317 Evaluation and Treatment of Adult Scoliosis and Sagittal Plane Deformity

18 JANUARY 2018

PHYSIOLOGY

DUBOUSSET **Cone of Economy**

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Adult spinal deformity (ASD)

- cumulative degenerative changes associated with aging

- Major contributing factors include loss of lumbar lordosis (LL) secondary to intervertebral disk collapse

- progressive increase in thoracic kyphosis from osteoporotic wedging of the anterior vertebral bodies

- Approximately 60% of the elderly population has some degree of ASD

CLINICAL EVALUATION: HISTORY AND PHYSICAL EXAMINATION

- **Comparison of upright and supine** imaging can help determine flexibility of the deformity and also detect positional deformities such as camptocormia, which may develop in patients with **Parkinson's disease**

CLINICAL EVALUATION: HISTORY AND PHYSICAL EXAMINATION

- Thomas leg raise test

- **hip flexion contractures** may develop from **chronic pelvic retroversion**

Thomas leg raise test

Radiologic Evaluation

- C7PL
- CSVL
- A deformity is termed
  - *thoracolumbar* if the apex is the intervertebral disk between T12 and L1,
  - *thoracic* if the apex is superior to the T12-L1 disk,
  - *lumbar* if inferior to the T12-L1 disk.

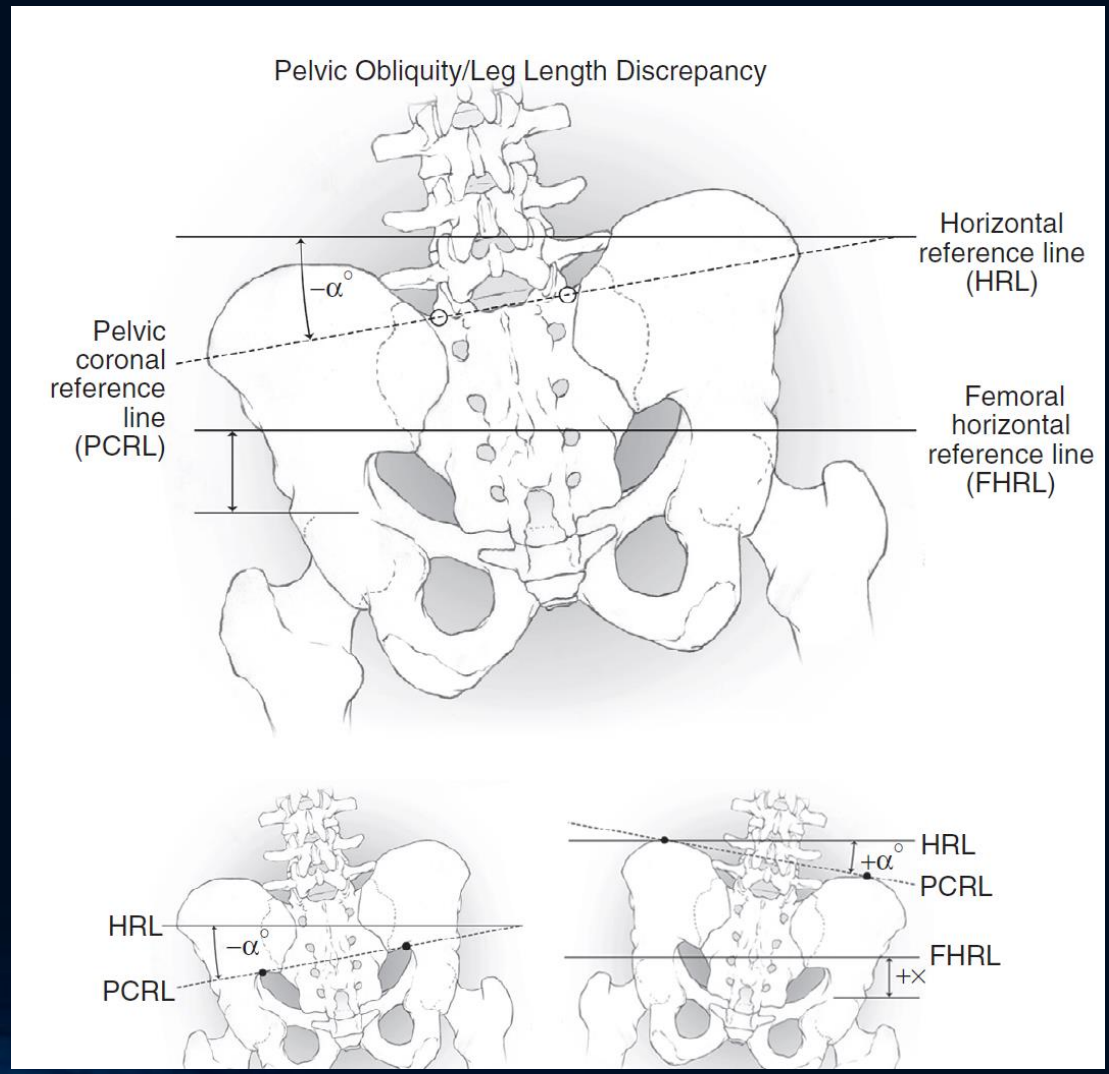
Radiologic Evaluation

- Cobb angle
- Structural curve
  - Major curve
  - Minor curve
- Nonstructural curve

- **Structural curves are stiff and do not correct to an angle less than 25 degrees.**

Radiologic Evaluation

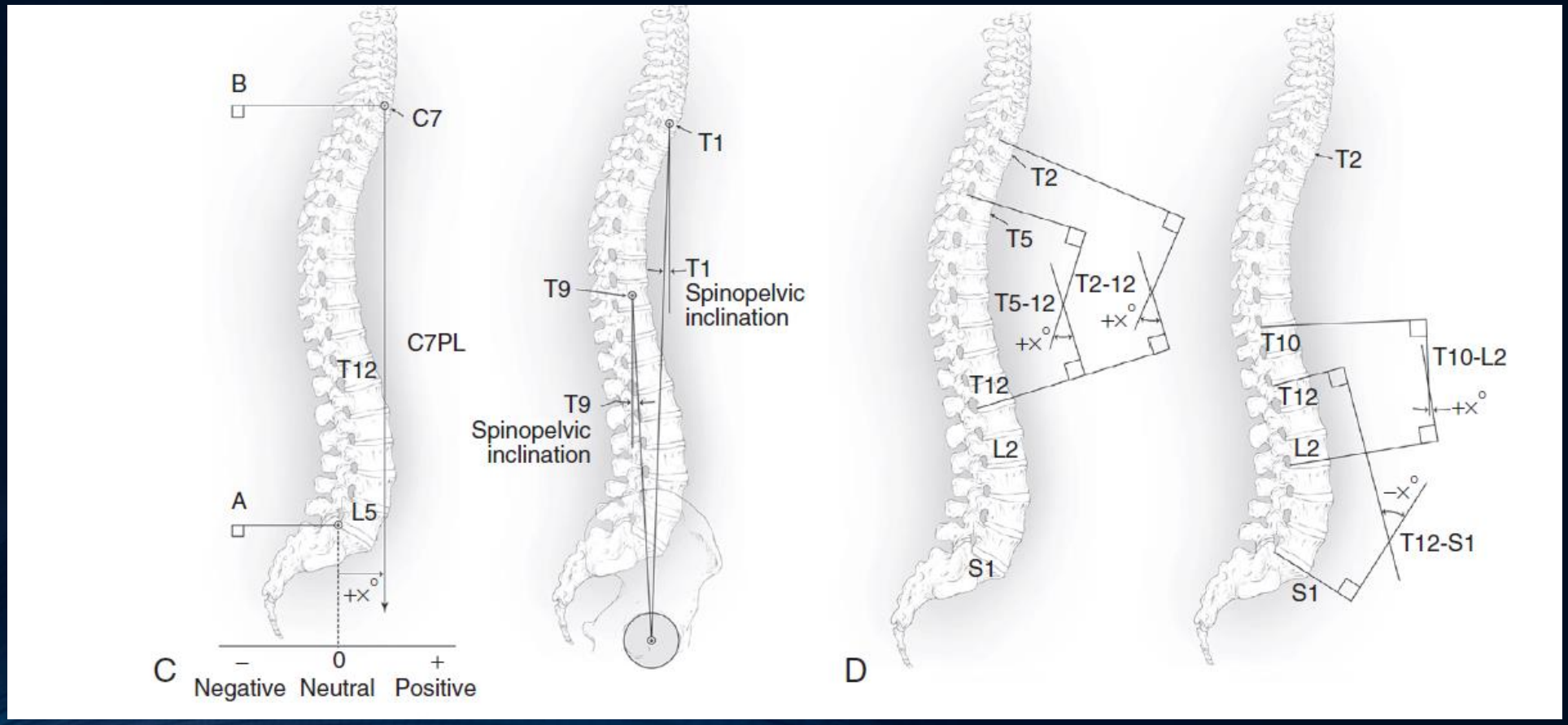
patient should be clinically and radiographically evaluated for leg length discrepancy and then reevaluated after fitting of a **shoe** lift if a discrepancy is identified



