

## Design Concept for a Total Knee Replacement with Condylar Guiding Features

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Better performance of total knee replacement requires normal kinematics and higher range of motion. A potential solution can be a surface-guided knee with asymmetric configuration including a

ball-and-socket articulation in the medial compartment and guiding bearing surfaces on the lateral compartment. An innovative design concept with constant bearing spacing and variable radii for the medial and lateral aspects of the lateral condyle as the guiding features is introduced as a potential design solution. This design allows for normal articulation of the patella and preservation of one or both of the cruciates. In this study, the viability of such surface-guided TKR was tested experimentally. A prototype was built and tested on the joint simulator. The results of the preliminary tests demonstrated that the reference bearing surfaces built based on the novel design concept could successfully generate motion patterns similar to the kinematics of a normal knee joint under compressive forces. The developed concept and methodologies can serve as a basis for development of a TKR with normal kinematics.

## Hemodynamic Changes Induced by Pneumoperitoneum and Measured With ECOM

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Laparoscopic surgery required inducing a pneumoperitoneum during surgery and anesthesia this presents unique hemodynamic challenges for the anesthetic management of patients. We monitored hemodynamic management using ECOM endotracheal tubes the parameters are derived using Bioimpedance Cardiac output, stroke volume variability, and systemic vascular resistance were

measured using this technology. Pneumoperitoneum results in intra-abdominal pressure of 15–20 mm hg induced by CO<sub>2</sub> insufflation Hemodynamic parameters were measured using a new noninvasive device, the endotracheal cardiac output monitor (ECOM) (ConMed Corporation, Utica, NY). This monitor provides measurements—including cardiac output, systemic vascular resistance, and stroke volume variation—which were previously unavailable noninvasively. The results obtained were consistent with those found in the literature (1–4). Based on our assessment, it appears that ECOM derived hemodynamic changes are similar to those obtained invasively. Therefore, ECOM's noninvasive method to measure cardiac output seems advantageous when considering patient safety, because it is less invasive. A better understanding of the applicability and reliability of this new technology in the clinical setting is important for patient safety.