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Hylan GF-20 viscosupplementation in the treatment of symptomatic osteoarthritis of the knee: long-term follow-up results at 5 years

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BASK 2017 Abstract reference: 002 E-mail: tboutefnouchet@hotmail.com



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Association for
Surgery of the
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Background:

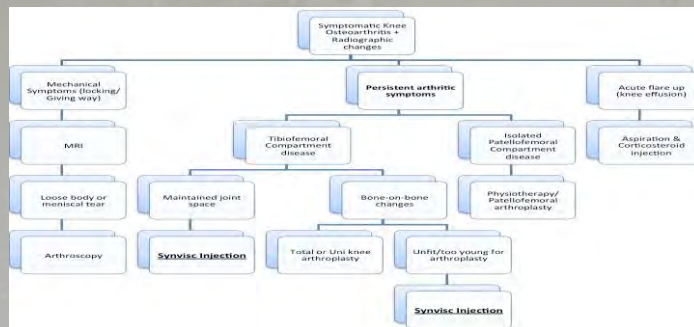
Intra-articular injections of hyaluronic acid have shown efficacy in the management of symptomatic knee osteoarthritis. Controversies remain surrounding choice of products and patients selection. We aimed to report the long-term efficacy and safety of intra-articular injections of hyaluronic preparation Synvisc-one (Hylan GF20) for patients with symptomatic knee osteoarthritis.

Patients & Methods:

A retrospective observational analysis of a single therapeutic series was carried out. A total of 77 consecutive patients (82 knees) were eligible for the intervention and had outcomes recorded at one year and five years. Analysis was conducted to determine therapeutic effect survivorship taking arthroplasty and any other interventions as endpoint results.

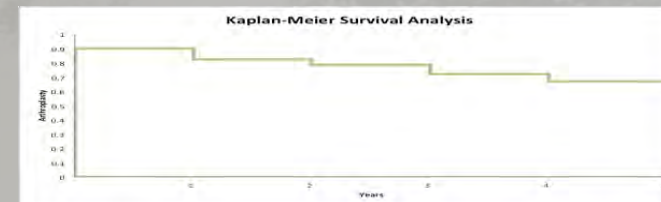
Results:

Symptomatic knee osteoarthritis management algorithm

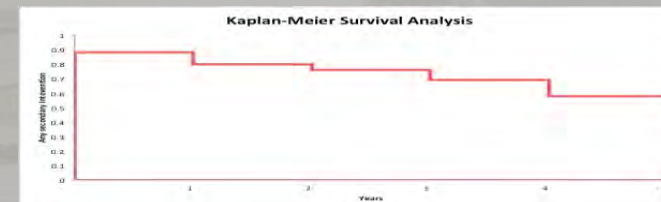


At one year 87% (n=71) responded to treatment and only 10% (n=8) of cases were put on a waiting list for arthroplasty due to persistence of symptoms.

At five years follow-up 50% (n=41) were still considered responders. During the five years period a repeat injection was given in 11% of cases (n=9). 31% (n=26) required arthroplasty (either total or unicompartmental). Kaplan-Meier survivorship analysis of therapeutic effect demonstrated 67% survival of therapeutic effect at 5 years with arthroplasty as endpoint and 58% survival of therapeutic effect at 5 years with all secondary interventions as endpoint.



Therapeutic effect survivorship analysis with arthroplasty as endpoint



Therapeutic effect survivorship analysis with any secondary intervention as endpoint

Discussion:

The present study demonstrates a significantly longer duration of clinical benefit for Synvisc-one injection. Only a third of patients required arthroplasty surgery and over half of the patients did not require any further surgical intervention at five years follow-up. These results could support the notion of an ideal delay strategy for the "too young" or "unfit" for arthroplasty category of patients.

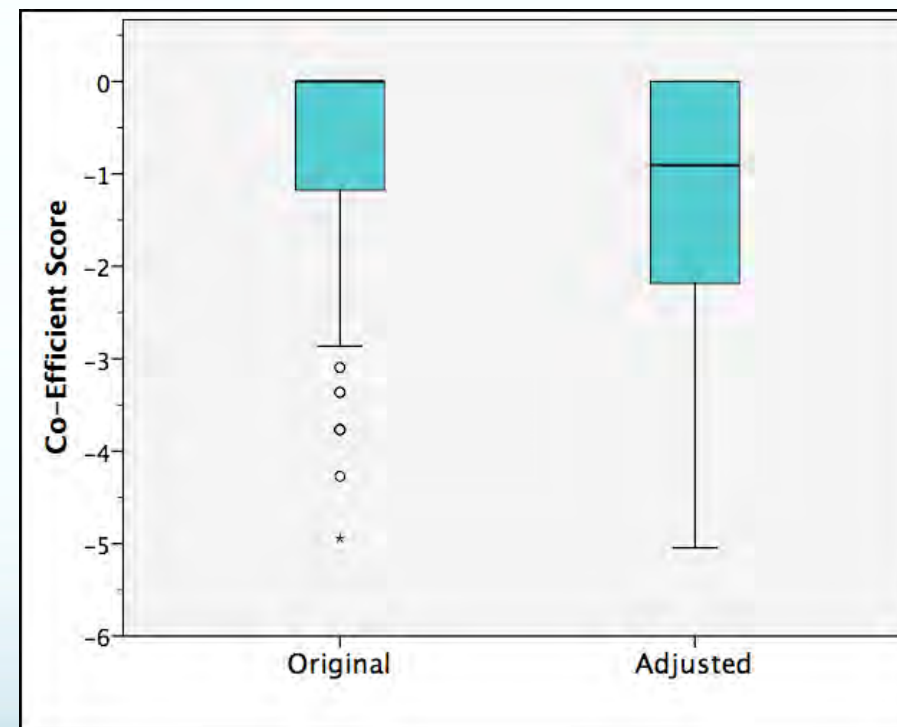
Summary: Retrospective observational analysis of a single series conducted to determine therapeutic effect survivorship taking arthroplasty and any other interventions as endpoint results. Kaplan-Meier survivorship analysis showed 67% survival of therapeutic effect at 5 years with arthroplasty as endpoint and 58% survival of therapeutic effect at 5 years with all secondary interventions as endpoint. These results support the notion of longer benefits in adequately selected patients.

(0005) – Differences in Clinician vs. Patient Recording of Co-Morbidities in PROMs: Small Changes Big Impact

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- PROMs are used to compare healthcare providers and may affect funding.
- Per patient co-morbidities generate a co-efficient applied to their pre-op PROM which affects their expected post-op PROM
- Of 195 patients, 121 under reported their co-morbidities thus falsely elevating expected PROM.
- **Adjusting for clinician reported co-morbidities brings significant change to co-efficient and could change outlier status of a healthcare provider**



Anterior Cruciate Ligament: Single vs Double Bundle

Review of current surgical management of ACL Rupture

Great Western Hospitals **NHS**
NHS Foundation Trust

Johnson Tam

INTRODUCTION

In the UK, approximately 35 cases of ACL injury per 100,000 people occur annually¹. 40% of all sports related knee injury involves ligament damage, 59% of which involves the ACL².

ACL injury management has revolutionized since the first reported treatment in 1837 by Robert Adams³. Throughout the late 19th century, clinicians gained knowledge about symptoms associated with ACL injury. Up until 1900, clinicians managed the injury conservatively and were reluctant to perform an open surgery.

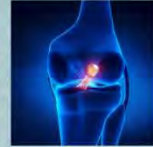
In 1900, the first repair was performed by Mayo Robson who sutured both cruciate ligaments in a 41 year old miner, his knee was reported as 'perfectly strong' after cast immobilization postoperatively⁴. Suturing was widely criticised, especially by Ernest Groves who believed suturing failed to restore function and the only reliable management was to use natural cicatricial tissue⁵. In 1916, he performed the first ACL reconstruction by securing the fascia lata onto the tibia via a bone tunnel. Galeazzi then discovered using a semitendinosus tendon as an autograft for a new ACL in 1924 which initiated numerous experiments over the next few decades to find alternative autologous tissue graft such as patella and quadriceps tendon. Synthetic graft was wrongly believed to be more durable and equipped to withstand stress during the 1980s, and was soon disregarded. Arthroscopic technique was discovered by Jackson and Dandy which reduced invasiveness and infection. The current gold standard recruits either a patella or hamstring tendon graft. Some literatures have suggested the rate of arthritis progression after ACL injury and reconstruction is equal to or worse than would have occurred after non-operative treatment⁶. With these studies reporting a subset of patients with poorer outcomes, there is a need for a review of current practices of ACL reconstruction and research into new techniques that can improve the prognosis.

Aim: Describe the history of double-bundle ACL reconstruction techniques. Review clinical literature comparing outcomes of double-bundle repair to the more traditional single-bundle repair.

