

One Should Always Get A Full Body Scan Before Any Spine Procedure To Understand Spinal Alignment

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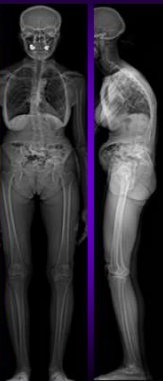


Disclosures Shay Bess

- Consulting= Allosource, K2M
- Royalties= Pioneer Spine, K2M
- Research support= Depuy/Synthes, Medtronic, K2M, Nuvasive, Orthofix, Globus, EOS
- Scientific advisory board= Allosource

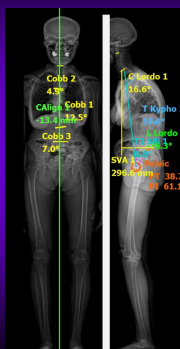
Pro Full Body Scan

- Me= Dorky, zealot= always get full body scans before any spine procedure
 - Underlying message= measure a million different alignment parameters that don't really matter
- Cool, reasonable guy= that's ridiculous only a few measures are important and full body images are a waste of money and resources
- Is this true?
 - Are only a few measures important?
 - Is routine obtaining full body scans wasteful?
 - Dangerous (radiation)
 - More expensive?
 - Waste of resources?



Are Only A Few Spinal Alignment Measures Important?

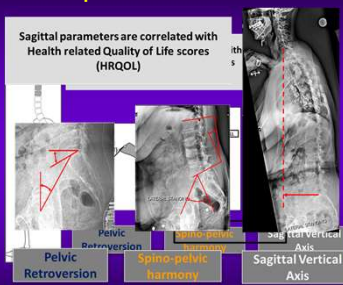
- Underlying issue= Is spinal alignment really important and should I measure?
 - I just want to do surgery, so can I be lazy and ignore the emerging data and forget all the "lines"
 - I am really experienced, have been doing surgery for a long time and don't need to be told what to do
- ISSG emphasis= alignment matters
- If debate= routine full body scans
- Then alignment= part of vernacular
- Recognition= alignment is important
- Why alignment is important



Are Only A Few Spinal Alignment Measures Important?

- What "few measures" are important?
- Lumbar lordosis only?
 - Meaningless isolation
 - Need PI= need femoral heads
- SVA +/-T1-PA?
 - Need C7 and T1
- Isolated radiograph lumbar spine limits
 - Identify pain generator
 - Improve pain (alignment) surgically

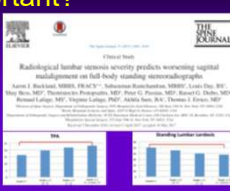
Sagittal parameters are correlated with Health related Quality of Life scores (HRQOL)



Pelvic Retroversion Spino-pelvic Harmony Sagittal Vertical Axis

Are Only A Few Spinal Alignment Measures Important?

- Degenerative pathologies?
- Buckland et al, TSJ 2017
 - Worsening LL, SVA, T1PA with worsening spinal stenosis
- Leveque, et al Spine 2017
 - 1-2 level lumbar fusion (n=578)
 - Preoperatively, 173 (30%) malaligned
 - Postoperatively, 161 (28%) malaligned
 - Alignment preservation/restoration considerations should be incorporated into decision-making of degenerative lumbar spinal fusions



A Multicenter Radiographic Evaluation of the Rates of Preoperative and Postoperative Malalignment in Degenerative Lumbar Spinal Fusions.

Leveque JA, Segebarth B, Schroerlucke SR, Khanna N, Pollina J, Youssef JA, Tohmeh AG, Uribe JS

Are Only A Few Spinal Alignment Measures Important?

