



**Centro Specialistico Ortopedico Traumatologico**  
Gaetano Pini-CTO

Sistema Socio Sanitario



**Regione  
Lombardia**

**ASST Gaetano Pini**

# **Chirurgia Vertebrale: Cosa fare e cosa non fare in Elezione**

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Pini - CTO, Milano, Italy**

# Chirurgia Vertebrale

- Chirurgia 'complessa'
- Elevato Tasso di Complicanze
- Minore Soddisfazione dei Pazienti
- Alto rischio di fallimento

# Quali linee guida?

LINEE GUIDA SIOT

GIOT AGOSTO 2011;37:183-197

183

## TRATTAMENTO CHIRURGICO DELLA SCOLIOSI IDIOPATICA DELL'ADOLESCENTE



Linea guida per la diagnosi  
ed il trattamento dell'ernia del disco  
lombare con radicolopatia

Giornale Italiano di Ortopedia e Traumatologia  
2016;42:118-136

# Interventi di Revisione



Registro Italiano ArtroProtesi

Tabella 2.3. Anca. Numero di interventi utili per le analisi sugli interventi e *completeness*, per tipo di intervento

	N	%	Completeness (*) %
<b>Tipo di intervento</b>	<b>39.779</b>		<b>65,6</b>
<b>Primario</b>	<b>37.559</b>	<b>94,4</b>	<b>67,0</b>
Sostituzione totale	29.269	73,6	
- in elezione	25.715	87,9	
- in urgenza	3.554	12,1	
Sostituzione parziale	8.290	20,8	
<b>Revisione</b>	<b>2.220</b>	<b>5,6</b>	<b>48,7</b>
Revisione parziale (**)	1.529	68,9	
Revisione totale	246	11,1	
Rimozione (***)	445	20,0	

Tabella 2.14. Ginocchio. Numero di interventi utili per le analisi sugli interventi e *completeness*, per tipo di intervento

	N	%	Completeness (*) (%)
<b>Tipo di intervento</b>	<b>31.833</b>		<b>68,0</b>
<b>Primario</b>	<b>30.016</b>	<b>94,3</b>	<b>69,2</b>
- totale	25.119	83,7	
- monocompartimentale	4.897	19,5	
<b>Revisione</b>	<b>1.817</b>	<b>5,7</b>	<b>53,1</b>
Revisione parziale	405	22,3	
Revisione totale	1.343	73,9	
Rimozione, sostituzione spaziatore	44	2,4	
Impianto primario di sola rotula su protesi già impiantata	25	1,4	

(\*) *Completeness*: numero di interventi registrati nel RIAP e linkati alle SDO / numero di interventi registrati nelle SDO dalle istituzioni partecipanti

# Interventi di Revisione



International Report 2021



## Patient characteristics

The figures presented in the following tables are based on 141,403 surgeries documented up to 31 December 2021.

Number of Previous Surgeries (any level)	0	70.8%
	1	19.2%
	> 1	10.0%

# Quali Patologie 'Elettive'



CHI SIAMO

STRUTTURE

SERVIZI AL PAZIENTE

PRENOTAZIONI

NOTIZIE

UNIVERSITÀ E RICERCA

AMMINISTRAZIONE TRASPARENTE

DONAZIONI

DIPARTIMENTI > DIPARTIMENTO DI ORTOPEDIA/TRAUMATOLOGIA E CH... > ORTOPEDIA TRAUMATOLOGIA PER LE PATOLOGIE DEL...

## Ortopedia Traumatologia per le patologie della colonna vertebrale

Presidio Ospedaliero Pini | Blocco A, 6° piano

Via Gaetano Pini, 9, Milano

AMBULATORI

- [Patologia Vertebrale Pediatrica e Adulti](#)
- [Deformità del rachide](#)

Patologie Degenerative

Deformità (Adulto e Pediatriche)

# Quali Patologie 'Elettive'

## Patologia Degenerativa (Lombare):

- Minori rischi
- Minor durata della chirurgia
- Migliori Outcomes



## Deformità:

- Rischi elevati
- Insoddisfazione del paziente (adulto)
- Chirurgia 'complessa'



# Rachide Degenerativo vs Deformità

Multicenter Study > Neurosurgery. 2021 Nov 18;89(6):1012-1026. doi: 10.1093/neuros/nyab352.