METHOD

MEDLINE, PubMed, Cochrane and Google Scholar were used to identify suitable literatures. Search terms:

#	Searches	Results
1	Anterior Cruciate Ligament/ or Anterior Cruciate Ligament Reconstruction	12062
2	Single bundle.mp.	769
3	Double bundle.mp.	837
4	1 AND 2 AND 3	270



Literatures were selected based on its hierarchy of evidence, samples size, bias, sufficient blinding, relevance to ACL rehabilitation, validity, presentation of results and credibility. Literature gave efficacy of ACL management based on knee kinetics, but rarely accounted for patients' emotions towards different management plans, thereby limiting the holism required to understand prognosis and patient satisfaction.

DOUBLE BUNDLE RECONSTRUCTION

Conventional ACL reconstruction restores the anteromedial bundle, whilst limiting the restoration of the posterolateral bundle. The double bundle (DB) tension pattern of ACL was discovered as early as 1832 by the Weber brothers, but wasn't acknowledged until 1982, when Mott⁷ created 2 tunnels in the femur and tibia to pull through the semitendinosus tendon for a DB reconstruction, but without any follow-up nor outcome measures to compare DB to a single bundle (SB). Mott had recognized if he replicated both bundles, it would restore the knee closer to its original anatomical state.



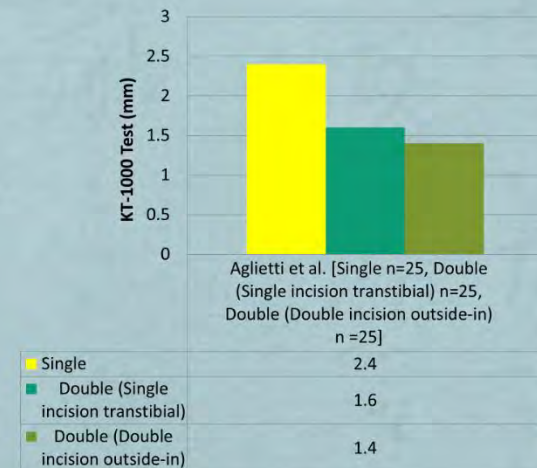
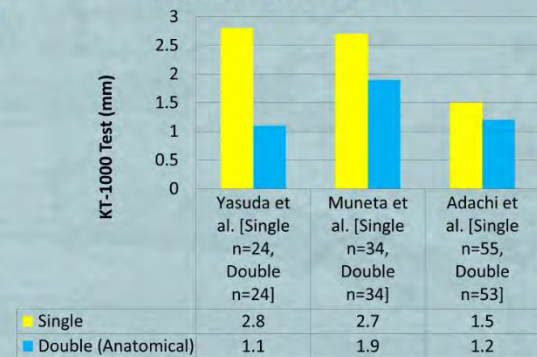
Several years Mott's findings, Radford and Amis⁸ investigated the biomechanical outcome of double-versus single-bundle reconstruction. The flexion stability of six ACL intact cadaveric knees were tested at both 20° and 90° flexion. The native ACL was then removed, and testing was repeated with reconstruction method simulating the anteromedial bundle, and then a reconstruction simulating the posterolateral bundle. A double-bundle was also simulated by the combination of the two. AM bundle stabilized best at 90° of flexion, and the PM bundle stabilized best at 20° of flexion. The addition of both bundles replicated the stability of the native knee before disruption of the native ACL. They concluded that double-bundle reconstruction most closely reproduced the stability of a native knee.

RESULTS

4 literatures were reviewed. Yasuda et al.⁹, Muneta et al.¹⁰, Adachi et al.¹¹, Aglietti et al.¹² were all prospective randomised study comparing single- vs double- bundle ACL reconstruction using these outcome measures: KT-1000 arthrometer test, pivot shift testing, knee range of movement and muscle torque.

KT-1000 is the chosen parameter for this review, it is used to provide an objective assessment of the amount of anterior knee translation between 20° and 30° of knee flexion. It is a tool to help diagnosis ACL tear and to also assess the prognosis post-ACL reconstruction. A test result of ≤3 mm anterior translation indicates an intact ACL, the less translation, the more intact it is.

Single vs Double Bundle ACL



DISCUSSION

Yasuda et al. examined 2 groups of patients 2 years after surgery. The investigators found a significant difference in anterior laxity, as measured by KT-test, between the anatomic double-bundle groups and the single-bundle groups, as well as by pivot shift tests. They reported no significant differences in knee ROM, muscle torque. Muneta et al. defined two intervention groups with a clear purpose to measure the efficacy of both techniques and found similar results with the other aforementioned studies. Controlling selection criteria such as damage to their ACL, same surgeon, rehabilitation protocol would be difficult unless it was a RCT. Adachi et al. separated participants into single- and double-bundle but were all reconstructed using hamstring tendons, and a standard rehabilitation protocol was used for all participants. At an average of 32 months follow-up, they found no difference in anterior laxity and proprioception. Aglietti assigned patients into 3 groups differentiated by the method of repair. They found a significant difference in anterior stability measured with KT-1000, with group 3 better than 2, and 2 better than 1. They also found significantly less pivot shift in group 3 and higher subjective functional scores. There were some downfalls to the selected studies. The follow-up was short, with 2-years being the longest. Method of randomisation was unclear and sample groups were small. Although KT-1000 provided an objective measurement of anterior laxity, there were no objective measurement for rotational laxity during follow-up. These studies do however, collaborate to conclude double-bundle ACL has certain advantages over single-bundle reconstruction by returning the knee to a more natural anatomy and kinematics.

CONCLUSIONS

- Double-bundle ACL reduces anterior laxity postoperatively compared to single-bundle.
- More parameters should be included, but will need to be standardized to allow comparison across many patient groups, skill levels and functional levels.
- Larger populations and longer follow-up will be needed to determine which method of ACL reconstruction holds advantages for various patient groups.
- Advanced imaging may help compare natural motion in native knees and the motion of ACL reconstructed knees in both traditional single-bundle techniques as well as double-bundle techniques.

REFERENCES



Inflammatory cell-induced corrosion in total knee arthroplasty: a retrieval study (0008)

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Institute of Orthopaedics and Musculoskeletal Science, University College London and the Royal National Orthopaedic Hospital, Stanmore, United Kingdom

Introduction and Aim

Inflammatory Cell Induced Corrosion (ICIC) is speculated to lead to metal ions release

1. Identify the **extent and location of ICI corrosion patterns** on our **femoral and tibial components**
2. Correlate our **findings with implant and clinical information**

Materials and Methods

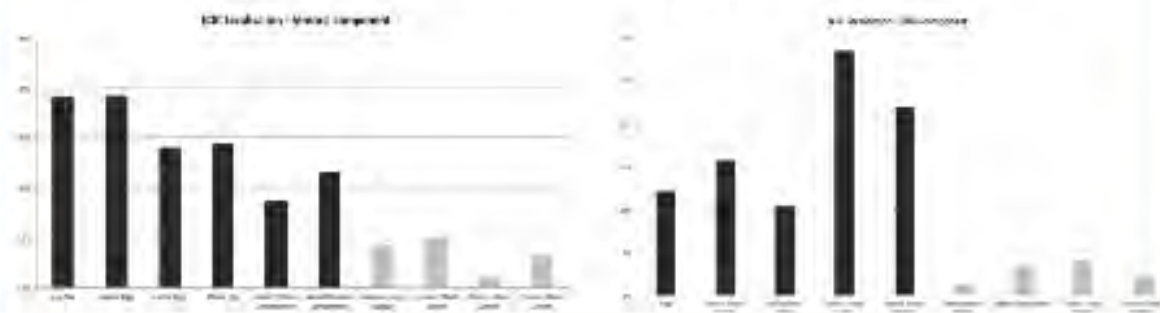
Samples: 28 Femoral Components and 9 Tibial Plates, made of CoCr with polished surfaces

1. **Macroscopic Assessment and ICIC Localization** (Microscope)
2. **ICIC Quantification** (Photogrammetric Method)
3. **Surface and Elemental Assessment** (SEM/EDX)
4. **Polyethylene Surface Assessment** (Hood Score)
5. **Statistical Analyses**

Results and Conclusions



71% of femoral and 100% of tibial components showed evidence of ICIC, with higher amount in **non contacting regions** ($p < 0.0001$). ICIC may help explain some of the material loss that may occur in vivo.



0010: Total Knee Arthroplasty for Osteoarthritis in Patients Under 55 Years old: A Systematic Review

Randeep Aujla, Colin Esler (University Hospitals of Leicester)

Background

The demand for TKA between the ages of 45 and 54 will increase 17 fold by the year 2030 and the under 55 population will soon become the largest operated group.

