

## Appendix

### Radiographic Measurements

All patellar measurements were made on the sunrise view (Settegast method<sup>1</sup>), which was made with the patient supine, the cassette parallel to the femur, the knee bent until the patella was perpendicular to the cassette, and the beam angled approximately 15 or 20 degrees; all radiographs were made by the same team of x-ray technicians. The patellar tilt was measured as the angle between a line tangent to the femoral condyles and the patellar component, with the ideal being 0° (parallel lines). Patellar resection asymmetry was the thickness (in millimeters) of the remaining patellar bone anterior to the patellar component at the medial edge of the component minus the thickness measured at the lateral edge of the component; the ideal value for this measurement is 0 mm (symmetric patellar remnant thickness at medial and lateral sides of the patellar component). Patellar subluxation was measured as the horizontal distance, in millimeters, between the center of the patellar component and the deepest part of the femoral component trochlear groove, with an ideal value of 0 mm. Sagittal plane femoral component alignment (femoral component flexion relative to the axis of the femur) was evaluated, but found not to be reproducible because of differences in femoral bowing between patients and because slight obliquity of the radiograph combined with the rounded profile of the component rendered evaluation of the amount of flexion of the component unreliable; in principle, differences in radiographic technique apply a limitation on all studies that evaluate radiographs. Mechanical axis radiographs were not available at this center, and so overall axis and coronal plane femoral alignment were not measured.

### Details of Surgical Approaches

#### Traditional Medial Parapatellar Approach

This consisted of a direct-anterior longitudinal 15 to 22-cm skin incision (determined by patient weight, patient height, and joint deformity), a medial arthrotomy with longitudinal division of the quadriceps tendon over a distance needed to achieve safe patellar eversion without tension, maintenance of the tibiofemoral joint in flexion during femoral and tibial preparation, including deep flexion and anterior dislocation of the joint during tibial preparation and implant insertion. Both exposure and closure were performed with the knee

flexed 90°. The sequence of cuts prior to implant insertion was as follows: anterior part of the femur, distal part of the femur, femoral finishing cuts, femoral intercondylar box resections, tibial finishing, and patellar preparation.

#### Minimally Invasive Surgery/ Quadriceps-Sparing Approach

As described by Tria and Coon<sup>2</sup>, the skin incision for this approach was placed anteromedially from a point about 1 to 2 cm proximal to the superior pole of the patella, to the anteromedial tibia about 2 to 3 cm distal to the joint line. The incisions varied proportionally to patient weight, patient height, and joint deformity, but typically were between 9 and 12.5 cm in length; no specific attempts were made to keep incisions short, but rather proportional use of the abovementioned landmarks and satisfactory exposure were the goals. A medial capsulotomy was performed from about the 11 o'clock (for the left knee) or 1 o'clock (for the right knee) position on the medial border of the patella to a point 2 to 3 cm distal to the anteromedial tibial joint line distally; at the top of the capsulotomy, the incision then angled medially for 1 to 2 cm, depending on the size of the patient, as described in the initial report on this technique<sup>10</sup>. The sequence of bone resections was as follows: patellar resection, distal part of the femur, tibial resection, femoral finishing block, intercondylar box resection, and tibial finishing. Morphine (10 mg) and Marcaine (bupivacaine; 20 mL, 0.05%) were injected into the meniscal bed and edges of the arthrotomy prior to closure, as described by the originators of the procedure<sup>2</sup>.

In both groups, careful attention was paid to ligament balancing, restoration of full range of motion, and correct alignment of all bone resections. Flexion/extension space symmetry and correct component sizing were ensured with use of the measured-resection technique and were verified with the spacer-block technique in both groups; final ligament balancing was performed with use of trial components before cementing in both groups. A tourniquet was used in all patients in both groups.

### References

1. Ballinger PW. Merrill's atlas of radiographic positions and radiologic procedures. 7th ed, vol 1. St. Louis: Mosby Year Book; 1991. p 232-4.
2. Tria AJ Jr, Coon TM. Minimal incision total knee arthroplasty: early experience. Clin Orthop Relat Res. 2003;416:185-90.