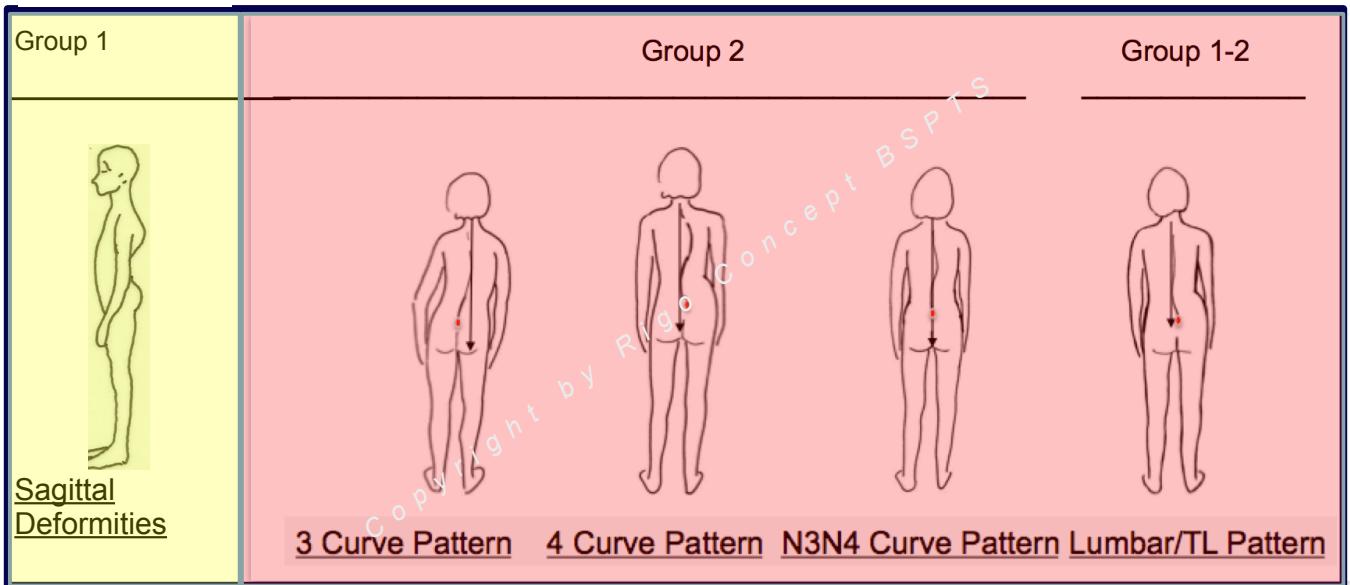


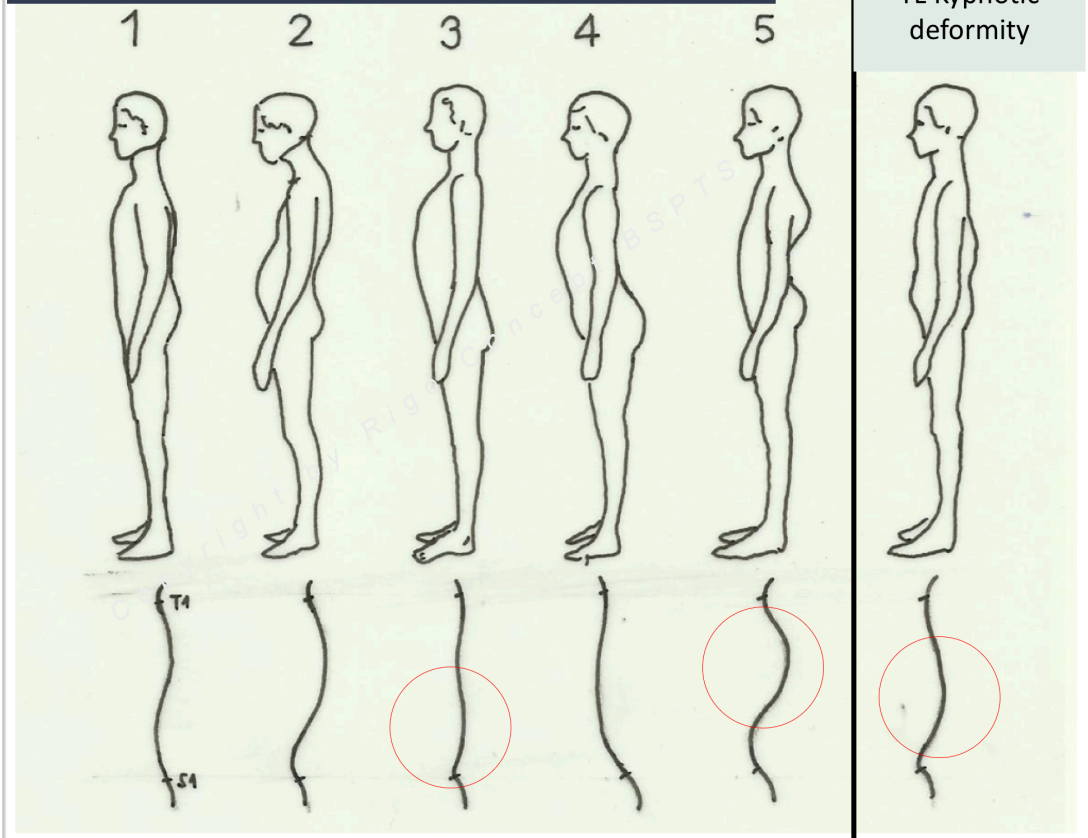
**EU2: Sagittal Profile.
Theory and xRay Lab**

