

Title: Robotic-Arm Assisted Total Knee Arthroplasty in a Long-Standing Ankylosed Knee: A Case Report and Technical Considerations

Background:

Total knee arthroplasty (TKA) in ankylosed knees is technically demanding due to altered anatomy, poor bone quality, and difficulty in achieving accurate alignment and ligament balance. Robotic-arm assisted TKA (RA-TKA) offers enhanced precision, but its role in ankylosed knees remains sparsely reported.

Methods:

We report a case of a woman in her 30s with long-standing rheumatoid arthritis and a 10-year history of left knee ankylosis who underwent conversion to TKA using the MAKO robotic system. Preoperative CT-based planning was performed to generate a three-dimensional model for implant sizing and alignment. Following surgical release of the ankylosis through a standard medial parapatellar approach, intraoperative bone registration and ligament balancing were carried out under robotic guidance. Technical challenges, intraoperative findings, and postoperative rehabilitation were documented.

Results:

Intraoperative bone registration proved challenging due to distorted anatomy, but accurate registration was achieved from non-osteotomised regions. Precise bone resections within haptic boundaries enabled restoration of joint line and balanced gaps. A posterior-stabilised cemented implant was used. Immediate on-table range of motion (ROM) was 0–90°. Postoperative radiographs demonstrated satisfactory alignment and component positioning. At 2-year follow-up, the patient achieved painless ROM of 0–90° with improvement in Knee Society Score from 40 preoperatively to 80. At 3 years, ROM further improved to 0–100°, allowing resumption of daily activities without complications.

Conclusion:

RA-TKA can be a safe and effective option for conversion of ankylosed knees, enabling accurate alignment, controlled bone resection, and reliable ligament balancing even in complex anatomy. Although limited to a single case, this report highlights the feasibility of robotic assistance in managing severe knee stiffness and suggests potential benefits in functional recovery. Larger studies are required to validate these findings.