## Operative Treatment of Severe Scoliosis in Symptomatic Adults: Multicenter Assessment of Outcomes and Complications With Minimum 2-Year Follow-up

Thomas J Buell<sup>1</sup>, Justin S Smith<sup>1</sup>, Christopher I Shaffrey<sup>2</sup>, Han Jo Kim<sup>3</sup>, Eric O Klineberg<sup>4</sup>, Virginie Lafage<sup>3</sup>, Renaud Lafage<sup>3</sup>, Themistocles S Protopsaltis<sup>5</sup>, Peter G Passias<sup>5</sup>, Gregory M Mundis<sup>6</sup>, Robert K Eastlack<sup>6</sup>, Vedat Deviren<sup>7</sup>, Michael P Kelly<sup>8</sup>, Alan H Daniels<sup>9</sup>, Jeff L Gum<sup>10</sup>, Alex Soroceanu<sup>11</sup>, D Kojo Hamilton<sup>12</sup>, Munish C Gupta<sup>8</sup>, Douglas C Burton<sup>13</sup>, Richard A Hostin<sup>14</sup>, Khaled M Kebaish<sup>15</sup>, Robert A Hart<sup>16</sup>, Frank J Schwab<sup>3</sup>, Shay Bess<sup>17</sup>, Christopher P Ames<sup>18</sup>

> J Neurosurg Spine. 2022 Apr 29;1-10. doi: 10.3171/2022.3.SPINE2295. Online ahead of print.

## Outcomes of operative treatment for adult spinal deformity: a prospective multicenter assessment with mean 4-year follow-up

Elias Elias<sup>1</sup>, Shay Bess<sup>2</sup>, Breton Line<sup>2</sup>, Virginie Lafage<sup>3</sup>, Renaud Lafage<sup>4</sup>, Eric Klineberg<sup>5</sup>, Han Jo Kim<sup>4</sup>, Peter G Passias<sup>6</sup>, Zeina Nasser<sup>7</sup>, Jeffrey L Gum<sup>8</sup>, Khal Kebaish<sup>9</sup>, Robert Eastlack<sup>10</sup>, Alan H Daniels<sup>11</sup>, Gregory Mundis<sup>10</sup>, Richard Hostin<sup>12</sup>, Themistocles S Protopsaltis<sup>6</sup>, Alex Soroceanu<sup>13</sup>, D Kojo Hamilton<sup>14</sup>, Michael P Kelly<sup>15</sup>, Munish Gupta<sup>16</sup>, Robert Hart<sup>17</sup>, Christopher P Ames<sup>18</sup>, Christopher I Shaffrey<sup>20</sup>,

> Spine (Phila Pa 1976). 2022 Sep 27. doi: 10.1097/BRS.0000000000004474. Online ahead of print. Spine Study Group

## Improvements in Outcomes and Cost after Adult Spinal Deformity Corrective Surgery between 2008 and 2019

Peter G Passias<sup>1</sup>, Nicholas Kummer<sup>1</sup>, Bailey Imbo<sup>1</sup>, Virginie Lafage<sup>2</sup>, Renaud Lafage<sup>3</sup>, Justin S Smith<sup>4</sup>, Breton Line<sup>5</sup>, Shaleen Vira<sup>6</sup>, Andrew J Schoenfeld<sup>7</sup>, Jeffrey L Gum<sup>8</sup>, Alan H Daniels<sup>9</sup>, Eric O Klineberg<sup>10</sup>, Munish C Gupta<sup>11</sup>, Khaled M Kebaish<sup>12</sup>, Amit Jain<sup>13</sup>, Brian J Neuman<sup>12</sup>, Dean Chou<sup>14</sup>, Leah Y Carreon<sup>8</sup>, Robert A Hart<sup>15</sup>, Douglas C Burton<sup>16</sup>, Christopher I Shaffrey<sup>17</sup>, Christopher P Ames<sup>18</sup>, Frank J Schwab<sup>2</sup>, Richard A Hostin Jr<sup>19</sup>, Shay Bess<sup>20</sup>, International Spine Study Group

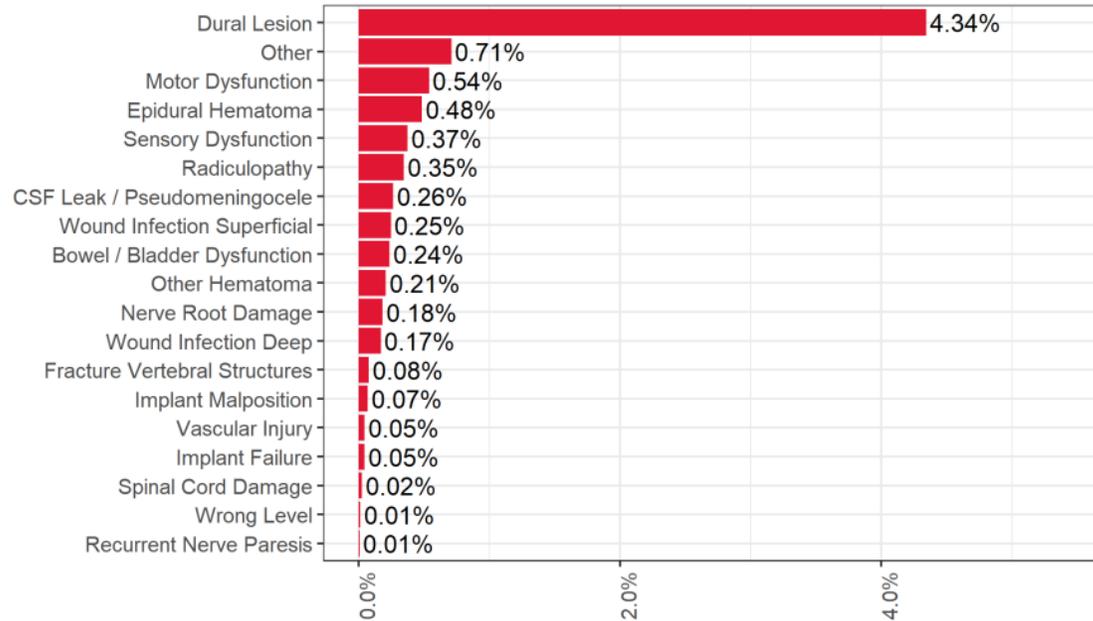
Rate di **Complicanze** nella Chirurgia delle Deformità (Adulto):  
**65-80%** (di cui 13-25% maggiori/che hanno richiesto revisione chirurgica)