BASIC BSPTS CLINICAL TYPES
Modified from Traditional Schroth Method



Please note that this (Rigo Classification) is a clinical classification, so based on clinical criteria, with a good radiological correspondence – but it is not a radiological classification of curve patterns by itself.

Modified from Staffel 1889 (as seen in the Moe's text book)

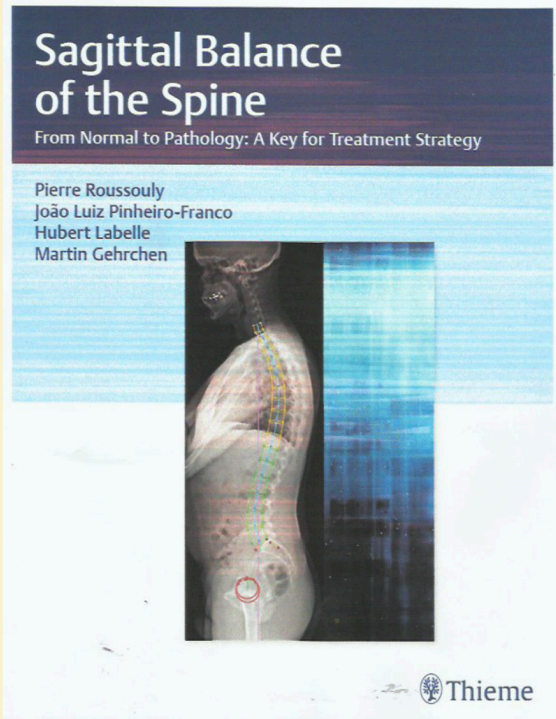


Pierre Rousouly

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Sagittal spinopelvic balance in normal children and adolescents

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[Eur Spine J.](#) 2007 Feb; 16(2): 227--234. |

