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## Clinical Research Summaries

### North Sydney Orthopaedic Research Group



**2015—2018**

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# Frequency of Complications after Total Hip Arthroplasty. An Age Based Analysis.

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## Introduction:

The aim of this study was to document the incidence of complications in a population of subjects undergoing elective total hip arthroplasty (THA) across 3 age groups: 80 years or more, 55-79 years and those <55 years.

## Methods:

100 consecutive subjects from each of the 3 age groups: 80 or more, 55-79 years and <55 years who had undergone elective THA between September 2015 and June 2018 were identified from a prospective database. Medical records were reviewed to determine the frequency of post operative complications in each cohort.

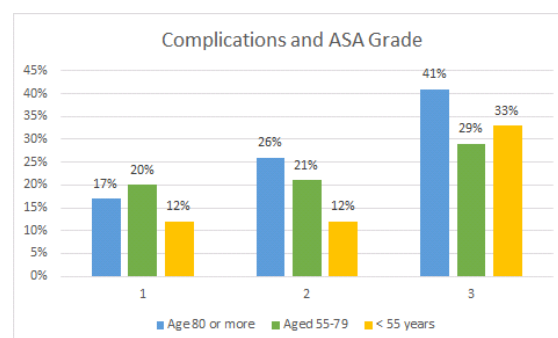
## Results:

There was no significant difference between the groups preoperatively for mean BMI ( $p=0.09$ ), or gender ( $p=0.11$ ). There were significantly greater incidence of preoperative ASA grade >2 in the 80 or more group (37%), compared to the 55-79 years (7%) or <55 years (6%), ( $p=0.001$ ).

The incidence of complications by age groups is shown in Table 1. The regression of the relative contribution of ASA and age on complications is shown in Table 2. The frequency of complications increased with ASA grade for all age groups (Figure 1)

Inpatient rehabilitation was adopted by 92% of the 80 or more group compared to 57% of the 55-79 year group, and 49% of the <55 year group ( $p=0.001$ ).

Complication	80 or more	55-79 years	<55 years	P value
Any complication	35	21	12	0.001
Anaemia	8	0	0	0.001
Hyponatraemia	6	2	0	0.027
DVT	5	0	0	0.006
Cardiac Event	3	0	0	0.048
Confusion/delirium	3	1	0	0.170
Fall	3	1	0	0.232
Hypotension	4	9	5	0.289
Respiratory Tract Infection/Atelectasis	1	5	3	0.253
Urinary Tract Infection	2	4	0	0.130
Pulmonary Embolus	2	1	0	0.364
Dislocation	1	1	3	0.443
Surgical Site Infection	1	0	0	0.367



**Conclusions:** The frequency of complications after THA subjects increases progressively in increasing age groups. Octogenarians have 1.7 times greater incidence of complication compared to the those 55-79 years. However, ASA grade is a more significant predictor of complications after total hip arthroplasty than being an octogenarian.



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		Any Complications	Odds Ratio	95% CI	P
ASA Grade	Grade 1-2	18%	2.8	1.3 to 5.7	0.006
	Grade 3-4	43%			
Age	80 or more	34%	1.7	0.9 to 3.2	0.114
	<80 years	17%			

# The Utility of Preoperative Blood Screening Before Hip and Knee Arthroplasty

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- Australian Orthopaedic Association Annual Scientific Meeting, Perth 2018
- Australian Knee Society, Broome 2018
- NSW AOA Branch Meeting, Hunter Valley 2018
- American Academy of Orthopaedic Surgeons Annual Meeting 2019, Las Vegas

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## Introduction:

It is engrained in medical training that routine blood screening prior to arthroplasty is necessary for optimal patient care. There is little evidence to support their utility and the aggregate cost to the health system.

The purpose of this study was to evaluate preoperative blood screening by identifying the frequency of an abnormal result and to examine the influence of age, gender and body mass index (BMI) on the frequency of abnormal blood pathology. It was hypothesised that routine blood screening may not be required in younger, otherwise healthy patients prior to undergoing hip or knee replacement.

## Methods:

This is a retrospective review of 1000 patients from a single centre who underwent elective primary hip or knee arthroplasty from 2015-2017. Abnormal blood results were identified and clinically relevant intervals were created for routine markers.

## Results:

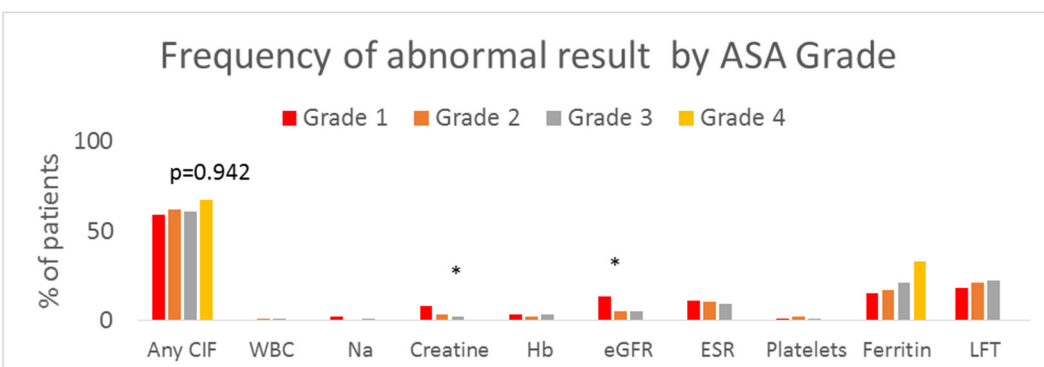
939 patients had available pathology results with 84% identified as having an abnormal result and 43% having a clinically important factor. Abnormal liver function tests (LFT) and ferritin were most common. There was no significant difference by age for any abnormal result, however there was an increase in renal dysfunction, abnormal haemoglobin and ESR with increasing age. Males and patients with BMI > 40 had an increased rate of abnormal results, particularly LFTs.

**Conclusions:** With rising healthcare costs, responsible clinical practice includes devel-

Abnormal Test	% of patients
Any Clinically Important Factor	43
Liver Function Tests	21
Ferritin	18
ESR	9
eGFR	6
Cr	4
Haemoglobin	2
Platelets	1
White Cell Count	1
Sodium	1
Albumin	0

oping strategies to reduce expenses without compromising patient care. The purpose of this study was to identify a possible area in preoperative management in which cost could be reduced for patients undergoing hip and knee replacement. The results from this study show a surprisingly high percentage of patients with abnormal pathology results. The frequency of an abnormal result is increased with older age, higher BMI and is more common in males. Interestingly in our study ASA grade did not seem to influence frequency of abnormal results.

Our study determined a high frequency of abnormal results, justifying routine blood screening is recommended prior to arthroplasty surgery, particularly for the elderly, males and obese patients.



# 5-Year Survival of Pediatric ACL Reconstruction With Living Donor Hamstring Tendon Grafts

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Accepted for presentation at :

- Australian Orthopaedic Association Annual Meeting 9-13 October 2016 Cairns
- Sports Medicine Australia Annual Conference, Langkawi, Malaysia, October 2017

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[Link to video abstract](#)



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## Background:

It is well accepted that there is a higher incidence of repeat anterior cruciate ligament (ACL) injuries in the pediatric population after ACL reconstruction (ACLR) with autograft tissue compared with adults. Hamstring autograft harvest may contribute to the risk for repeat ACL injuries in this high functional demand group. A novel method is the use of a living donor hamstring tendon (LDHT) graft from a parent; however, there is currently limited research on the outcomes of this technique, particularly beyond the short term.

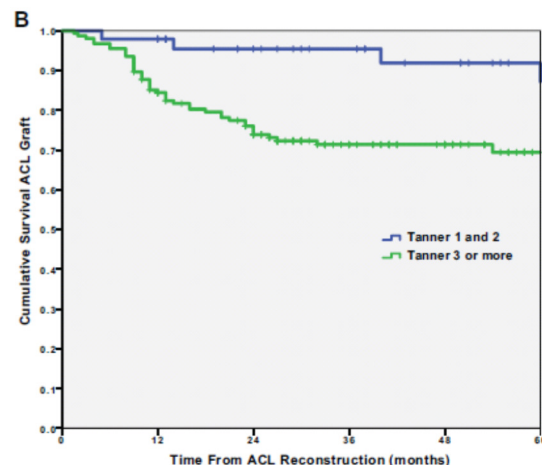
The purpose was to determine the medium-term survival of the ACL graft and the contralateral ACL (CACL) after primary ACLR with the use of an LDHT graft from a parent in those aged less than 18 years and to identify factors associated with subsequent ACL injuries.

## Methods:

Between 2005 and 2014, 247 (of 265 eligible) consecutive patients in a prospective database, having undergone primary ACLR with the use of an LDHT graft and aged less than 18 years, were included. Outcomes were assessed at a minimum of 2 years after surgery including data on ACL reinjuries, International Knee Documentation Committee (IKDC) scores, and current symptoms, as well as factors associated with the ACL reinjury risk were investigated.

**Results:** Patients were reviewed at a mean of 4.5 years (range, 24-127 months [10.6 years]) after ACLR with an LDHT graft. Fifty one patients (20.6%) sustained an ACL graft rupture, 28 patients (11.3%) sustained a CACL rupture, and 2 patients sustained both an ACL graft rupture and a CACL rupture (0.8%). Survival of the ACL graft was 89%, 82%, and 76% at 1, 2, and 5 years,

respectively. Survival of the CACL was 99%, 94%, and 86% at 1, 2, and 5 years, respectively. Survival of the ACL graft was favorable in patients with Tanner stage 1-2 at the time of surgery versus Tanner stage 3-5 at 5 years (87% vs 69%, respectively; hazard ratio, 3.7;  $P = .01$ ). The mean IKDC score was 91.7. A return to preinjury levels of activity was reported by 59.1%.



