

# Parkinson disease Spine Instrumentation, a Chronicle of a Death Foretold

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## Abstract

A 75-year-old male with history of medically controlled Arterial Hypertension (AH) and Parkinson Disease (PD), reporting Degenerative Lumbar Scoliosis and Lumbar Stenosis. Underwent for coronal deformity correction and lumbar stenosis decompression. An immediate successful radiological and clinical outcome, but six weeks after surgical intervention patient with thoracic pain, x-rays showed a fracture of the upper instrumented vertebra. Due to multimorbidity we decided conservative treatment, expecting consolidation. Nevertheless, after 5 months of conservative treatment without bone consolidation, he underwent for a re-intervention, making a transition from a rigid to a semi-rigid spine instrumentation. The purpose of this article is to show how challenging is a combination of PD with Degenerative Spine Disease.

**Keywords:** Parkinson disease • Spinal surgery • PJK • PJF • Neuromuscular disease surgery

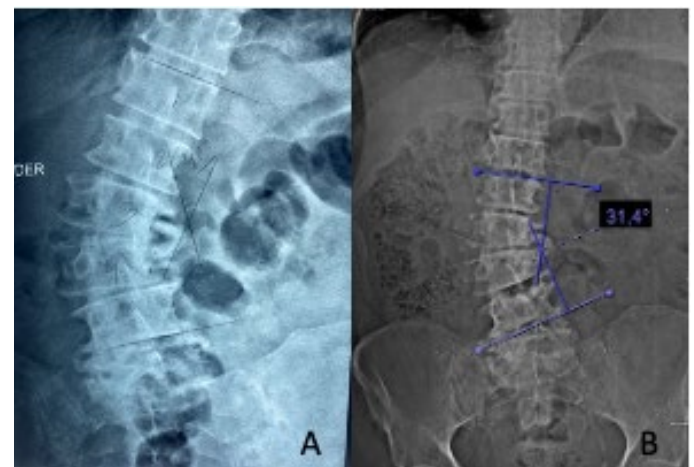
## Introduction

PD is the second most common neurodegenerative condition, with an estimated prevalence of 0.3% [1,2]. Postural deformities are common in this disease, being two types the most important: 1) sagittal plane (camptocormia and antecollis), and 2) coronal plane (Pisa syndrome and scoliosis). Coronal deformity has a coronal deviation of the trunk, that resolves after being in supine [3]. Those types of deformities could have myelopathy or radiculopathy. Degenerative spondyloarthropathy, thoracolumbar scoliosis and cervical deformity, are the most common degenerative spine problems in PD [4]. Consider that PD patients are susceptible to osteoporosis, due to: 1) low bone mechanical stress due to low mobility, 2) vitamin D deficiency, 3) low body weight, and 4) hiperhomocysteinemia [5,6]. But, which is the appropriate asses of a degenerative spine disease with PD? Do we have to fix it or not? Well, depends on each case. First, analyzed the severity of PD by a modified scale of Hoehn and Yahr [7,8], and then determined the best option.

## Case Presentation

A 75-year-old male with history of medically controlled AH and PD, with low-back-pain radiating to both limbs, predominantly to the left. Tendency to a positive balance gait and left coronal deviation. X-rays showed a degenerative lumbar scoliosis with 40° of Cobb angle (Figure 1). Underwent a posterior spine fusion from T9 to Iliac bones, plus lumbar stenosis decompression. Postoperative x-rays and clinical evaluation were successful (Figure 2). After six weeks, he was in great pain localized in thoracic spine due to movement, and x-ray control showed a fracture of the Upper Instrumented Vertebra (UIV) with Regional Kyphosis Angle (RKA) of 30.6° (Figure 3). Due to multimorbidity, treatment choice was conservative with analgesic medication and Taylor

Brace. After three months, still with thoracic pain. Supine x-ray with RKA of 23.2°, and standing x-ray RKA of 46.3° (Figure 4); patient was not agree for a revision surgery, so we continued with conservative treatment. Four months after surgery was performed a computed tomography (CT), with a 75% lysis of T9 and inferior platform of T8 affected (Figure 5). After five months from the



**Figure 1.** A) AP x-ray with degenerative lumbar scoliosis at L4 apex and 40° Cobb angle, L3-L4 and L4-L5 lateralisthesis and B) Axial traction x-ray, showing reduction of scoliosis up to 31.4°.