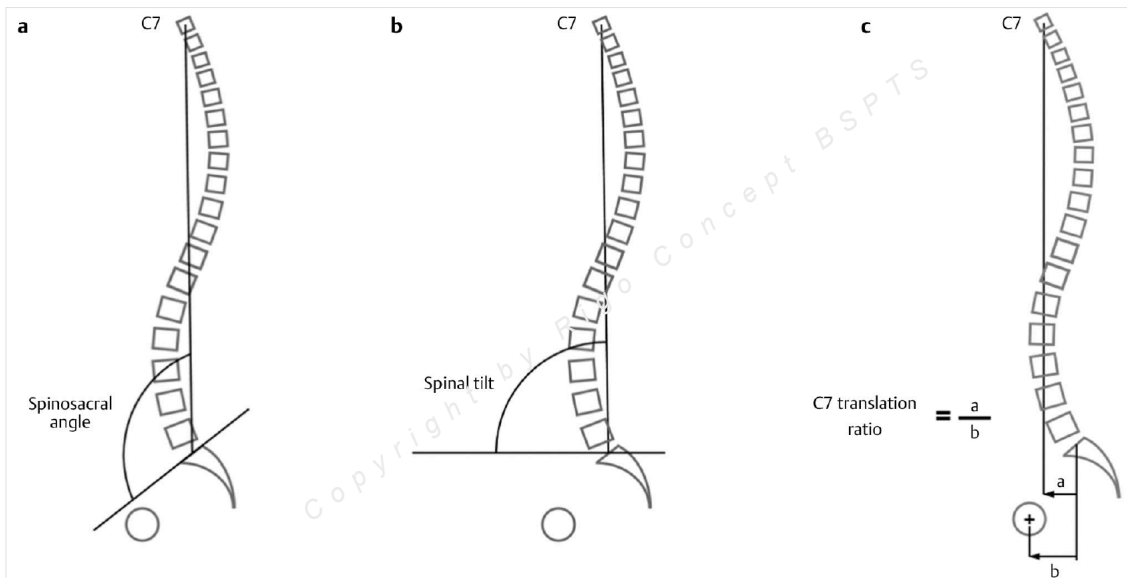
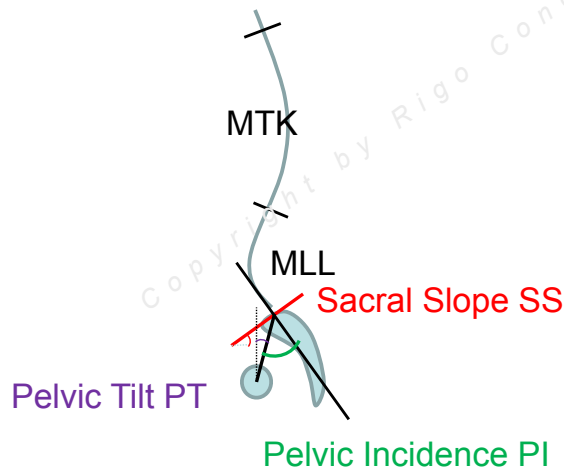
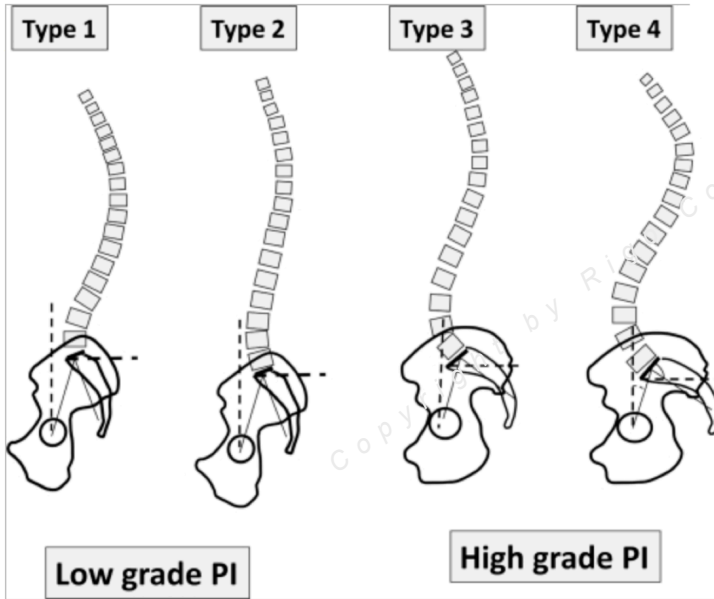


Fig. 7.2 Measurement of global sagittal balance. (a) Spinosacral angle: angle subtended by the upper sacral endplate and the line from the center of C7 vertebral body to the center of upper sacral endplate. (b) Spinal tilt: angle subtended by the horizontal line and the line from the center of C7 vertebral body to the center of upper sacral endplate. A value greater than 90° indicates that the center of C7 vertebral body is behind the center of the upper sacral endplate, whereas for values less than 90°, the center of the C7 vertebral body is in front of the center of the upper sacral endplate. (c) Instead of using a pure distance like SVA (sagittal vertebral axis) that needs precise X-ray calibration, we prefer to use the ratio between two distances (a/b, for example).

