

Catastrophic Proximal Junctional Failures after Correction Surgery for Adult Spinal Deformity

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Introduction

No funds or benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this study

Former studies defined PJF as different words

Symptomatic PJK requiring revision op

PJK + structural failure

PJK + structural failure / need for extension of fusion within 6 months

Definition of catastrophic PJF *our study*

= Structural failures **at the most cranial segment**

1. Fracture at UIV (Upper Instrumented Vertebrae)
2. Fixation failure at UIV
3. Junctional subluxation

Yagi et al. Spine 2014

Hart et al. Spine 2013

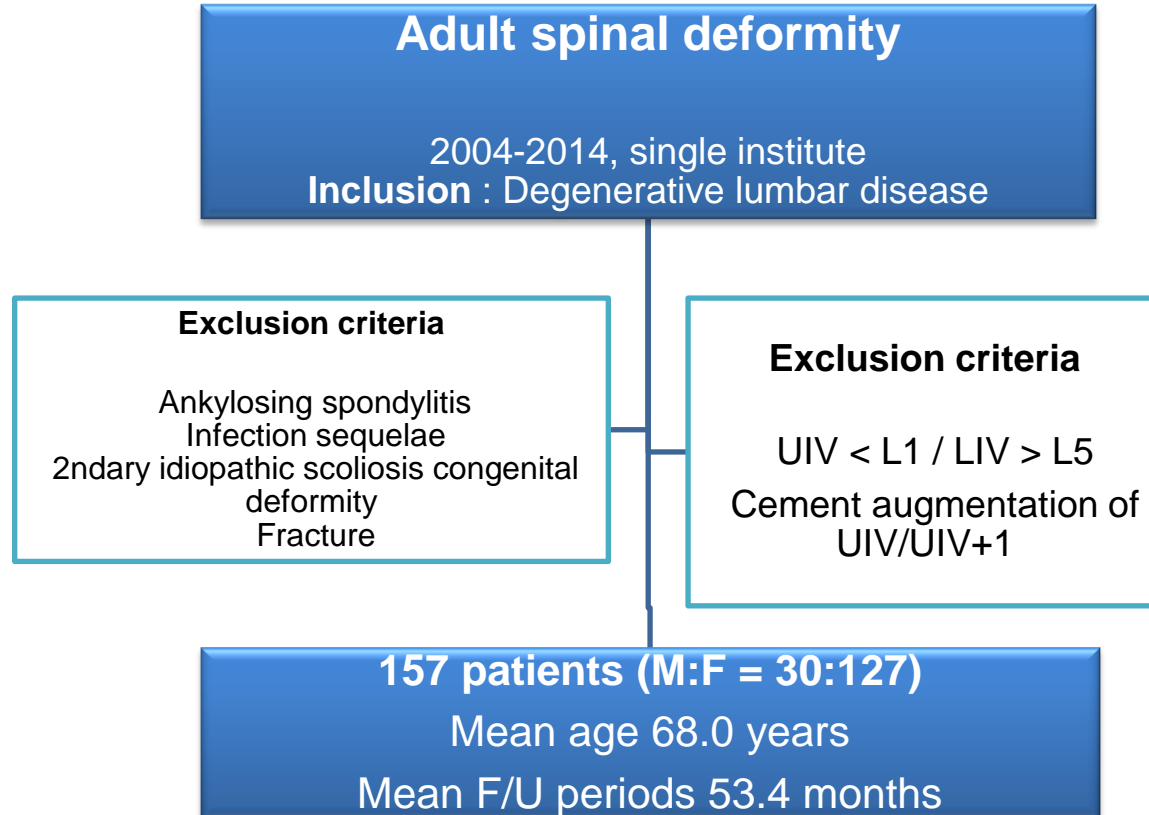
Hostin et al. Spine 2013

Annis et al. Evid Based Spin Care J 2014

Purpose

To identify **clinical and radiographic features of subtypes of PJFs** at the Upper Instrumented Vertebrae (UIV) after correction surgeries for adult spinal Deformity (ASD)

Study population



Results

PJK

11 cases (7.0%)

Fracture at UIV
(n=4)

UIV fixation failure
(n=4)

Junctional subluxation
(n=3)

★ Fracture at UIV+1: 6

Symptoms : Pain (n=8, 72.7%), neurologic deficits (n=3, 27.3%)

Revision surgery : 2 patients for severe pain, 3 for neurologic deficits

Results *Demographics*

	no PJF (n=146)	PJF (n=11)	P
Age at the time of surgery	67.9±6.3	68.4±6.6	NS
Gender (M:F)	29:118	2:9	NS
<u>BMI (kg/m²)</u>	<u>25.4±3.8</u>	<u>23.9±2.9</u>	<u>0.051</u>
<u>BMD (T-score)</u>	<u>-2.0±1.5</u>	<u>-3.1±1.4</u>	<u>0.006</u>
DM	40 (27.4%)	4 (36.4%)	NS
Smoking history	11 (7.5%)	2 (18.2%)	NS
Previous history of spine surgery	49 (33.3%)	2 (18.2%)	NS
UIV			
T (-T10)	41 (27.9%)	1 (9.1%)	NS
TL (T11-L1)	108 (72.1%)	11 (90.9%)	
LIV			
L5	58 (39.5%)	3 (27.3%)	NS
S1	89 (60.5%)	8 (72.7%)	
Iliac fixation	43 (29.3%)	2 (18.2%)	NS
Osteotomy	15 (10.7%)	3 (17.6%)	NS
Interbody fusion	69 (47.2%)	5 (45.5%)	NS
Fused segments	6 (5-11)	6 (5-12)	NS

