Safety and efficacy of percutaneous instrumentation combined with antibiotic treatment in spondylodiscitis

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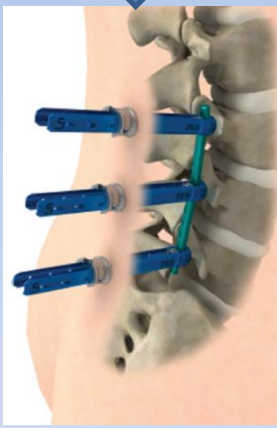
Introduction

- Spondylodiscitis incidence: 0.5 à 2.2/100000 inhabitants per year.
- Treatment:
  - antibiotic for 6 to 12 weeks.
  - Brace for 3 months in patients presenting back pain and a risk for vertebral body collapse.
- Braces are not always tolerated and complications of prolonged immobilization might occur.
- The patient's autonomy (walking ability, daily activities) might improve more rapidly after a percutaneous procedure. Additionally, the sagittal thoracolumbar alignment could be better maintained by internal fixation.



Purpose

Analyze back pain, quality of life, sagittal deformity, and complications after percutaneous instrumentation in spondylodiscitis.

Criteria

- The following inclusion criteria were considered:
  - severe functional impairment because of back pain and
  - diagnostic magnetic resonance imaging demonstrating spondylodiscitis and
  - vertebral body osteolysis on computed tomography (CT) and
  - a disc puncture and/or blood culture were required for microbiological analysis and antibiotic treatment.

- The following exclusion criteria were considered:
  - postoperative infection after spinal instrumentation or
  - spinal tuberculosis or
  - mycosis or
  - general septic conditions or
  - acute endocarditis documented by sonography or
  - contra-indications for surgery or general anaesthesia or
  - absence of vertebral body osteolysis on CT.

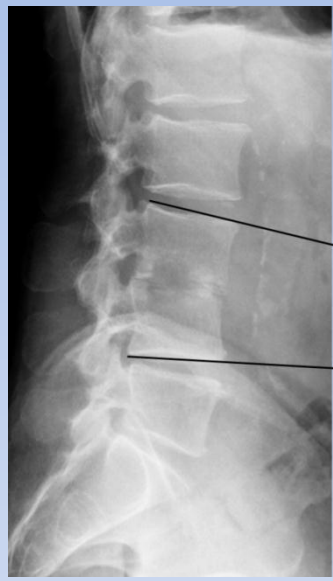
Material and Methods

- A retrospective observational study
- 28 consecutive patients between May 2012 and May 2016

Clinical Outcome

- Back pain was evaluated on a Visual Analogue Scales (VAS) from 1 to 10.
- Preoperatively and postoperatively at day 5, 6 weeks, 3 months, and 1 year.
- Quality of life was studied using the EQ-5D-3L questionnaire at the same time points (except 5^{th} postoperative day).

Material and Methods
Radiologic deformity assessment



- Lateral thoracolumbar X-Ray
  - in standing position.
  - prior to treatment, at day 5, 6 weeks, 3 months and 1 year.
  - Regional kyphosis was measured between the cranial endplate of the cranial adjacent vertebra and the caudal endplate of the caudal adjacent vertebra.
  - A modified sagittal index was used.

- CT
  - Osteolysis of vertebral bodies was assessed prior to treatment. Osteolysis of both vertebral bodies adjacent to the infected disc was graded as <1/3, between 1/3 and 2/3, or >2/3 of vertebral body height.
  - Assessment of fusion was performed on CT at 1-year follow-up

Material and Methods

Statistical evaluation

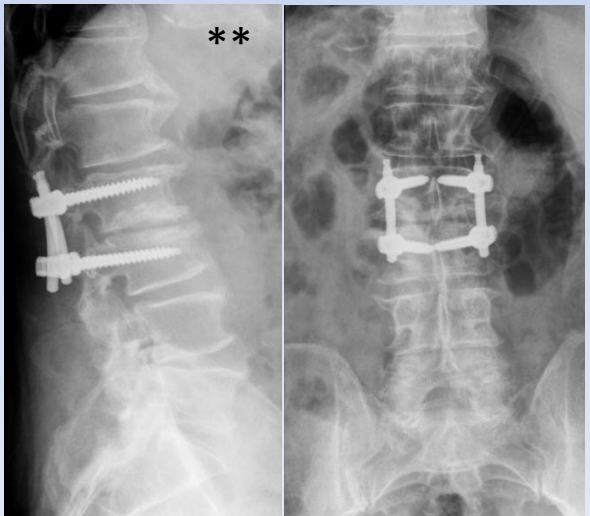
- Statistical evaluation was performed with R Software Version 3.1.3 and OpenBUGS Software Version 3.2.3.
- A Bayesian inference with Markov chains Monte Carlo technique was used.
- Clinical scores and radiographic measurements were compared preoperatively versus postoperatively at day 5, and in the postoperative course.
- Probabilities of difference between time points (β) were estimated from posterior distributions and considered as significant if they were >0.95.

