International online debating program2022

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Oversea guest debaters＆Japanese discussers:

1) **)Dr. Dominique A. Rothenfluh Consultant spinal surgeon, Oxford University, UK**
   Dr. Yusuke Nakao, Sanraku Hosp. Tokyo
2) **Dr. Martin Gerchen, head of spine surgery, Univ. of Copenhagen, Denmark**
   Dr. Kei Miyamoto, Gifu city Hosp. Gifu,
3) **Dr. Ibrahim Obeid ：Spine unit, Bordeaux university hospital, Bordeaux France**
   Dr. Mitsuru Takemoto, Kyoto city Hosp, Kyoto
4) **Dr. Pedro Berjano：Chair, GSpine4 Galeazzi Spine, IRRCS Istituto Ortopedico**
   Dr. Yoh Kumano, JCHO Tokyo Yamate Medical Center, Tokyo

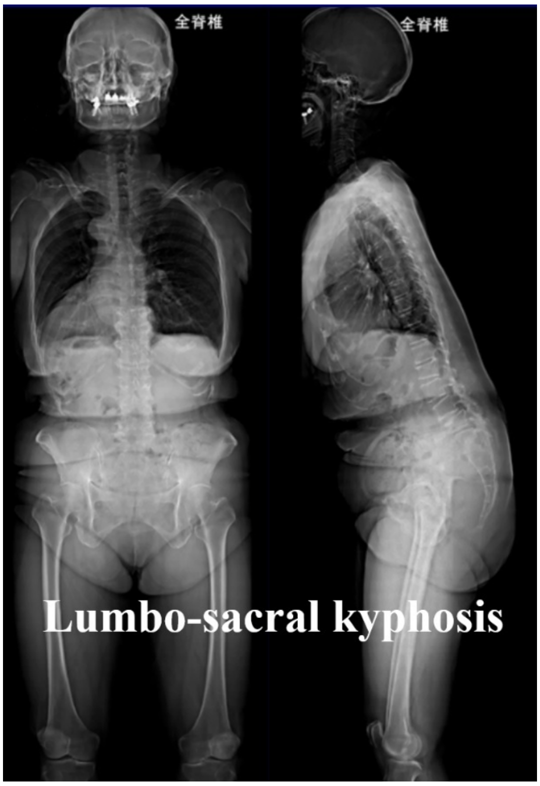
Title: Sanraku Formula& Sanraku-style PSO

Abstract:

A 72-year-old woman with severe kyphotic deformity was surgically treated by Sanraku-style PSO : 1)by preoperatively calculating correction angle using Sanraku Formula based on reciprocal change and 2) by Medial iliac screw fixation of Sanraku method and 3) by PSO-TLIF superior with Domino-3rd rod method. The preoperatively planned spinal alignment was successfully obtained.

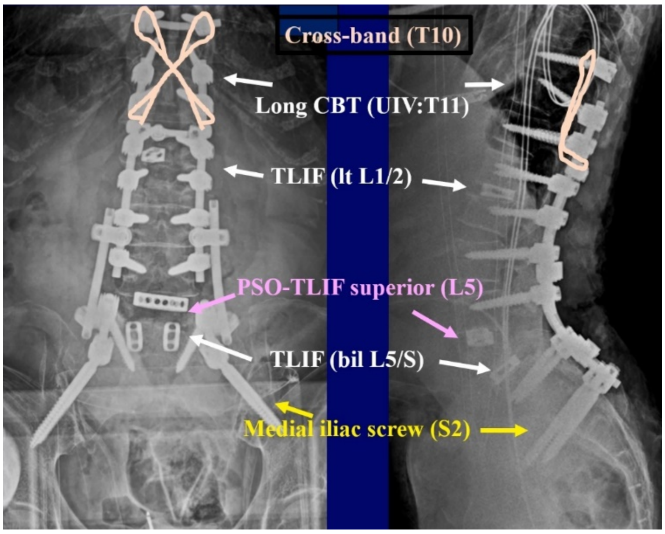
The Sanraku Formula: With a pelvic incidence (PI) of 57 degrees and a pelvic tilt (PT) of 33 degrees, this individual has a normal PT of 16 degrees on a sliding scale. The concepts of the Sanraku Formula are to bring the center of gravity (C3 or 4) on the the uncompensated pelvis of PT 16 degrees. Thirty-three degrees of the measured PT value

minus 16 degrees of normal PT value; / that is, 17 degrees is the compensated PT, which is rotated forward to create a pelvis with a normal PT value. The center of gravity



line is drawn on it, that is, 17 degrees of anterior rotation, to create a normal pelvis. The line of center of gravity is drawn on it, and the angle for bringing C3/4 from the osteotomy to this center of gravity line; that is, 42 degrees is the minimal correction angle, without incorporating the reciprocal change. This is the basic Sanraku Formula.

When you rotate this 17 degrees backward, it returns to the original image and the center of gravity line becomes a line drawn 17 degrees backward. Thus, drawing against a line drawn 17 degrees posterior to begin with may make the rotation unnecessary and practical. The Advanced Sanraku Formula takes the reciprocal change into account. Looking at the angle from C3/4 to the upper instrumented vertebra (UIV), which is a non-fixation levels and is movable between standing and forward flexion. Thus in this example, the returnable angle is 23 degrees. However, in the study of Nakao, the angle is returned to slightly above the forward flexion position. This 23 degrees is set as the reciprocal change. The manual methods are feasible and practical in hospital PCs. This section explains the sliding scale methods. For such kyphosis, assume that the osteotomy was brought on the line of gravity. Subsequently, reciprocal change occurs above the UIV. This is further corrected at the osteotomy site to bring C3/4 back on the gravity line. The angle β, "the reciprocal change correction angle" will be calculated.



The intended correction angle is the minimal correction angle plus beta.

In doing so, the ratio of the length a from C3/4 to the UIV, and length b from the UIV to the osteotomy site, becomes important. In practice, the spine is not straight and has a kind of curvature but still α-dash and β-dash / measured on the curvature are almost the same as the α and β measured on the straight line, and can be substituted in the straight line diagram. To determine β, we focus on this triangle and solve it using the cosine theorem and the sine theorem. The value of β is represented by this formula. Substituting α, a, and b equals xa gives the value of β. Here, we explain the more convenient sliding scale method. If a versus b is one-to-one, then β would be 0.5α.

β is 0.7α if a versus b is 2 versus 1, β is 0.3α if a versus b is 1 versus 2, β is 0.7α if a versus b is 2 versus 1, β is 0.3α if a versus b is 1 versus 2, β is 0.6α if the a:b ratio is 3:2, and β is 0.4α if the a:b ratio is 2:3.You can then create a sliding scale like the one on the right for a:b. In this example, the a:b ratio was 3:2; therefore, β would be 0.6α and β equals 0.6 multiplied by 23 degrees, equals 13 degrees.

Thus, the target correction angle is the minimal correction angle plus β, and equals 42 degrees plus 13 degrees, which equals 55 degrees.