Aims

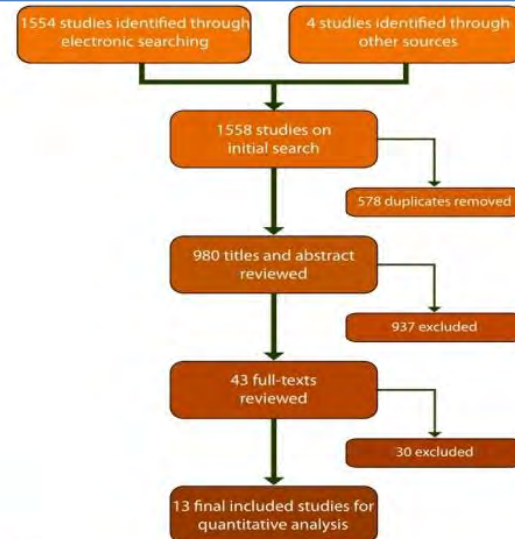
- 1) To conduct a systematic review of published literature using the PRISMA guidelines
- 2) To establish the long-term functional outcomes using the Knee Society Score (KSS) of TKA in patients under 55 years of age
- 3) To determine survivorship and incidences of complications to better inform this population of risks

Methods

A systematic review was conducted using the electronic databases Ovid Medline, EMBASE and Central for appropriate studies published between 1995-2015.

Inclusion Criteria

- All included patients under 55 years of age
- >75% of cases in studies involving patients with OA
- Minimum 5 years follow-up
- English language only
- Functional outcome scores



Results

Author	Journal	Year	Study Period	No. of TKAs	Mean Follow-Up (years)
Long et al	JBJS (Am)	2014	1977-1992	84	25.1
Lizaur-Utrilla et al	Knee Surg Sports Tramatol Arthrosc	2014	1999-2007	93	7
Kim et al	International Orthopaedics	2014	1995-1996	160	16.6
Keenan et al	JBJS (Br)	2012	1995-2012	221	10
Odland et al	CORR	2011	1991-2012	67	12.4
Kamanth et al	J of Arthroplasty	2011	Not stated	100	5
Kim et al	J of Arthroplasty	2009	1995-1996	122	10.8
Ritter et al	The Knee	2007	1974-2000	167	9.1
Duffy et al	J of Arthroplasty	2007	1987-1994	52	12
Tai et al	JBJS (Br)	2006	1992-2000	118	7.9
Mont et al	J of Arthroplasty	2002	1991-1995	30	7.2
Lonner et al	CORR	2000	1982-1994	32	7.9
Gill et al	J of Arthroplasty	1997	1977-1989	37	9.9

	Pre-Operative	Post-Operative	Difference	Complication	Number	Percentage
Range of Motion	112.6	115.1	+2.5	Revision	72	5.8%
Clinical KSS	36.5	91.5	+55.0	Aseptic Loosening needing revision	33	2.6%
Functional KSS	37.0	83.2	+46.2	Infection	15	1.2%
Satisfaction	-	85.5%		Instability needing revision	9	0.7%

- Risk of revision surgery for any cause is 0.79% per year
- Implant survival at 10 years was 95.0%
- Risk of revision surgery for aseptic loosening is 0.39% per year

Conclusions

- ✓ TKA is a excellent treatment option for the young arthritis knee with a >50% improvement in functional scores
- ✓ Satisfaction overall is 86% after >5 years
- ✓ Revision rate remains under 1% per year of implant survivorship
- ✓ Under half of revisions were for aseptic loosening



Antero-Lateral Ligament Augmentation for Patients with Persistent Rotational Instability after ACL Reconstruction

J Sultan (j.sultan@nhs.net), A Winter, D Duffy, N J London (0013)

Background

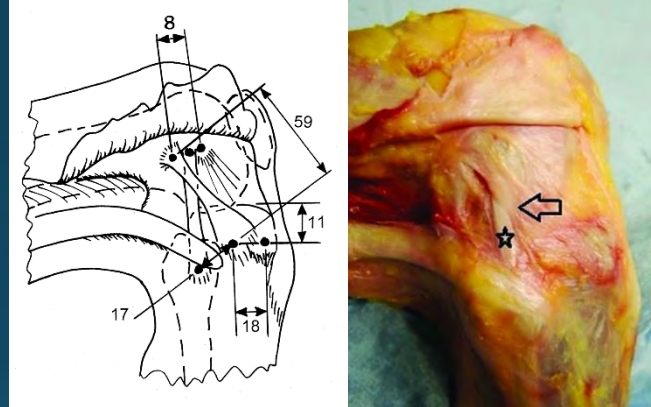
- Following ACL reconstruction, a small proportion of patients present with persistent rotatory instability
 - Young males with stretched grafts
 - Historic “vertical” grafts
 - Even with “perfect” reconstruction
- Current management options are:
 - Activity modification
 - Non-anatomic lateral tenodesis
 - Full revision ACL +/- tenodesis

Patients Selection

- 10 patients with persistent instability:
 - Intact graft on Lachman’s
 - Positive pivot-shift test
- MRI scan:
 - All had intact grafts
 - Two stretched, and two vertical grafts
- Mean age 31 (20-52), 70% males
- All participated regularly in sports
- Five elite/professional athletes

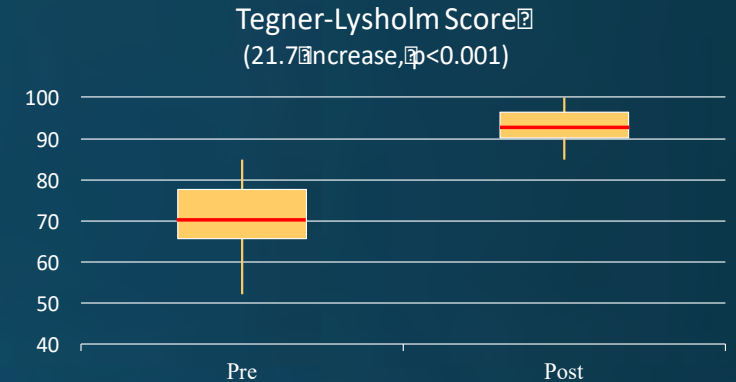
Surgical Technique

- ALL augmentation was performed using an artificial tape secured with bioabsorbable anchors.



Results

- 14 months follow up (3-32)
- No complications or revisions.
- Subjectively: All felt more stable
- Objectively: Pivot-shift test improved by at least one grade



- 9 (90%) returned to their original pre ACL injury sport activity within 6 month (mean 4.13, 3.35-4.90 95% CI)
- One had complications from hernia surgery performed 2 months post ALL, delaying his return to sports to 12 months.

Conclusion

For patients with persistent rotatory instability following ACL reconstruction, isolated ALL augmentation offers an alternative to full revision, with shorter rehabilitation and faster return to full activity.

Background

Literature:

- Sequential (one anaesthetic) vs Simultaneous
- Chan et al, JBJS Br 2009 (80 bilateral):
Higher complications (DVT/PE, cardiac)
- Chen et al, Bone Joint J 2013 (62 bilateral):
Higher blood loss and transfusion
Less cumulative hospital stay
- Romagnoli et al, Int Orthop 2015 (567 bilateral):
Higher blood loss and transfusion
Same hospital stay, complications and revision

Potential Advantages:

- Patient: one admission, one rehabilitation
- Surgeon: waiting list, training for fellow
- Hospital: health economics (less combined stay)

Potential Disadvantages:

- Risk of complications (anaesthetic time, immobility)
- Length of stay (less than cumulative for both knees)
- Potentially poorer outcome /implant survival?

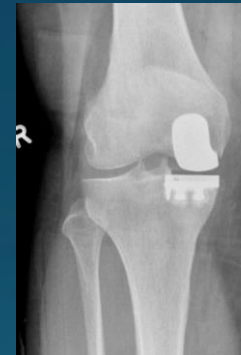
Patients & Methods

Patient Selection:

- Bilateral symptomatic medial OA
- No major cardiovascular risk (anaesthetist decision)
- Commitment to rehabilitation

Surgical Procedure:

- Bilateral under one anaesthetic
- Spacer block fixed-bearing technique (no intramedullary instrumentation)
- Simultaneous not sequential: consultant and fellow, one scrub team and one set of instruments



Cohort:

- 86 consecutive patients (172 knees) over 15 years
- Mean age 65 (49 – 88)
- Two thirds were males

Results & Conclusion

Safety:

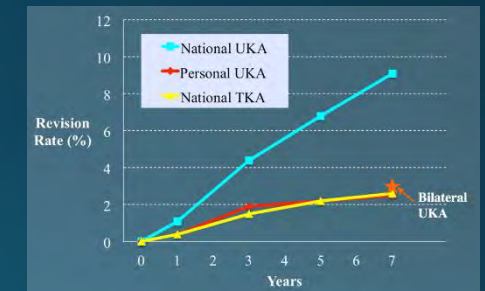
- No intra-operative complications
- One PE (treated successfully), one transfusion
- No deep infections or early deaths

Time:

- Tourniquet: 81min (56-120); 36% longer
- Hospital stay: 3.8 days (2-6) vs 2.8 days (1-6) for unilateral (less than cumulative for both knees)