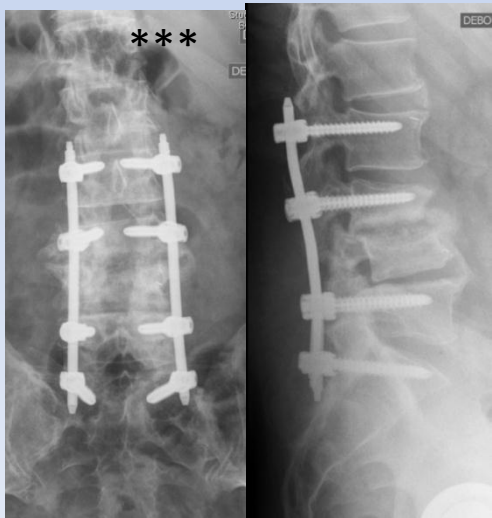
Material and Methods

Epidemiologic data

Gender	M 14(50%) / F 14(50%)
Age	67.8 +/-11.9 years (42 to 85)
Level	Lo 18 (64.28%) / T-Lo 5 (17.86%) / T 5 (17.86%)
Extention of osteolysis	<1/3 bodies 15 (53.58%) ; 1to2/3 bodies 10 (35.71%) ; >2/3 bodies 3* (10.71%)
Osteosynthesis	Short 9** (32,1%) / long 19*** (67,9%)
average hospital stay	4.3 ± 2.0 days (1 to 9)

* these 3 patients were treated by a complementary iliac crest graft through a minio-open anterior approach.





Clinical results

VAS	Preoperative	Day 5	6 weeks	3 months	1 year
Average± SD	7.0 ± 1.2	3.2 ± 1.8	2.2 ± 1.4	1.9 ± 1.5	1.6 ± 1.5
Range	5 to 9	0 to 8	0 to 5	0 to 5	0 to 4
Probability β		1.000	0.974	0.927	0.902

EQ-5D	Preoperative	6 weeks	3 months	1 year
Average± SD	0.229 ± 0.209	0.563 ± 0.210	0.687 ± 0.216	0.755 ± 0.253
Range	-0.036 to 0.687	0.075 to 0.780	0.075 to 1	0.075 to 1
Probability β		1.000	0.999	0.961

A probability of change > 0.95 was considered significant between to time points.

Bacterial spectrum and antibiotic treatment

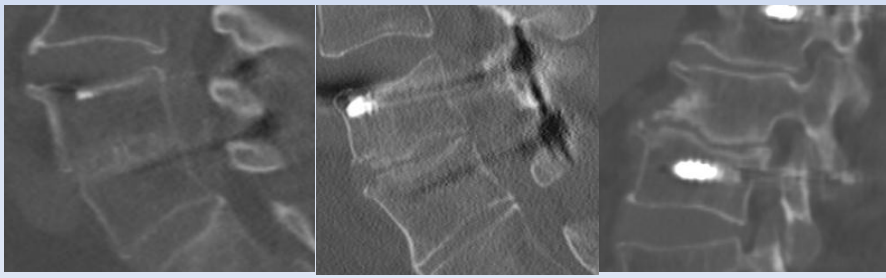
- All 28 patients underwent a preoperative diagnostic intervertebral disc puncture.
- The bacterial spectrum was:
  - 6 *Staphylococcus aureus* (21.4%)
  - 4 *Staphylococcus epidermidis* (14.3%)
  - 4 *Streptococcus* (14.3%)
  - 4 *Echerichia coli* (14.3%)
  - 3 *Enterococcus* (10.7%)
  - 4 other bacteria (14.3%)
  - 3 negatives cultures (10.7%)
- CRP average value at diagnosis was 138.0 mg/dl (19 to 400 mg/dl) and 13.7 mg/dl (0 to 50 mg/dl) after 6 weeks.
- Antibiotics were stopped after 6 weeks in 23 patients and after 12 weeks in the other 5 patients.

Radiological results

	Preoperative	Day 5	6 weeks	3 months	1 year
Regional Kyphosis					
Average± SD	8.7° ± 2.8°	3.3° ± 2.8°	4.3° ± 2.8°	4.8° ± 2.8°	5.0° ± 2.8°
Range	0° to 19°	0° to 18°	0° to 17°	0° to 17°	0° to 17°
Probability β		1.000	0.069	0.227	0.427
Sagittal Index					
Average± SD	15.1° ± 13.0°	9.6° ± 13.5°	10.8° ± 13.5°	10.7° ± 13.5°	11.0° ± 13.9°
Range	-12 à 38°	-19 à 32°	-16 à 35°	-17 à 31°	-17 à 35°
Probability β		1.000	0.044	0.316	0.301

A probability of change > 0.95 was considered significant between to time points.

- Interbody fusion was complete in 17 cases (60.7%), partial in 5 cases (17.9%), and pseudarthrosis was observed in 6 cases (21.4%) at 1-year follow-up.



Complications

- Four complications were registered in the early postoperative period:
  - 2 pulmonary atelectases
  - 1 pedicle screw migration
  - 1 hematoma of the paravertebral muscles
- Septic complications did not occur.
- Revision surgery was not indicated.
- 24 out of 28 patients were clinically followed for more than 2 years. Recurrent spondylodiscitis was not encountered in any patient on long-term follow-up.

Conclusion

- Percutaneous instrumentation seems safe and efficient in the treatment of spondylodiscitis.
- It improved back pain and quality of life significantly in the early postoperative period and prevents kyphotic deformity.
- Septic complications were not observed among our patients and the course of antibiotic treatment was not influenced.