## Conclusion:

After ACLR with an LDHT graft from a parent in those aged less than 18 years, a second ACL injury (ACL graft or CACL injury) occurred in 1 in 3 patients. The 5-year survival rate of the ACL graft was 76%, and the 5-year survival rate of the CACL was 86%. High IKDC scores and continued participation in sports were maintained over the medium term. Importantly, there was favorable survival of the ACL graft in patients with Tanner stage 1-2 compared with patients with Tanner stage 3-5 over 5 years. Patients with Tanner stage 1-2 also had a significantly lower incidence of second ACL injuries over 5 years compared with those with Tanner stage 3-5, occurring in 1 in 5 patients. Thus, an LDHT graft from a parent is an appropriate graft for physically immature children.

Survival of ACL Grafts With Univariate Hazard Ratios by Sex<sup>a</sup>

	Male Sex		Female Sex	
	Odds Ratio (95% CI)	P Value	Odds Ratio (95% CI)	P Value
Positive family history	2.95 (1.3-6.9)	.01	0.21 (0.0-11.1)	.23
Tanner stage 3-5	3.53 (1.2-9.9)	.02	0.40 (0.0-68.7)	.40
Age ≥14 years	0.47 (0.2-1.9)	.06	1.60 (0.4-7.2)	.54
Open growth plate	0.79 (0.4-1.5)	.49	2.67 (0.4-20.5)	.35

# Efficacy of The Mater Accelerated Recovery Strategy to Reduce Length of Stay After Arthroplasty

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## Introduction:

In a study at The Mater Hospital, comparing subjects discharged home to those attending inpatient rehabilitation after hip or knee arthroplasty, there were no significant differences in patient reported outcomes 6 months after surgery. On the basis of this, the Mater Accelerated Recovery Strategy (MARS) was established. Its aim is to reduce acute inpatient length of stay (LOS) from 5-7 days to 3-4 days, and extended inpatient rehabilitation to discharge directly home.

## Methods:

Upon booking arthroplasty, eligibility for the MARS is determined using the Risk Assessment Prediction Tool (RAPT). If deemed suitable, subjects are given a Garmin activity tracker to establish a baseline step count prior to surgery, and to track step count for the first 6 weeks and later at 6 months after surgery. Subjects are discharged directly home 3-4 days after arthroplasty and continue their rehabilitation in the outpatient setting.

## Results:

Between February 2018 and September 2018, of the 350 hip and knee arthroplasty subjects, 193 subjects (55%) were deemed eligible for the MARS and 96 (50%) were recruited. 86 subjects (90%) were discharged to home within 3-4 days.

At 6 weeks after surgery,

- 95% of subjects were satisfied with the hospital stay
- 94% were satisfied with the rehabilitation experience
- 95% would participate in an accelerated rehabilitation program again.
- MARS subjects were achieving a mean of 50% of their preoperative step count by week 2 and 97% of their preoperative step count by week 6.

- When compared to a control group MARS subjects were taking 50% more steps in week 1 and 27% more steps in week 2 ( $p < 0.005$ ) as assessed with their activity tracker.
- On an audit of 132 consecutive THR subjects, MARS participants had significantly lower incidence of complications in the first 6 weeks (Table 1)

Complications Feb 2018-June 2018	MARS subject	Non MARS	P-value
No of THR	33	99	
Mean Age	60	68	0.001
% Males	58	33	0.014
ASA Grade 1 or 2	94%	88%	0.327
Any complication	6%	26%	0.014
Anaemia	0	1%	0.562
Hyponatraemia	0%	2%	0.411
DVT or PE	0%	1%	0.562
Cardiac Event	0%	1%	0.562
Confusion/delirium	0%	3%	0.312
Fall	0%	3%	0.312
Hypotension	6%	7%	0.842
Respiratory Infection	0%	5%	0.188
Urinary Tract Infection	0%	4%	0.241
Dislocation	0%	1%	0.562
Surgical Site Infection	3%	0%	0.250
30 day readmission	3%	2%	0.736

## Conclusions:

The MARS has been successfully implemented at the Mater Hospital in 2018. Prior to the MARS, only 7% of arthroplasty patients of the investigating surgeons elected discharge to home over inpatient rehabilitation. 97% of MARS subjects were discharged to home and did not attend inpatient rehabilitation. The MARS is associated with excellent activity levels and patient satisfaction and a lower rate of complications within the first 6 weeks after surgery.



# Feedback from Activity Trackers Improve Daily Step Count after Knee and Hip Arthroplasty. A Randomised Controlled Trial.

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- Arthroplasty Society Noosa, June 2017
- Australian Knee Society, Noosa October 2017
- International Society of Orthopaedic Centres Conference, Sydney, November 2017
- American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, March 2018
- Australian Orthopaedic Association Annual Meeting, October 2018



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**AIM:** Commercial wrist worn activity trackers have a great potential to accurately assess activity levels, and are being increasingly adopted in the general population. The aim of this study was to determine if feedback from a commercial activity tracker improved activity levels after total hip (THA) or knee arthroplasty (TKA).

## METHODS:

160 consecutive subjects undergoing primary TKA or THA were randomized into 2 groups. Subjects received a Garmin Vivofit® device 2 weeks prior to surgery and completed patient reported outcome measures (PROMS). The step count display was obscured in all subjects in the preoperatively. On day 1 after surgery participants were randomised to either the

“Feedback Group” (FB) or the “Non Feedback Group” (NFB). The FB group were able to view their daily step count via the activity monitor or using the app on a mobile device, and were given a daily step goal. Participants in the NFB group wore the device with the display

obscured for 2 weeks after surgery, after which time they were also able to see their daily step count, but did not receive a formal step goal. The mean daily steps at 1, 2, 6 weeks, and 6 months were expressed as a percentage of the subject’s preoperative steps and compared between the FB and NFB groups. At 6 months after surgery subjects repeated PROMS and daily step count collection.

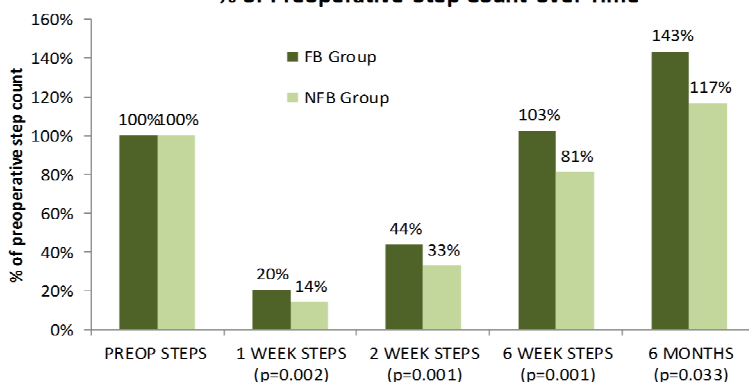


## RESULTS:

Of the 160 joints, 96 underwent THA and 64 underwent TKA. The FB group had a significantly higher mean daily step count by 45% in week 1 ( $p=0.002$ ), 33% in week 2 ( $p=0.001$ ), 26% in week 6 ( $p=0.001$ ) and 23% a 6 months, ( $p=0.03$ ) compared to the NFB group (Figure 1).

There was no significant difference between the 2 groups for preoperative steps ( $p=0.020$ ), operative type ( $p=0.79$ ), gender (0.21), mean age

Figure 1: Daily Step Count of FB and NFB Group as % of Preoperative Step Count over Time



( $p=0.94$ ), BMI ( $p=0.51$ ), or preoperative PROMS ( $p>0.30$ ). There was no significant difference between the groups in patient reported outcomes at 6 months. At 6 months 91% of the FB group and 82% of the NFB group reported they were satisfied with the results of the surgery ( $p=0.08$ ). At 6 months after surgery 70% of subjects had a mean daily step count of more than 100% of their preoperative level.

## CONCLUSIONS

Subjects who received feedback from a commercial activity tracker with a daily step goal had significantly higher activity levels after hip and knee arthroplasty over 6 months, compared to subjects who did not receive feedback in a randomised controlled trial. Commercial activity trackers may be a useful and effective adjunct to treatment of subjects after arthroplasty.

# Outcome of Paediatric Anterior Cruciate Ligament Reconstruction using Parental Hamstring Allograft

## Introduction:

Anterior cruciate ligament (ACL) injuries are occurring with increasing frequency in juveniles, and is associated with higher rates of repeat injury after ACL reconstruction compared to adult cohorts. Over the long term the hazard for ACL graft rupture is 5 x greater in adolescent males and 2.5x greater in adolescent females compared with adults [1]. Use of a parental graft for ACL reconstruction has the theoretical advantages of allowing for a predictable graft diameter, minimizing donor site morbidity for the child, and preserving the neuromuscular structure of the child's knee, all of which may have favorable effect on reducing repeat ACL injury and facilitate a full rehabilitation. Evidence supporting this technique is currently limited.

## Methods:

100 consecutive juveniles aged < 17 years undergoing transphyseal ACL reconstruction with a living parental hamstring graft were recruited. After ACL reconstruction patients were reviewed at 1 and 2 years after surgery with

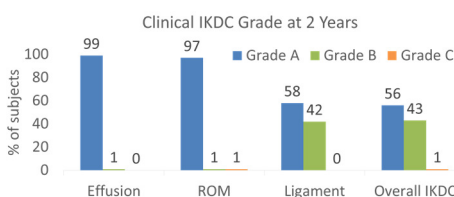
- IKDC Knee Ligament Evaluation
- Xrays of those with open growth plates
- KT1000 instrumented laxity testing

## Results:

Of the 100 subjects 96% were followed to 2 years. 69 were male, and the mean age of was 13 years at surgery (range 8-17). The hamstring was donated by father in 79% and mother in 21%. The mean HT graft diameter was 7.5mm (range 6-10mm).

