Davis Bregman MD Published in Clinical Orthopedics

Accuracy of Intramedullary Versus Extramedullary Tibial Alignment Cutting Systems in Total Knee Arthroplasty, complete paper download @ https://davisbregman.com

LAS VEGAS, NEVADA, UNITED STATES, August 11, 2020 /EINPresswire.com/ -- The postoperative standing 51-inch radiographs of 352 total knee arthroplasties were reviewed. The angle formed by the tibial tray to the mechanical axis of the tibia in the coronal plane measured. The mean deviation from a perpendicular cut to the tibial mechanical axis was not significantly different between tibial cuts made with extramedullary alignment and with intramedullary alignment. With extramedullary alignment, 92% of the cuts were ±4° of the ideal 90° cut (perpendicular to the mechanical axis), whereas 94% of the cuts with intramedullary alignment were within 4° of ideal. An analysis of the cuts that erred >=4° with intramedullary alignment showed that for the majority the intramedullary guide rod, if passed down the middle of the tibial shaft in the coronal plane, directly led to the less than ideal cut. In these tibias, bowing deformity in the coronal plane made passage of the intramedullary rod parallel to the tibial mechanical axis impossible.

> Total Knee Arthroplasty is one of the great advancements in surgery for the treatment of severe arthritis"
>
> *Davis Bregman*

Tibiofemoral alignment in the coronal plane is an important factor in the long-term success of total knee arthroplasty, Early studies had relatively high rates of early clinical failure when appropriate alignment was not achieved. Ecker et al and Lotke and Ecker showed a statistically significant correlation between good clinical results and proper radiographic alignment. Bargren et al reported a 91% failure rate for total knee arthroplasties with varus tibiofemoral alignment, and 11% with valgus alignment. However, they used tibial components that often were undersized compared with the proximal tibia. Two basic technical methods can be used to align the tibial cut, either intramedullary alignment or extramedullary alignment guides.
Dennis et al found a wider range of error with intramedullary alignment in a comparative study; however, 2 surgeons did the intramedullary alignment and extramedullary alignment, respectively. During a comparative study, Brys et al thought that intramedullary alignment offered "more accurate and reproducible" results than extramedullary alignment, based on 94% of intramedullary alignment cuts being ±2° from a perpendicular to the mechanical tibial axis compared with 85% of extramedullary alignment cuts. One hundred fourteen total knee arthroplasties were analyzed, and no mention was made of deleting radiographs having

excessive rotation or poor centering. Also, no mention was made of whether surgeon bias was present. It has been shown that rotation and flexion can result in apparent varus/valgus radiographically. Several studies using extramedullary alignment have shown consistent results of 72% to 88% of the cuts being ±2° from the mechanical axis. The present study is unique in that all the operations were done during 1 decade under the supervision of 1 surgeon, thus having no surgeon bias and a larger database. The risk of inaccurate measurements caused by rotation or flexion was eliminated by deleting those radiographs with significant rotation or imperfect centering. Even with experienced xray technicians, it was believed that approximately 20% of the films were unsatisfactory for the study. The Johnson and Johnson PFC tibial component was ideal for determining significant rotation by virtue of its cruciate stem and runners placed equidistant from the stem for polyethylene capture.

MATERIALS AND METHODS

The postoperative, weightbearing anteroposterior (AP) radiographs of all primary total knee arthroplasties done by the senior surgeon from 1983-1993 were studied. All radiographs were on cassettes 51x14 inches, were done in a double leg stance. All radiographs were taken 3-6 months postoperatively. Radiographs were considered unsatisfactory if any of the following were present: significant rotation, imperfect centering at the knee joint, or the entire tibia and superior talar dome were not present. A line was drawn from the exact middle talus to middle of the proximal tibial cut. This line defined the tibial mechanical axis. A second line was drawn along the underface of the tibial component. The angle formed by the intersection of these lines was named the tibial component alignment angle. The tibial component alignment angle was considered to be perfect if the angle 90°. Any deviation from 90° was recorded in varus/valgus. Extramedullary alignment was used exclusively from 1983-1988; intramedullary alignment was used exclusively from 1988-1993. The surgical technique aim was for 90° cut to the mechanical axis of the tibia in all cases. The second metatarsal and the ankle malleoli were used to estimate the center of the ankle when using extramedullary alignment. The data were analyzed statistically using the 2-sample-t-test.

RESULTS

Radiographs were satisfactory for measurement for 140 of 174 knees in the extramedullary alignment group and 179 of 212 in the intramedullary alignment group. The mean deviation from the perfect 90° cut in the extramedullary alignment group was 1.6°, and in the intramedullary alignment group 1.5°. Extramedullary alignment resulted in 61% varus cuts, 20% perfect cuts, and 19% valgus cuts. Intramedullary alignment resulted in 47% varus cuts, 24% perfect cuts, and 29% valgus cuts. With extramedullary alignment, 92% of the tibial cuts were within 4° of the ideal 90° cut. Ninety-four percent of the intramedullary alignment tibial cuts were within 4° of 90°. These results compare favorably with those reported in the literature.

Figure.2 illustrates dispersion of tibial component alignment. No statistically significant difference present between the extramedullary alignment and intramedullary alignment

technique. The figure illustrates that cuts are made more often in varus than valgus using extramedullary alignment and intramedullary alignment. When the intramedullary alignment cuts that erred >=4° were analyzed, the investigators saw that in 6 of 13 (46%), representing 3.4% of all intramedullary alignment knees, tibial bowing deformity in the coronal plane made accurate passage of the intramedullary alignment rod impossible. When extramedullary alignment cuts that erred >=4° were analyzed, no correlation between tibial bowing or preoperative deformity could be determined. Most likely, these less than ideal cuts occurred because of difficulty identifying the distal landmark for the tibial mechanical axis, the true center of the ankle. Other possible reasons for the unexplained less than ideal cuts in extramedullary alignments and intramedullary alignments include wobbling of cutting jig or using suboptimal cutting technique.

Davis Bregman, MD & Clifford W. Colwell, Jr., MD Scripps Clinic and Research Foundation, La Jolla, CA
Kenneth E. Teter,MD Orthopedic-Sports-Medicine-Clinic of Topeka, KS

Davis Bregman
Billboard Taxi Media, Inc.
+1 702-857-8455
email us here
Visit us on social media:
Facebook
Twitter
LinkedIn