Osteoporosis Treatment and Outcomes in Patients Undergoing Adult Spinal Deformity Surgery

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INTRODUCTION:
This study is to evaluate the prevalence and treatment of osteoporosis among patients undergoing adult spinal deformity (ASD) surgery and to compare surgical and radiographic outcomes between patients with and without osteoporosis undergoing ASD surgery.
METHODS:
We retrospectively reviewed adult patients (≥18 years old) who underwent ASD surgery at a single academic institution. The prevalence of osteoporosis was calculated in this population, and pharmacological therapy was recorded. Osteoporosis was defined as having a history of osteoporosis in the past medical history currently on medical therapy and/or a T-score ≤-2.5 on dual X-ray absorptiometry (DXA). Patients with osteoporosis (osteoporotic cohort) were compared to those without (non-osteoporotic cohort). Radiographic outcomes included preop and postop sagittal vertical axis (SVA) and pelvic incidence–lumbar lordosis (PI-LL) mismatch. Surgical outcomes included surgical site infection (SSI), pseudarthrosis, proximal junctional kyphosis (PJK), and proximal junctional failure (PJF). PJK was defined as proximal junctional angle (PJA) ≥ 10° and at least 10° greater than the preoperative angle. PJF was defined as symptomatic PJK and fracture or hardware failure at the upper instrumented vertebra (UIV) or its adjacent vertebrae requiring revision surgery.
RESULTS:
In total, 168 patients (55 men, 113 women) underwent ASD surgery. The prevalence of osteoporosis in this population was 28.6% (n=48). There was a higher proportion of female patients in the osteoporotic cohort (79.2 vs. 62.5%, p=0.04). Osteoporotic patients were also older (71.1 vs. 67.2 years, p=0.006). BMI was similar between cohorts (28.7 vs. 20.1 kg/m^2, p=0.74). At the time of surgery, 34 patients (70.8%) with osteoporosis were receiving pharmacologic treatment, with 27 patients (79.4%) receiving monotherapy and 7 patients (20.6%) receiving combination therapy. Among those on monotherapy, bisphosphonates (40.7%) and teriparatide (44.4%) were most often prescribed, followed by denosumab (11.1%).
Preop PI-LL mismatch (23.7 vs. 22.5°, p=0.68) and SVA (84.6 vs. 95.6mm, p=0.32) did not differ between cohorts. Mean levels fused were similar between cohorts (10.1 vs. 10.5 levels, p=0.44). At first postoperative visit, there were similar improvements in PI-LL mismatch (18.6 vs. 16.0°, p=0.37) and SVA (27.3 vs. 45.3mm, p=0.11) when compared to preop. At mean final follow-up (974 vs. 907 days, p=0.60), there were similar improvements in PI-LL mismatch (12.6 vs. 12.0°, p=0.87) and SVA (21.5 vs. 41.3mm, p=0.12) when compared to preop. There were no differences in rates of SSI (6.3% vs. 3.3%, p=0.39) or pseudarthrosis (10.4 vs. 7.5%, p=0.54). The osteoporotic cohort had a higher rate of PJK (35.4 vs. 17.5%, p=0.01) but not PJF (18.8 vs. 14.3%, p=0.30).
DISCUSSION AND CONCLUSION:
We found the prevalence of osteoporosis among patients undergoing ASD surgery to be 28.6%, with >70% of patients receiving pharmacologic treatment at the time of surgery. The most commonly prescribed monotherapy was bisphosphonate or teriparatide. Osteoporotic patients undergoing ASD surgery had similar improvements in PI-LL mismatch and SVA as non-osteoporotic patients. While the rate of PJK was higher among patients with osteoporosis, there was no difference in the rate of PJF.