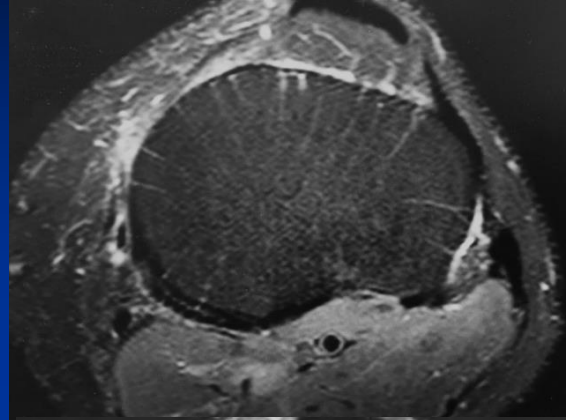
Outcomes:

- Same survival
- Mean OKS 43 at 12 months (18-point mean increase)

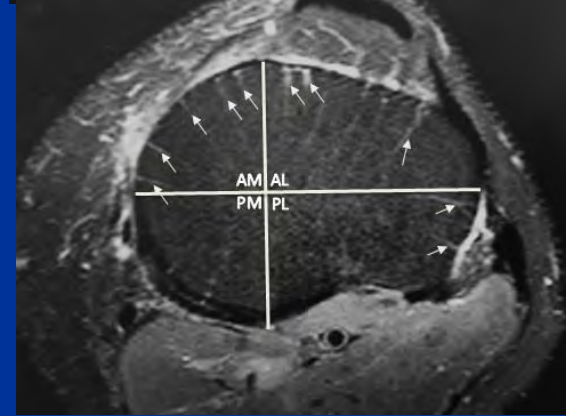


Conclusion:

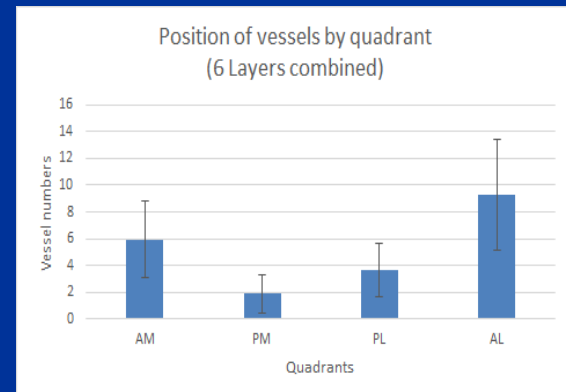
Bilateral truly “simultaneous” UKR is a safe, efficient and effective technique in treating patient with bilateral unicompartmental knee OA. It offers benefits to patients, surgeons, trainees and hospital health economics, with no increase in complications.



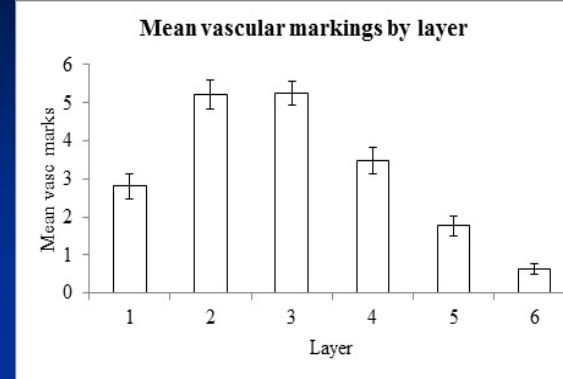
We noted these water bright vascular marks on MRI scans but found no previous description



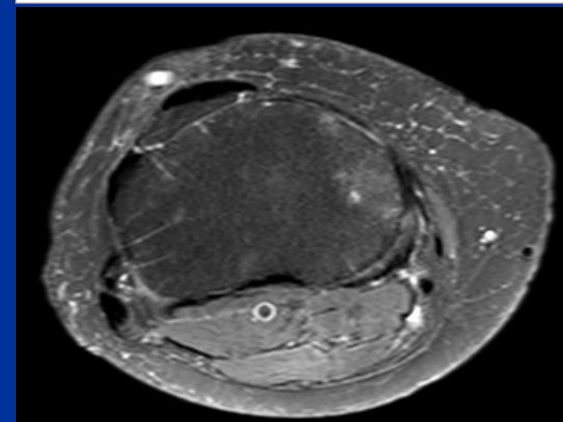
We counted the marks by quadrant and depth from the surface
56 patients 27m 29f
Age 53 (22-85)



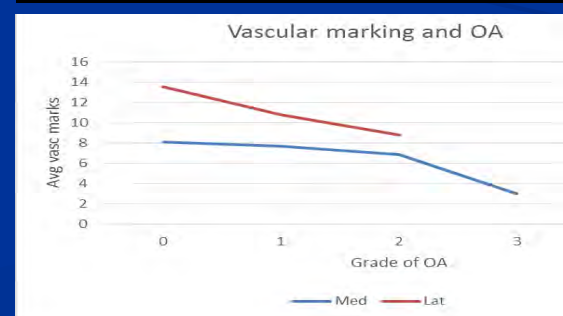
Marks by quadrant
More ant/lat
Fewer post/med



Presence of vascular marks by depth 0- 2cm below surface (3mm slices)



Marks absent in OA as shown here
medial OA in R knee



Kellgren-Lawrence grade on plain x-ray vs marks lost med $p < 0.001$
lat $p < 0.002$

Conclusion OA is probably a vasculo-mechanical disease
MRI scans change before plain x-ray



BRITISH
ASSOCIATION FOR
SURGERY OF THE
KNEE

Welcome

Welcome to the home page of the British Association for Surgery of the Knee.

The Association was set up in the early 1980's to represent the knee surgeons within Britain. Since then it has grown to become one of the largest surgical subspecialist organisations, which brings together knee surgeons with the single aim of improving their patient's care.

The Association provides a forum for research, education and advises on healthcare management for all aspects of knee surgery. For more information please follow the links to either the Public or Professional users sections of this website.

Public User

The British Association for Surgery of the Knee has created a website specifically designed for members of the public.

It has been written and will evolve to cover public and patient education material, as well as include information about accessing healthcare treatment concerning knee problems.

Follow the link below to enter the site.

Visit Site



Professional User

The British Association for Surgery of the Knee has created a website specifically for healthcare professionals.

This website contains publicly available material, including details of forthcoming meetings. It also contains material only available to members of BASK, which are accessible via a login.

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Do Unicompartmental Knee Replacements Enable A Superior Functional Performance?

A Single Blinded, Controlled Gait Analysis At Fast Walking Speeds And Steep Slopes

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Objectives:

Retrospective comparative studies have demonstrated superior gait patterns in unicompartmental knee replacement (UKR) over total knee replacement (TKR) patients. These findings have recommended UKR over TKR in unicompartmental knee arthrosis despite selection bias being a limitation to these claims. To objectively question these findings, a study of the gait of patients with both UKR and TKR was conducted. The null hypothesis was that patients with similar preoperative radiological disease severity with well positioned knee replacements of differing types (UKR & TKR) would demonstrate no functional gait advantage.

Methods:



A total of 16 subjects with both UKR and TKR were recruited after a 15 year database search from a tertiary institution. A group of unilateral anteromedial osteoarthritis patients and healthy controls, n=16 each, were also recruited to compare. Gait analysis was done on an instrumented treadmill at fast speeds and steep slopes. Replacement patients were included if they had both a primary UKR and TKR in situ. Patients were excluded if they had any other lower limb prosthesis or medical disorder which could compromise their gait. MatLab™ analysis was done with significance at $\alpha=0.05$.

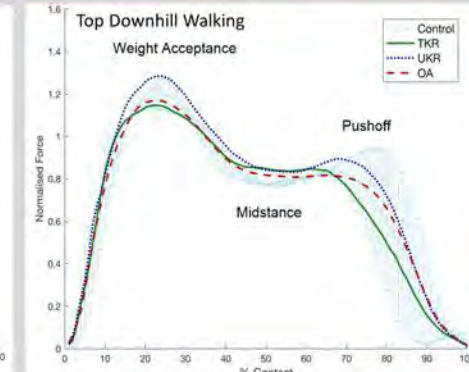
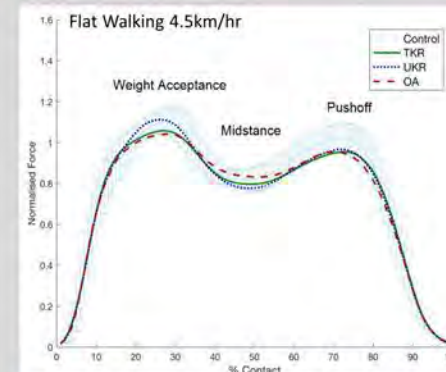


Results:

All three groups were matched demographically (Tables). All 16 knee replacement patients had medial tibiofemoral osteoarthritis with similar Kellgren Lawrence grade (mode of 3 bilaterally). The mean time from knee replacement operation to gait assessment was 39 and 45 month for UKR and TKR respectively. The gait pattern of the groups at varying slopes can be seen in graphs below, showing more physiological gait loading ($p<0.05$) on the UKR side.

