Functional Outcome following Primary and Revision Total Hip and Knee Replacement

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Background

• Total hip (THR) and knee replacements (TKR) are effective interventions for severe osteoarthritis (OA)

• Most successful operation of 20th Century

• Ongoing aim to assess the Clinical Outcome
Why Outcomes Measurement in Joint Replacement Orthopaedics?

- Need for information about effects of surgery/treatments
- Need for understanding of the factors affecting outcome of surgery
- Variations between centres/surgeons
- Concerns about quality of care/ a device
- Empowering patients - the patient’s point of view

Joint Replacement Assessment Clinic (JRAC)

- Royal Perth Hospital Elective Orthopaedic Department established JRAC to assess and follow-up patients
- Pilot project 1997
Assessment Time Frames

- pre-op
- 3/12
- 6/12
- 1 year
- 2 years
- 5 years
- 10 years

Assessments - conducted by trained physiotherapists

Procedures & Data Collection

- Pre-op data
  - Past medical history
  - Medical diagnosis
- Operative data
- Peri and post-op complications
- Pre and post-op functional outcome scores
- Pre and post-op patient questionnaires
- Post-op x-rays/CT scan
Joint Replacement Assessment Scores

- Hip Evaluation - Modified Harris Hip Score
- Knee Evaluation - Knee Society Score
- SF36 Health Survey
- Womac Osteoarthritis Index
- Patient Satisfaction Questionnaire

Clinical Scores

- Scores based on
  - Pain
  - Range of Movement
  - Activities of Daily Living

- Modified Harris Hip Score = out of 100
- Knee Society Score
  - Functional 100
  - Knee (Pain) 100

\{ = out of 200
Western Ontario and McMaster Universities Osteoarthritis Index

- Disease-specific measure for hip and knee OA (Bellamy 2002)
- Widely-used in joint replacement research
- Good psychometric properties (McConnell et al 2001)
- 3 Components - Pain, Physical Function, Stiffness
- Likert scale
- Lower score better, converted to scale of 100
- Assessed pre-op, 6 months and 2 yrs post op

RESULTS

- Data collected between Jan 1998 and Dec 2006
- Primary group - no joint was revised in timeframe
- Revision group did not include staged revisions
- Staged revisions examined separately
- Variables
  - Knee Society Score
  - Harris Hip Score
  - WOMAC
  - Satisfaction
## RESULTS - Demographics THR

- **Primary**
  - Av Age 66.8 (12.9)
  - Female 736
  - Male 570
  - BMI Av 28.7 kg/m²
    - <30 64.4%
    - >=30 36.6%
  - Charnley
    - A 469
    - B 646
    - C 191

- **Revision**
  - Av Age 68.7 (12.7)
  - Female 131
  - Male 84
  - BMI Av 28.4 kg/m²
    - <30 44.3%
    - >=30 55.7%
  - Charnley
    - A 84
    - B 84
    - C 47

## Revision THR

- Acetabulum only 87
- Both components 61
- Liner/ Head exchange 31
- Femur only 29
- Conversion 7
  - Hemiarthroplasty

Total 215
PRIMARY VS REVISION OUTCOME (NO STAGED REVISIONS)
- HARRIS HIP SCORE (MEAN +/- 95%CI)

PREOP 3MTHS 6MTHS 1YR 2YRS 5YRS

SCORE (100)

* p = 0.000

WOMAC PAIN SCORE - PRIMARY VS REVISION HIPS
(NO STAGED REVISIONS) - MEAN +/- 95% CI

PREOP 6MTHS 2YRS

PAIN SCORE (100)

* p = 0.000

* p = 0.001

* p = 0.002
WOMAC STIFFNESS SCORE - PRIMARY VS REVISION HIPS
(NO STAGED REVISIONS) - MEAN +/- 95% CI

* p = 0.000
* p = 0.043
* p = 0.003

WOMAC PHYSICAL FUNCTION SCORE - PRIMARY VS REVISION HIPS
(NO STAGED REVISIONS) - MEAN +/- 95% CI

* p = 0.000
* p = 0.001
* p = 0.005
REVISION AND STAGED REVISION OUTCOME - HARRIS HIP SCORE (MEAN +/- 95% CI)

PREOP 3MTHS 6MTHS 1YR 2YRS 5YRS

SCORE (100)

REVISIONS
STAGED REVISIONS

56%
25%
6%
7%
6%
100%

VERY SATISFIED
SOMewhat SATISFIED
UNSURE
SOMewhat DISSATISFIED
VERY DISSATISFIED

Satisfaction at 1 year - Hip Patients

Primary
Revision

84.3%
10.0%
0.4%
2.1%
3.2%
10.0%
Summary THR

- Primary THR - Score improves markedly at 3/12
- Improvement continues up to one year
- Plateau between one and five years
- Similar trend seen in revision