Clinical Results at 2 years:

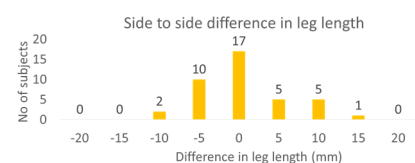
- 12 had an ACL graft rupture
- 9 had a contralateral ACL injury



- The mean IKDC score was 96/100
- 82% reported they had returned to their preinjury sport

At surgery radiographic growth plates were classified as open in 43, closing in 23, and closed in 34. Of the 66 subjects with open or closing growth plates the mean increase in height over 2 years was 8cm (range 0-22cm. There were no cases of iatrogenic physeal injury or mal-alignment.

Leg length was measured at 2 years on long leg radiographs No subjects had more than 1.5 cm side to side difference in leg length, which is consistent with the normal population [3].



- 45% had a posterior tibial slope (PTS) of >12.
- The mean side to side difference in radiographic mechanical alignment was -0.4 (range -3 to 3)

## Conclusions:

- Transphyseal ACLR was safely performed in juveniles without growth disturbance in this series, has a acceptable clinical stability, high rate of return to preinjury sport (82%) and high subjective scores at 2 years after surgery
- Parental living donor HT graft is a viable alternative graft
- A higher proportion of juveniles (45%) have posterior tibial slopes >12, compared to adult cohorts (20%), which is strongly associated with repeat ACL injuries [1,4]
- 2nd ACL injury remains common in juveniles, occurring in 21% within the first 2 years with similar frequency on the ACLR and contralateral limb



FRIENDS OF THE MATER

Accepted for presentation at :

- AANA Specialty Day New Orleans 2014
- APKASS Congress, Nara Japan 2014
- ISAKOS Biennial Conference, Lyon France 2015
- International Olympic Committee, Geneva, Switzerland, 2017
- International Society of Orthopaedic Centres Sydney 2017
- American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, March 2018



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# Inpatient Rehabilitation Did Not Affect Patient Reported Outcomes 6 Month After Hip or Knee Arthroplasty.

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- Australian Orthopaedic Association Annual Scientific Meeting, Adelaide October 2017
- Australian Knee Society, Noosa October 2017
- International Society of Orthopaedic Centres Conference, Sydney, November 2017



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## AIM:

The use of inpatient rehabilitation after hip and knee arthroplasty varies considerably between Australian States. In NSW inpatient post-operative rehabilitation is used in the vast majority of patients after hip or knee arthroplasty. This study examined patient satisfaction and patient reported outcomes (PROMS) at 6 months after surgery between subjects who attended inpatient rehabilitation and those who did not.

## METHODS:

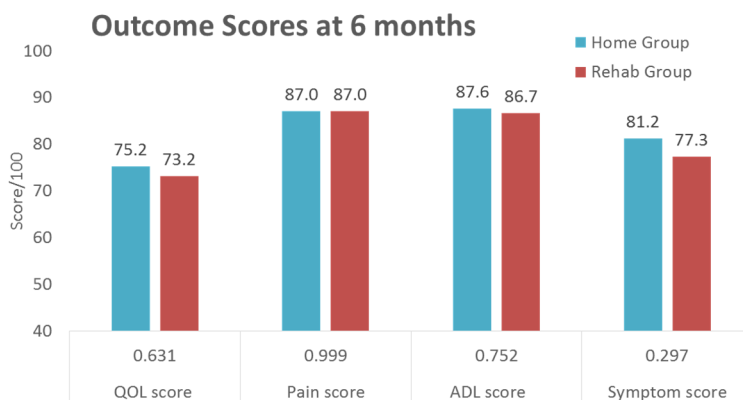
In the 2016 financial year 748 consecutive patients underwent hip or knee arthroplasty at the Mater Private Hospital under the care of the investigating surgeons and were included in a prospective database. Of these, 643 subjects (86%) completed preoperative and 6 month PROMS including Hip or Knee Osteoarthritis Outcome Score, Satisfaction scores and EQ5D. There were 44 patients who were discharged directly to home (Home Group). These subjects were matched for age, gender, procedure and surgeon to 44 patients who attended inpatient rehabilitation (Rehab Group). Six month PROMS scores were compared between those who attended inpatient rehabilitation and those who were discharged to home using SPSS version 24.

## RESULTS:

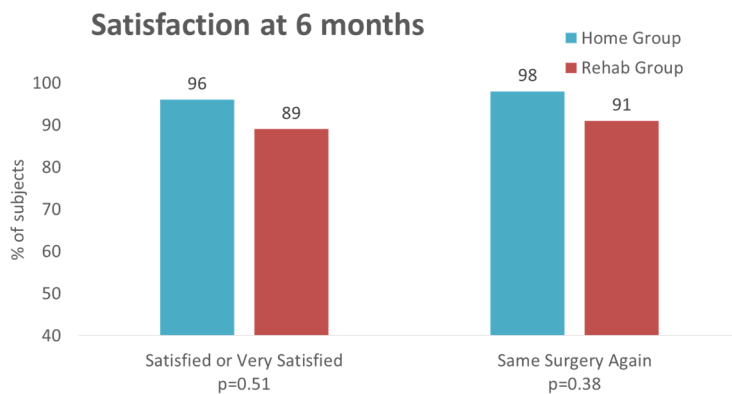
The mean length of stay in acute care hospital was 5 days in both groups. The median length of stay in inpatient reha-

bilitation of the Rehab group was 7 days (range 4-16 days).

Six months after surgery there was no significant difference between the Home Group and Rehab Group with respect to Quality of Life Score ( $p=0.63$ ), Pain Score ( $p=0.99$ ), ADL score ( $p=0.75$ ) or Symptom Score ( $p=0.30$ ) (Figure 1).



At 6 months there was no significant difference between the 2 groups on percentage of subjects satisfied with their surgery (Figure 2)



There was no significant difference between the groups for any other the EQ5D general health measures at 6 months.

## CONCLUSIONS

Inpatient rehabilitation after hip or knee arthroplasty did not positively affect patient reported satisfaction, expectation, pain quality of life or ADL scores compared to subjects who were discharged to home at 6 months after surgery in an age, gender and procedure matched analysis.

# Bioabsorbable versus Titanium Screws in ACL Reconstruction Using Hamstring Autograft at 13 years: A Preliminary Analysis

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Accepted for presentation at :

- Australian Orthopaedic Association & APKASS Combined Meeting, June 2018

## INTRODUCTION:

Aperture fixation by bioabsorbable (BS) or titanium (TS) interference screws, during hamstrings (HT) anterior cruciate ligament (ACL) reconstruction is a well-established technique which allows accelerated rehabilitation and return of normal knee function. Although metallic interference screws (TS), and bioabsorbable screw (BS) have shown to have the same fixation strength, metallic screws have been associated with graft damage, hinder subsequent MRI examination due to their ferromagnetic qualities and artifacts, and potentially need to be removed in revision surgery or high tibial osteotomy. To overcome these disadvantages, bioabsorbable screws were introduced and have demonstrated equivalent clinical and functional results compared to the TS up to 5 years.

In this prospective randomized controlled study of hamstring tendon graft ACL reconstruction, we compare outcomes of a metal interference screw to a screw made of PLLA (70-80%) and hydroxyapatite (20-30%). The outcome of ACL reconstruction comparing a PLLA-HA screw to a titanium screw with MRI and CT scan over 13 years has not previously been reported.

## METHODS:

40 patient who met the inclusion and exclusion criteria below were recruited to participate in the trial after giving their signed informed consent.

### Inclusion criteria

- Undergo ACL reconstruction between June 2002 and October 2003
- Be willing to participate in a randomized controlled trial and provide written informed consent

### Exclusion criteria

- Previous ACL reconstruction to either knee
- Contralateral ACL deficiency
- Concurrent ligamentous injury or significant pathology to the index knee
- Seeking compensation for their injury

Patients were randomised to receive either the titanium RCI or BioRCI screw for tibial fixation of the ACL graft. Subjects were assessed at 1 week, 6 weeks, 12, 24, 60 and 156 months following surgery with the IKDC Evaluation, KT1000 arthrometer, Lysholm Knee Score, effusion, and kneeling pain. X-ray, MRI and CT scans were performed at 2, 5 and 13 years to assess the rate and extent of screw resorption and bony ingrowth.

## RESULTS:

At 13 years after surgery 1 patient with a titanium screw had an ACL graft rupture and had undergone revision surgery. Of the remaining 39 patient, 36 (92%) were reviewed at 13 years.

There was no significant difference between the PLLA-HA group and the titanium group on any of the other clinical parameters at 2, 5 and 13 years (see Figure 1, and Table 1. ). X-ray, MRI and CT scans were performed on 30 patients and a detailed analysis of these image studies is pending.

Table 1. Comparison of 13 year outcome clinical results

13 year outcomes	Bio	Ti	p
IKDC Subjective Score mean	90	88	0.67
KT1000 mean (mm)	1.7	1.7	0.99
No effusion (%)	93	100	0.29
Grade A ROM (%)	93	40	0.37
Ligament Grade A (%)	80	67	0.41
Overall IKDC A (%)	67	63	0.62
Activity Level 4/5 (very strenuous/strenuous) (%)	78	78	0.99
No/minimal kneeling pain (%)	94	89	0.55

## CONCLUSION:

ACL reconstruction with PLLA-HA bioabsorbable screws affords comparable clinical and subjective results to titanium screws at 13 years after surgery.