# Rachide Degenerativo vs Deformità

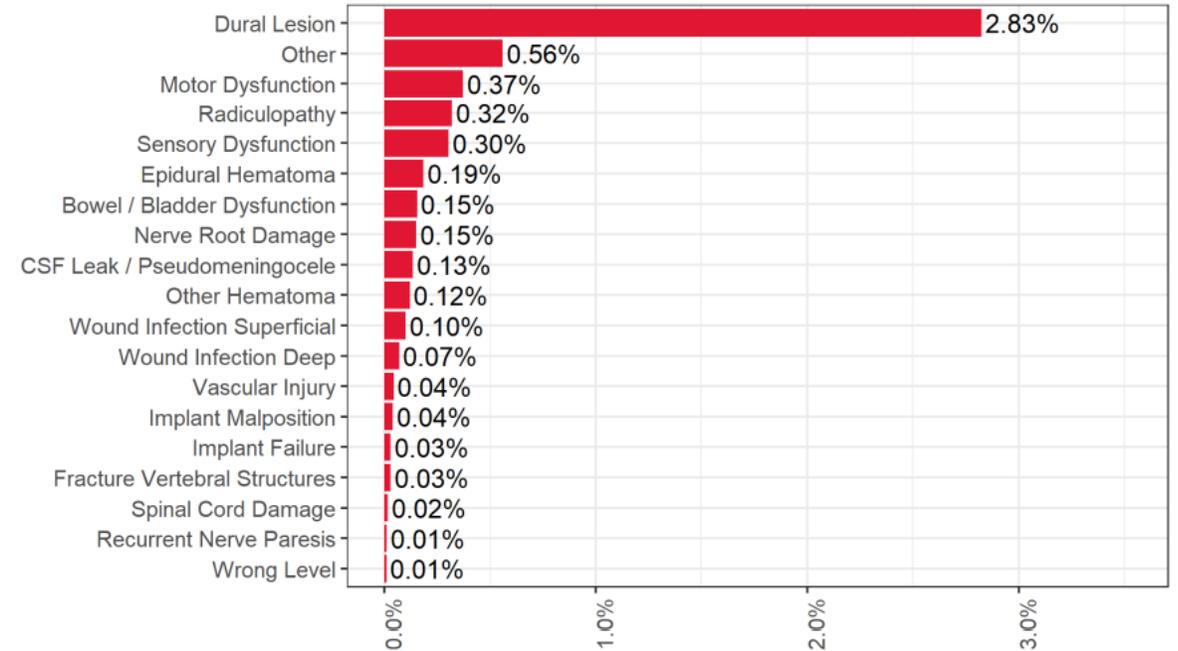


International Report 2021

Spinal Stenosis - Surgical Complications



Disc Herniation - Surgical Complications



Il rate di complicanze è di circa l'8% nella chirurgia della stenosi del canale e del 6% nella chirurgia dell'ernia del disco

# Rachide Degenerativo vs Deformità



Contents lists available at ScienceDirect

Brain and Spine

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Journal  
Cover  
Image

Perioperative adverse events in adult and pediatric spine surgery: A prospective cohort analysis of 364 consecutive patients

Alessio Lovi<sup>a,\*</sup>, Enrico Gallazzi<sup>d</sup>, Fabio Galbusera<sup>b</sup>, Alessandra Colombini<sup>c</sup>, Fabrizio Pregliasco<sup>b</sup>, Giuseppe Peretti<sup>b</sup>, Marco Brayda-Bruno<sup>a</sup>

<sup>a</sup> Spine Surgery III – Scoliosis Division, I.R.C.C.S. Istituto Ortopedico Galeazzi, Milan, Italy

<sup>b</sup> I.R.C.C.S. Istituto Ortopedico Galeazzi, Milan, Italy

<sup>c</sup> Orthopaedic Biotechnology Lab, IROCCS Istituto Ortopedico Galeazzi, Milan, Italy

<sup>d</sup> U.O. Ortopedia e Traumatologia per le Patologie della Colonna Vertebrale, ASST Centro Specialistico Ortopedico Traumatologico G. Pini – CTO, Milan, Italy

Table 4

Association Between presence of AE and each diagnostic subgroup in the whole Population. Data reported as Number (Percentage).