Radiologic Evaluation

Sagittal vertical axis (SVA)
- TK
- TLA
- LL

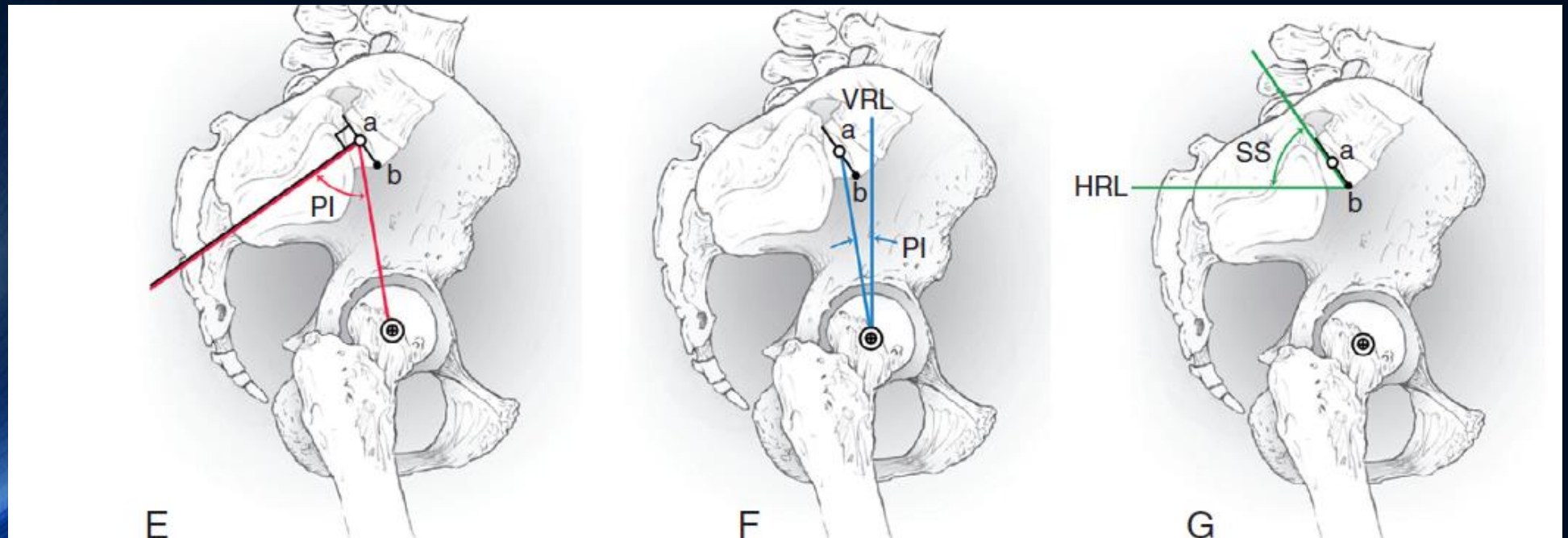
Spinopelvic inclination



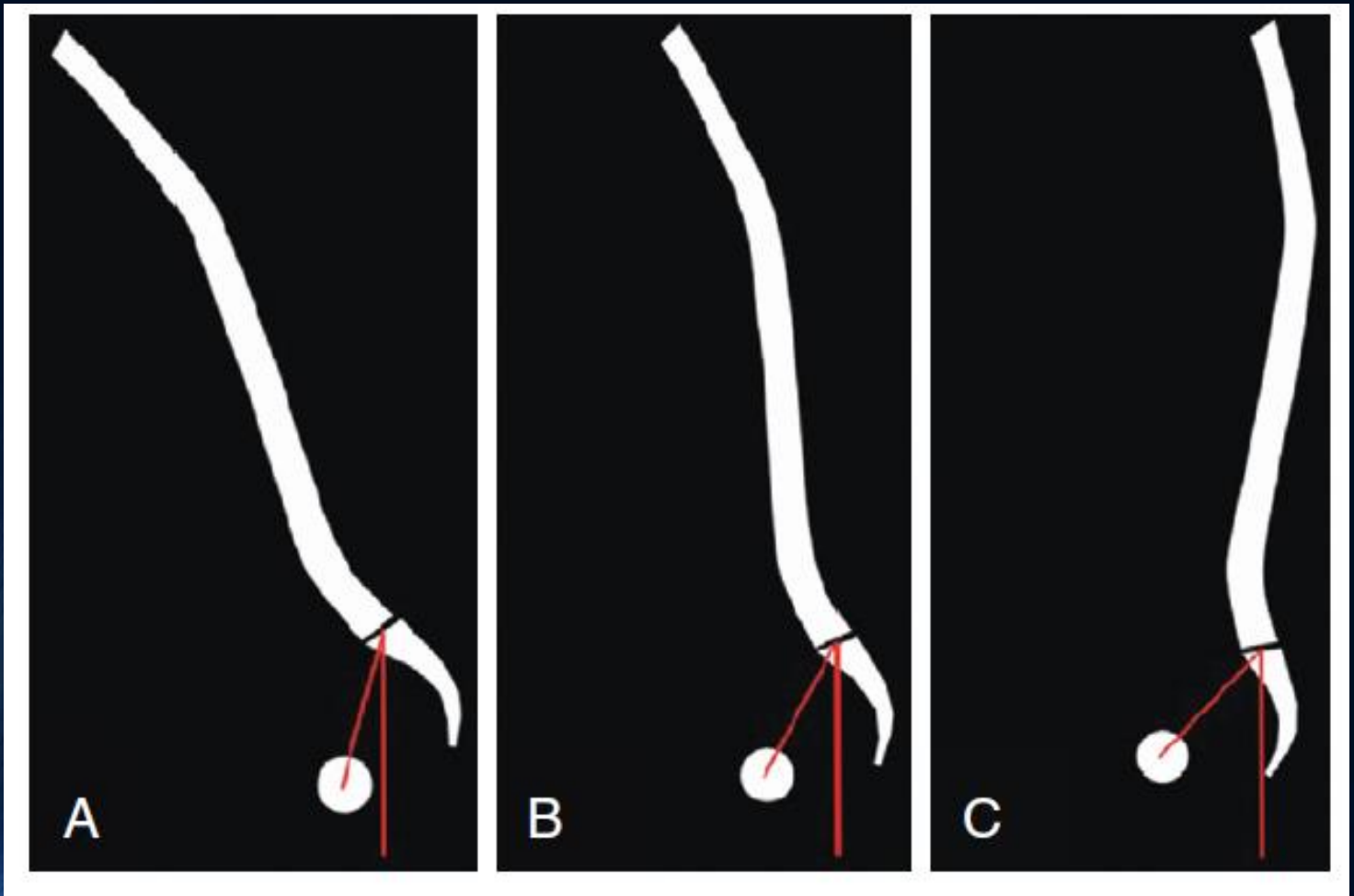
Radiologic Evaluation

The SVA of an individual with positive sagittal malalignment can be decreased by retroversion of the pelvis. **Pelvic retroversion (increased PT).** Average normative values for PT range from **11 to 15 degrees**, and a PT of 22 degrees or higher is associated with moderate disability

