Sagittal spinal deformity

Sagittal spinal deformity refers to an abnormal curvature of the spine in the sagittal plane, which is the plane that divides the body into left and right halves. The spine normally has natural curves, including lordosis (forward curvature) in the cervical and lumbar regions, and kyphosis (backward curvature) in the thoracic region. However, when these curves become exaggerated or deviate from the normal range, it can result in sagittal spinal deformity.

There are several types of sagittal spinal deformities, including:

Kyphosis: This is an excessive forward rounding of the upper back. Hyperkyphosis can lead to a hunched or rounded appearance of the back and may be associated with conditions such as Scheuermann's disease or osteoporosis.

Lordosis: This is an excessive inward curvature of the lower back. Hyperlordosis can lead to an exaggerated swayback appearance and may be associated with conditions such as spondylolisthesis or obesity.

Flatback Syndrome: This occurs when there is a loss of the normal lumbar lordosis, resulting in a flattening of the spine. It can be caused by various factors, including spinal fusion surgery.

Sagittal Imbalance: This refers to an imbalance in the sagittal plane, where the spine does not maintain proper alignment. This can cause issues with posture and may lead to pain and functional limitations.

Ankylosing Spondylitis: This is a chronic inflammatory condition that primarily affects the spine, leading to progressive stiffness and fusion of the vertebrae. It can result in a rigid, stooped posture.

Treatment for sagittal spinal deformity depends on the specific type and severity of the deformity. Conservative measures may include physical therapy, exercises, and bracing. In more severe cases or cases unresponsive to conservative treatment, surgical intervention may be considered to correct the spinal alignment.

Management often involves a multidisciplinary approach, with orthopedic surgeons, neurosurgeons, and other healthcare professionals working together to determine the most appropriate treatment plan based on the individual patient's condition. Regular monitoring and follow-up care are essential to manage and address any potential complications or changes in the deformity over time.

Patients from USA (85% Caucasian) > 25 y/o were propensity matched by age, gender, and pelvic incidence with patients from Korea and Japan. Only primary patients or those with existing fusion below T12 were retained for analysis. Groups were sub-classified by deformity severity (aligned: sagittal vertical axis (SVA) < 50 mm; moderate malalignment: SVA 50-100 mm; severe malalignment: SVA >100 mm). Radiographic measurements including pelvic retroversion, thoracic kyphosis, loss of lumbar lordosis (PI minus LL), cervical lordosis and cervical SVA were compared between the groups. RESULTS: There were 288 patients (96 each in USA, KOR, JPN), with similar age (64-67yrs) and PI (49-53°). USA had smaller PI-LL in every alignment group (p < 0.05). In moderate malalignment, JPN had more pelvic retroversion than USA (30° vs. 20°), and KOR had more thoracic hypokyphosis than USA (15 vs. 31°). In severe malalignment, JPN had more pelvic retroversion than USA (39° vs. 27°),

and KOR had more thoracic hypokyphosis than USA (15° vs. 31°). KOR had smaller cSVA than USA in both aligned (11 vs. 27mm) and moderate (19 vs. 31mm) malalignment. In severe malalignment, KOR had less cervical lordosis (13° KOR vs. 15° USA vs. 27° JPN). All differences with P<0.05. CONCLUSIONS: Compensation for sagittal is ethnicity dependent. Korean patients favor thoracic compensation via hypokyphosis, and Japanese patients favor pelvic compensation via retroversion. Patient ethnicity should be considered when evaluating the sagittal plane and surgical correction strategies ¹.

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