

Vertebral compression fracture frequently affects sagittal standing posture in total hip arthroplasty patients.

Masashi Shimoda¹, Hyonmin Choe¹, Hiroyuki Ike¹, Koki Abe¹, Yuta Hieda¹, Yota Katuyama¹, Yutaka Inaba¹

¹Yokohama City University Hospital

e-mail: masa0621shimo@gmail.com

[Introduction] Postoperative posture influence walking ability and activities of daily living in patients undergoing total hip arthroplasty (THA). vertebral compression fractures, when they occur, can result in lumbar lordosis and pelvic retroversion, contributing to postural malalignment. However, despite its clinical significance, there is a lack of comprehensive studies examining the incidence of vertebral compression fractures and their impact on sagittal plane vertebral alignment in THA patients. The purposes of this study were to investigate the occurrence of new vertebral compression fractures following THA, quantify their influence on standing sagittal spinal alignment, and identify associated factors contributing to vertebral compression fracture in THA patients.

[Patients and Methods] The study cohort comprised 197 cases of THA performed at our institution during the years 2016 and 2017. After excluding patients with no postoperative follow-up (59 cases), those lacking standing sagittal spinal alignment X-rays beyond 5 years postoperatively (49 cases), and individuals who presented with preoperative vertebral compression fractures (16 cases), 73 cases were included in this study. The following variables were assessed: Preoperative demographic data of age and gender, preoperative laboratory values of Albumin (Alb) levels, dual-energy X-ray absorptiometry (DEXA) values on lumbar spine, fracture Risk Assessment Tool (FRAX) Score. Preoperative and postoperative measurements of C7-sagittal pelvic axis (SVA), Lumbar lordosis (LL), Sacral slope (SS), and Pelvic tilt (PT). Harris Hip Score (HHS) at the final follow-up was also investigated as the representative of ADL.

[Results] 16 of 73 patients (22%) had vertebral compression fractures after THA. The mean age at surgery was 59.4 years for the group without postoperative vertebral compression fractures (control group) and 68.3 years for the group with vertebral compression fractures. Vertebral compression fractures occurred more frequently in L1 and Th12. The vertebral compression fracture group showed a significant postoperative increase in SVA and decrease in LL. Postoperative HHS was 90.5 in the control group and 85.5 in the vertebral compression fracture group. Multivariate analysis of the association between these measures and the occurrence of vertebral compression fractures showed that age at surgery and preoperative FRAX Score were significantly associated with the occurrence of new vertebral compression fractures.

[Discussion] In this study, approximately 22% of THA patients experienced incident vertebral compression fractures within five years after surgery. Vertebral compression fractures resulted in the increase of C7-SVA, the reduction of LL, and decrease of ADL measured as HHS. Of particular significance, elderly patients with higher FRAX scores appear to be susceptible to this complication. Hence, the prevention of spinal compression fractures emerges as a crucial consideration, particularly in the context of older patients with elevated FRAX scores.

[Significance] The FRAX score may be useful in predicting post-operative vertebral compression fractures after THA, and early intervention to predict vertebral compression fractures before surgery may contribute to improved post-operative THA outcomes.

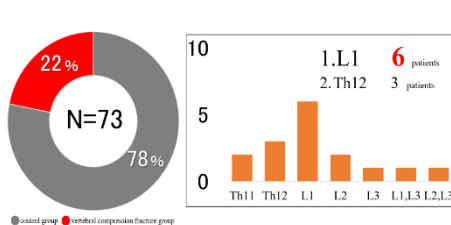


Figure1: Incidence of vertebral compression fractures after THA and their affected joints: 16 of 73 patients (22%) had vertebral compression fractures within 5 years after THA. Vertebral compression fractures occurred more frequently in L1 and Th12.

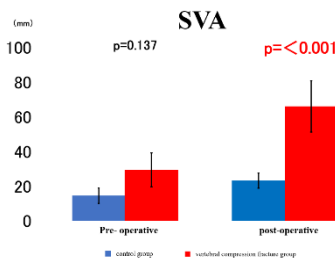


Figure2: Comparison of SVA before and after THA: SVA showed a significant difference in postoperative values. This indicates that the posture was tilted forward due to the vertebral compression fracture.

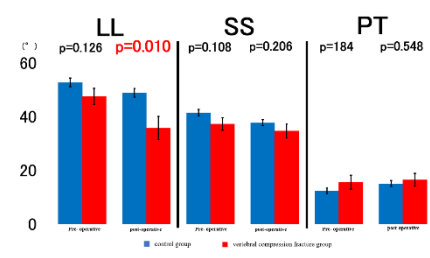


Figure3: Comparison of LL and SS and PT before and after THA: SS and PT showed no significant difference. LL showed a significant difference in postoperative values, and the lumbar spine was kyphotic due to vertebral compression fracture.