

Comparison of total knee arthroplasty using conventional method and image-free navigation system in severely deformed femur

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Purposes: We analyzed the comparative results of limb alignment and clinical results after total knee arthroplasty using conventional method and image-free navigation system in severely deformed femur.

Materials & Methods: Total knee arthroplasties were performed in fifteen patients(20 knees) with conventional method(10 cases) (Group A) and Orthopilot 4.0 image-free navigation system(10 cases) (Group B) in severely deformed femur. The definition of severely deformed femur was femoral deformity that intramedullary nail did not go through straight to the less trochanteric area on coronal plane. We drew two lines in coronal plane: one line was between knee center and center at femur shaft, another was between center at less trochanteric area and center at femur shaft and measured angle between two lines, so called femoral shaft angle. The femoral shaft angle was $12.4^{\circ} \pm 3.2^{\circ}$ in group A and $13^{\circ} \pm 2.8^{\circ}$ in group B. Average follow-up period was 7.5years. We measured limb alignment using the femoro-tibial angle, femoral and tibial component angle in coronal and sagittal plane using the weight bearing whole leg radiograph taken one month and final follow-up period after surgery. Clinical evaluation was done using range of motion and knee society score and function score at final follow-up period.

Results: Mechanical femoro-tibial angle was 3.5° of varus in conventional group (Group A) and 0.9° of varus in the navigation group (Group B) on average ($p < 0.05$). Femoral and tibial component angle in the coronal plane was mean 3.9° of varus and 2.3° of varus in group A, 0.9° of varus ($p < 0.05$) and 0.9° of varus in group B on average. Average femoral and tibial component angle in sagittal plane was 0.5° of flexion and 3.2° of anterior tilt in group A, 2.2° of flexion and 3.1° of anterior tilt in group B. There were statistically significant differences between two groups in the femoro-tibial angle, femoral component angle in coronal plane. Although there were no statistically significant differences between two groups in tibial component angle in coronal and sagittal plane and femoral component angle in sagittal plane, the ranges of deviation from desired angle were smaller in Group B than Group A. There were no statistically differences between two groups in knee score and function score. Also there was no loosening of the component.

Conclusion: Accuracy of limb alignment in total knee arthroplasty using navigation system in severely bowed femoral shaft was better results in the deviation of mechanical femoro-tibial angle and femoral component angle in coronal plane than the conventional method. There were no statistically differences between two groups in clinical evaluation.

References

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