Preliminary experience with the use of *pedicle screws* and *flexible bar* for the treatment of *lumbar spinal diseases*.

Luciano Mastronardi  
Chief of Neurosurgery  
San Filippo Neri Hospital  
Roma, Italy
The elimination of motion produced by rigid spinal fixation may have consequences:

1. Overloading juxtaposed spinal motion segments (*functional consequences*);
2. Leading to degenerative changes at adjacent levels (*organic consequences*).
• **Adjacent segments degenerative disease** to instrumented levels has sparked increasing interest over the last years.

• In order to **prevent** degenerative disc changes at segments adjacent to fused levels several techniques have been developed, including **pedicle screw fixation with flexible bars** (**semi-rigid dynamic rods**).
Our “flexible” fixation series

- 36 cases \((10/2009 - 12/2013)\)
- 16 segmental instability with LowBackPain
- 11 severe lumbar stenosis
- 2 stenosis with instability
- 4 A1-A2 lumbar fractures \((pts \text{ with degenerative disease})\)
- 2 mild listhesis with instability
Osteoporosis

• The incidence of screw loosening increases significantly in patients with severe osteoporosis.

• Biomechanical tests have shown that a pedicle screw that expands within the vertebrae body can substantially improve fixation in the presence of osteoporotic bone.
Osteoporotic series (5/2012 – 12/2013)

Material & Methods

• 15 patients with lumbar diseases
  - 13 Stenosis +/- Degenerative Lysthesis
  - 2 Traumatic Fractures

• pre-operative DEXA bone mineral density scan (BMD) mean T-score of -2.5

• Adjacent Segment Disease in all cases
Osteoporotic series
Typical case
Technique

- decompression: laminectomy and/or foraminotomy
  (except for the fractures)
- two or three-level stabilization with expandable pedicular screws *(Osseoscrew)* &
  semi-rigid dynamic rods *(Isobar Evolution)*
Technique:
Osseoscrew + 2-level Isobar Evolution (Scient’x Aphatec)
Complications

- Two cases of incidental CSF leakage (unrelated to the devices), both in patients with severe stenosis and lysthesis, healed after prolonged subfascial drainage.
Results in 17 cases with 7-12 months clinical-radiographic followup

- VAS & ODI markedly **improved** in all cases.
- Two cases had recurrent low back pain
- No instances of screw loosening, or breakage, or pull-out of the screws
- Good screw-bone interface
- **Until now, prevention of degenerative disease above the fixed segments**
Final Considerations

• The **raise of intradiscal pressure** at the adjacent levels consecutive to a rigid instrumented segment can be **reduced** when the rigid construct is augmented with a flexible stabilization device, using **semi-rigid dynamic rods**.
Final Considerations

- Augmentation with titanium expandable screws may represent an advisable solution in pts with documented severe osteoporosis.
Proposal

• **Multicenter study group** on the efficacy of Osseoscrew + Isobar Evolution implant in **osteoporotic** patients with:

1. Degenerative stenosis +/- listhesis
2. LBP for degenerative/iatrogenic instability
3. Mild symptomatic spondylolisthesis
4. A2 lumbar fracture (open or mini-invasive)
5. Other?
Conclusion

• The flexible lumbar constructs might have a possible protecting role preventing the occurrence of degenerative disc changes at the adjacent segment also in osteoporotic patients.