	No AEs (n = 238; 81.0%)	AEs (n = 56; 19.1%)	p-value
Diagnostic Subgroups			
Deformity	78 (28%)	29 (43.3%)	0.015
Degenerative	143 (51.3%)	21 (31.3%)	ns
Vertebral Fracture	24 (8.6%)	7 (10.4%)	ns
Pseudoarthrosis	27 (9.7%)	7 (10.4%)	ns
Others	8 (2.9%)	4 (6%)	ns

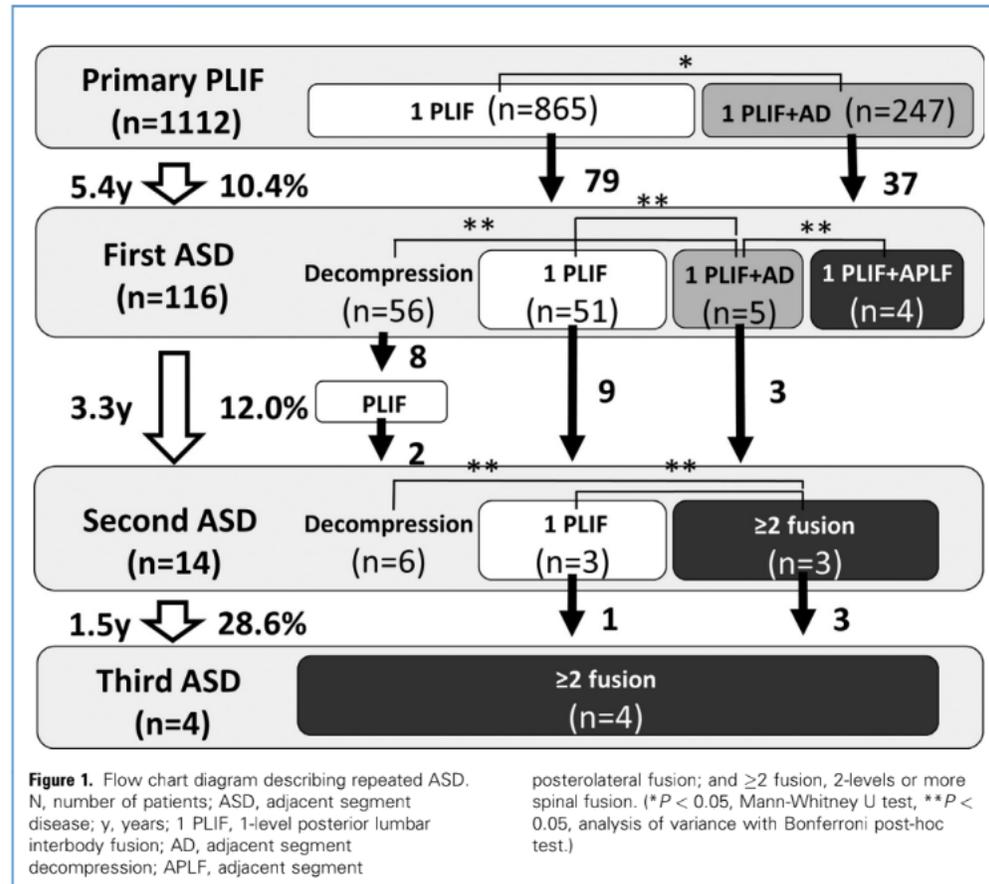
- The overall prevalence of AEs found in this study (20.8%) is high if compared to retrospective analysis, but similar to what reported in prospective studies.
- Although the distribution of AEs is almost equal between adult and pediatric patients, their severity is related to age, being higher in pediatric patients.
- In Adults, a diagnosis of deformity, and the procedures of deformity correction, revision surgery and anterior-posterior surgery are the most 'at risk' for AEs occurrence.
- In Pediatric Patients, Anterior Release is the most 'at risk' procedure for AEs occurrence
- AEs seriously affect hospitalization, with prolonged LOS (mean of 6 days).