Significant progression of PLLA HA screw resorption occurs between 2 and 5 years with over 75% of screws demonstrating some resorption by 5 years. Further progression of screw resorption at 13 years will be reported in the final paper.

ACL reconstruction with a PLLA HA screw has excellent clinical outcomes and progressive screw resorption and ossification at 13 years will be reported in the final paper.

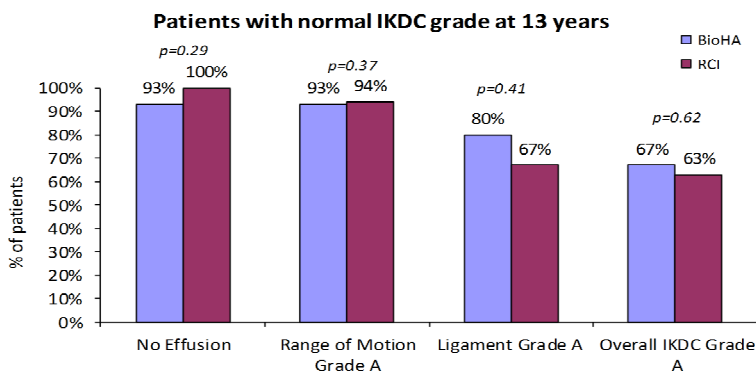


Figure 1. Comparison of normal IKDC grades at 13 years



# Patient Reported Outcomes Before & After Arthroplasty. A Comparison of Metropolitan and Regional Subjects.

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Accepted for presentation at :

- Australian Knee Society, Noosa October 2017
- International Society of Orthopaedic Centres Conference, Sydney, November 2017
- American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, March 2018



NORTH SYDNEY ORTHOPAEDIC & SPORTS MEDICINE CENTRE



MATER HOSPITAL  
SYDNEY  
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## AIM:

To examine the differences in patient reported outcomes after knee and hip arthroplasty between subjects residing in the rural and metropolitan centres.

## METHODS:

From a prospective database of arthroplasty we identified 867 subjects who underwent hip or knee arthroplasty under the care of the investigating surgeons over 18 months. There were 631 total hip arthroplasty procedures and 236 total knee arthroplasty procedures. Subjects completed patient reported outcome measures (PROMs) preoperatively and at 6 and 12 months after arthroplasty. Subjects were classified into Regional Group or Metropolitan Group based on their primary place of residence.

## RESULTS:

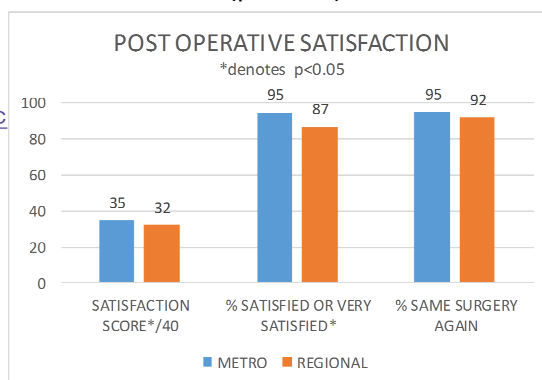
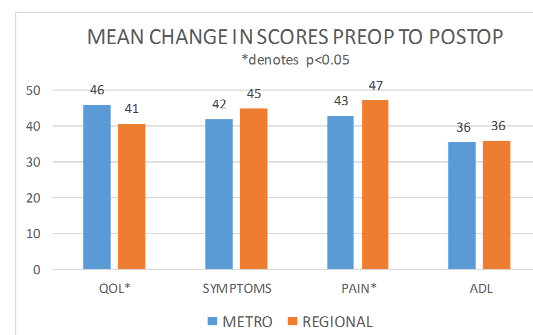
There was no significant difference between the Metro and Regional groups for the variables of mean age (0.45), or gender ( $p=0.92$ ). At 6 and 12 months after surgery the Metro Group reported significantly higher mean satisfaction score compared to the Regional Group ( $p=0.001$ ). At 6 months 95% of the Metro Group and 87% of the Regional Group reported they were satisfied with the results of their surgery ( $p=0.001$ ) (Figure 1).

The Regional Group reported significantly lower preoperative KOOS/HOOS Quality of Life (QOL) ( $p=0.05$ ), Symptom Scores ( $p=0.004$ ), Pain Scores (0.001) and ADL Scores ( $p=0.001$ ) than the Metro

Group. After surgery the Regional Group had significantly lower scores on all KOOS/HOOS Subscores. (See Table 1).

	METRO	REGIONAL	P
MEAN QUALITY OF LIFE SCORE			
PREOP	30.1	27.5	0.05
POSTOP	76.4	69.2	0.001
MEAN SYMPTOM SCORE			
PREOP	45.1	40.9	0.004
POSTOP	86.8	83.7	0.024
MEAN PAIN SCORE			
PREOP	47.8	41.3	0.001
POSTOP	90.2	87.9	0.05
MEAN ACTIVITIES OF DAILY LIVING SCORE			
PREOP ADL	49.9	44.4	0.001
POSTOP	87.0	82.3	0.001

The mean change in HOOS/KOOS scores between preoperative and 6 or 12 months was significantly higher for Quality of Life Scores in the Metropolitan Group compared to the Regional Group ( $p<0.01$ ), see Figure 2.



## CONCLUSIONS

Before arthroplasty subjects from regional areas report significantly worse QOL, symptoms, pain and ADL scores than subjects from metropolitan areas. After arthroplasty, regional subjects have poorer mean patient reported outcomes, less improvement in QoL measures, and lower rates of patient satisfaction than metropolitan subjects.

# Postoperative microscopy and culture screening following hip and knee arthroplasty - an unnecessary cost with no effect on clinical management?

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Presented at:

- Australian Orthopaedic Association Annual Meeting, October 2016 Cairns
- American Academy of Orthopaedic Surgeons Annual Meeting March 14 – 18, San Diego, California
- American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, March 2018



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## Background

The use of microscopy and culture screening to detect pathogenic micro-organisms followed by a decolonization protocol is a widely performed practice prior to elective hip and knee arthroplasty. In our centre, the routine care of hip and knee arthroplasty also involves postoperative screening including direct culture of the surgical site. The aim of this study was to assess the frequency of pathogen detection following these tests and to determine whether routine postoperative screening, with particular reference to postoperative surgical site culture, led to any change in clinical management of these patients.

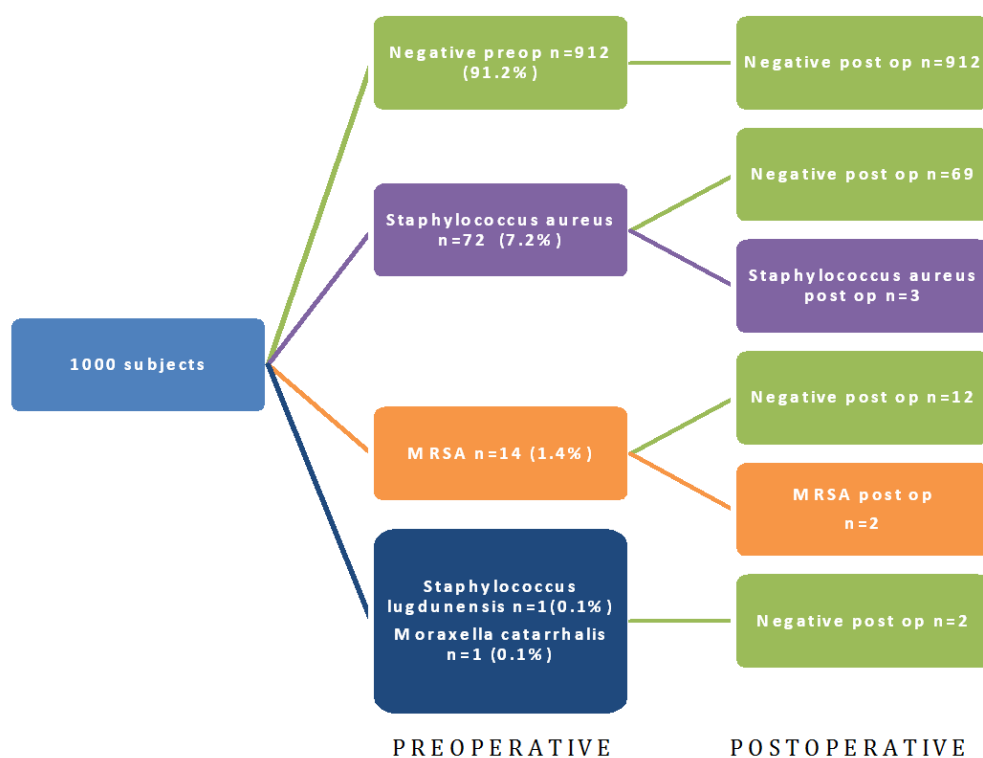
## Methods

A series of 1000 patients undergoing hip or knee arthroplasty at The Mater Hospital between January 2014 and December 2015 were identified from our arthroplasty database. Results of pre and postoperative microscopy and culture screening were reviewed by two independent researchers.

of the 5 positive postoperative microscopy and culture screen results were in patients who had positive cultures preoperatively. There were no positive postoperative microscopy and culture screen results in patients who had had negative preoperative results. Postoperative screening was performed at a cost of AU\$213 per patient.