- **Pelvic incidence** is a **morphologic parameter** that reaches a fixed angle upon skeletal maturity . average angle is about **55 degrees**, values have been reported to range from 28 to 84 degrees.



Radiologic Evaluation



Radiologic Evaluation

PI=PT+SS

Radiologic Evaluation

Ferguson view **Sacrum**
Stagnara or **leeds** view **Pedicle**

STAGNARA VIEW

- Stagnara described a radiographic technique to eliminate this rotational component of the curve. In this technique, an oblique radiograph is made with the cassette parallel to the medial aspect of the rotational rib prominence and the x-raybeam positioned at right angles to the cassette.
- A film made at 90 degrees to this provides the true lateral view, allowing a much more accurate measurement of the curve size and better evaluation of vertebral anatomy

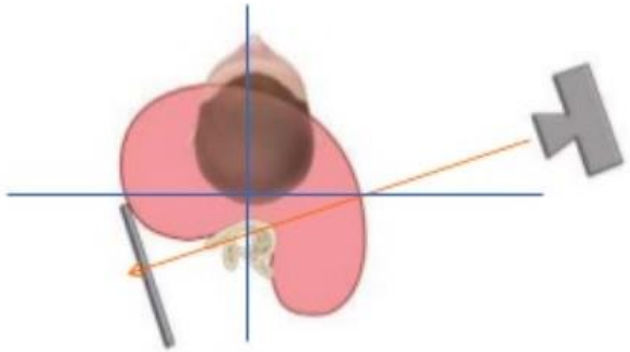
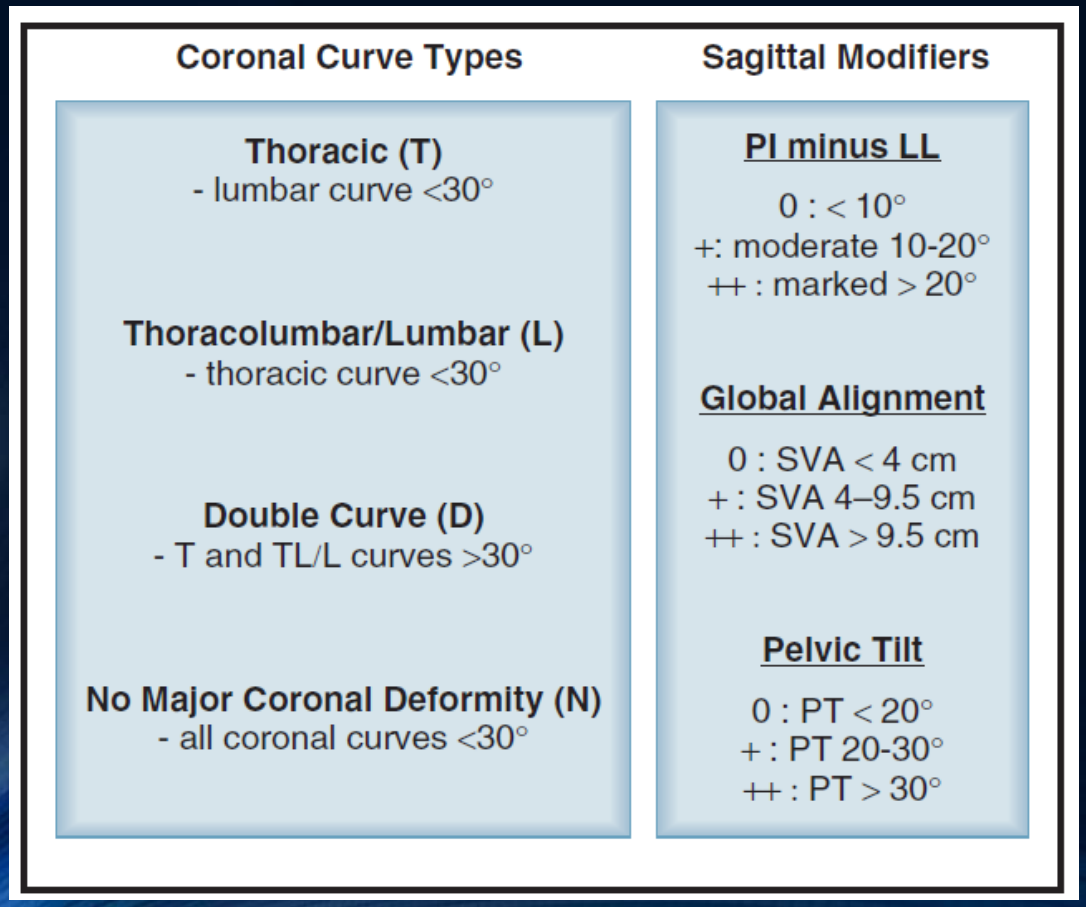


