

Local application of vancomycin was associated with a significant decline in pH to a nonphysiologic range at doses of 6 mg/cm² ($P < .015$) or 12 mg/cm² ($P < .001$). It also resulted in a dose-dependent suppression of osteoblast migration (control, 100%; 3 mg/cm², 44%; 6 mg/cm², 33%).

After 24 hours, cell proliferation and viability were also reduced, with the reductions being significant at the 6 and 12 mg/cm² doses for proliferation and at the 12 mg/cm² dose for viability (both $P < .001$). The application of vancomycin also led to a significant ($P < .001$) inhibition of alkaline phosphatase expression (15.4% in controls vs 1.8% at 3 mg/cm² and undetectable at the 6 and 12 mg/cm² doses).

Dr Ogon concluded that cell migration, proliferation, and differentiation are key factors in osteogenesis. To properly balance the risks of infection and nonunion, controlled in vivo studies should be conducted to establish the minimal local concentrations of vancomycin necessary for infection prevention.

Deviation From Preoperative Planning Leads to Undercorrection of Sagittal Spine Deformities

Written by Phil Vinall

Bertrand Moal, MS, NYU Hospital for Joint Diseases, New York, New York, USA, presented details of the Discrepancies in Preoperative Planning and Operative Execution in the Correction of Sagittal Spinal Deformities study [Liu BS et al. *Spine*. 2014], demonstrating the complexity of intraoperative decision making and indicating that deviation from the preoperative plan may lead to undercorrection of sagittal spine deformities, especially in patients in need of large lumbar lordosis (LL) correction.

In patients with adult spinal deformity (ASD), sagittal malalignment correlates with disability. The SRS-Schwab ASD classification is a system that describes and classifies ASD and is used to define realignment objectives based on 3 sagittal modifiers: pelvic incidence-LL (PI-LL), global alignment (sagittal vertical axis [SVA]), and pelvic tilt (PT). Despite the known connection between sagittal realignment and postoperative outcomes, postoperative radiographs show suboptimal alignment in about 40% of cases as a result of either deterioration or lack of correction. Preoperative planning tools are needed.

This was a prospective study designed to evaluate the discrepancies in preoperative planning and operative execution in the correction of sagittal spinal deformities.

The study comprised consecutive patients with ASD undergoing major sagittal realignment surgery. Data were collected on preoperative planning, surgical strategy, and complication and revision rates. Preoperative and 3-month postoperative radiographs were evaluated for thoracic kyphosis (TK), LL, PI-LL, SVA, and PT. Outcome measures included preoperative, planned, and postoperative spinopelvic alignment (SRS-Schwab) and major changes in plan (less aggressive procedure than planned, more aggressive procedure than planned, and no change).

The study enrolled 50 patients (mean age, 64 years; body mass index [BMI], 27 kg/m²; 70% with a history of spine surgery). Data were incomplete for 9 patients. Most participants had large sagittal malalignment.

Only 14 patients (34%) were planned to reach grade 0 for PI-LL, PT, and SVA. The locations of the most common upper instrumented vertebrae (UIV) were T10 and T4. Twenty-seven patients were planned for single grade III resection, and 12 patients were planned for at least 1 grade II osteotomy. Only 4 patients (10%) had a postoperative grade 0 in all 3 modifiers.

For patients, the postoperative grade was a smaller grade than planned (PI-LL, 12%; PT, 10%; SVA, 23%), the same grade as planned (PI-LL, 51%; PT, 29%; SVA, 44%), or a greater grade than planned (PI-LL, 37%; PT, 61%; SVA, 33%).

There were significant differences in the mean planned vs postoperative change for LL, PI-LL, and PT ($P \leq .001$) but not SVA. Mr Moal suggested that this may have been due to greater-than-planned changes in TK and undercorrection of both LL and PT. Procedurally, UIV changed by 1 level for 6 patients (5 to 1 level less). Eight changes in planned interbody fusions were reported in 7 patients (5 unplanned; 3 were not performed).

Twenty-five patients received the planned procedure; 14 received less aggressive; and 2 received more aggressive procedures. There were no significant differences in age, BMI, blood loss, or distribution of short/long fusion between patients having more vs less aggressive surgery. Patients with less aggressive surgery had greater correction of LL and PT but more grade II osteotomies and fewer grade III resections. There were no differences between the groups having less aggressive surgery and those with no procedural changes. There were also no differences in complications or revisions.

This was the first study to examine surgical strategy and procedures from preoperative planning to postoperative alignment, and it indicated the need for better planning and intraoperative tools for predicting sagittal alignment.