## Conclusion

The results of our study do not support the routine use of postoperative surgical site culture, nor the practice of routine postoperative screening for subjects who return a negative result from preoperative screen. In the presence of a negative preoperative microscopy and culture screen is extremely unlikely to obtain a positive result postoperatively. The practice is therefore performed at an additional and unnecessary cost without any benefit to patient care. As well as this, performance of routine surgical site cultures potentially increase the risk of developing a postoperative infection given that the surgical site wound must be exposed to perform the test. We therefore continue to



## Results

Of the 1000 subjects, positive microscopy and culture results were identified in 88 patients (8.8%) preoperatively and 5 patients (0.5%) postoperatively. None of the 1000 postoperative surgical site swabs had a positive microscopy and culture screen. All

support the use of preoperative routine microscopy and culture screening to reduce the risk of postoperative surgical site infection but would recommend against the practice of routine postoperative surgical site culture in all patients as well as routine postoperative screening in those patients with negative preoperative tests.

# Objective Measure of Activity Level After Total Knee Arthroplasty with the Use of the 'Fitbit' Device. Preliminary Results

Justin Roe FRACS

Lucy Salmon PhD

Benjamin Gooden FRACS

Joshua Twiggs

## INTRODUCTION

Mobility and physical activity are imperative to healthy aging. Measurable improvements in activity level have been reported after total knee arthroplasty (TKA)<sup>4,5</sup>. However historically, activity level after TKA has been assessed with subjective questionnaires from patients<sup>4</sup>. The recent development and commercial release of non invasive, light weight, low cost accelerometers has great potential to more accurately assess activity level before and after knee arthroplasty from a small light weight wrist strap. These devices have been shown to be valid and reliable assessment tools for activity levels in normal subjects<sup>1</sup>. After cardiac surgery, authors have demonstrated a relationship between activity level assessed with the FitBit device and length of stay<sup>3</sup>.



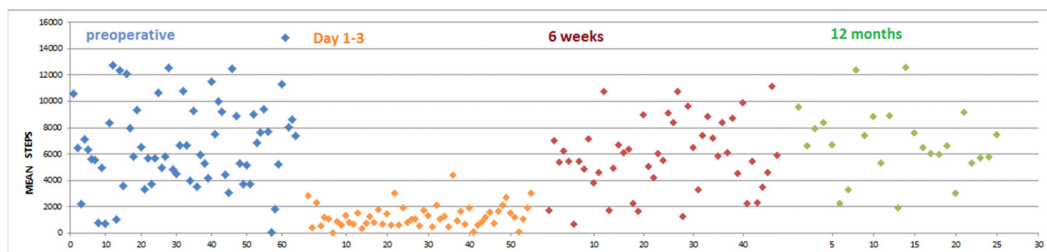
## RESULTS:

54 patients (63 knees) participated over 12 months. There were 26 males and 28 females with a mean age of 70 years. The mean number of steps per day was 6596 preoperatively, 1168 in Day 1-3 post op, 5707 at 6 weeks and 7228 at 1 year after TKA. Preoperative activity level was significantly correlated with preoperative Pain Score ( $p=0.003$ ), activity level in the first 3 days ( $p=0.01$ ), and at 6 weeks ( $p=0.001$ ). Short battery life and technical failure of the 'fitbit' device hampered successful data extraction in approximately 20% of this series

## CONCLUSIONS

Modern accelerometers present a novel way to objectively measure activity level before and after TKA.

One year after TKA on average subjects are taking 7200 steps per day. Only 50% of participants were taking >7000 steps per day at 1 year, which is the



## AIM:

The aim of this study was to assess the efficacy of using a modern commercially available accelerometer known as a "FitBit" to assess activity level before and after TKA.

## METHODS

In this study the Fitbit device was worn by TKA patients for 5-7 days at 4 times periods: before surgery, day 1-5, 6 weeks and 12 month after arthroplasty. Subjective outcomes including preoperative and 12 month Knee injury and Osteoarthritis Outcome Score (KOOS), WOMAC Assessment and Patient Satisfaction Scale were collected.

activity level recommended for 65+ years, and is well below the recommended daily average of 10,000 steps per day for healthy adults

Although KOOS scores significantly improved between preop and 12 months after TKA, this does not translate to an increase in activity level at 12 months

Continued follow up is in progress. Further studies are planned to see if activity levels after TKA can be improved by using these devices when patients are provided feedback and goals on daily activity.

## Presented:

- Australian Knee Society ASM, 15-18 October 2015, Byron Bay, Australia
- AOA and NZOA Annual Scientific Meeting 2016, Cairns
- ISOC Meeting London 2016



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# Early Results of the Mater Orthopaedic Outcomes Registry. Pilot Study

Dr Matthew Lyons  
A/Prof Justin P Roe  
A/Prof Leo A Pinczewski  
Dr Michael O'Sullivan  
Dr Benjamin Gooden  
Ka Martina  
Claire Collins  
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Presented:

- Australian Knee Society ASM, 15-18 October 2015, Byron Bay, Australia
- AOA and NZOA Annual Scientific Meeting, Cairns 2016



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## INTRODUCTION:

The Mater Hospital is acknowledged as the largest joint replacement centre in the Southern Hemisphere with over 2000 joint replacements performed annually. The systematic monitoring of the outcomes of joint arthroplasty performed at The Mater hospital is integral to quality assurance to ensure that patients are receiving the best and most current standard of care.

The aim of this study was to trial a pilot prospective data registry to document hip and knee arthroplasty procedures performed at the Mater Hospital, including operative variables, as well as patient reported outcome measures after surgery. This is a collaborative project between The Mater Hospital and North Sydney Orthopaedic Research Group.

## METHODS:

All patients undergoing hip or knee joint arthroplasty under the care of the 5 participating pilot study surgeons were invited to participate in the prospective registry. Informed signed consent was obtained from all participants. Operative variables were prospectively collected at the time of surgery. Prior to surgery and at 6 month after surgery participants completed subjective questionnaires including Oxford Scores, Hip or Knee Orthopaedic Outcome Scores (HOOS and KOOS), EQ5D, Patient Satisfaction and Expectation Scores.

## RESULTS:

Over 9 months between July 2015 and March 2016, 744 participants were included in the prospective registry, including 341

total knee arthroplasties and 403 total hip arthroplasties.

Patient reported questionnaires were completed by 91% of subjects preoperatively and 85% of subjects at 6 months after arthroplasty.

Mean patient reported outcome scores of hip arthroplasty participants significantly improved preoperative to postoperatively as follows: Oxford Hip Score 28 preoperative to 41 at 6 months, HOOS Pain Score 59 preoperative to 89 at 6 months, HOOS ADL score 59 preoperatively to 88 at 6 months. 97% of hip arthroplasty subjects reported they would undergo the same procedure again under the same circumstances at 6 month review.

Mean patient reported outcome scores of knee arthroplasty participants significantly improved preoperative to postoperatively as follows: KOOS Pain Score 46 preoperative to 81 at 6 months, KOOS ADL score 51 preoperatively to 84 at 6 months. 91% of knee arthroplasty subjects reported they would undergo the same procedure again under the same circumstances at 6 month review.

## CONCLUSIONS:

Routine collection of operative variables and patient reported outcomes before and after arthroplasty was successfully implemented in this pilot study. Hip and knee arthroplasty is associated with excellent 6 month patient reported outcomes and patient satisfaction.

Table 1. Patient reported outcomes scores		Preop	6 months
HIP ARTHROPLASTY	Oxford Hip Score/48	28	41
	HOOS Pain Score/100	59	89
	HOOS ADL Score/100	59	88
	Same Surgery Again		95%
KNEE ARTHROPLASTY	KOOS Pain Score/100	46	81
	KOOS ADL score/100	51	84
	Same surgery again		91%

# 20 Yr Outcomes of ACL Reconstruction with Hamstring Tendon Autograft. The Catastrophic Effect of Age & Posterior Tibial Slope.

A/Prof Leo A Pinczewski  
Dr Lucy J Salmon  
Emma Heath  
Dr James Linklater  
A/Prof Justin P Roe

Presented:

- Australian Orthopaedic Association Annual Meeting , October 2016 Cairns
- Curso Avanzado de Cirugía Rodilla, Santiago February 2017
- American Academy of Orthopaedic Surgeons Annual Meeting March 2017 San Diego, California
- Australian Knee Society Noosa October 2017
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## INTRODUCTION:

The aim of this study was to compare the prospective longitudinal outcome of 'isolated' ACL ruptures treated with anatomical endoscopic ACL reconstruction using hamstring tendon autograft over 20 years in adolescent and adult cohorts, and the examine factors for repeat ACL injury.

## METHODS:

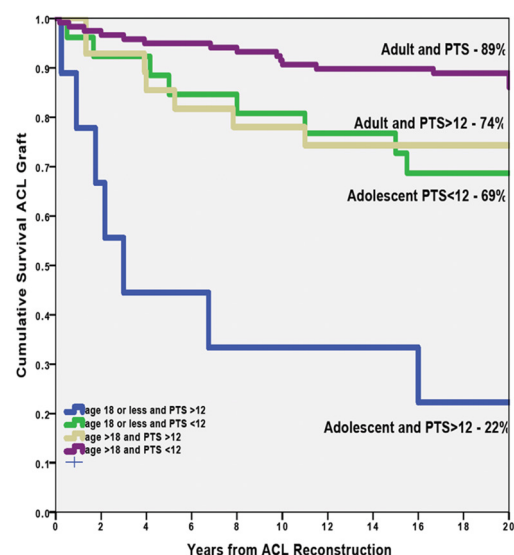
A single surgeon series of 200 consecutive patients undergoing isolated primary ACL reconstruction with hamstring tendon autograft were prospectively studied. Subjects were assessed pre-operatively and 2, 7, 15 and 20 years post-operatively. Outcomes included: IKDC Knee Evaluation, IKDC subjective scores, KT1000 Instrumented laxity testing and radiological evaluation of degenerative change and medial tibial slope. 20 year outcomes were compared between those who underwent surgery at the age of 18 years or less (adolescent group n=39) and those who underwent surgery >18 years (adult group n=161).