Diagram of Stagnara derotation view.

Classification

- Scoliosis Research Society–Schwab (**SRS-Schwab**)



Coronal Curve Types	Sagittal Modifiers
Thoracic (T) - lumbar curve <30°	**PI minus LL** 0 : < 10° +: moderate 10-20° ++ : marked > 20°
Thoracolumbar/Lumbar (L) - thoracic curve <30°	**Global Alignment** 0 : SVA < 4 cm + : SVA 4–9.5 cm ++ : SVA > 9.5 cm
Double Curve (D) - T and TL/L curves >30°	**Pelvic Tilt** 0 : PT < 20° + : PT 20-30° ++ : PT > 30°
No Major Coronal Deformity (N) - all coronal curves <30°	

SURGICAL PLANNING AND TREATMENT

- **Postoperative HRQOL** scores are directly correlated with the degree of SVA and PT correction, with the **goals of surgical correction** generally including an **SVA less than 50 mm and a PT less than 20** degrees.

SURGICAL PLANNING AND TREATMENT

- choice of osteotomy depends on the **flexibility of the deformity**, **extent of desired sagittal correction**, and **number of levels** over which the correction is desired
- SPO
- PSO
- VCR

SURGICAL PLANNING AND TREATMENT

- **SPO** can provide approximately **10 degrees** of lordosis per level involved. It is best suited for moderate sagittal imbalance (**SVA < 8 cm**). requires that the **disk space be flexible**.

- **PSO** approximately **30 degrees** of corrective lordosis. usually performed **below the conus**. is often used for more severe sagittal malalignment **(>8 cm)**, for treating **iatrogenic flat back** syndrome, and for deformities **lacking anterior column flexibility**
- **VCR large lordotic correction** is needed **over a small segment**, such as for **sharp angular kyphotic deformities**. The most aggressive osteotomy, it involves complete resection of the posterior elements, entire vertebral body, and both superior and inferior intervertebral disks. VCR can provide up to **45 degrees**

Complication

- No osteotomy 17%
- SPO 28%
- PSO 39%
- VCR 61%