Roussouly Classification



The shape of lumbar lordosis depends on SS orientation. Type 1 and 2 have $SS < 35^\circ$; Type 3 has $35^\circ < SS < 45^\circ$; Type 4 has $SS > 45^\circ$. Generally Type 1 and 2 have a low PI and Type 3 and 4 have a high PI

Classification of normal sagittal spine alignment: refounding the Roussouly classification

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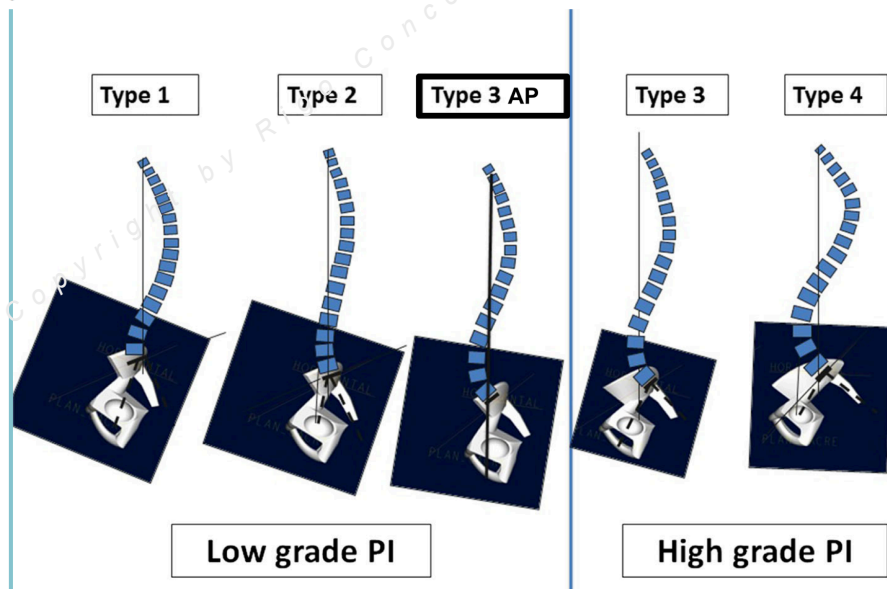


Table 7.1 Regional parameters of sagittal balance reported for the normal pediatric population in different age groups

Age group	Fetal	Infantile	Juvenile	Adolescent
Age	28.7 ± 6.2 weeks (19–40 weeks)	38.7 ± 23.1 months (12–108 months)	8.1 ± 2.0 years (3–10 years)	13.6 ± 1.9 years (>10 and <18 years)
Pelvic incidence	30.6° ± 5.6° (20°–40°)	39.5° ± 8.9° (22°–64°)	43.7° ± 9.0° (23°–84°)	46.9° ± 11.4° (22°–87°)
Pelvic tilt	—	—	5.5° ± 7.6° (-13°–40°)	7.7° ± 8.3° (-12°–34°)
Sacral slope	—	—	38.2° ± 7.7° (21°–56°)	39.1° ± 7.6° (18°–65°)
Thoracic kyphosis	—	—	42.0° ± 10.6° (8°–65°)	45.8° ± 10.4° (9°–84°)
Lumbar lordosis	—	—	53.8° ± 12.0° (16°–86°)	57.7° ± 11.1° (20°–102°)

Table 7.2 Global parameters of sagittal balance reported for the normal pediatric population

Age group	Juvenile	Adolescent	All
Age	8.1 ± 2.0 years (3–10 years)	13.6 ± 1.9 years (>10 and <18 years)	12.1 ± 3.1 years (>10 and <18 years)
Spinosacral angle	130.4° ± 9.0° (103°–154°)	132.7° ± 8.0° (109°–159°)	132.1° ± 8.4° (103°–159°)
Spinal tilt	92.2° ± 5.7° (76°–107°)	93.5° ± 4.1° (83°–106°)	93.2° ± 4.6° (76°–107°)

