Spine Session: prevention and management of surgical complications

Per-operative problems: iatrogenic bone damage, osteoporosis, cement extravasation

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1. General considerations about bone damage during surgery

Goal of spine surgery is to:

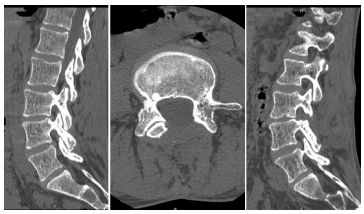
1. Decompress and protect the neural elements	LSS, LDH, myelopathy…
2. Stabilize the spine or re-align the spine	trauma, scoliosis
3. Remove tumoral or infected tissue	cancer, discitis

To do so spine surgeon have to **remove bone** mainly when

Getting an access to nerve, cord, disc…	most surgeries
Rarely to realign or stabilize	PSO
When treating tumor or infection	vertebrectomy, spondylitis

This is opposed bone removed or damaged by the disease / condition itself (facet osteoarthritis, erosive disc arthritis, infection, cancer, fractures…)

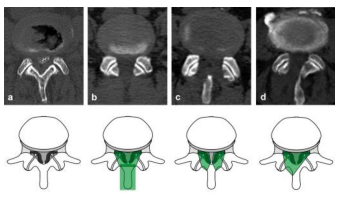
2. Iatrogenic bone damage



Example of facet bone removal

Most of the time no immediate instability

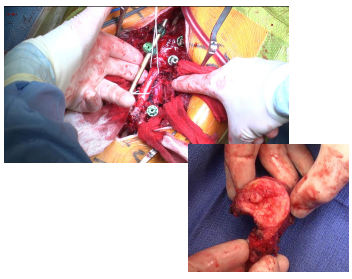
2. Iatrogenic bone damage



Example of laminectomy vs laminotomy

Most of the time no immediate instability

2. Iatrogenic bone damage



Example of en bloc vertebrectomy

Always immediate instability

2. Iatrogenic bone damage : prevention and management

Planning and anticipation
- Locate weak (osteolysis) or strong bone (condensation)
- Limit bone damage as much as possible
- Plan carefully the bone removal extension…
- Estimate eventual instability (do not overestimate !!)
- Consider immediate reconstruction (benefits ?)

Rigorous execution
- Do what was planned (check the level…)
- Use helping tools (burr, microscope or navigation…)
- Check during procedure (dyna CT)

Check just after surgery
- = make a post-op CT scan
- Is it OK ?

3. Osteoporosis

Osteoporosis is never a per-operative problem if you do decompression alone
(too wide decompression can increase the risk of fracture)

Osteoporosis is always a problem **if you put implants**
- Implant has no mechanical strength (you feel it)
- Implant has no mechanical strength and moves in the bone when making maneuvers
- Implants loose anchorage (you know it) PJF
- implants induce a collapse (fracture) of the adjascent level PJK

3. Osteoporosis


Simple spondylo
Rheumatoid arthritis (and OP)

Did not observe per-op problem
But…

3. Osteoporosis


L5 screw placement and posterior laminectomy induced Chance fracture

Possibly per-op, possibly immediate post-op

Revision with pelvic extension

3. Osteoporosis : prevention and management

Detect and treat osteoporosis (rarely feasible)

Decompression alone
- spare bone as much as possible (unilateral laminotomy…)

If think about putting implants
- **reconsider this option**: do not put implants (see later)

If you have to put implant
- cement screw (modified technique, see after)
- consider hooks, consider resigning
- avoid cages (sink = useless)
- anticipate problems

4. Cement leakage

Screw is the most common implant used to stabilize spine
Most screws are implanted in the elderly
Screw pullout and lateral stability is reduced in osteoporotic spine

Adding cement to increase immediate stability (pullout) of the screw is a good solution

Is it really always a good plan ?

Yes and no

4. Cement leakage

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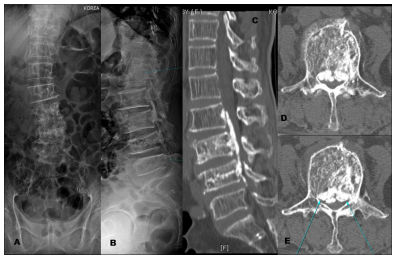
De Puy, techn notice

F. Costa Medical Engineering & Physics 2016

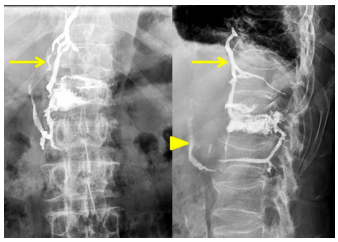
4. Cement leakage



Si-Young Park, et al. Journal of Orthopaedic Surgery and Research 2010

Low viscosity cement
may leak in the canal

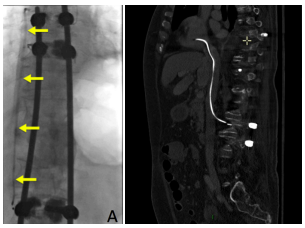
4. Cement leakage



Poster EPOS Department of Radiology, University of Palermo, Italy

Low viscosity cement
may leak outside the canal

4. Cement leakage



Elens and Lecouvet, Eur J Vasc Endovasc Surg (2018) 55, 416

Low viscosity cement
may leak outside the canal

Perivertebral vein
(segmental vein)
Vena cava
Right atrium

Molding the vein….

4. Cement leakage

Low viscosity cement
True embolization in the lung

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Rev. Assoc. Med. Bras. vol.58 no.5 2012

Radiopaedia.org

4. Cement leakage: prevention and management

Think about it (it happens)

Do not inject large quantity (1 to 2 ml)
Do not use low viscosity cement

Use **high viscosity** cement loaded in small 1ml syringe
simply cut the end of the syringe
aspirate the cement
remove the regular screw
put the cement, put the screw…
Cost = 0, danger considerably reduced

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