thoraco-lumbar fractures and of vertebral metastasis.
Thank You for Your attention
Antonio Cardarelli
AZIENDA OSPEDALIERA DI RILIEVO NAZIONALE
The SEXTANT Spinal System is an implant system composed of rods, screws, specially designed surgical tools and a novel mechanical implant delivery device. This device looks much like the sextant of naval navigation, and is the navigation and insertion tool that allows screws and rods to be applied to the spine in a minimally invasive manner.
Common indications for this procedure include: severe disc degeneration, recurrent disc herniation, misaligned vertebrae (spondylolisthesis) or traumatic fracture.

The SEXTANT Spinal System can only be used for conditions affecting the lumbar spine.
Follow-up assessments

✓ the quality of decompression and reconstruction of the spinal canal (CT and MRI scanning);
✓ the stability of the operated segment (dynamic x-rays);
✓ the quality of interbody fusion (CT scanning and dynamic x-rays);
✓ 4) correction of the fracture kyphosis and its postoperative loss (measurements of Cobb angles for the assessment of sagittal plane deformity).