Subject	Control	UKR/TKR	OA/Normal
Sex M:F	6:10	7:9	7:9
Age (yrs)	66 (50-85)	70 (55-84)	66 (52-78)
BMI	27 (20-35)	30 (24-35)	30 (24-40)
Height (cm)	166 (155-181)	168 (152-188)	171 (161-186)

Subject	Control	UKR/TKR	OA/Normal
Top Speed (km/hr)	7.1 (6.0-8.0)	5.9 (4.9-7.5)	6.1 (4.8-6)
Pre-op OA Severity	NA	3 (2-4) vs 3 (2-4)	3 (2-4)
Follow-up (months)	NA	39 (8-108) vs 45 (8-180)	NA
Laterality	NA	7 vs 9	NA
Oxford Knee Score	NA	41 (37-48)	21 (15-30)



Conclusions:

This small case-control gait study is the first to assess patients with different knee replacements on each side. The aim of this study was to determine if implant design affected gait performance. Interestingly, irrespective of speed and slope, the gait pattern of the UKR side resembled controls more than the TKR. This preliminary report confirms better function can be achieved with UKR for unicompartmental knee arthrosis.

The Impact of Diabetes on Infection Rates in Orthopaedic Joint Replacement Surgery

(0023)

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VijayasingamD@Cardiff.ac.uk
Mr Simon White, Cardiff and Vale Orthopaedic Centre

Objective: To evaluate the adherence and effect of the new set of guidelines recently established by the Cardiff and Vale Orthopaedic Centre (CAVOC) with a focus on the impact diabetic control has on infection rates.

Introduction:

- Over the next decade the projected exponential rise in obesity is predicted to increase the prevalence of diabetes by greater than 50%.
- Diabetes is a risk factor for post-operative infections. Not only do infections add to costs for the NHS, they also increase a patient's length of stay and can lead to adverse health.
- Previously, data on infections was collected in England for inpatients only which gave disproportionately low rates but now readmissions due to infection are included also. Despite this, a vast amount of SSIs are still treated in outpatients or GP practices so this suggests wider surveillance is key.
- Recent guidelines by the department have stated that an HbA1c of less than 69 mmol/mol (8.5%) should be targeted prior to surgical referral - this has been reduced from the previous value of 75 mmol/mol (9%).
- There has been conflicting evidence regarding glycaemic control, measured by HbA1c, and its effect on patient outcomes.

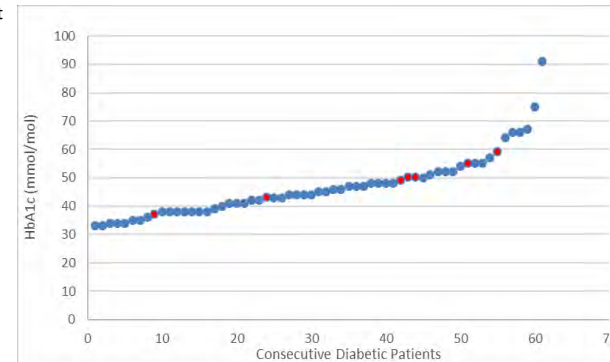
Figure 1. Preoperative HbA1c Values in Diabetic Patients with and without infection (• = cases of infection)

Variable		All patients (n = 321)	Percentage with infections
Sex	Male	124	5.7
	Female	197	3.6
Age	≥65	217	4.2
	<65	104	4.8
HbA1c	≥7% (53 mmol/mol)	12	16.7
	<7%	49	10.2
Presence of Diabetes	Diabetic	61	11.5
	Non-Diabetic	260	2.7

Table 1. Percentage of patients with infections with preoperative variables

Methods:

- Gaining an insight into the function of the CAVOC and examining historic infection rates in the department.
- Undertaking background reading of relevant studies regarding diabetic control and infection rates in total hip and knee replacements.
- Completing a retrospective case-control study for a 3-month period to determine the impact that HbA1c has on infection rates.



Discussion:

- In order to completely determine the relationship between HbA1c and the outcomes for patients, a prospective study would need to be utilised with the confounding variables controlled.
- However, the 7-week length of the project meant that a prospective study was not feasible as it leaves a short window for an infection to develop and then be followed up.

Conclusion:

- A positive outcome of the study is that the results were utilised by the microbiology team who stated that they had reduced infection rates. To further the study, the different types of infections could be analysed also.
- One aspect for the future is that since the preoperative HbA1c has been reduced, it would be useful to focus on whether there is a significant difference in infection rates for the HbA1c values that are near the threshold.
- This is particularly relevant as there is still insufficient trial data to recommend an upper limit for the HbA1c preoperatively.

Acknowledgements: Thank you to the Cardiff and Vale Orthopaedic Centre for supporting this study.

Results:

- The relative risk shows that diabetic patients with an HbA1c ≥7% have a 1.63 times higher risk of post-operative infection compared to those with an HbA1c <7%.
- The table also shows that in the diabetic cohort 11.5% of patients contracted infections and in the non-diabetic cohort this value was considerably lower at 2.7%.
- The graph shows that there is increased incidences of infection as the HbA1c value rises.

HbA1c	Infection	No infection	Totals
HbA1c ≥7%	2	10	12
HbA1c <7%	5	44	49
Relative Risk:			1.63

Table 2. Relative risk calculation

Stability and advanced kinematics of gait in patients with knee osteoarthritis (0024)



¹Tawy, G.F., ²Simons, M.R., ¹Rowe, P.J., ³Biant, L.C

¹University of Strathclyde, ²University of Edinburgh, ³University of Manchester – gwenllian.tawy@strath.ac.uk



Introduction

- Knee osteoarthritis (OA) affects the form and function of the affected joint.
- Walking stability can become compromised, affecting patient confidence and mobility.



Aim

Quantify walking stability in patients with knee OA by analysing the variability of kinematics during gait.

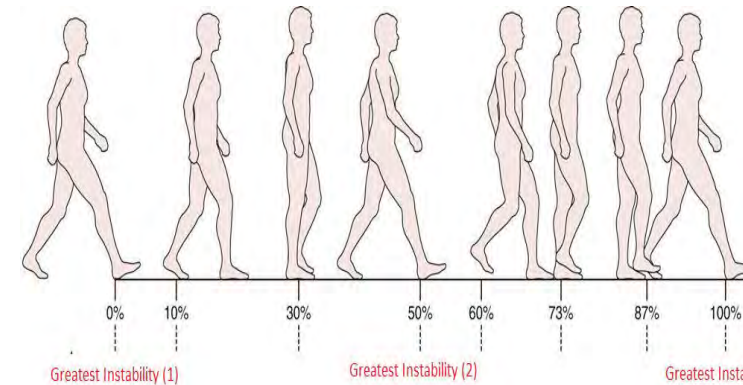
Methods



Fig.1: Setup used to record data

- 50 adults walked on a self-paced treadmill for 2 minutes (Fig.1).
- Motion capture technology was used to record kinematic data (Fig.1).
- A mathematical model was used to analyse the variability.

Results



Greatest instability (most variability) occurred during initial contact and terminal stance (Fig.2).

Fig.2: The times at which centre of mass stability was least stable during gait.

- Active extension of the knee joint to approximately 5° is required during these gait cycle events.
- The events are therefore quadriceps dependent.

Conclusion

1. This study identified and quantified components of the gait cycle where patients with knee OA are most unstable.
2. Employment of this technique may allow specific personalised prescription for prehabilitation and rehabilitation.

The Correlation Between PROMs and Advanced Biomechanics in Knee Osteoarthritis (0025)



¹Tawy, G.F., ²Simons, M.R., ¹Rowe, P.J., ³Biant, L.C
¹University of Strathclyde, ²University of Edinburgh, ³University of Manchester – gwenllian.tawy@strath.ac.uk



Introduction

- Patient reported outcome measures (PROMs) are used to assess joint function in knee osteoarthritis (OA)
- Dynamic knee function cannot be assessed through the use of PROMs alone.

Aim

Investigate the correlation between frequently used PROMs and advanced biomechanics in patients with knee OA

Table 1: Mean PROMs scores.

Variable	Mean ($\pm$ SD)
OKS	22 $\pm$ 7
SF-12	30.19 $\pm$ 8.22

Table 2: Mean functional assessment results.

Variable	Mean ($\pm$ SD)
ROM	102.9 $\pm$ 22.3°
Extensor Strength	160.9 $\pm$ 69.2N
Flexor Strength	57.1 $\pm$ 39.3 N
Walking Speed	0.33 $\pm$ 0.10m/s

Methods

- 50 adults completed Oxford Knee Score (OKS) and SF-12 PROMs.
- Knee ranges of motion (ROM), strength and walking speeds were recorded with motion capture technology.
- Clinical significance: $r > 0.4$ & $p < 0.05$.

