

Adult Degenerative Scoliosis

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Disclosures

- Synthes-Medical Education

Demographics Portend an Increasingly Elderly Population

- Over the next 25 years, the number of people >65 yrs/old will increase by 125% (70 million)
- Those aged ≥ 85 yrs will double

Age (y)	Population (in millions)		
	1990	2000	2030
20-44	99.73	104.00	110.45
≥ 65	31.2	34.99	70.3
≥ 85	3.1	4.2	8.9

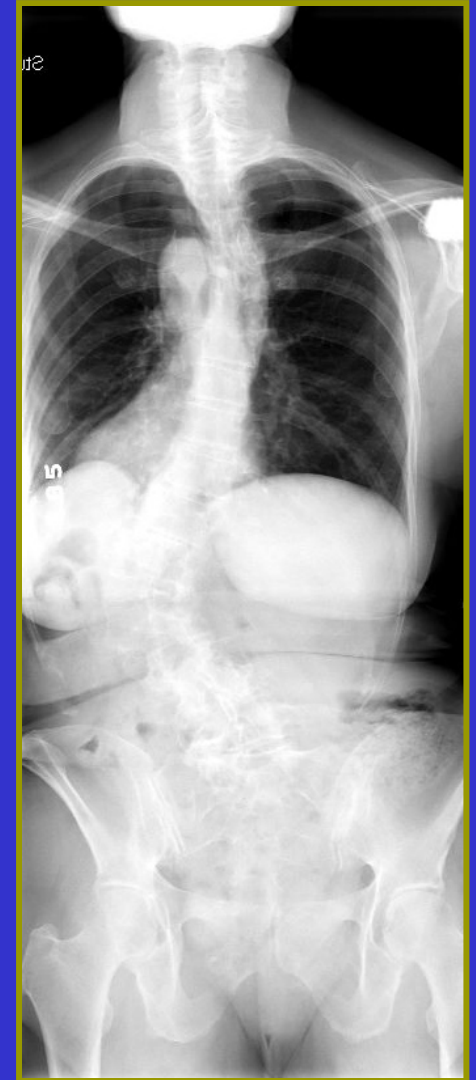
Back Pain is a Significant Factor affecting the Elderly Population

- A survey of >100K Medicare beneficiaries ≥ 65 found heart and lung disease and back pain were the most important factors impacting the physical health status of older Americans
- Disabling back pain is common in old age-affecting ~20% of men and ~30% of women

High Prevalence of Scoliosis in the Adult Population

- Robin evaluated 554 subjects aged between 50 and 84 years and found some scoliosis was found in 70% of the subjects
- Schwab a scoliosis rate of 68% in an asymptomatic adult population with an average age of 70.5 years

Spine. 1982 Jul-Aug;7(4):355-9.
Spine. 2005 May 1;30(9):1082-5.

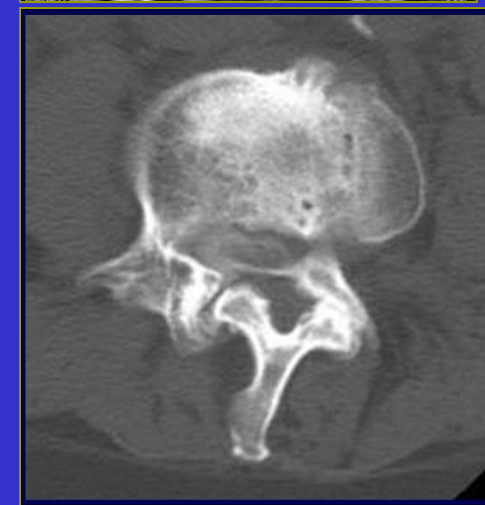


Types of Adult Scoliosis

- Adults with History of Adolescent Scoliosis
- Iatrogenic Deformity
 - Mild or no deformity prior to destabilizing surgical intervention(s)
- Older Adults with Degenerative “de novo” Scoliosis
 - No Deformity Before 40 Years Old
 - Consequence of disc degeneration

Degenerative Scoliosis: Pathoanatomy

- Disc degeneration/collapse
- Facet arthrosis/hypertrophy
- Ligamentum hypertrophy
- Segmental instability:
 - Spondylolisthesis in 55%
 - Rotatory olisthesis in 13-34%