- Tempel, et al Neurosurgery 2017
 - 1° increase preop and postop PI-LL mismatch odds of developing ALD requiring surgery increased 1.3-1.4
 - PI-LL mismatch of >11°=positive predictive value 75% development symptomatic ALD requiring revision surgery
 - Assess spinopelvic parameters for degenerative lumbar spine
- Matsumoto, et al JNS Spine 2017
 - Retrospective 1:5 matched case-control study; revision vs no-revision ASD
 - ASD = Preoperative SVA > 50 mm, higher PT, pre- and postoperative PI-LL mismatch

The Influence of Pelvic Incidence and Lumbar Lordosis Mismatch on Development of Symptomatic Adjacent Level Disease Following Single-Level Transforaminal Lumbar Interbody Fusion Zachary J. Tempel, MD, Gurpreet S. Gandhoke, MD, Bryan D. Bolinger, DO, Nicolas K. Khattar, MD, Philip V. Farry, MD, Yue-Fang Chang, PhD, David O. Okonkwo, MD, PhD, Adam S. Kanter, MD

Spinopelvic sagittal imbalance as a risk factor for adjacent-segment disease after single-segment posterior lumbar interbody fusion. Matsumoto T, Okuda S, Maeno T, Yamashita T, Yamasaki R, Sugiura T, Iwasaki M

Are Only A Few Spinal Alignment Measures Important?

- Rothenfluh, et al Euro Spine Jnl 2015
 - 45 patients 1 level PSF revision surgery ASD vs 39 control
 - Pre and postop PI-LL mismatch 10-times higher risk for undergoing revision
- Park, et al TSJ 2015
 - ASD C5-6 ACDF (n=122)
 - Pre and postoperative sagittal malalignment most predictive
 - C2-7 SVA and T1 slope
- Are these revision rates sustainable?
- Are revisions avoidable?

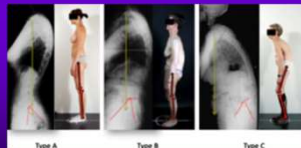
Pelvic incidence-lumbar lordosis mismatch predisposes to adjacent segment disease after lumbar spinal fusion. Rothenfluh DA, Mueller DA, Rothenfluh E, Min K.

Sagittal alignment as a predictor of clinical adjacent segment pathology requiring surgery after anterior cervical arthrodesis. Park MS, Kelly MP, Lee DH, Min WK, Rahman RK, Riew KD.

Are Only A Few Spinal Alignment Measures Important?

- What can surgeons control to improve durability
 - Measure alignment
 - Type of surgery
 - Maintenance vs. restoration alignment
- Le Huec, et al Euro Spine JI 2011
 - Degenerative spine cascade
 - What is PI? Is patient balanced? What is compensation?
 - Visualize C2, pelvis, 10 cm femur

Sagittal imbalance cascade for simple degenerative spine and consequences: algorithm of decision for appropriate treatment. Le Huec JC, Charosky S, Barrey C, Rigal J, Aunoble S.



Are Full Body Scans Wasteful?

- Health Technology Assessment (HTA), 2012
 - UK National Institute of Health
 - Clinical effectiveness EOS
 - Equal/superior imaging
 - Clinically significant reduction radiation
 - Cost effectiveness EOS
 - Radiation exposure as PROM for QALY, ICER
 - Need EOS=60-106 patients/day vs. CR=30/day
 - 2x EOS flow through vs CR ICER=£30,000 per QALY



Spine Deformity

Cumulative Radiation Exposure With EOS Imaging Compared With Standard Spine Radiographs

T. David Lee, MD, Anthony A. Stone, MD, Beth A. Schuster, PhD, A. Neville Laroche, MD

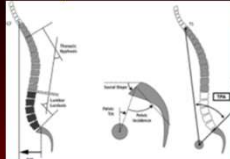
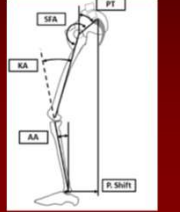
EOS 2D/3D X-ray imaging system: a systematic review and economic evaluation

C McKenna,¹ R Wade,^{2*} R Faria,¹ H Yang,² L Stirik,² N Gummerson,³ M Sculpher¹ and N Woolacott²


vs


Conclusions: Full Body Scans

- Does alignment matter?
 - Pain and disability
 - Surgical outcomes
 - Revision surgery due to ASD
- If yes do I have to change my current behavior?
 - Do I have to be educated and draw lines
 - Can I shortcut with just a few measures (on lumbar images)
 - Do full body scans permit better assessment
- Is radiation a problem, can I reduce
- What is a greater waste of resources?
 - Full body scan
 - Revision spine surgery
 - Failed spine surgery
- What can I do to improve the current state/sustainability of spine surgery?

Thank You