# Rachide Degenerativo vs Deformità

## Multiple-Repeated Adjacent Segment Disease After Posterior Lumbar Interbody Fusion

Yukitaka Nagamoto, Shinya Okuda, Tomiya Matsumoto, Tsuyoshi Sugiura, Yoshifumi Takahashi, Motoki Iwasaki



Il 10.4% dei pazienti sviluppa una deformità secondaria a 5 anni che richiede un intervento di revisione



Dei casi revisionati, il 12% sviluppa una nuova deformità a 3 anni



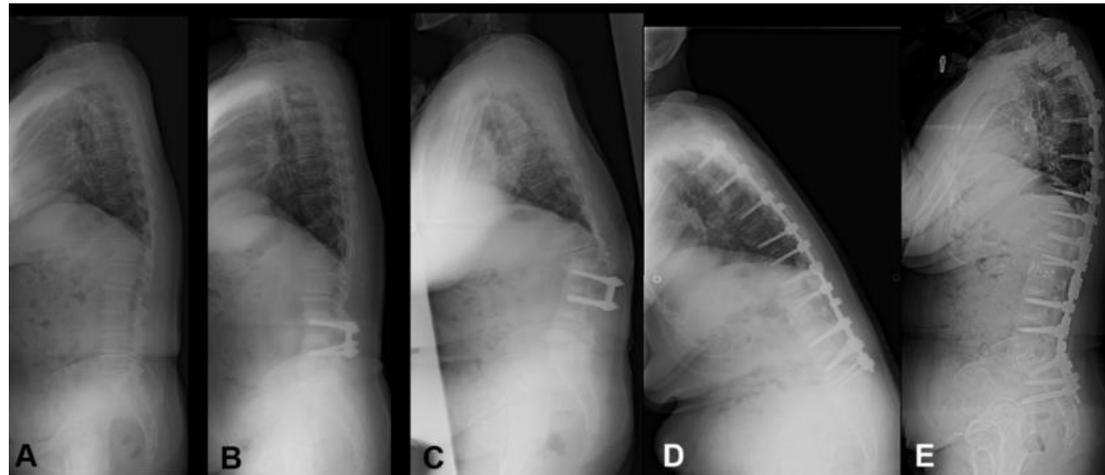
Dei casi revisionati, il 28.6% sviluppa una nuova deformità a 1.5 anni

# Rachide Degenerativo vs Deformità

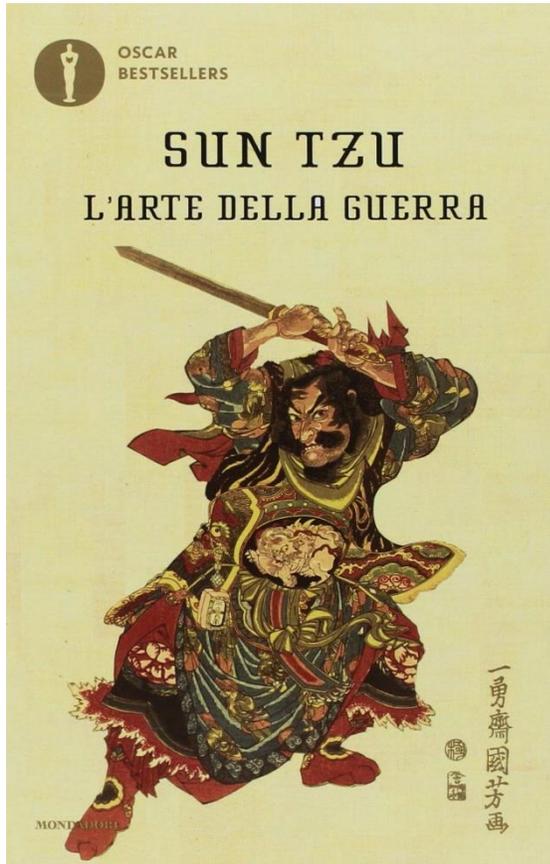
Multiple-Repeated Adjacent Segment Disease After Posterior Lumbar Interbody Fusion

*Yukitaka Nagamoto, Shinya Okuda, Tomiya Matsumoto, Tsuyoshi Sugiura, Yoshifumi Takahashi, Motoki Iwasaki*

- Il Fallimento richiama fallimento
  - **Aumento della percentuale** di deformità iatrogene con progressiva **riduzione del tempo** di insorgenza
- Tutti i chirurghi vertebrali sono chirurghi delle deformità: c'è chi le cura e c'è chi le crea



# Cosa fare in 'elezione'?



*Se conosci il nemico e conosci te stesso,  
Nemmeno in cento battaglie ti troverai in  
pericolo*

- Conoscenza della patologia
- Correttezza delle indicazioni
- Expertise dell'equipe
- Mezzi 'adeguati' per l'esecuzione della chirurgia