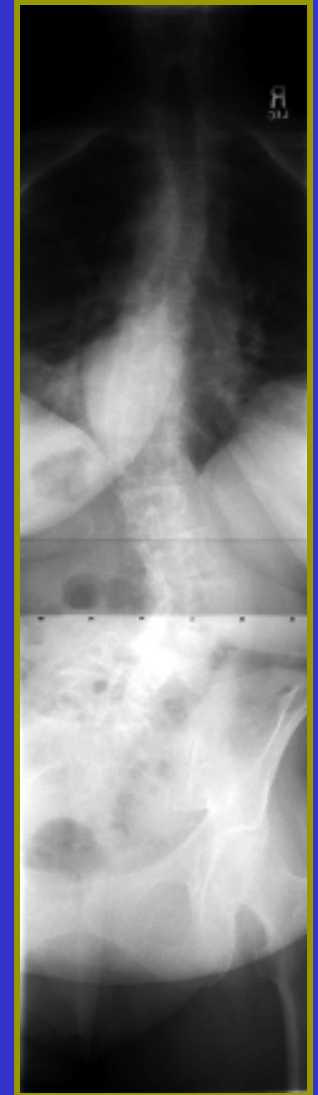


Development of *De Novo* Scoliosis

- A 12-year prospective study of *de novo* scoliosis in a community based cohort was performed
- 60 subjects aged 50–84 years without scoliosis at baseline were selected and followed
- *De novo* scoliosis $>10^\circ$ developed in 22 subjects
- $>20\%$ decrease in unilateral disc height or >5 mm osteophyte on one side led to an increased incidence of *de novo* scoliosis

Natural History of Adult Scoliosis

- Untreated AIS ($>45^\circ$) progresses 0.5 to 0.75° per year
- Greater magnitude curves are more likely to become symptomatic
- Degenerative adult curves progress 3.3° per year
- Rapid decompensation may follow decompression for spinal stenosis



Impact of Adult Scoliosis?

- Mean age 63 y/o
- Adult scoliosis patients had significantly lower SF-36 scores when compared to the age matched norms

Table 3. SF-36 Scores for Maimonides Population Vs. General U.S. Population With Comorbid Conditions

SF-36 Variable	Mean Maimonides Score	General U.S. Score	P Value
PF	49.56	66.32	$P < 0.001$
RP	31.40	46.71	$P < 0.01$
BP	34.29	59.34	$P < 0.001$
GH	58.14	58.45	NS
VT	41.82	52.29	$P < 0.01$
SF	52.06	81.48	$P < 0.001$
RE	51.76	70.90	$P < 0.001$
MH	64.14	74.93	$P < 0.001$

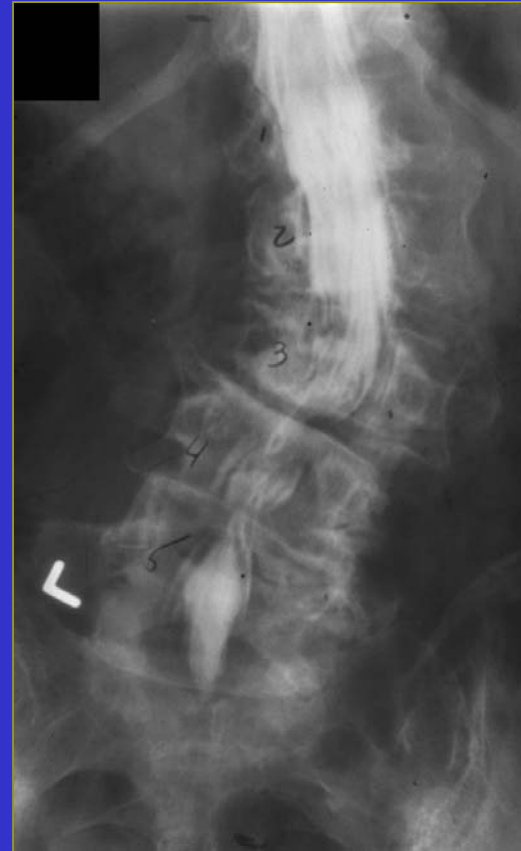
PF = Physical Functioning scale; RP = Role Physical scale; BP = Bodily Pain scale; GH = General Health scale; VT = Vitality scale; SF = Social Functioning scale; RE = Role Emotional scale; MH = Mental Health scale; NS = not significant.