Results Summary THR

- Primary THR patients start with lower scores and have consistently higher post op scores at all time frames - indicating significantly better outcomes than revision patients
- Patient satisfaction reflects this - much less for revision patients - 56% compared 84% very satisfied
Summary - THR

- Interesting that revision hip scores start higher than primary and then perform significantly worse

- This may be due to the reason for revision—reflecting an asymptomatic revision for wear versus a symptomatic revision for loosening and implant failure

RESULTS - Demographics TKR

- 1553 Primary
  - Av Age 70.43 (9.5)
  - Female 961
  - Male 592
  - BMI Av 31.0 kg/m2
    - <30 47.1%
    - >=30 52.9%
  - CHARNLEY
    - A 771
    - B 535
    - C 247

- 115 Revision
  - Av Age 72.25 (9.43)
  - Female 71
  - Male 44
  - BMI Av 30.95 kg/m2
    - <30 44.3%
    - >=30 55.7%
  - CHARNLEY
    - A 51
    - B 39
    - C 25
Revision TKR

- Component Revision: 56
- Poly Exchange: 25
- Patella only: 14
- Conversion Uni: 12
- Insert patella: 8

Total: 115

PRIMARY KNEES (NO STAGED REVISIONS)

- TOTAL KNEE SOCIETY SCORE (MEDIAN AND 90TH AND 10TH PERCENTILES)
PRIMARY VS REVISION KNEES (NO STAGED REVISIONS)
- TOTAL KNEE SOCIETY SCORE (MEDIAN AND 90TH AND 10TH PERCENTILES)

- PRIMARY - MEDIAN
- PRIMARY - 90TH PERCENTILE
- PRIMARY - 10TH PERCENTILE
- REVISION - MEDIAN
- REVISION - 90TH PERCENTILE
- REVISION - 10TH PERCENTILE

PREOP  3 MTHS  6 MTHS  1 YR  2 YRS  5 YRS
SCORE (200)

PRIMARY VS REVISION KNEES (NO STAGED REVISIONS)
- TOTAL KNEE SOCIETY SCORE (MEAN +/- 95% CI)

- PRIMARY KNEES
- REVISION KNEES

* p = 0.031  * p = 0.000  * p = 0.000  * p = 0.000  * p = 0.022

NS
WOMAC PAIN SCORE - PRIMARY VS REVISION KNEES
(NO STAGED REVISIONS) - (MEAN +/- 95% CI)

PREOP 6MTHS 2YRS

PAIN SCORE (100)

PRIMARY KNEES
REVISION KNEES

* p = 0.031
* p = 0.05

WOMAC STIFFNESS SCORE - PRIMARY VS REVISION KNEES
(NO STAGED REVISIONS) - (MEAN +/- 95% CI)

PREOP 6MTHS 2YRS

STIFFNESS SCORE (100)

PRIMARY KNEES
REVISION KNEES

* p = 0.029
Satisfaction at 1 year - Knee Patients

Primary

- VERY SATISFIED: 72.0%
- SOMEWHAT SATISFIED: 16.9%
- UNSURE: 16.9%
- SOMEWHAT DISSATISFIED: 4.2%
- VERY DISSATISFIED: 1.9%

Revision

- VERY SATISFIED: 56.8%
- SOMEWHAT SATISFIED: 9.1%
- UNSURE: 9.1%
- SOMEWHAT DISSATISFIED: 8.0%
- VERY DISSATISFIED: 17.0%
Summary TKR

- Scores improve up to one year post op

- Plateau between one and two years

- Fall slightly but significantly to five years - this probably reflects the older age of patients at the time of surgery

Summary TKR

- Revisions still perform poorly but difference is less significant than with Hips

- Patient satisfaction less with revision surgery - 56% compared to 72% Very Satisfied

- Primary and revision have similar pre-op starting point
Conclusion

• This data displays the natural history of both primary and revision joint replacement

• Poorer functional outcomes achieved and patients less satisfied after revision surgery

Conclusion

• Little difference between groups - in terms age, gender, co-morbidities, BMI (slightly more obese patients in revision group)

• Pre-op scores similar for knee, primary hips higher than revision

• Revision outcome influenced by original operation, bone stock, higher rate complications
Conclusion

• Improve expectations of patients and surgeons for both types of surgery

• Patient handout developed by RPH on outcomes after joint replacement

Future Work

• Future work will examine further those factors that influence primary and revision outcome and result in a poorer outcome for revision surgery

• Explore reasons for revision - trade off may exist when patient asymptomatic
Acknowledgements

- The JRAC Team
- Sandy Kerr
- Cathy Hoare
- Todd Beveridge
- Kim Cocker
- Jo Pollock

Thank you