# Rachide Degenerativo vs Deformità

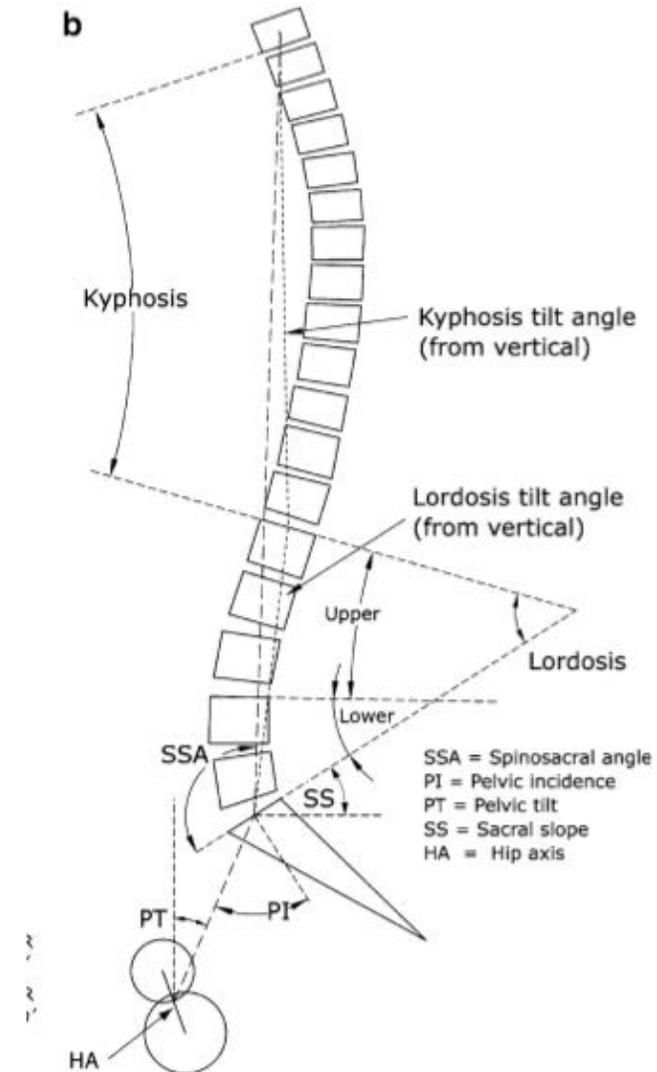
## Radiographical Spinopelvic Parameters and Disability in the Setting of Adult Spinal Deformity

*A Prospective Multicenter Analysis*

Frank J. Schwab, MD,\* Benjamin Blondel, MD,\*† Shay Bess, MD,‡ Richard Hostin, MD,§  
Christopher I. Shaffrey, MD,¶ Justin S. Smith, MD, PhD,¶ Oheneba Boachie-Adjei, MD,||  
Douglas C. Burton, MD,\*\* Behrooz A. Akbarnia, MD,†† Gregory M. Mundis, MD,††  
Christopher P. Ames, MD,‡‡ Khaled Kebaish, MD,§§ Robert A. Hart, MD,¶¶ Jean-Pierre Farcy, MD,|||  
Virginie Lafage, PhD,\* and the International Spine Study Group (ISSG)

✓ Several studies have demonstrated sagittal spinal alignment as well as pelvic parameters to be correlated with HRQL

✓ INDEPENDENT PREDICTOR of CLINICAL STATUS and OUTCOMES



# Rachide Degenerativo vs Deformità

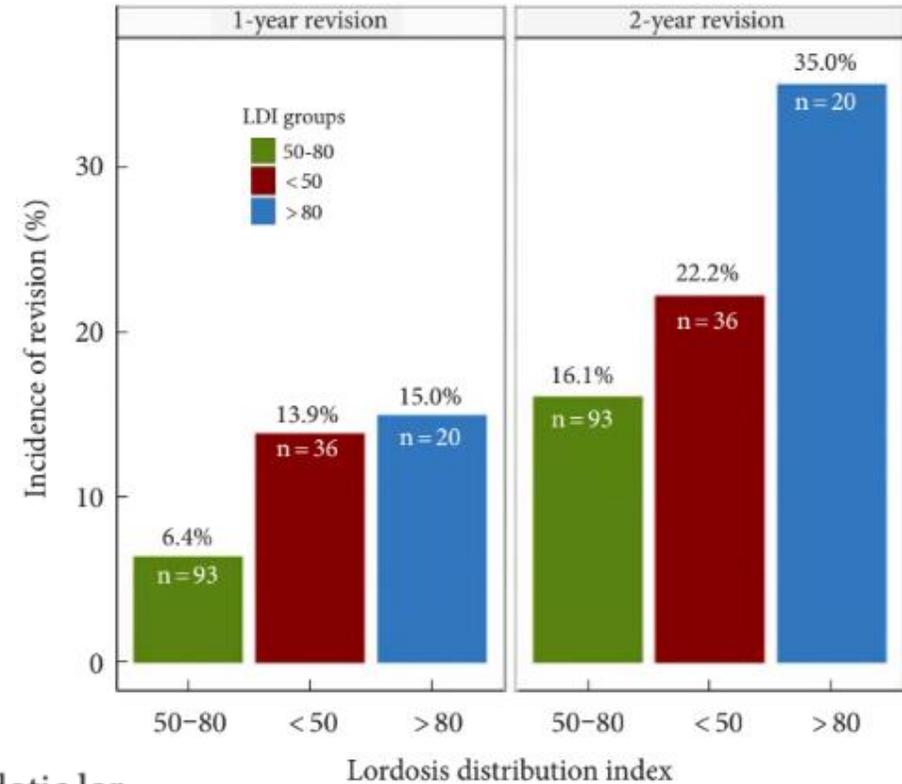
Neurospine

pISSN 2586-6583 eISSN 2586-6591



## Lordosis Distribution Index in Short-Segment Lumbar Spine Fusion – Can Ideal Lordosis Reduce Revision Surgery and Iatrogenic Deformity?

