Serum and hair titanium concentrations after scoliosis surgery

R. Uchimura[1], K. Yamazaki[1], H. Murakami[1], S. Yoshida[1],
T. Shimamura[1] and K. Sera[2]

[1] Department of Orthopaedic Surgery,School of Medicine,Iwate Medical University
19-1 Uchimaru, Morioka, Iwate 020-8505 Japan

[2]Cyclotron Research Center, Iwate Medical University
348-58 Tomegamori, Takizawa, Iwate 020-0173, Japan

Abstract

Posterior spinal fixation using titanium implants is a common procedure for correcting scoliosis. Surgical intervention for scoliosis is usually performed while the patient is in the teen-age years and the titanium implants remain in situ for the rest of the patient's life. However, the long-term consequences of titanium implants are unclear. We investigated the associations among serum and hair titanium concentrations and spinal implants. Serum and hair samples were collected from 64 scoliosis patients and 36 unaffected volunteers. Titanium concentrations were measured using particle-induced X-ray emission. The mean serum and hair titanium concentrations were slightly higher in patients than those in volunteers, although this difference was not statistically significant. The mean concentrations of titanium elution due to implant wear during a mean of 41.3 months after surgery was extremely small. Hair titanium concentrations were found to be increased early after surgery. These findings suggest that damage due to implant wear and titanium debris from surgery resulted in increased hair titanium concentrations. However, the fluctuation began to decrease more than 36 months after surgery. This decrease appears to be of the result of the decreasing of micromotion during the union period.