Results

- No correlations were clinically significant.
- The strongest correlation (Fig.1) was between the functional SF-12 score and maximum extensor strength ($r = -0.295$, $p = 0.038$, Pearson Correlation).

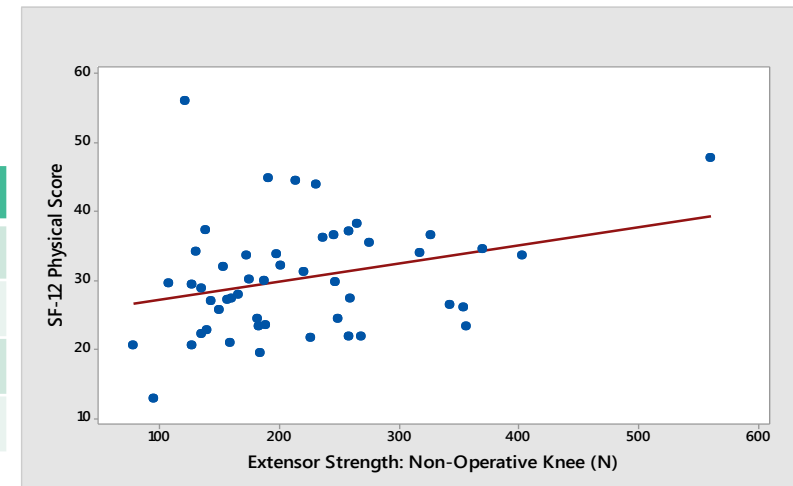


Fig.1: Relationship between max extensor strength and physical score of SF-12

Conclusion

- OKS and SF-12 are unsuitable for assessing function in knee OA.
- PROMs should only be used to supplement information collected during functional assessments.

Optimal Interference for the Cementless Oxford Partial Knee Tibial Component

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(0027)

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Introduction

Cementless unicompartmental knee replacement (UKR) has better fixation than cemented with a lower incidence of tibial radiolucent lines. However, a cadaver study has suggested that the risk of tibial plateau fracture may be higher. The interference between the tibial component keel and the keel slot in the tibia is likely to influence both the fixation and the risk of fracture. The aim of this plastic bone study was to identify the optimal interference fit by measuring the force requisite to seat the component (push-in force), which is likely to be related to the risk of fracture, and the force required to remove the component (pull-out force), which is related to primary stability.

Materials and methods

Interference was defined as the difference between the maximum width of the keel and the width of the keel slots (*fig. 1*), which were prepared on solid and porous Sawbones blocks. A testing machine was used to implant and extract cementless Oxford UKR tibial components, whilst measuring the push-in and pull-out forces (*fig.2*). A range of interferences from 0.1mm to 1.9mm were tested.

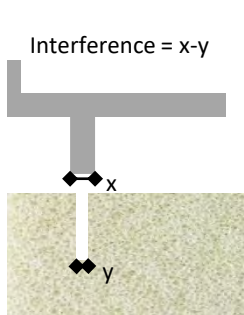


Fig.1: interference fit

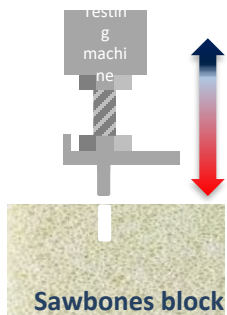
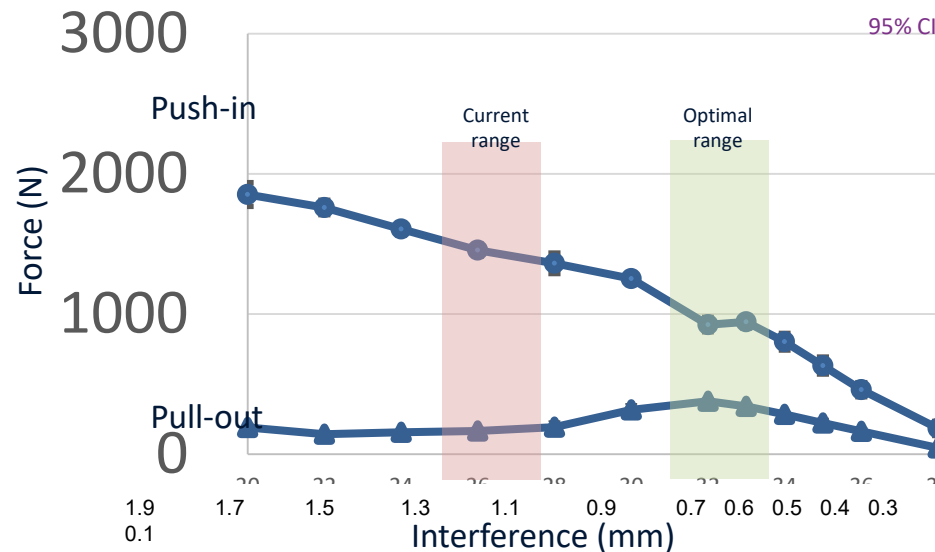


Fig.2: testing machine

Results

The push-in force progressively increased with increasing interference. The pull-out force was related in a non-linear fashion to interference. The highest pull-out force (380N, SD 24) was obtained with an interference of 0.7mm. The pull out force decreased with higher interference. In current clinical practice the interference is about 1.1 mm. Compared to this, interferences of 0.7mm, 0.6mm or 0.5mm had push-in forces that were reduced by up to 45% ($p < 0.001$) and comparable pull-out forces ($p > 0.05$).



Conclusions

- The ideal interference fit for the cementless Oxford knee ranges from 0.7 - 0.5 mm
- Decreasing the interference fit of the keel of the cementless reduces the push-in force up to 45%, without diminishing the pull-out force
- A decrease in the push in force could reduce bone damage and the risk of fracture
- The test needs to be repeated on cadaveric/animal bone to confirm the results

[0031] The interaction of caseload and usage in determining outcomes of unicompartmental knee arthroplasty: A meta-analysis of published series

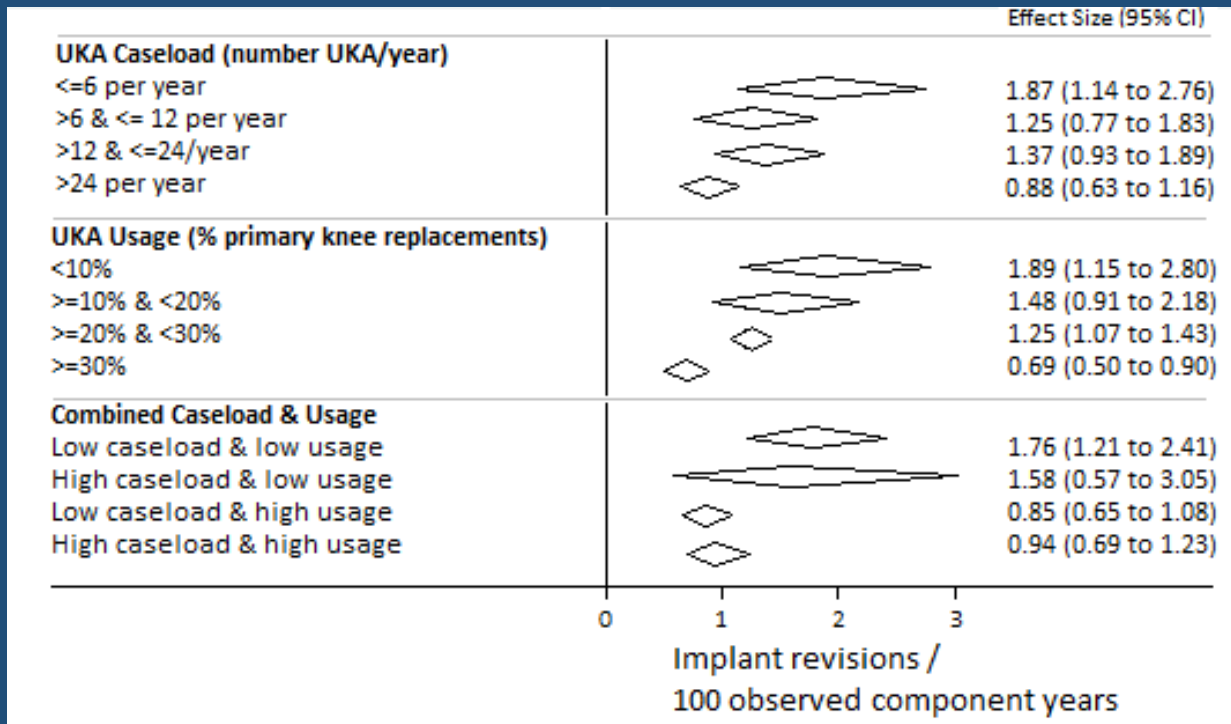
Hamilton TW¹, Rizkalla J¹, Kontochristos L¹, Marks B¹, Mellon S¹, Dodd CAF¹, Pandit HG^{1&2} & Murray DW¹

¹University of Oxford & ²University of Leeds

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- Searches identified 46 studies (12,520 knees) reporting consecutive series of cemented Phase 3 Oxford medial UKA.
- The annual revision-rate varied from 0%pa to 4.35%pa, mean 1.21%pa (95%CI 0.97-1.47).
- In series with mean follow-up of ten-years or more the revision-rate was 0.63%pa (95%CI 0.46-0.83), which equates to a ten-year survival of 94% (95%CI 92%-95%).
- Aseptic loosening, lateral arthritis, bearing dislocation & unexplained pain were the predominant failure mechanisms with revision for PFJ problems and wear rare (<0.1%).
- Both increasing caseload ($p=0.02$) and usage ($p<0.001$) were associated with decreasing revision-rate.
- Usage was more important than caseload: with high-usage ($\geq 20\%$) the revision-rate was low, whether the caseload was high (>12 UKA/year) or low (≤ 12 UKA/year); whereas with low-usage ($<20\%$) the revision-rate was high, whether the caseload was high or low.