Tanvir Johanning Bari<sup>1,2</sup>, Martin Heegaard<sup>1,2</sup>, Rachid Bech-Azeddine<sup>2,3</sup>, Benny Dahl<sup>4</sup>, Martin Gehrchen<sup>1,2</sup>



**Conclusion:** In patients undergoing instrumented lumbar fusion surgery, hypolordotic lordosis maldistribution (LDI < 50) was associated to increased risk of revision surgery, increased postoperative PT and PI-LL mismatch. Lordosis distribution should be considered prior to spinal fusion, especially in high PI patients.

# Rachide Degenerativo vs Deformità

Preoperative Pelvic Incidence Minus Lumbar Lordosis Mismatch in Repeat Posterior Lumbar Interbody Fusion Induces Subsequent Corrective Long Fusion

*Yukitaka Nagamoto<sup>1</sup>, Shinya Okuda<sup>1</sup>, Tomiya Matsumoto<sup>1</sup>, Shota Takenaka<sup>2</sup>, Yoshifumi Takahashi<sup>1</sup>, Masayuki Furuya<sup>1</sup>, Motoki Iwasaki<sup>1</sup>*

- Pazienti revisionati per deformità iatrogena dopo artrodesi lombare singolo livello
- Conclusioni:
  - Peggiori Outcomes clinici nella chirurgia di revisione
  - Maggiori difficoltà nel ripristino dei parametri sagittali
  - Se alto mismatch tra PI e LL elevato rischio di fusione toracolombare

# Interventi di Revisione

European Spine Journal  
<https://doi.org/10.1007/s00586-018-5747-1>

ORIGINAL ARTICLE



## Revision adult spinal deformity surgery: Does the number of previous operations have a negative impact on outcome?

Xiaobang Hu<sup>1</sup> · Isador H. Lieberman<sup>1</sup>

Received: 14 February 2018 / Revised: 29 July 2018 / Accepted: 24 August 2018  
© Springer-Verlag GmbH Germany, part of Springer Nature 2018

**Table 4** Perioperative surgical or medical complications (up to 90 days post-op)

Perioperative surgical or medical complications	Group 1 (%)	Group 2 (%)	Group 3 (%)	<i>p</i> value
Minor	7.8	13.3	9.8	> 0.05
Major	19.6	17.8	29.3	> 0.05
Overall	27.5	31.1	39	> 0.05

## Take Home Messages

1. ASD patients who had multiple previous surgeries tend to present with worse functional status, and worse coronal and sagittal imbalance.
2. If these patients undergo revision surgery, they are more likely to encounter further revision surgeries.
3. However, majority of these patients can still anticipate improvement of their clinical symptoms at long term follow-up.