N = 49; age >55 = 32; age <55 = 17.

Incidence of Neurological Compression

- Adult degenerative scoliosis has been associated with radiographic evidence neurological compression

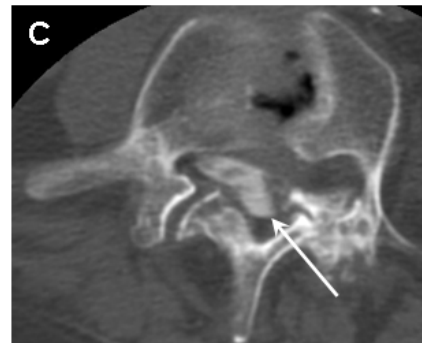
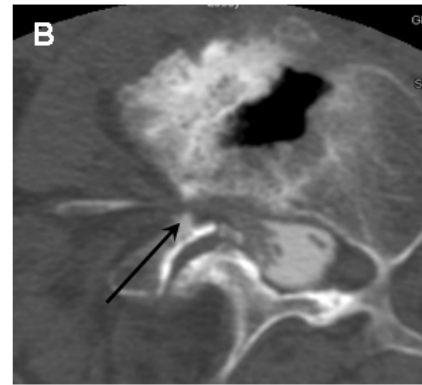
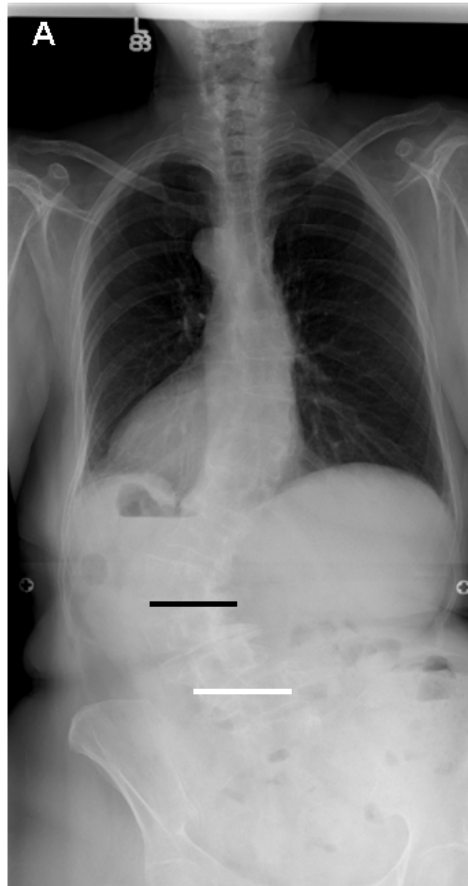
Grubb SA; Spine 1988; 13:241



Incidence of Neurological Compression

- 36 patients presenting for operative management of elderly degenerative scoliosis
- Mean age: 68.9 years; range: 51-85
- The mean leg pain NRS was 6.5
- Mean ODI was 53.2
- At least one level of severe foraminal stenosis was identified in 97% of patients
- All but one patient reported significant radicular pain

Incidence of Neurological Compression



Importance of Identifying Scoliosis

- Outcomes of nonoperative treatment of lumbar spinal stenosis are poorer with scoliosis
- Surgical decompression alone for spinal stenosis has a high failure rate with progression of symptoms and deformity
- Results of limited posterolateral lumbar spinal fusion with pedicle screws is poorer
 - Degenerative scoliosis has a lower (70%) fusion rate compared with degenerative disc disease alone (91%)

Simotas A. Spine 2000, Hanley EN Jr. Spine 1995,
Narayan P. J Neurosurgery 2002

How to identify patients whom should be further evaluated for Scoliosis

- Patients who report previous diagnosis of scoliosis
- Reports of scoliosis on imaging
- Increasing difficulty with ADL's
- Progressive kyphosis (bent forward posture)

What to do next

- Evaluation by spine surgeon/ deformity
- Standing x rays (preferably long cassette)