## RESULTS:

At 20 years 179 of 200 subjects were reviewed (89.5%). Outcomes were not statistically different between adolescents and adults for the variables of IKDC subjective score ( $p=0.29$ ), return to preinjury activity level ( $p=0.84$ ), current activity level ( $p=0.69$ ) or degree of radiological degenerative change at 20 years ( $p=0.51$ ). The adolescent group had a higher proportion with grade 1

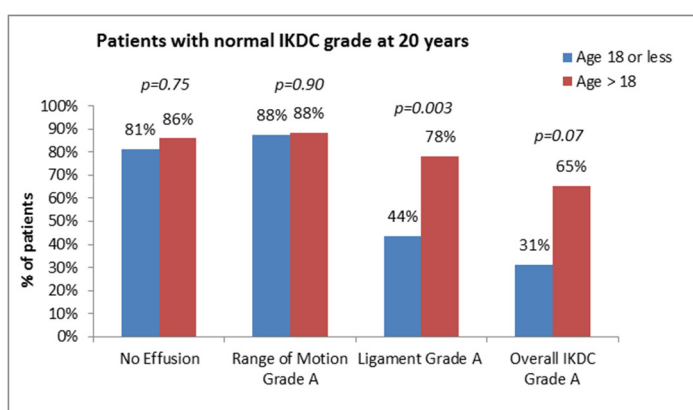
laxity testing compared to the adult group ( $p=0.003$ ).

Overall ACL graft survival at 20 years was 86% for adults and 61% for adolescents (HR 3.3;  $p=0.001$ ). The hazard for ACL graft rupture was increased by 4.8 in adolescent males and 2.5 in adolescent females, compared to adults. At 20 years the ACL survival for adolescents with a PTS of >120 was 22%. The hazard for ACL graft rupture was increased by 11 in adolescents with a PTS of >120 ( $p=0.001$ ), compared to adults with a PTS <120.



## CONCLUSIONS:

Isolated ACL reconstruction using this technique was associated with good long term outcomes with respect to patient reported outcomes and return to sports, regardless of age. However, mild ligament laxity and ACL graft rupture after ACL reconstruction is significantly more common in the adolescents, especially adolescent males, compared to adults. PTS of 12 degrees or more is the strongest predictor of repeat ACL injury, and its negative effect is most pronounced in adolescents.



# Total knee replacement with an Oxidised Zirconium femoral component: ten year survivorship analysis

Issaq Ahmed,  
Lucy J Salmon  
Hiroki Watanabe  
Justin P Roe  
Leo A Pinczewski

Presented:

- Australian Knee Society ASM, 15-18 October 2015, Byron Bay, Australia

Published:

Bone and Joint Journal 98-B (1) 58-64; January 2016



## INTRODUCTION:

Total knee replacement (TKR) is a highly effective procedure in producing good functional outcomes and long term survival rates of greater than 90%. Despite these excellent results polyethylene wear leading to osteolysis remains a common cause of failure. In an attempt to reduce wear and improve long term survival rates there has been considerable interest in the use of alternative bearing surfaces to improve the wear characteristics of the femoral component. Oxidized zirconium has been shown in numerous in vitro and retrieval studies to have better wear properties than cobalt chromium and cause less surface damage on the polyethylene component.

We performed a retrospective review of a prospectively collected database to assess the ten year survival and clinical and radiological outcomes of the oxidized zirconium TKR with the Genesis II prosthesis. We hypothesised that the use of this implant would produce comparable clinical outcomes and survivorship to those reported at mid term follow up.

We performed a retrospective review of a prospectively collected database to assess the ten year survival and clinical and radiological outcomes of the oxidised zirconium total knee replacement (TKR) with the Genesis II prosthesis. Outcome measures included the Western Ontario and McMaster Universities Osteoarthritis Index, Knee Injury and Osteoarthritis Outcome Score (KOOS) and a patient satisfaction scale.

## METHODS:

We performed a retrospective review of a prospectively collected database to assess the ten year survival and clinical and radiological outcomes of the oxidised zirconium total knee replacement (TKR) with the Genesis II prosthesis. Outcome measures included the Western Ontario and McMaster Universities Osteoarthritis Index, Knee Injury and Osteoarthritis Outcome Score (KOOS) and a patient satisfaction scale.

## RESULTS:

A total of 303 consecutive TKRs were performed in 278 patients with a mean age of 68 years (range 45 to 89 years). The ten year survival rate from the Kaplan–Meier predicted survivorship was 97% (95% CI 94 - 99) with revision for any reason as the endpoint. There were no revisions for loosening, osteolysis or implant failure. There was a significant improvement in all components of the WOMAC score at final follow up ( $p < 0.001$ ).

## CONCLUSIONS:

Our study supports the hypothesis that over the long term TKR with an oxidised zirconium femoral component gives comparable survival rates and functional outcomes to conventional implants as reported from several national joint registries. However whether this implant leads to fewer revisions for polyethylene wear and osteolysis compared to a conventional CoCr implant to justify its selective use in younger patients and its increased costs is yet to be determined.

**Table 1. Functional outcomes scores and range of movement**

Parameter	Pre operative (n=303)	10 years postop (n=216)	p
<b>Mean WOMAC score</b>			
Pain	49 (5-95)	90 (5-100)	0.001
Stiffness	44 (0-100)	83 (25-100)	0.001
Function	47 (7-88)	85 (15-100)	0.001
Total	48 (13-84)	85.7 (15-100)	0.001
<b>Mean KOOS scores</b>			
Symptoms	n/a	82.4 (36-100)	n/a
Pain	n/a	87.5 (6-100)	n/a
ADLS	n/a	84.9 (15-100)	n/a
Quality of life	n/a	71.4 (6-100)	n/a
<b>Mean Range of flexion (range)</b>			
	116 (70 to 140)	114 (70 to 130)	0.012

# Osteoarthritis, Outcomes and Reinjury 20 years After ACL Reconstruction with Hamstring or Patellar Tendon Grafts

Simon Thompson,  
Lucy Salmon,  
Alison Waller,  
James Linklater,  
Justin Roe  
Leo Pinczewski

**Presented at:**

- Australian Orthopaedic Association Annual Meeting, 11-15 October 2015, Brisbane
- Australian Knee Society ASM, 15-18 October 2015, The Byron at Byron
- \* APKASS Congress, June 9 -12, 2016, Hong Kong – Macau
- \* ISAKOS Biennial Congress, May 2017 Shanghai

**Published**

American Journal of Sports Medicine  
Volume 44 (12) 2016

**Objective:**

This prospective longitudinal study compares the results of ACL reconstruction using 4-strand hamstring tendon (HT) and patellar tendon (PT) autograft over a 20-year period

**Method:**

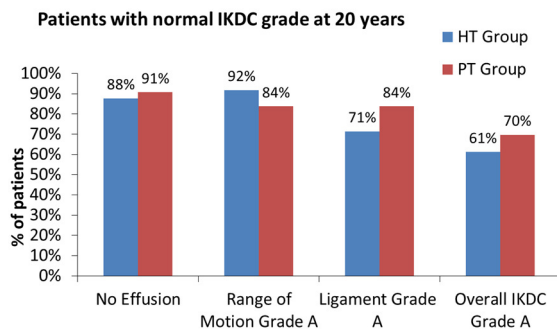
90 consecutive patients with isolated ACL rupture were reconstructed with a PT autograft and 90 patients received HT autograft, with an identical surgical technique. Patients were assessed at 2, 5, 7, 10, 15 and 20 years. Assessment included the IKDC Knee Ligament Evaluation including radiographic evaluation, KT1000, Lysholm Knee Score, kneeling pain, and clinical outcomes.

**Results:**

Subjects who received the PT graft had significantly worse outcomes compared to those who received the HT graft at 20 years for the variables osteoarthritis visible on xrays (61% v 41%, p=0.01), kneeling pain (38% v 20%, p=0.02), and incidence of ACL injury to the opposite knee (29% v 17%, p=0.04). There was no significant difference between the HT and PT groups in overall IKDC grade (p=0.23), or IKDC subjective score (p=0.18). At 20 years 53% and 57% of the PT and HT groups participated in strenuous or very strenuous activity (p=0.55).

Differences in outcome between males and females were identified. The female PT group reported significantly lower mean IKDC subjective scores (p=0.05), more pain (p=0.02) and swelling (0.03) with activity, and more difficulty with kneeling (p=0.04) compared to the other subgroups at 20 years.

ACL graft rupture occurred in 18% of HT group and 10% of the PT group (p=0.13). The significant predictors of ACL graft rupture were shown in Table 1. Graft type was not a predictor of ACL graft rupture (p=0.11). Contralateral ACL injury was associated with age less than 18 years (HR=3.4, p=0.001), and the patellar tendon graft (HR=2.2, p=0.02).



**Conclusion:**

Over 20 years, endoscopic ACL reconstruction using either an autologous HT or PT graft with is associated with excellent subjective outcomes and clinical ligamentous stability that are maintained, with high rates of continued participation in active sports. Regardless of graft type, ACL-reconstructed patients have a high incidence of further ACL injury (30%). Graft rupture is strongly associated with younger age, nonideal graft position, and male sex. Injury to the contralateral ACL is associated with younger age and PT graft choice. Patients who receive an HT graft have a lower incidence of kneeling difficulty and radiological OA than their PT-reconstructed counterparts. Given that the operative procedure and tunnel placement of the 2 graft choices are similar, any differences in outcome are attributable to graft choice. Although both the HT and PT grafts can be considered viable choices, the long-term results in this series favor the HT tendon graft, over the PT graft, for the lower incidence of radiological OA.