Conclusion: To achieve optimum results with mobile-bearing UKA surgeons, whether high or low-caseload, should perform $\geq 20\%$ of their knee replacements as UKA. If they do this then they can expect to achieve results similar to those of the long-term series, which all had high-usage ($>20\%$) and an average ten-year survival of 94%.

An Economic Evaluation of Unicompartmental Compared to Total Knee Replacement: Analysis Using Large, Matched, Routinely-Collected Observational Data from the UK (0032)

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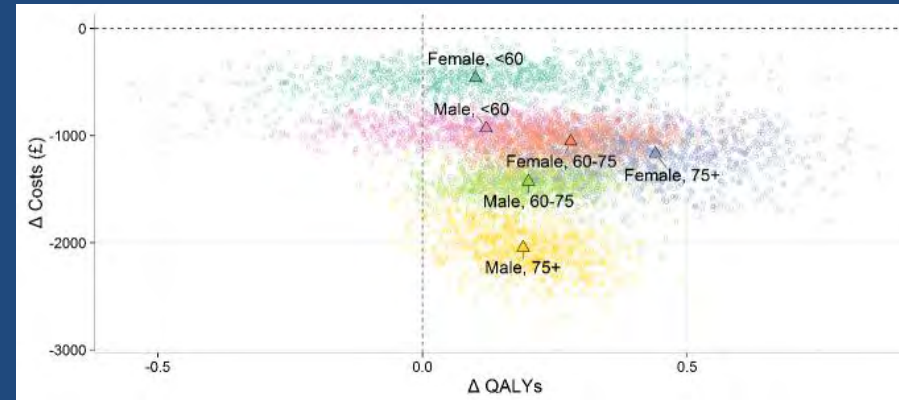


Introduction:

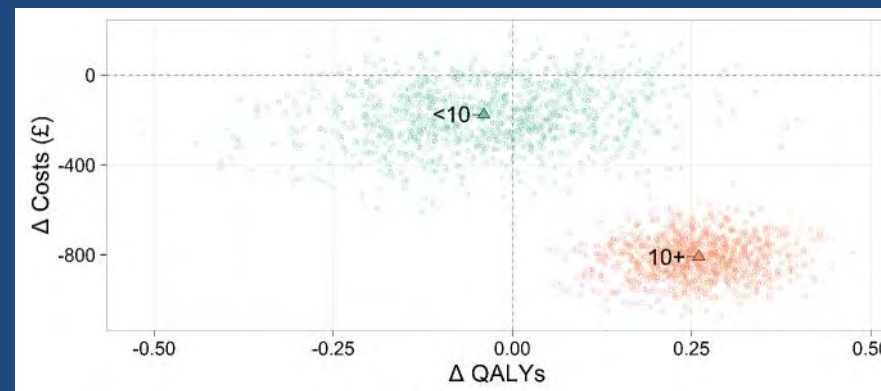
- Up to 50% of patients eligible for TKR could have UKR instead.
- This study assessed which procedure was cost-effective for such patients.

Methods:

- A lifetime Markov model was informed by routinely collected data.
- Propensity score matching was used to identify comparable patients who had UKR or TKR.
- Transition probabilities and hospital costs were informed by over 100,000 knee replacements. Patient-reported quality of life and primary care costs were based on close to 15,000 and 1,500 individuals respectively.



Cost-effectiveness plane for age and gender subgroups



Cost-effectiveness plane for surgeon usage subgroups

Results:

- For all age and gender subgroups UKR provided better clinical outcomes at lower cost than TKR although there was some uncertainty particularly in the young.
- For surgeons with low UKR usage (<10% of knee replacements as UKR, median 6%) the clinical outcome of UKR was worse than TKR.
- For surgeons with high UKR usage (>10%, median 27%) the clinical outcomes were better and the cost less, and there was very little uncertainty.

Conclusions:

Based on routinely-collected NHS data

- UKR provides better lifetime clinical outcomes and lower costs than TKR.
- Surgeons who do <10% of their knees as UKR should apply the indications and techniques of current high usage surgeons.

Predicting kneeling ability after partial and total knee replacement (0035)

P. Craig, P. Gallacher, S White, A Smith, A Barnett.
Robert Jones and Agnes Hunt Orthopaedic Hospital



Introduction

Kneeling is a basic human function and is a pertinent –but often overlooked–outcome for patients considering knee arthroplasty. The ability to predict kneeling after TKR/PKR would improve the preoperative consent and counseling process. This study aimed to assess kneeling in PKR and TKR and to identify simple clinical factors that would predict post-operative kneeling ability at 1 year follow up.

Method

Sample size satisfied β 0.8, significance: α 0.05. 162 patients (80 TKR, 82 PKR-all medial) operated on 2012-14 with 12 month minimum follow up. Exclusion criteria : death, peri-prosthetic infection, any cause revision. Implants; PKR - Oxford Partial Knee (Biomet) TKR - PFC-Sigma (Depuy Synthes). Data recorded pre and post operatively at 12 months; demographics, body mass index (BMI), range of movement (ROM), fixed flexion deformity (FFD), oxford knee score (OKS) and kneeling ability (Question 7 of OKS). Statistical analysis SPSS v21 (IBM).

Results

BMI was significantly higher in TKR group. ROM was significantly higher in PKR. PKR patients' achieved significantly higher 1 year OK 39.5 (21-48) than TKR 38.4 (16-48). Ability to kneel after PKR was superior to TKR at 12 months. Correlation and regression analysis demonstrated that **pre-operative kneeling ability was the single best positive predictor of post-operative kneeling at 12 months**. The presence of a fixed flexion deformity was a negative predictor of kneeling in PKR.

OKS Q7	UKR Pre op	UKR Post op	TKR Pre op	TKR Post op
0	42	4	37	12
1	34	15	23	21
2	6	14	2	17
3	0	24	0	22
4	0	23	0	0

Discussion

These results suggest that whilst both implants impart improvement from baseline knee function those receiving a PKR achieve a superior level of range of motion and kneeling ability. Regardless of implant, the reported ability to kneel pre operatively is the single best predictor of achieving similar post surgery. The presence of a fixed flexion deformity in those considered suitable for UKR should warrant a more guarded opinion regarding kneeling.

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A novel design of metal interference screw can improve ease of insertion while maintaining fixation (0036)

Kiron Athwal,¹ Breck Lord, Piers Milner, Alex Gutteridge and Andrew Amis



¹The Biomechanics Group, Department of Mechanical Engineering, Imperial College London, Email: k.athwal12@imperial.ac.uk

- New screw (Quick-Start, QS) for ACL reconstructions designed to insert into bone tunnels more easily than conventional interference screws (IS)



- **Cadaveric study** with 10 knees to compare fixation strengths of the QS and the IS
- *No difference found between QS and IS in graft slippage from tunnel under cyclic loading as well as graft pull-out load*

- **Sawbone study:** ten surgeons inserted QS / IS into bone-substitutes to compare insertion loads
- QS required *less axial force and fewer turns to engage into bone tunnel* than IS
- 90% of screws blindly identified by the surgeon as easier to insert were the QS



- The QS found to be **easier to insert** than the IS, whilst **still achieving similar immediate post-surgery fixation strength**
- This suggests that *screw designs can be improved to reduce likelihood of graft damage on insertion*

Kneeling after knee replacement – what do our patients REALLY think? (0037)

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Introduction

The ability to kneel following knee replacement surgery is not reproduced to the same extent as pain relief nor is it an area of knee function that is focussed on by outcome scores. The loss (or gain) of kneeling can be completely life changing for the individual patient concerned. This study set out to improve our understanding of the impact of knee replacement surgery on kneeling ability in our patients via the use of a questionnaire.

Method

An 8-section questionnaire was developed and distributed to 162 patients (82 PKR- Oxford medial, 80 TKR PFC Sigma) operated on at our institution between 2012 and 2014 with a minimum of 12 month follow up. Questions included; ability to kneel both pre and post operatively (yes /no), perceived reasons for any inability to kneel, time taken to first kneel comfortably after surgery and the surfaces upon which kneeling was then possible (e.g. cushion (very soft) , carpeted or linoleum flooring, grass and concrete (very hard)). The impact of any inability to kneel on quality of life was assessed through a free text response.

