

Advantages of Computer Navigation in Knee Arthroplasty

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Abstract : Computer navigation has been introduced in total knee arthroplasty to improve the accuracy of the procedure. Computer navigation improves the accuracy of bone resection in the coronal and sagittal planes. It was also noted that it normalizes the rotational alignment of the femoral component and fully assesses and balances the deformation of soft tissues in the coronal plane. The work is devoted to the advantages of using computer navigation technology in total knee arthroplasty in 62 patients (11 men and 51 women) suffering from gonarthrosis, aged 51 to 83 years, operated using a computer navigation system, followed up to 3 years from the moment of surgery. During the examination, the deformity variant was determined, and radiometric parameters of the knee joints were measured using the Knee Society Score (KSS), Functional Knee Society Score (FKSS), and Western Ontario and McMaster University Osteoarthritis Index (WOMAC) scales. Also, functional stress tests were performed to assess the stability of the knee joint in the frontal plane and functional indicators of the range of motion. After surgery, improvement was observed in all scales; firstly, the WOMAC values decreased by 5.90 times, and the median value to 11 points ($p < 0.001$), secondly KSS increased by 3.91 times and reached 86 points ($p < 0.001$), and the third one is that FKSS data increased by 2.08 times and reached 94 points ($p < 0.001$). After TKA, the axis deviation of the lower limbs of more than 3 degrees was observed in 4 patients at 6.5% and frontal instability of the knee joint just in 2 cases at 3.2%. The lower incidence of sagittal instability of the knee joint after the operation was 9.6%. The range of motion increased by 1.25 times; the volume of movement averaged 125 degrees ($p < 0.001$). Computer navigation increases the accuracy of the spatial orientation of the endoprosthesis components in all planes, reduces the variability of the axis of the lower limbs within $\pm 3^\circ$, allows you to achieve the best results of surgical interventions, and can be used to solve most basic tasks, allowing you to achieve excellent and good outcomes of operations in 100% of cases according to the WOMAC scale. With diaphyseal deformities of the femur and/or tibia, as well as with obstruction of their medullary canal, the use of computer navigation is the method of choice. The use of computer navigation prevents the occurrence of flexion contracture and hyperextension of the knee joint during the distal sawing of the femur. Using the navigation system achieves high-precision implantation for the endoprosthesis; in addition, it achieves an adequate balance of the ligaments, which contributes to the stability of the joint, reduces pain, and allows for the achievement of a good functional result of the treatment.

Keywords : knee joint, arthroplasty, computer navigation, advantages

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