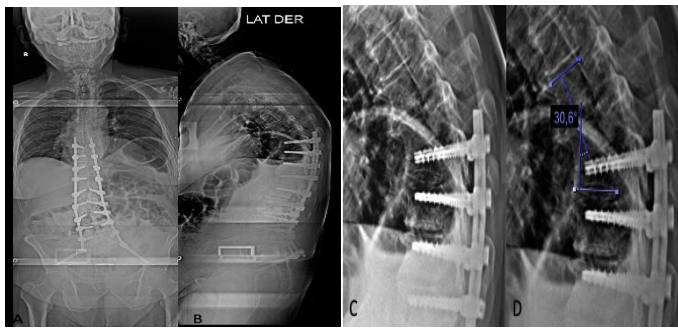


**Figure 2.** A, B) Immediate post-operative x-ray control.

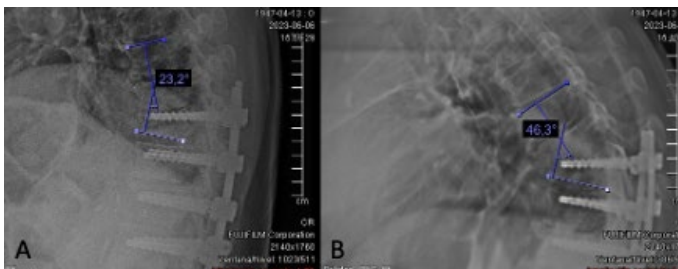
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**Received:** 03 October, 2023, Manuscript No. jsp-23-116087; **Editor Assigned:** 05 October, 2023, PreQC No. P-116087; **Reviewed:** 17 October, 2023, QC No. Q-116087; **Revised:** 23 October, 2023, Manuscript No. R-116087; **Published:** 30 October, 2023, DOI: 10.37421/2165-7939.2023.12.613



**Figure 3.** Six weeks post-operative x-ray control. **A)** Coronal adequate correction, **B)** Kyphosis cephalad to the upper instrumented vertebra and **C, D)** Evidence of fracture of T9, with a RKA of 30.6°.



**Figure 4.** **A)** Supine x-ray RKA of 23.2° and **B)** Standing x-ray RKA of 46.3°.



**Figure 5.** **A)** Right foraminal view and **B)** Left foraminal view. On both sides, evidence of a bone cavity localized in the upper instrumented vertebra, included lysis of the inferior platform of T8.

first surgery, patient accepted a revision surgery. Extension of instrumentation was performed by the following way: removed of T9 screws, transpedicular screw were placed in T7, T6 and T5; transverse process hooks were used in T4 and T3. Due to a bone cavity, a vertebroplasty was performed in T9 for anterior stability. The length of the previous rod was extended, using an end-to-end connector to the most cephalad segment where transpedicular screw were placed, and a reinforcement rod to the vertebroplasty using a side-to-side connector between T9 to T3 (Figure 6). After six weeks of surgical treatment, patient with an adequate clinical and radiological outcome.



**Figure 6.** Immediate post-operative control x-ray. **A)** Coronal view and **B)** Sagittal view. Both views showing a prolonged rod to the upper transpedicular screw, using an end-to-end connector. While an anterior reinforcement with vertebroplasty and a rod connecting T9 to T3, using a side-to-side connector.

## Results and Discussion

Process of selecting an adequate option is complex, as it is to determine up to the level to fuse. Satisfactory surgical outcome is about 63% and 45% required a re-intervention [1]. As is known, kyphosis and instability progression of the adjacent segment, is the path for a failed treatment [9]. Thoracic spine is divided in two parts, a rigid (T1-T7) and a semi-rigid (T8-T12), so stopping in a semi-mobile segment could affect the development of the fusion. Most common post-surgical complications of thoracic fusion are the Proximal Junctional Kyphosis (PJK) and the Proximal Junctional Failure (PJF), risks factors that influenced on this are osteoporosis and neuromuscular disorder (both in this case) [10,11]. Prevalence of PJK after and Adult Deformity Spine surgery (ADS) is about 17-39% [12,13]. Decision making of instrumentation extension is complex, since is not only one more surgery, but establish the level and type of construction. Vertebroplasty for PJK prevention has an unconcluded evidence [14,15]. The construction option selected for treatment of the PJF was to prevent a posterior PJK. Using a double rod on the unstable segment plus an anterior support with vertebroplasty, and then a semi-rigid transition to the upper level using the transverse process hooks [16-18]. We also recommend the algorithm proposed by Schroeder, to treat spinal deformation with PD [19,20].

## Conclusion

Decision making to treat spine degenerative condition with PD is complicated, nevertheless, it is well known that a multidisciplinary team must be involved. Combination of both types of illness (degenerative spine condition and PD) and a PJF complication, semi-rigid construction transition and vertebroplasty reinforcement gave and adequate stability to the spine in this case.

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**How to cite this article:** Montenegro, Fernando José Rodas, Cesar A. Moreno Villegas, Leonel Ramírez Abrego and Francisco Javier Sánchez, et al. "Parkinson disease Spine Instrumentation, a Chronicle of a Death Foretold." *J Spine* 12 (2023): 613.