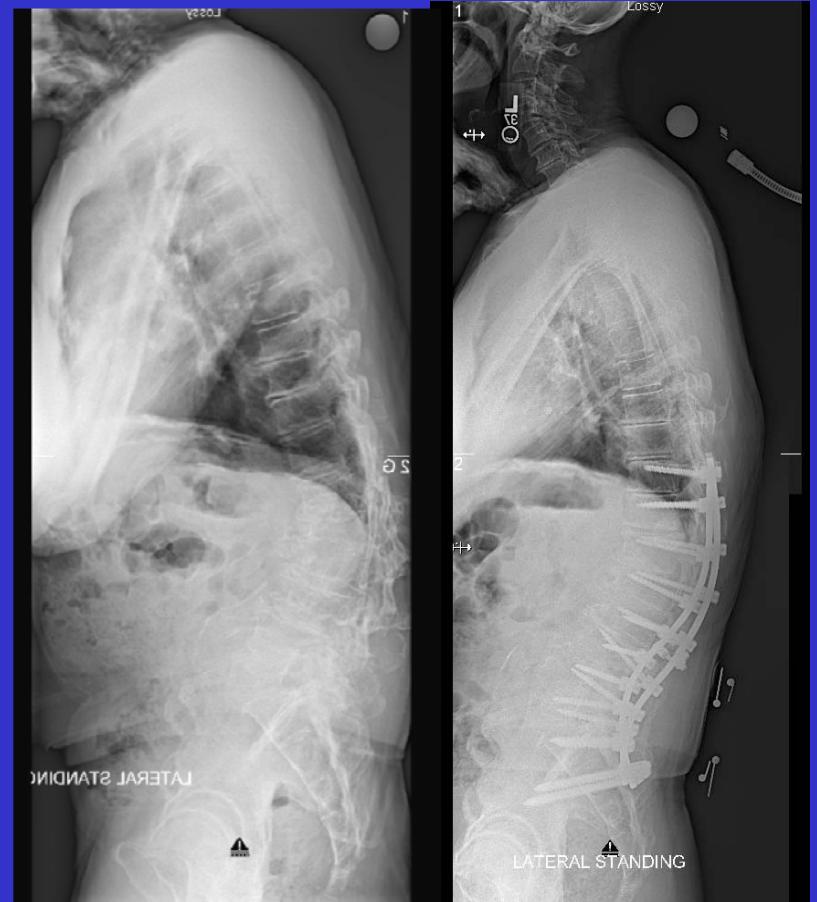
Treatment Options

- Nonoperative
 - Pain Medications
 - Injections (facet, epidural, selective nerve root)
 - Physical therapy, reconditioning (aquatics)

Treatment Options

- Operative
 - Focal Decompression
 - Focal Fusion
 - Reconstruction

Next Steps



ISSG

Multi-center study proposal

Evaluation of patient factors in non-operative deformity patients transitioning to operative care

K Fu/C Shaffrey/ J Smith

7/13/2011

Clinical Question

- *A sub group of patients initially treated with non-operative care for significant symptomatic adult scoliosis will transition to “needing” operative intervention.*
- *Determining if there are apparent attributes at presentation can provide prognostic information or potentially justify earlier intervention*
- *Understanding the factors (radiographic, hrql) that influence patients to transition can again help with prognosis and provide a potential basis for proceeding forth with surgical intervention.*

Clinical Question

What similar projects have been done and by whom and how they affected this study design...

- Chris, Justin, I looked at elderly degenerative patients (retrospective analysis of prospective database) over age 60
- High rate of patients transitioning (25%) mean time 1.7 years
- No statistically significant differences at presentation
- At last followup or transition only significant differences in pain/hrql
- No significant differences in SVA, Cobb angle
- Need for more patients/multicenter and prospective transition data collecting

Data collection

- Adult Scoliosis patients
- HRQL (enrollment, followup, transition)
- Nonoperative interventions (chiro/inj/etc.)
- Radiographic parameters (e,f,t)
 - Cobb angles, thoracic kyphosis, lumbar lordosis, sagittal balance, pelvic tilt, pelvic incidence
- Follow up minimum 2 years or until transition

Study Implementation

- Piggy back on the prospective study, IRB
- Ideally minimal extra costs, would be happy to do data analysis.