MININCISION versus MININCISION and COMPUTER ASSISTED SURGERY in TOTAL KNEE REPLACEMENT: A RADIOLOGICAL PROSPECTIVE RANDOMIZED STUDY

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Introduction: Early wear and loosening of TKR with a poor performance can be caused both by an incorrect positioning/orientation of the implant and by a wrong limb alignment. Likewise in these last few years a new interest in less invasive reconstructive surgery has involved all the orthopaedic world with more difficulties in correct limb alignment.
However less invasive surgery has often been identified both by surgeons and producers in a shorter surgical incision to implant the same prostheses used with traditional approaches performing the so called “key-hole surgery”. Moreover there is a biological contradiction because to spare skin and quadriceps tendon they use mid-vastus or sub-vastus approach increasing the possibilities to damage muscles and nerves. But G. Bizzozero, an Italian biologist pioneer, in the early years of the last century classified the tissues and the cells in three categories. At the lowest step he put the reproducible tissues, like epithelium (skin) and endothelium, in the middle the stable ones, like mesenchyima (tendons and ligaments) that recover very well, at the top put the noble ones (muscles and nerves), that mustn’t be touched as they are perpetual tissues. And so we think the real mini-incision in knee replacement should be the abbreviated median parapatellar

with a small quad's snip and an average of 12 cm. of skin cut. But the real mininvasive surgery is not mini-incision but a new approach to the joint with more respect for the noble tissues under the skin and the kinematic joint using new tools and smaller implants.
Computer assisted surgery has been introduced to achieve more accurate alignments in reconstructive joint surgery. These tools meet M.I.S. and obviously should improve the results and performances, avoiding complications and pitfalls.
Aim of the trial is to compare in a prospective randomized study the radiological results of 2 different groups of TKRs using a less invasive approach with or without the assistance of a computer.

Materials and Methods: Since 1999 we have been using CAOS tools in more then 400 knee and hip replacements. Among these experience, since September 2004 in our Department 94 patients have been undergoing TKR, using a Posterior Cruciate Retaining implant (Genesis II, Smith and Nephew, Memphis, USA) and 74 have been enroled in the study.
The first 10 cases of each group had been excluded to avoid bias for the learning curve. Criteria of inclusion were a body-mass index lower than 30, no joint laxity and no previous surgical exposure of the knee.
The patients were randomly assigned to 2 groups. In group A (37 knees) without c.a.s. a less invasive approach (parapatellar incision) was performed using an intramedullary femoral guide and an extramedullary tibial guide; in group B (37 knees) the implant was positioned using a computer assisted technique (BrainLab) with the same less invasive surgical approach.
All the implant were cemented and all the patients underwent both the same pre and post-operative protocols.
For each group we calculated the surgical time and registered any postoperative skin complication according to Kim et al. classification.
Six months postoperatively both standing long-leg anterior-posterior radiographs and lateral radiographs of the knee had been taken for every patient. For the long standing radiographs the patient had to maintain the knee in maximum extension, the patella pointing forward and with both hips and ankles visible on the film.
The radiograph quality was assessed by an independent radiologist not involved in the

study, considering 5 parameters: the frontal femoral component angle (FFC), the frontal tibial component angle (FTC), the hip-knee-ankle angle (HKA: mechanical axis) and the sagittal orientation (slope) of both femoral and tibial components. The results were statistically compared between the 2 groups.
Furthermore we calculate the percentage of outliners for each angle (alignment worse than 3 degrees to an ideal alignment) and the sum of the outliners for all the angles.
Statistical analysis was performed using both parametric (T-test) and non parametric (Mann and Whitney) tests.
All the tests were considered statistically significant when $p<0.05$.

Results: The 2 groups were omogeneous and there were no statistical significant differences between the 2 groups in terms of age, bony mass deformity, preoperative deformity and ROM.
The surgical time was statistically longer in CAS group (average 100' vs 75'). The scar incision was longer in the CAS group, but without any statistically significant difference (10.1 cm vs 11.2 cm), furthermore, in the traditional MIS group, we registered higher number of skin problems (6 vs 2).
The blood loss ….
There were statistical differences in the positioning of the implants between the 2 groups. Despite no statistical differences in HKA angle, FTA angle and tibial slope in all the other parameters the computer assisted group presented an alignment of the components, statistically significant.
The number of cases in caos group with all five parameters are corrected is statistically significant.

Discussion:
Mini invasive surgery has been invented for market problems but in spite of complications this has become an essential issue in joint replacement procedures.
Many times the patient himself asks for this less invasive procedure.
Unfortunately MIS procedures are identified simply as a shorter surgical approaches with an increased risk of inaccuracy.
The Authors results show no benefit of using MIS without a computer assisted

alignment system. They registered significant worse components malpositioning and a higher number of post-operative skin problems.

The Authors define as less invasive a surgery respecting all the anatomical structures keeping a kinematics closer to the original joint.

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