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Functional Outcome Following Primary and Revision Total Hip and Knee Replacement

Introduction
The Royal Perth Hospital Elective Orthopaedics Department established the Joint Replacement Outcomes Project and its associated clinic, JRAC (Joint Replacement Assessment Clinic) in 1998 to follow up all arthroplasty patients attending the hospital. Since its inception over 3,000 hip and knee replacement patients have been reviewed. This paper contrasts the functional outcome of primary and revision patients, providing a natural history of both types of surgery and better patient and surgeon expectation.

Joint Replacement Assessment Clinic
The Joint Replacement Clinic operates 5 days a week. Patients who are having either a primary or revision knee or hip replacement are seen in the clinic pre-operatively (pre-op), then at 3, 6, 12 months, 2 years and 5 years post-operatively (post-op) and for every 5 years after that, until the implant fails or the patient dies. Trained physiotherapists conduct all assessments to ensure independence of the clinic.

Information is collected both at pre-op and at each visit post-op. At pre-op the patient’s past medical history and diagnosis are recorded, together with all operative data, and peri and post-op complications. This information is obtained using specially designed forms, which are completed by both the resident and registrars and sent back to the clinic.

At pre-op and post-op visits functional outcome scores are collected, together with a number of questionnaires. Standard x-rays and CTs are also taken at designated visits.

A modified Harris Hip Score (3,4) is used for hip replacement patients while the Knee Society Score (1,5) has been adopted for all knee replacement patients. Both of these scores are widely used and accepted outcome measures in orthopaedics. The SF36 Health Questionnaire (9,10) is collected at pre-op, 6 months and 2 yrs, and 5 yrs post-op together with the WOMAC Osteoarthritis Index (2).

The functional outcome scores are based on pain, range of movement and the ability to perform tasks related to daily living. The Harris Hip Score produces a score out of 100 while the Knee Society Score is out of 200, which can be divided into a knee or pain score out of 100 and a functional score out of 100. The higher the score the better the patient is performing.

In addition to the outcome scores, a Satisfaction Questionnaire, designed by RPH, is given to patients at every post-op appointment, to examine their level of satisfaction with the surgery and with the hospital. This is a one-page document which patients usually fill out at the appointment.

Only the Knee Society Score, Harris Hip Score, WOMAC results and satisfaction will be presented here.
Results

Data collected was from all patients undergoing a primary or revision total knee or hip replacement at RPH between January 1998 and December 2006. No primary joint replacement that went on to a revision in the timeframe examined was included in the primary group. The revision group did not include any staged revisions. Staged revisions were examined separately.

- **Hip**

There were 1306 primary total hip replacements and 215 revision hip replacements in the study group. Demographics (Slide 11) indicate that while the primary group was slightly younger, both groups had more females than males. The average BMI was similar between groups, although the revision group had a greater percentage of patients with a BMI over 30. The majority of both primary and revision patients were classified a Charnley category A or B, with C least represented. The Charnley classification is modified for use at RPH, where A is unilateral/bilateral (opposite joint successfully replaced), B is unilateral, other joints limiting function eg. polyarthritis and C is limited function due to other medical factors eg. heart failure, peripheral vascular disease, a respiratory condition. Revision details are listed on Slide 12.

Comparison of the outcome data is mainly of a descriptive nature, detailing the range of patient scores using the median and 10th and 90th percentile scores, together with means and 95% confidence intervals. Differences between means at each time frame were determined using independent T-tests (p<0.01).

In primary hip patients the Harris Hip Score improves significantly up to one year post surgery, with the largest increase occurring at 3 months. Post surgery improvement then plateaus between one and two years and between two and five years (Slide 13). Revision hip replacement patients display a significant improvement in the Harris Hip Score to six months post surgery, but improvement plateaus after this up to two years (Slide 14).

At all time frames post surgery primary hip replacement patients have significantly higher mean scores than revision patients, indicating a better functional outcome (Slide 15). The WOMAC score for pain, stiffness and physical function display a similar trend (Slides 16,17,18) to the Harris Hip Score.

Prior to surgery the primary patients have lower scores than revision patients, indicating better functioning at pre-op for the revision patients. This may be due to the differing reasons for revision. Often revision is conducted for asymptomatic wear rather than for implant failure or loosening which will decrease function and increase pain.

While there were not enough staged revisions to form any real conclusions, it appears that staged revisions perform more poorly than single revision operations (Slide 19), but further work is needed.

Satisfaction is much less with revision surgery, with only 56% of patients very satisfied compared to 84.3%. In addition 6% of revision patients were very dissatisfied compared to 0.4% of primary patients (Slide 20).

- **Knee**

There were 1553 primary total knee replacements and 115 revision knee replacements in the study group. Demographics (Slide 24) indicate that while the primary group was slightly younger, both groups had more females than males. The average BMI was similar between groups, although the revision group had a greater percentage of patients with a BMI over 30. The majority of both primary and revision patients were classified a Charnley category A or B, with C least represented. Revision details are listed on Slide 25.
In primary knee patients the Total Knee Society Score improves significantly up to one year post surgery, with the largest increase occurring at 3 months. Post surgery improvement then plateaus between one and two years, falling slightly but significantly between two and five years (Slide 26). This fall probably reflects the older age of patients at the time of surgery. Revision knee replacement patients display a significant improvement in the Knee Society Score at three months post surgery, but improvement plateaus after this up to two years (Slide 27).

At all times frames post surgery primary knee replacement patients have significantly higher scores than revision patients, indicating a better functional outcome (Slide 28). However this difference is less profound than that found in hip patients. There is no difference between primary and revision patients pre-operatively. The WOMAC score for pain, stiffness and physical function display a similar trend (Slides 29,30,31) to the Knee Society Score.

Satisfaction is much less with revision surgery, with only 56.8% of patients very satisfied compared to 72%. In addition 9.1% of revision patients were very dissatisfied compared to 1.9% of primary patients (Slide 32).

**Conclusions**

This data displays the natural history of both primary and revision joint surgery, and reveals that poorer functional outcomes are achieved and patients less satisfied after revision. Others have also reported these findings (5,6,7).

There was little difference between the primary and revision groups, in terms of age, gender, co-morbidities and BMI, although there was slightly more obese patients in the revision group. Revision outcome is more likely to be influenced by how the original operation was conducted, the amount of bone stock available and the higher rate of complications that accompany it, rather than these demographic factors.

The information obtained in this study can be used to improve the expectation of this type of surgery for both patients and surgeons. A handbook containing patient outcomes after joint surgery has been developed at Royal Perth Hospital to aid in this.

**References**