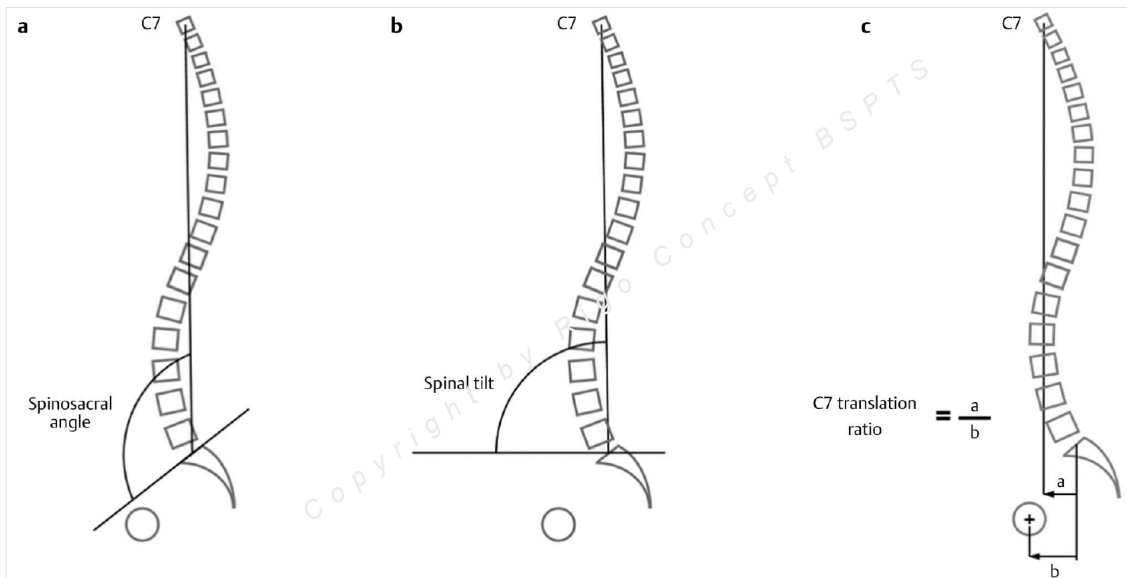


Fig. 7.2 Measurement of global sagittal balance. (a) Spinosacral angle: angle subtended by the upper sacral endplate and the line from the center of C7 vertebral body to the center of upper sacral endplate. (b) Spinal tilt: angle subtended by the horizontal line and the line from the center of C7 vertebral body to the center of upper sacral endplate. A value greater than 90° indicates that the center of C7 vertebral body is behind the center of the upper sacral endplate, whereas for values less than 90°, the center of the C7 vertebral body is in front of the center of the upper sacral endplate. (c) Instead of using a pure distance like SVA (sagittal vertebral axis) that needs precise X-ray calibration, we prefer to use the ratio between two distances (a/b, for example).

Table 7.4 Parameters of sagittal balance reported for the normal adult population in different age groups

Age group	>18 and <30 years	30–39 years	40–49 years	50–59 years	>60 years	All
Pelvic incidence	52.3° ± 10.9° (22°–88°)	52.1° ± 10.4° (27°–89°)	53.2° ± 9.3° (32°–76°)	53.6° ± 10.3° (25°–85°)	52.7° ± 10.5° (33°–78°)	52.6° ± 10.4° (22°–89°)
Pelvic tilt	12.5° ± 6.7° (-6°–33°)	12.1° ± 6.6° (-7°–28°)	12.8° ± 6.8° (-3°–28°)	14.8° ± 6.7° (0°–32°)	16.1° ± 6.9° (0°–32°)	13.0° ± 6.8° (-7°–33°)
Sacral slope	39.8° ± 8.0° (17°–63°)	40.0° ± 7.5° (25°–62°)	40.5° ± 7.3° (23°–56°)	38.9° ± 7.5° (25°–62°)	36.7° ± 9.3° (14°–63°)	39.6° ± 7.9° (14°–63°)
Thoracic kyphosis	48.4° ± 9.3° (16°–74°)	49.7° ± 10.4° (22°–74°)	49.5° ± 10.7° (19°–72°)	52.7° ± 9.9° (28°–79°)	56.5° ± 12.0° (21°–81°)	50.1° ± 10.4° (16°–81°)
Lumbar lordosis	54.5° ± 9.9° (20°–84°)	55.1° ± 10.4° (33°–84°)	56.7° ± 11.2° (31°–79°)	54.3° ± 10.3° (33°–83°)	53.4° ± 12.1° (29°–84°)	54.8° ± 10.5° (20°–84°)
Spinosacral angle	130.7° ± 8.0° (102°–153°)	131.1° ± 7.4° (115°–148°)	131.7° ± 8.1° (112°–149°)	128.9° ± 7.9° (113°–151°)	126.7° ± 3.9° (106°–150°)	130.4° ± 8.1° (102°–153°)
Spinal tilt	90.9° ± 3.1° (80°–101°)	91.0° ± 3.3° (82°–100°)	91.3° ± 3.4° (82°–101°)	90.0° ± 3.9° (80°–98°)	90.0° ± 3.9° (77°–97°)	90.8° ± 3.4° (77°–101°)

