

## **TIME ANALYSIS OF MAKO RIO UKA PROCEDURES IN COMPARISON TO THE OXFORD UKA**

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Time analysis from video footage gives a simple outcome measure of surgical practice against a measured model of use. The added detail that can be produced, over simply recording the usual surgical process data such as tourniquet times, allows us to identify and time the sequence of surgical procedures as stages, to describe issues, and the identification of idiosyncratic behaviours for review and comparison.

Makoplasty (Mako surgical corp. FL,US) partial knee operation times were compared using this technique with those from the Oxford (Biomet, IN,US) partial knee. Three experienced surgeons were observed over 19 Makoplasty procedures ([Consultant 1] 11, [Consultant 2] 5, [Consultant 3] 3) and 2 experienced surgeons over 11 Oxford partial knee procedures ([Consultant 1] 5, [Consultant 2] 6). Times were refined into separate stages that defined the major operative steps of both the Makoplasty and Oxford processes as used by the surgical team at the Glasgow Royal Infirmary, UK. The videos were reviewed for start and stop times for pre-defined actions that would be expected to be observed during each surgical process and from these stage lengths were calculated. For both the Oxford and Mako system 12 comparable stages were identified for comparison and the timing of the various episodes was tested for statistical significance using a Two-Sample, two tail, t-Test. assuming Equal Variances. [Stages: 1.Setup time, 2.Patient on table, 3.Skin incision, 4.Joint Prep, 5.Robot registration (Not in Oxford), 6.Tibial resection, 7.Femoral resection, 8.Trials, 9.Finishing, 10.Cementing and Washout, 11.Closure and dressing, 12.Off table]

The MAKOpasty procedures were on average longer than Oxfords by 27 minutes. This can largely be accounted for in the additional setup stage 4, where in addition to the usual joint preparation taking a couple of minutes approximately 17 minutes were spent in the MAKO cases undertaking image registration and in stage 5 where nearly five minutes were spent in setting up the robot in the MAKO cases.

In conclusion while operative times fell for the Makoplasties across the learning curve they remained elevated once the plateau was reached. It should be remembered that the surgeons had much less experience with the Makoplasty procedure and were undertaking a randomised clinical trial of outcome and hence were not minded to perform the surgery quickly but to the best of their ability and that this may account for some of the elongated surgical time. Indeed other Makoplasty surgeons report an average surgical time of 30-45 minutes per case and 6 cases per day. What is striking is that the additional steps of registration and robot positioning account for a large proportion of the differences and these are mitigated to some extent by quicker trialling of the implant and finishing of the cuts suggesting more confidence in the suitability of the cut surfaces. There is clearly a need to reduce the registration time to produce more cost effective surgeries.