# Impatto volume del centro - Decompressione

## The Impact of Provider Volume on the Outcomes After Surgery for Lumbar Spinal Stenosis

Hormuzdiyar H. Dasenbrock, MD\*

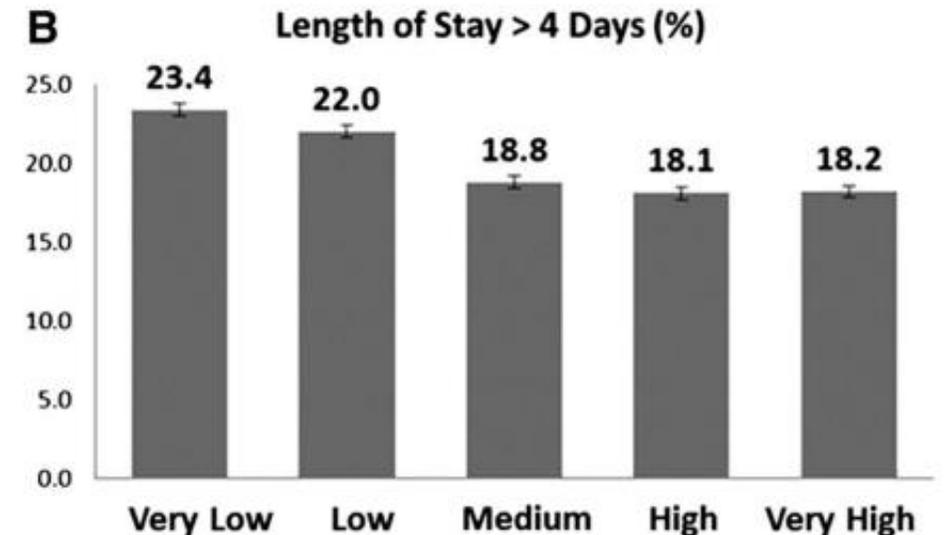
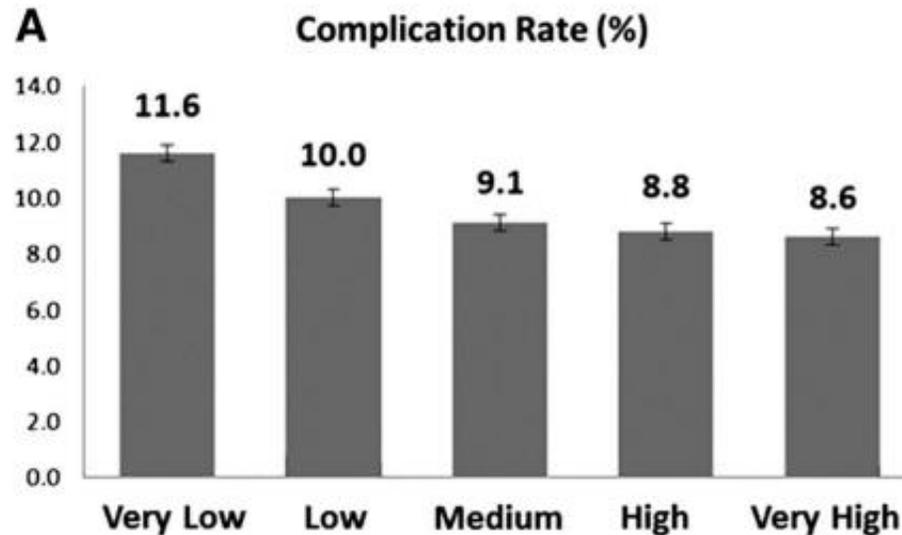
Michelle J. Clarke, MD‡

Timothy F. Witham, MD§¶||

Daniel M. Sciubba, MD§¶||

Ziya L. Gokaslan, MD§¶||

Ali Bydon, MD§¶||



**CONCLUSION:** In this nationwide study, patients treated by very-low-volume surgeons had a significantly higher complication rate compared with those treated by very high-volume surgeons.

# Impatto volume del centro – Artrodesi Lombare

SPINE Volume 36, Number 24, pp 2069–2075  
©2011, Lippincott Williams & Wilkins

## The Effects of Hospital and Surgeon Volume on Postoperative Complications After Lumbar Spine Surgery

Payam Farjoodi, MD, Richard L. Skolasky, ScD, and Lee H. Riley, III, MD

### ➤ Key Points

- Lower complication and mortality rates were associated with high hospital and surgeon volume in lumbar spine surgery.
- The decreases in complication and mortality rates were more substantial with high surgeon volume than with high hospital volume.
- More studies are needed to determine whether it would be beneficial to refer patients requiring lumbar spine surgery to high-volume surgeons in high-volume centers.

# Impatto volume del centro – Deformità

Clinical Study

Complication rates are reduced for revision adult spine deformity surgery among high-volume hospitals and surgeons

Justin C. Paul, MD<sup>a</sup>, Baron S. Lonner, MD<sup>b,\*</sup>, Vadim Goz, BS<sup>a</sup>, Jeffery Weinreb, MD<sup>a</sup>, Raj Karia, MS<sup>a</sup>, Courtney S. Toombs, BA<sup>a</sup>, Thomas J. Errico, MD<sup>a</sup>

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Received 14 August 2014; revised 2 February 2015; accepted 15 April 2015

Centri ad alto volume affrontano casi più complessi ma hanno meno complicanze

**Adolescent idiopathic scoliosis: risk factors for complications and the effect of hospital volume on outcomes**

Richard P. Menger, MD, MPA,<sup>1</sup> Piyush Kalakoti, MD,<sup>1</sup> Andrew J. Pugely, MD,<sup>2</sup> Anil Nanda, MD, MPH,<sup>1</sup> and Anthony Sin, MD<sup>1,3</sup>

Centri ad alto volume (>50 interventi/anno) hanno minori costi e maggior probabilità di dimissione al domicilio

# Cosa fare e cosa non fare in elezione

- Non esiste una chirurgia vertebrale 'semplice'
- Anche nelle chirurgie 'minori' il tasso di complicanze è elevato
- L'errore iniziale di pianificazione/indicazione nella chirurgia degenerativa può innescare un circolo vizioso di fallimento e revisione che trasforma la chirurgia 'minore' in 'maggiore'

- Correttezza delle indicazioni
- Adeguato planning preoperatorio
- Corretta educazione/informazione del paziente (Starai meglio vs Starai bene)
- Esperienza dell'equipe che affronta la patologia