**Table 1: Predictors of ACL Graft Reinjury**

Factor & Category	% with intact ACL graft	Hazard Ratio	95% CI*	p
<b>Age at surgery</b>				
< 18 years	67	4.6	1.7-2.7	0.003
>18 Years	88			
<b>Gender</b>				
Male	78	3.9	1.5-10.6	0.007
Female	89			
<b>Tunnel Placement</b>				
Non ideal	82	3.6	1.2-10.3	0.02
Ideal	93			

\*confidence interval



# Two-Stage Revision ACL Reconstruction: Supercritical Sterilized Bone Allograft is Effective in the Treatment of Tunnel Defects.

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 Sjoerd Ruen, MD, PhD  
 Lucy J Salmon, PhD  
 Fiona Bonar, MBBCh, FRCPA  
 Justin P Roe, MBBS, FRACS  
 Leo A Pinczewski, MBBS, FRACS

## INTRODUCTION

The aim of this study was to examine the histological properties of the grafted bone tunnels at the time of second stage revision ACL reconstruction to assess the in-vivo appearance of supercritical carbon dioxide sterilized bone allograft and to quantify the amount of graft incorporation. Additionally, we intended to compare the histological incorporation to its radiological appearance and correlate the incorporation to the clinical outcome of the revision procedure. This is the first study describing the use of supercritical sterilized bone allograft in humans.

## METHODS:

Histology and histomorphometric analysis as done on 12 subjects who underwent two-stage revision ACL reconstruction. In the first stage, the femoral and tibial tunnels were grafted with SCCO2 sterilized bone allograft. In the second stage, the revision ACL reconstruction was performed and bone biopsy specimens were taken.

## RESULTS:

Twenty patients had core biopsies taken at the time of their second stage revision ACL procedure. Due to sampling inadequacies, poor biopsy quality or core sample fragmentation, eight biopsy specimens were not suitable for detailed histomorphometry and incorporation measurements. The remaining twelve patients all had uneventful stage 1 and 2 revision procedures. The mean time between first and second

stage procedure was 8.8 months (range, 5.6 to 21.3 months). The graft material was easily identified at the second stage procedure by its necrotic appearance with empty osteocytes lacunes within the trabecular bone. In all tissue samples predominately lamellar host bone apposition was seen on the surface of graft fragments known as creeping substitution. Separate bone graft fragments were bridged by newly formed woven bone. In 2 subjects, small islands of chondral cell differentiation were seen, indicating endochondral ossification. Active bone remodeling through combined osteoclastic and osteoblastic activity was present in 3 subjects, suggesting more advanced phases of graft incorporation. Mean bone volume was 68% over tissue volume (range 33-92%), and graft volume over bone volume was 41% (range 19-70%). Analysis of graft volume in relation to timing of second stage procedure could not demonstrate a difference in biopsies take <7 months (mean graft volume 44%, range 19-70 %) and biopsies take >10 months (mean graft volume 34%, range 19-48%).

## CONCLUSIONS

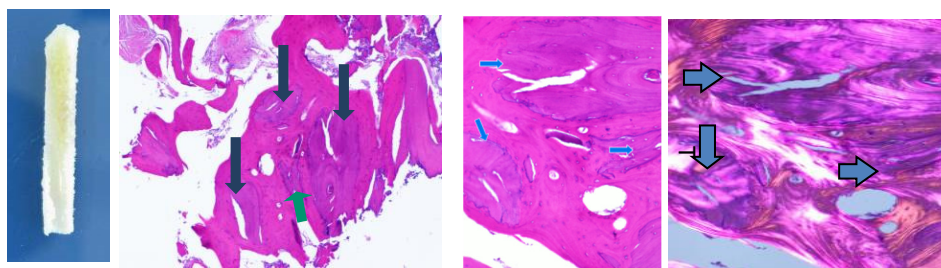
The osteoconductive SCCO2 sterilized bone allograft acted as an effective structural framework, allowing for successful graft incorporation through creeping substitution. The initial bone apposition on and bridging of graft fragments provides early mechanical strengths to facilitate two-stage revision ACL reconstruction.

Presented at:

- Australian Knee Society ASM, 15-18 October 2015, Byron Bay, Australia
- 2016 APKASS Congress, June 9 -12, 2016, Hong Kong – Macau

Accepted for publication

- Arthroscopy Journal 2017

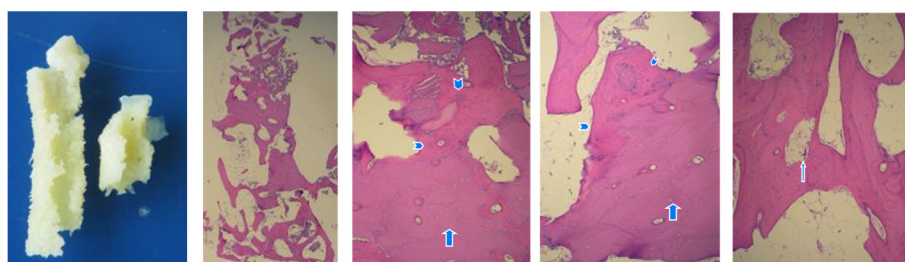


Sclerotic trabeculum with necrotic lamellar (arrows) bone bordered by lamellar and woven viable host bone

necrotic lamellar (arrows) bone bordered by lamellar viable host bone



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Bone with sclerosis, low power

Sclerotic areas with necrotic paler compact lamellar (arrows) bone bordered by lamellar and woven viable host bone (arrowheads)

osteoblastic and osteoclastic remodelling (arrows)



# 15 Year Survival of Endoscopic ACL Reconstruction in Patients Aged 18 and Under

Matthew Morgan  
Lucy Salmon  
Alison Waller  
Justin Roe  
Leo Pinczewski

#### Presented at:

\* NSW Australian Orthopaedic Association  
2014 Annual Scientific Meeting Friday 15  
August 2014  
\* Australian Orthopaedic Association 2014  
ASM, 12–16 October, Melbourne  
\* American Academy of Orthopaedic Sur-  
geons Annual Meeting, 24-28 March 2015,  
Las Vegas, USA  
\* AOSSM Specialty Day, 24-28 March 2015,  
Las Vegas, USA  
\* ISAKOS Biennial Conference, 7-11 June  
2015, Lyon, France

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Volume 44 (2) February 2016

#### Awarded:

Scientific Award, 2nd Place, ISAKOS Con-  
gress, Lyon, France May 2015



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& SPORTS MEDICINE CENTRE

## INTRODUCTION

Within the young population, the literature examining the short term survival and the variables contributing to ACL injury after primary ACL reconstruction is limited. The long term evidence for the same is non-existent.

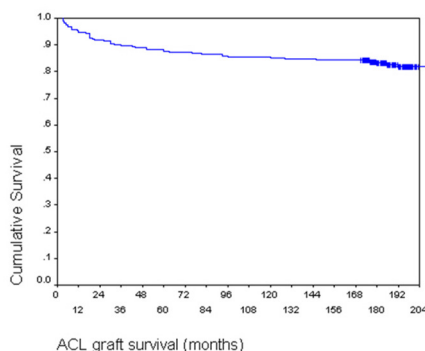
To determine the long term survival of the ACL graft and the CACL after primary reconstruction in those aged 18 years and under, and to identify the factors that increase the odds of subsequent ACL injury.

## METHODS:

Patients having undergone primary ACL reconstruction at age 18 or less between 1993 and 1998, included in a prospective database by a single surgeon were considered. Single-incision endoscopic ACL reconstruction was performed with either autologous bone-patellar tendon-bone graft (BPTB) or hamstring tendon graft (HT). At a minimum of 15 years after ACL reconstruction patients completed a subjective questionnaire regarding current symptoms, further ACL injury, family history of ACL and level of activity.

## RESULTS

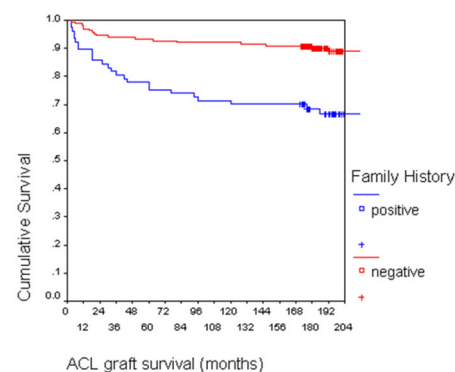
288 juveniles, aged 13-18 years, met the inclusion criteria of which 242 (84%) were reviewed at a mean of 16.5 years after ACL reconstruction. 75 (31%) patients sustained a further ACL injury of which 27 (11.2%) suffered an ACL graft rupture, 33 suffered a CACL injury (13.6%) and 15 sustained BOTH an ACL graft and a CACL rupture (6.2%) over 15 years.



A large proportion of ACL graft ruptures occurred within the first two years of ACL reconstruction, as illustrated by the slope of the survival curve in Figure 3. We found one third of the total number of ACL graft ruptures to occur within one year of primary reconstructive surgery, an incidence of 5%.

