Male patients with adult spinal deformity: sex differences in demographics, radiography, and complications

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論文題目
Male patients with adult spinal deformity: sex differences in demographics, radiography, and complications
（成人の脊椎変形を持つ男性患者：人口統計、放射線画像、合併症における性差）

論文の内容の要旨
[Introduction]
Adult spinal deformity (ASD) refers to a spectrum of spinal conditions characterized by diverse etiologies and clinical manifestations. Several studies have established a higher prevalence of ASD in females than in males, but research addressing sex differences in ASD attributable to various pathological factors is lacking. Sex has been established to influence responses to medical treatments since the enactment of the National Institutes of Health Revitalization Act in 1993, considering that patients of different sexes possess distinct cellular biochemical profiles. This legislation encourages researchers to further investigate sex-based differences in medical outcomes. Few studies have adequately addressed sex differences in these contexts, despite the existing literature on perioperative and postoperative complications associated with ASD. This study aimed to analyze the differences in etiology, demographics, preoperative comorbidities, perioperative and postoperative complications of ASD between the sexes. We sought to ensure a more comprehensive preoperative evaluation of corrective surgery by identifying the potential risk factors.
[Patients and Methods]
Patients with ASD at our institution underwent posterior instrumented fusion from March 2011 to March 2021. Patients were categorized based on sex into two groups. The variables for comparison included demographic data; preoperative blood tests, operative parameters: staged operation, Schwab osteotomy grade; deformity etiologies; preoperative comorbidities; perioperative complications; and postoperative mechanical complications. The study was approved by the Ethics Committee of Hamamatsu University School of Medicine (approval number: 24-102).
[Results]
A final total of 323 patients, comprising 277 females and 46 males. No statistically significant difference in age was observed between the female and male patients (68±9.5 years vs. 68±12 years, $p = 0.984$). However, female patients demonstrated a significantly lower T-scores (-1.6±1.1 vs. -0.8±1.0, $p = 0.02$) and prevalence of smoking (3.2% vs. 32.6%, $p = 0.001$). The estimated glomerular filtration rate (e-GFR) in female

patients was higher than that in male patients (74.0±19.0 vs. 67.6±21.9, $p = 0.039$). Female patients demonstrated a lower prevalence of cardiovascular disease (4.0% vs. 13.5%, $p = 0.034$), with fewer patients requiring hemodialysis (2.5% vs. 10.8%, $p = 0.035$). Additionally, the Charlson Comorbidity Index (CCI) was significantly lower in female patients than in male patients (0.8±1.1 vs. 1.4±1.1, $p = 0.001$). Female patients exhibited a higher rate of kyphoscoliosis (83.4% vs. 62.5%, $p = 0.004$) but a lower rate of neuromuscular disease (7.6% vs. 21.7%, $p = 0.003$) than male patients. The incidence of osteoporotic vertebral fractures was not statistically different between the genders (9.0% vs. 13.0%, $p = 0.392$). The overall incidence of perioperative complications did not differ significantly between female and male patients (37.9% vs. 47.8%, $p = 0.202$). However, male patients demonstrated a significantly higher incidence of surgical site infection (SSI) (4.0% vs. 15.2%, $p = 0.007$). Risk assessment indicated that males were found to be 3.4-fold to be affected than females in surgical site infection.

[Discussion]

This study revealed that the proportion of female patients was higher than that of male patients (85.8% vs. 14.2%, respectively). Although the exact etiology of ASD remains unclear, a higher proportion of female patients is associated with osteoporosis, as postmenopausal bone loss and osteoporosis, which cause vertebral collapse, are significant risk factors for ASD to female patients. Our results indicated that female patients demonstrated a lower T-score than male patients and a higher prevalence of kyphosis and kyphoscoliosis. Although male patients had a relatively higher bone density, they exhibited a higher prevalence of neuromuscular disease. The prevalence of preoperative comorbidities was 64.9% in female patients and 78.4% in male patients. Male patients demonstrated a higher CCI score. Overall, male patients exhibited worse preoperative physical conditions than female patients. Our study revealed an overall incidence of perioperative complications of 37.9% in females and 47.8% in males. Although this difference was not statistically significant, the rate of SSI was significantly higher (3.4-fold) in males than in females. The German National Nosocomial Infection Surveillance System, which included over one million surgical procedures over 10 years, revealed that male patients had higher SSI rates than female patients in orthopedic and abdominal surgeries. Similarly, in a multicenter clinical study involving approximately 400 hospitals, Kothari et al. observed a higher incidence of pulmonary and cardiac complications in male patients.

[Conclusion]

Male patients demonstrated higher rates of neuromuscular diseases, a greater CCI, and a higher incidence of SSI than female patients. However, the incidence of mechanical complications and revision rates did not significantly differ between the two groups.

Therefore, thorough preoperative assessments and meticulous intraoperative care are particularly crucial for male patients.