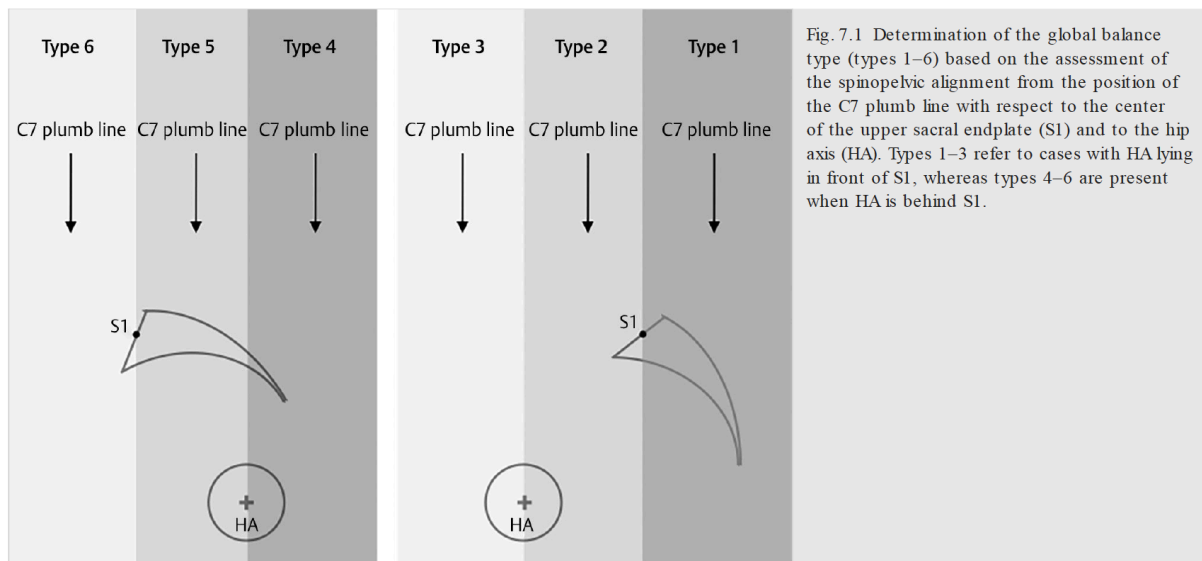


Table 7.3 Distribution of global balance types reported for the normal pediatric population

Age group	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
3–10 years	50.9%	9.0%	19.2%	11.4%	1.8%	7.8%
>10 and <18 years	63.3%	11.9%	7.7%	12.5%	1.0%	3.5%
All	60.1%	11.1%	10.7%	12.2%	1.2%	4.6%

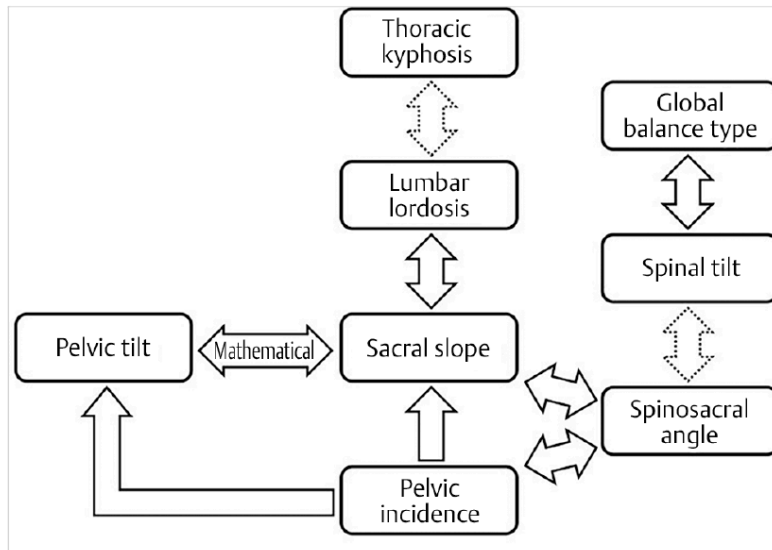
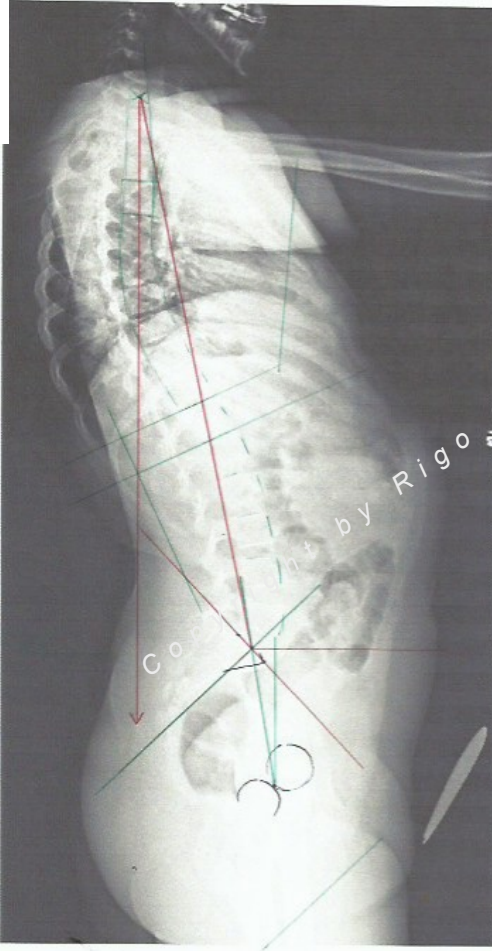