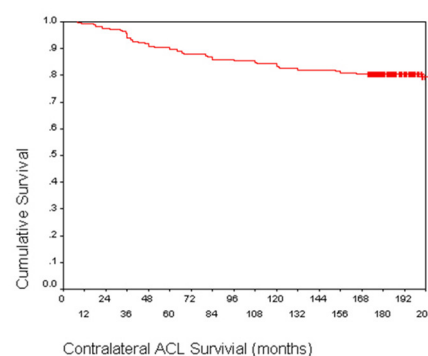
## RESULTS

Survival of the ACL graft was 95%, 92%, 88%, 85% and 83% at 1, 2, 5, 10 and 15 years, respectively. Survival of the CACL was 99%, 98%, 90%, 83% and 81%, respectively. Survival of the ACL graft was less favourable in those with a positive family history (69% versus 90%, HR 3.6,  $p = .001$ ). Survival of the CACL was less favourable in males than in females (75% versus 88%, HR 2.1,  $p = .03$ ) and those that returned to competitive team ball sports (78% versus 89%, HR 2.3,  $p=0.05$ ). Graft



## CONCLUSION

After a minimum of 15 years post primary ACL reconstruction, 69% of adolescents returned to their pre-injury level of activity, however, this was at a significant cost. Approximately one third of this population suffered a further ACL injury during the study period, with an incidence of 20% in the contralateral knee and 17% in the reconstructed knee. Further ACL injury in the adolescent cohort is relatively common with several factors being implicated in contributing to this increased risk.



Family history of ACL rupture significantly increased the hazard for ACL graft rupture and CACL injury was more common in males and those who return to team ball sports. High subjective scores and continued participation in sports were maintained over the long term after ACL reconstruction in the juvenile population.

# Twenty Year outcome of a longitudinal prospective evaluation of isolated endoscopic ACL reconstruction with patella tendon autograft

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## INTRODUCTION

Long term prospective follow up studies of single-incision endoscopic ACL reconstruction are limited and may include confounding factors. This longitudinal prospective study reports the outcome of isolated anterior cruciate ligament (ACL) reconstruction using middle-third patellar tendon autograft in 90 patients over 20 years.

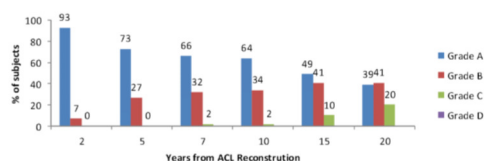
## METHODS:

Between January 1993 and April 1994, 90 patients met study inclusion criteria, evaluation 1,2,3,4,5,7,10,15 and 20 years post surgery. Exclusion criteria: associated ligamentous injury requiring surgery, previous meniscectomy; meniscal injury meniscectomy more than 1/3; chondral injury; and an abnormal contralateral knee.

## RESULTS:

At 20 years, 32(36%) patients had sustained another ACL injury, 8 (9%) to the index limb and 27(29%) to the contralateral limb (3 injuring both knees). Mean IKDC score was 86, 50% participated in strenuous/

Figure 3: Overall IKDC Radiological Grading

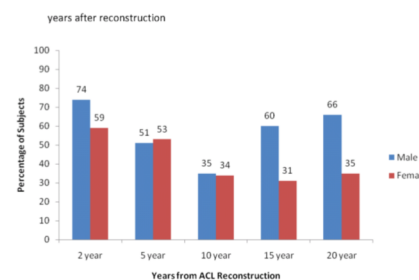


very strenuous activities, kneeling pain was present in 63%. Radiographic degenerative change was found in 61%, 20% IKDC Grade C, 0% Grade D. IKDC clinical examination revealed 95% had a normal/nearly normal knee. Significant gender differences existed: females were less likely to re-injure the reconstructed ACL (18%v2%,  $p=0.01$ ), reported poorer IKDC subjective score (90v83,  $p=0.03$ ), had more activity related pain (57%v20%,  $p=0.02$ ),

## RESULTS (CONT)

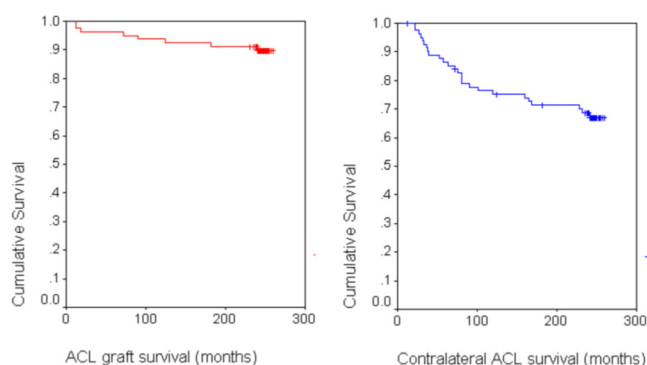
and less likely to participate in strenuous activity (35v66,  $p=0.01$ ).

Figure 4: Percentage of males and females participating in strenuous sports at 2-20 years after reconstruction



ACL graft survival was not related to age. Patients <18years old had an increased odd ratio (3.2) for rupturing the contralateral ACL. Coronal graft

Figure 6: Kaplan Meier ACL graft (left) And Contralateral ACL (right) survival over 20 years



angles <17 degrees had increased risk of failure compared to those over 17 degrees (96% v 77%), by a factor of 8.5.

## CONCLUSION

Injury commonly occurred in the contralateral ACL than the reconstructed ACL graft, the most significant predictor of contralateral ACL injury is age under 18yrs. The most significant predictor of ACL graft rupture is a coronal graft angle of less than 27 17 degrees. Females had lower rerupture rates, poorer subjective scores, decreased participation in strenuous activity, putting the graft at less risk of failure. Kneeling pain remained persistent over 20 years. Radiographic osteoarthritis was evident in 61% of subjects but symptomatic osteoarthritic symptoms were rarely reported.

# Construct Validity and Test Re-Test Reliability of the Forgotten Joint Score.

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NORTH SYDNEY ORTHOPAEDIC & SPORTS MEDICINE CENTRE

## INTRODUCTION

As patient outcomes following total knee replacement (TKR) have continued to improve and patient expectations have increased over recent years, traditionally used scoring tools have begun to demonstrate a ceiling effect, potentially losing the ability to determine differences in outcome in a high functional range. It has recently been suggested that the ultimate goal of arthroplasty surgery is for the patient to be able to forget their prosthetic joint during regular day to day activities. A new scoring system, The Forgotten Joint Score (FJS) has been developed. The FJS focuses on the patients' awareness of their joint replacement during a range of day to day and recreational activities. This score consists of 12 questions where subjects are asked to rate their awareness of their joint replacement during various activities. The aims of this study was to investigate the test retest reliability and the construct validity of the FJS-12 in English, specifically for patients who have undergone TKR.

## METHODS:

Patients undergoing TKR by the senior surgeon between 2006 and 2010 were invited to complete a questionnaire consisting of the FJS and the Knee Injury and Osteoarthritis Outcome Score (KOOS). The Western Ontario and McMaster Universities (WOMAC) osteoarthritis index scores were calculated from the KOOS score, and normalised in to a scale where high scores indicate a good outcome. WOMAC scores were normalised by summing the total score of each subscale and dividing by the maximum total score for the scale. Those who completed and returned their initial questionnaire were mailed a repeat questionnaire at 4 weeks.

## RESULTS

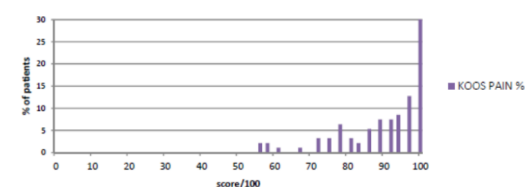
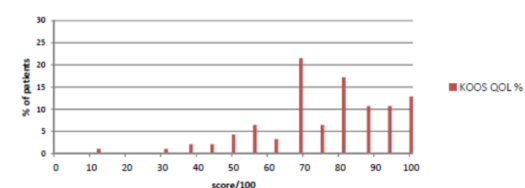
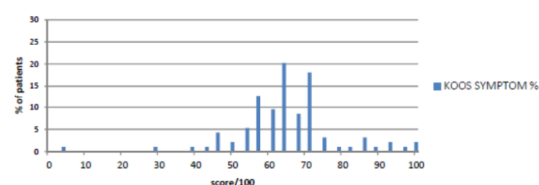
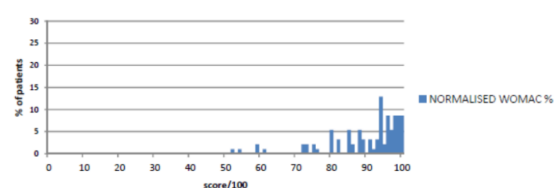
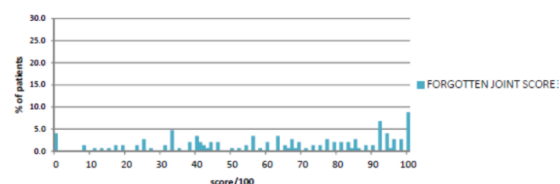
A total of 147 patients completed and returned both questionnaires and were included in the analysis.

There were 68 females and 79 males with a mean age of 67 years (range 32-89). The right knee was involved in 75 cases. A Triathlon (Stryker) prosthesis was used in 120 knees and a Genesis II (Smith & Nephew) prosthesis was used in 27 knees. The mean time from surgery to completion of the first questionnaire was 39 months (range 18-72).

## RESULTS

The FJS returned a mean score of 62 and 60 (range 0-100) and the normalised WOMAC overall mean score of 90 (range 52-100).

The test-retest reliability was almost perfect for the FJS (ICC=0.97, 95% confidence interval 0.95-0.98), and the FJS subscores (ICC>0.8). Convergent construct validity of the FJS was correlated with Spearman's test to the KOOS Subscales of Quality of Life (0.63, p=0.001), Symptom (0.33, p=0.001), Pain (0.68, p=0.001) and ADL (0.66, p=0.001) and the Total WOMAC (0.70, p=0.001). The distribution of the FJS to the Normalised WOMAC and KOOS Subscales is shown in the Figures below.



## CONCLUSION

The FJS demonstrates high test retest reliability and construct validity compared to the Normalised WOMAC and KOOS Subscales. The FJS does not demonstrate the ceiling effect of the WOMAC or KOOS pain scores so may have greater discriminatory ability following TKR.