THREE-DIMENSIONAL LAXITY OF A MOBILE BEARING TOTAL KNEE REPLACEMENT

INTRODUCTION Normal laxity is important to the function of the prosthetic knee. Too much laxity can lead to instability, subluxation or dislocation. Too little laxity can restrict normal motion. The purpose of this study was to test the hypothesis that the three-dimensional laxity of the knees of patients with a rotating platform total knee replacement (TKR) are normal.

METHODS Knee laxity testing was performed on 12 unselected patients, 2 males and 10 females, with the TRAC PS (Biomet, Inc) total knee replacement, and on 17 healthy control subjects, 5 males and 12 females. The protocol was approved by our institutional review board and informed consent was obtained. The average age of the patients and of the controls was 62 years. The average postoperative time to testing of the patients was 18 months and ranged from 12 to 25 months. The Genucom three-dimensional knee laxity testing system was used.\(^1\,\^2\) In this system, the subject sat in a reclined position in an instrumented chair. The seat of the chair is attached to a three-dimensional force plate which recorded the forces applied to the leg by the subject's thigh and posteriorly applied force. VV rotation was measured for 12.2 N-m of varus and valgus applied torque. IE rotation was measured for 8.2 N-m of internally and externally applied torque. The total AP translation, total VV rotation, and total IE rotation for each flexion angle at which the laxity tests were performed are reported here. Student t-tests were performed at the 0.05 level of significance.

RESULTS The anterior and posterior translational laxities of the patients were not significantly different. The average (sd) total IE rotation at 30° of flexion was 40 (8) deg for the TRAC PS patients and 41 (8) deg for the controls. These means were not significantly different. The average (sd) total rotation at 30° of flexion was 42 (9) deg for the TRAC PS patients and 40 (9) deg for the controls. These means were not significantly different. The average (sd) total VV rotation at 20° of knee flexion was 8 (5) deg for the TRAC PS patients and 9 (2) deg for the controls. These means were not significantly different. The average (sd) total AP translation at 90° of knee flexion was 7 (4) mm for the TRAC PS patients and 16 (5) mm for the controls. These means were significantly different.

DISCUSSION We believe this is the first report of three-dimensional in vivo laxity of a rotating platform TKR. The nearly identical VV and IE rotational laxities of the operated knees of the TKR patients and knees of the healthy control subjects demonstrate that normal ligament balancing can be achieved with a rotating platform prosthesis. Furthermore, normal IE rotation of the mobile bearing was found two years after surgery. It has not been previously demonstrated that the bearing of a rotating platform prosthesis rotates in vivo. That it was found to rotate normally is important given past concerns that scar tissue after TKR may proliferate to constrain the rotating platform.

The anterior and posterior translational laxities of the patients were expected to be less than those of the controls because of the anterior and posterior stabilization built into TRAC PS. This was found to be true at 30° of flexion, but not at 90°. The explanation for this is that to test the knee at 30°, the examiner extended the freely hanging leg and balanced the weight of the leg. This brought the tibial bearing and femoral component very close together. Thus, the enhanced anterior and posterior stabilization of TRAC PS was demonstrated at 30° of flexion during the drawer tests. However, to test the knee at 90°, the leg hung freely at 90° and the examiner did not balance the weight of the leg. Thus, the weight of the leg separated the tibial bearing and femoral components. Therefore, the enhanced anterior and posterior stabilization of TRAC PS was not demonstrated at 90° of flexion. The AP laxity at 90° was found to be normal.

REFERENCES


ACKNOWLEDGEMENT We gratefully acknowledge Biomet, Inc for support of this study.

Presenting Author: Louis Draganich
Corresponding Author: Louis Draganich
PC 6/7 ABSTRACT NO. 1675

One or more of the authors have received something of value from a commercial or other party related directly or indirectly to the subject of my presentation.

The authors have not received anything of value from a commercial or other party related directly or indirectly to the subject of my presentation.