Results *Inter-subtype analysis*

	No PJF	UIV fracture	Fixation failure	Junctional sublux.
Number of cases	140	4	4	3
Age (years)	67.9±6.4	73.5±3.3*	61.8±3.8*	69.5±5.1
Gender (M:F)	28:112	0:4	1:3	1:2
BMI (kg/m²)	25.6±3.7	22.8±1.6	25.3±4.1	23.4±2.1
BMD (T-score)	-1.9±1.5	-3.7±0.7*	-2.5±1.7*	-2.7±1.7
UIV (T:TL)	38:102	0:4	0:4	1:2
Fused segments	5.6±1.5	5	5.0±0.8	7.3±3.3
Developing time (month)	.	1.9 (1.5-4.5)	1.5 (1-2.5)**	9 (6-11)
PJA-preop (°)	5.7±9.3	-2.9±11.5	4.4±7.2	21.1±12.2**
PJA-postop (°)	8.5±7.9	19.7±29.1	7.9±6.2	20.1±14.4**

Risk factors analysis

PJF

BMD

Univariate, multivariate analysis

UIV Fracture

BMD

Postoperative PJA

Univariate analysis

Junctional subluxation

Preoperative TK
Postoperative PJA

Univariate, multivariate analysis

Different presentation with different clinical features

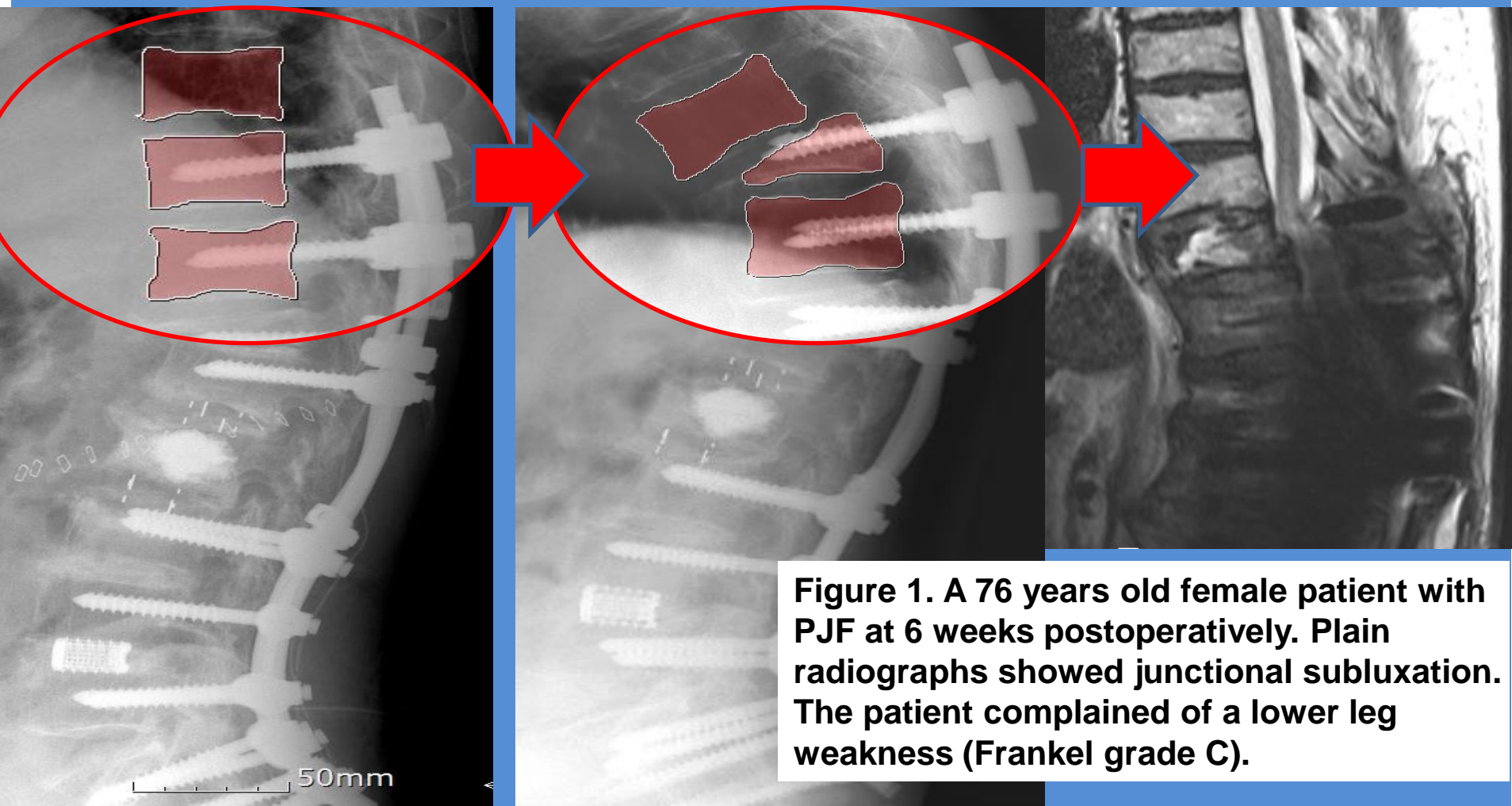
- Inter-subtype analysis shows **difference of developing time**

Watanabe et al. Spine 2010

- **Different risk factors**

UIV Fx : BMD

Junctional sUBLuxation : preoperative TK, postoperative PJA



Conclusion

- Incidence of PJF = 7.0% (11/157)
 - Each form seemed to have specific clinical and radiologic features.
 - Spine surgeon could consider the each subtype.
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