Fig. 7.3 Overview of the chain of correlations between parameters of sagittal balance typically observed in the normal pediatric population. Moderate ($0.3 \leq r < 0.5$) and strong ($r \geq 0.5$) correlations are shown by dotted and full arrows, respectively. The correlation between sacral slope and pelvic tilt is trivial considering that pelvic incidence = pelvic tilt + sacral slope.

Table 7.7 Comparison of parameters of sagittal balance between normal pediatric and adult populations

Population	Pediatric	Adult
Pelvic incidence	46.0° ± 10.9° (23°–87°)	52.6° ± 10.4° (22°–89°)
Pelvic tilt	7.2° ± 8.2° (-13°–40°)	13.0° ± 6.8° (-7°–33°)
Sacral slope	38.9° ± 7.6° (18°–65°)	39.6° ± 7.9° (14°–63°)
Thoracic kyphosis	44.8° ± 10.6° (8°–84°)	50.1° ± 10.4° (16°–81°)
Lumbar lordosis	56.7° ± 11.4° (16°–102°)	54.8° ± 10.5° (20°–84°)
Spinosacral angle	132.1° ± 8.4° (103°–159°)	130.4° ± 8.1° (102°–153°)
Spinal tilt	93.2° ± 4.6° (76°–107°)	90.8° ± 3.4° (77°–101°)

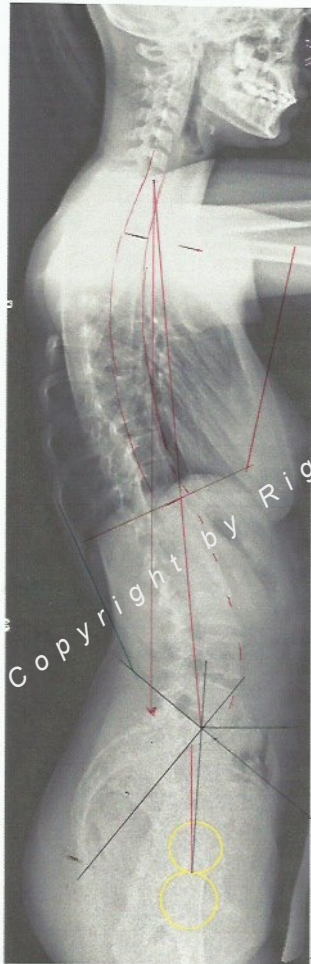


$PI = 56^\circ$
 $SS = 47^\circ$
 $PT = 9^\circ$
 $TIL = 71^\circ$
 $HTK = 30^\circ$
 $SSA = 147^\circ$
 $ST = 102^\circ$

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Balance 1

8 years of age



$PI = 36^\circ$
 $SS = 40^\circ$
 $PT = -4^\circ$
 $TIL = 81^\circ$
 $HTK = 36^\circ$
 $SSA = 135^\circ$
 $ST = 95^\circ$
 Balance = 1

Roussouly 3AP

15 years of age