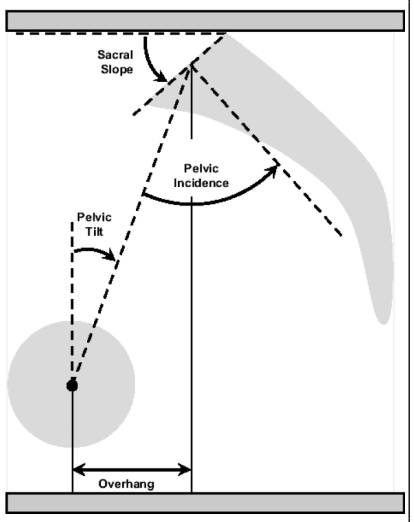
Optimizing Pelvic Tilt and Sagittal Balance in Adult Deformity Correction: Application of the Roussolly Criteria

Russ P. Nockels MD
Department of Neurosurgery, Loyola University Medical Center, Maywood IL

Introduction

Treatment options in the surgical management of adult deformities continue to evolve. However, despite advances in technique, biologics, biomaterials and understanding of global balance, outcomes remain relatively disappointing. In an effort improve overall success in these patients, we aligned postoperative anatomic goals with the Roussoully Classification (RC) of spinal balance.

Relevant Pelvic Parameters

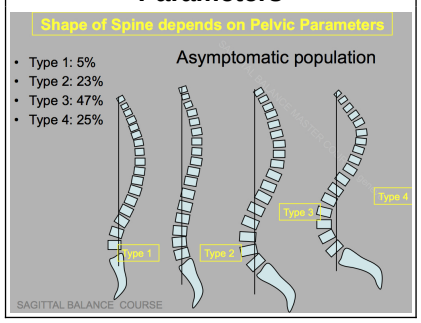


Postoperative Goals were to Decrease Pelvic Tilt to less than 1/2 of Pelvic Incidence

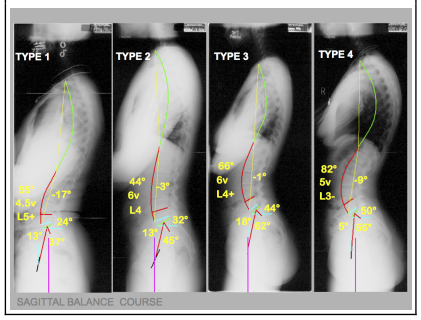
Methods

Roussouly describes 4 types of spinal balance in asymptomatic patients derived from standing long cassette X-rays. In our protocol, 27 consecutive adult deformity patients underwent underwent pre and postoperative measurements of spinal balance and clinical outcomes. Surgical goals were considered adequate of the patients were moved from a non-RC into one of the four RC. Surgical complications reoperation rates and clinical outcomes were recorded with a mean followup of 16 months.

Roussouly Classification of Assymptomatic Spinal Contours and Pelvic Parameters



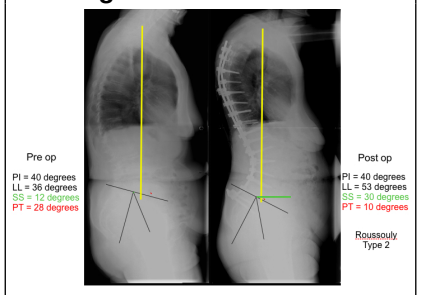
Examples of Standing Xrays in All Four RC Classifications



Results

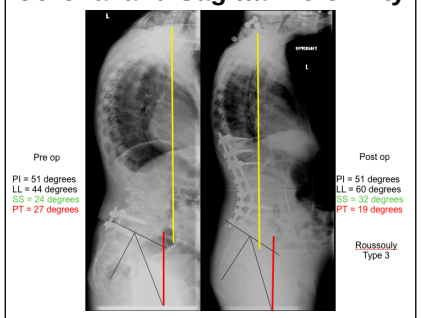
21 of the 27 patients were successfully treated according to the protocol. Of these patients, the majority (64%) were moved into RC Type 3, and 27% into RC Type 2 - roughly equivalent to general population. Reoperation rates and clinical outcomes (ODI, VAS) within the study period were significantly ($p < .05$) improved in the successfully treated group. Pseudoarthrosis rates and implant failure were few and equal in both groups. Postoperative Pelvic parameters (PI, SS) and Sagittal Balance (SVA) were greatly improved in all patients moved to a postoperative RC, these parameters were less improved in the remaining 6 patients.

Case Example: 62F wuth Degenerative Scoliosis



Pelvic Parameters corrected to RC 2

Case Example: 60F with Coronal and Sagittal Deformity



Postoperative Correction of Pelvic Parameters to RC 3

Conclusions

Operative planning using various surgical techniques to anatomically place adult deformity patients into an asymptomatic RC may improve outcomes in the management of these complex patients.

Learning Objectives

1. Understand the Roussoully classification of asymptomatic sagittal balance, 2. Understand surgical application of these spinopelvic parameters to adult deformity patients, 3. Identify potential causes of acute and long term failure in these patients.

References

Mac-Thong JM, Roussouly P, et al. Spine 2010 Oct 15;(35(22):E1193-8

Barrey C, Roussouly P, et al. Eur J Spine 2011 Sep;20 Suppl 5:626-33