



Office of Technology Management

A Device To Aid In Positioning, Adjusting and/or Fitting Of Orthopedic Joints During Surgery

Technology Reference

CS59

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Field

Joint replacements
Ligament repair

Key Words

Total Joint Arthroplasty
Joint Repair
Joint Prosthesis
Knee
Hip
Shoulder

License Status

Seeking Licensing Partner

Patent Status

Patent Application submitted

Overview

Many Total Joint Replacements fail prematurely due to misalignment. Common alignment practices in the operating room have a tolerance in the range of ± 5 degrees. Clearly, the current fitting procedure allows for errors that must be eliminated since more than 10% of the total knee replacements performed each year will require revision surgery at a cost of \$15,000 to \$20,000 each, based on historical experience.

Previous Knowledge: Existing approaches use the surgeon's "touch and feel" to determine the balance of a joint prosthesis.

Technical Summary

The invention, co-developed by an orthopedic surgeon and a biomechanical engineer allows the surgeon performing a total joint replacement or other joint surgery to adjust the balance of the joint in the operating room using quantifiable scientific measurements while requiring minimal additional time.

The invention consists of hardware and computer software that is used in the operating room when the prosthesis is in place or the repair is almost complete and closure of the wound is imminent. Pressure, stress and/or strain sensors are temporarily placed in and around the joint; the surgeon flexes the joint through its normal range of motion and automatically obtains dynamic readings that are used to adjust the prosthesis, ligaments and/or other joint components until a more optimal fit is attained. A graphic display compares the dynamic forces within the joint in real time with a range of values that was determined from tests on cadaveric joints.

The computer program can also aid in identifying problems the joint may encounter in the future such as bone-prosthetic loosening, increased wear of the bone or prosthesis resulting in varus-valgus instability, a limited range of motion, patellar pain syndrome, and eventual premature failure of the joint. The software then suggests alterations and adjustments that can be made to improve the longevity and comfort of the joint repair.

Benefits

- This system will assist the surgeon to position and adjust the tendons, ligaments and corresponding forces within a joint during the surgery to:
- Increase joint mobility and reduce pain
- Require minimal additional time during surgery
- Maximize the stability and longevity of the joint after a total joint replacement or reconstruction of tendons
- Define the thresholds of pressure within the reconstructed joint.
- Train orthopedic surgeons on performing total joint replacements

Areas of Application

- Joint Surgery
- Ligament Repair
- Joint Replacement
- Knee Arthroplasty

Stage of Development

- Demonstrated on six cadaveric
- Ready for use in the operating room



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legs