Results

Responses received from 45 TKR, 40 UKR. Approximately 40% of all patients retained an ability to kneel whilst 15% failed to gain any kneeling at 12 months. A “new” kneeling ability was gained in a third of all cases but was lost in 17% of TKR and 15% of PKR. Comfortable kneeling first occurred after mean of 7 months. The hardest tolerated surface for both implants types was “Hard”. Half of kneeling TKR patients were able to do so on “Hard or Very Hard” surfaces compared to 65% of PKR. Anterior knee pain and altered sensation in the kneeling triangle were the most restrictive factors to kneeling. The impact of inability was varied – but included a loss of ability to work, perform household chores/ DIY/hobbies.

Discussion

These results show a trend to achieve or maintain kneeling in over half of patients at a minimum of 12 months follow up regardless of implant used. The majority of kneeling was only possible after 7 months. Unfortunately **over 10% of patients cited a lost kneeling ability as a direct consequence of their surgery** with significant impacts on employment and quality of life.

Virtual Knee Arthroplasty Clinic; 5 year follow up in a district general hospital.

R Fisher, F Khatun, S Reader, V Hamilton, M Porteous and A Dunn
West Suffolk hospital, Bury St Edmunds (0040)

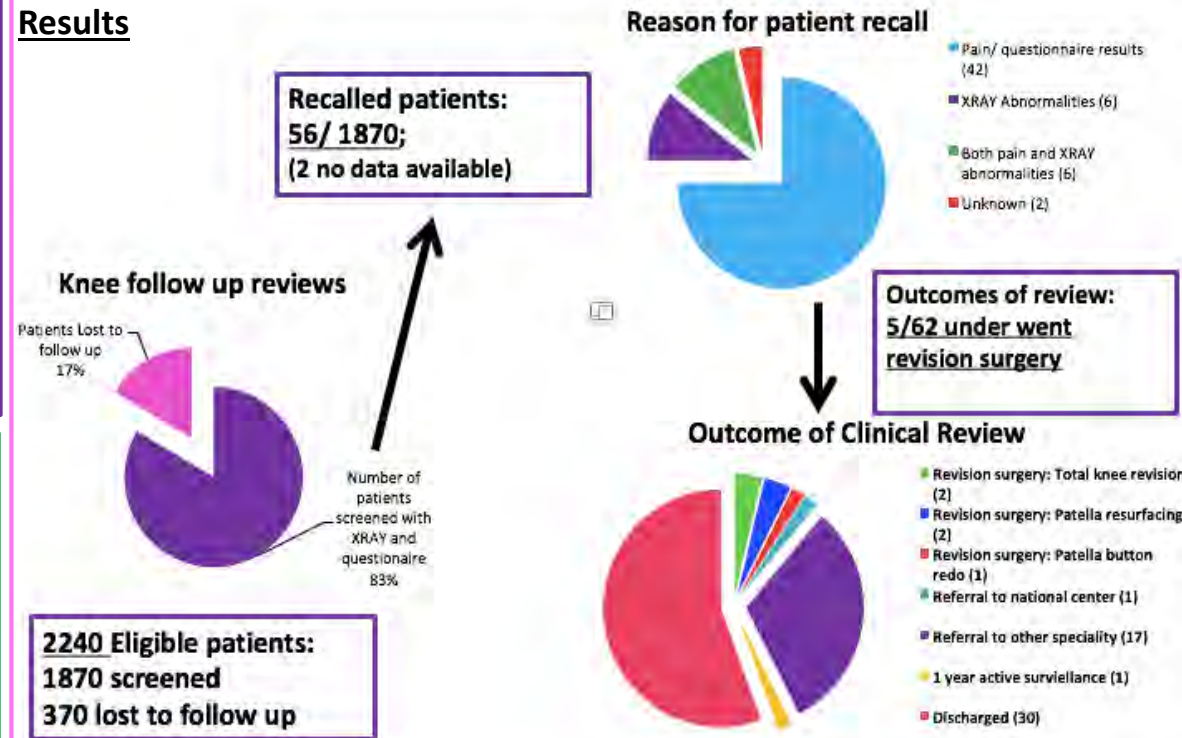
Introduction

Follow up of elective knee arthroplasty patients has been advocated to identify those patients with asymptomatic loosening. Regular clinic follow up leads to both financial and time implications. Assessment through virtual means has been endorsed by the literature and the BOA as an alternative to physical clinic reviews in arthroplasty patients.

Methods

In our institution 'virtual follow up' via a patient questionnaire (Oxford knee score) and x-ray is scheduled at 5 yearly intervals from 5 years post op after an initial questionnaire at year 1. Both results are then assessed by an arthroplasty surgeon and patients who give cause for concern, either radiologically or in outcome measurements are recalled to a clinic appointment. Using a locally compiled databased we identified all patients reviewed 'virtually' between 2011-2015. We reviewed the patients recalled notes and x- ray's and the rationale prior to establishing the outcome of their recall.

Results



As a result of the virtual review process **1814** clinic appointments were avoided, equivalent to over 300 hours of clinic time.

No patient undergoing a knee revision in the period under review had a problem that was missed in a Virtual assessment.

Conclusions

A virtual arthroplasty clinic not only significantly reduces the number of patients attending regular follow up clinics without compromising patient safety but identifies patients who may need referral to other subspecialty pathways.

References:

Baxter JA, Courtman NH. Patient perception of follow-up review after hip and knee arthroplasty. Ann R Coll Surg Engl 2015; 97:E5-8
British Orthopaedic Association. Primary Total Hip Replacement: A guide to good practice. BOA Nov 2012



Tourniquet use in TKR: A Potential Predictor of Postoperative Pain Score

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(Abstract Reference:- 0042)

Circle Healthcare, Bath



ABSTRACT

The aim of this study was to compare two groups of patients that have undergone a TKR. To look at specifically the effect of limited versus tourniquet use and the effects on the post-operative pain score, length of stay and muscle function

METHODS

- One hundred and fifty consecutive patients who underwent TKRs were included.
- Patients were allocated to two groups, Group A, with the limited use of
- tourniquet and Group B, with tourniquet applied for the duration of the surgery.
- Group A consisted of 103 patients, with 46 males and 57 females. The patient's age's ranged between 42 and 89, with an average age of 69 (+/-9.59) years. Mean Body Mass Index (BMI) of the patients in, group A was 28.8 (+/- 4.76).
- Group B consisted of 48 patients, with 16 males and 32 females. Mean age of group B was 69 (+/- 9) years, with a range between 45 to 86 years. Mean BMI of 29.3 (+/-4.2) was recorded for the full tourniquet group.

RESULTS

- Flexion was recorded twice daily until discharge.
- In Group A, day 1 am mean ROM was 68.8 (+/- 20.2) degrees. Day 1 pm, 72.25 (+/-17.01) degrees and Day 2 am, 78.11 (+/- 13.1) degrees. Day 2 pm, 81.21 (+/- 11.08) degrees and Day 3 am 84.34 (+/-7.7) degrees. Day 3 pm mean flexion was 82.5 (+/- 6.34) degrees.
- In Group B, mean flexion day 1 am, was 68.15 (+/- 17.93) degrees. Day1 pm mean flexion 76.58 (+/- 15.42) and day 2 am, 79.76 (+/-13.38) degrees. Day 2 pm, mean flexion was 84.84 (+/-7.12) degrees. Day 3 am, mean flexion was 82 (+/- 9.92) degrees and pm was 85.90 (8.60) degrees. The difference between the two groups was not thought to be significant,
- Haemoglobin was also measured pre and post op .In group A, Mean change in Hb was 24.97 (+/- 9.18)g/l. In group B Mean change in Hb was 25.78 (+/-9.84) g/l. Statistically, the difference was not significant, with a p value of 0.6287.
- Pain scores for Group A were taken on daily basis, we utilised the visual analogue score 0-3, 0 indicated no pain, 1 mild pain, 2 moderate and 3 severe pain. Mean Day 1 scores of pain was recorded as 0.71 (+/- 0.63), day 2 0.96 (+/-0.85) and day 3 0.83 (+/- 0.79). Day 4, 0.49 (+/0.53) and day 5 0.30 (+/- .46).
- Group B, mean pain score for Day 1 was 1.21 (+/-1.06) and day 2 1.52 (+/- 0.50). Day 3 pain scores demonstrated a mean of 1.00 (+/-0.65) and Day 4 1.12 (+/- 0.64).
- Day 1 scores demonstrated a p value of 0.0011, day 2 a p value of 0.0001 was found.
- This demonstrated that the difference found on the first two days post operatively is of significant value. Day 3 pain scores had a p value of 0.4500 and therefore are not thought to be significant.

CONCLUSIONS

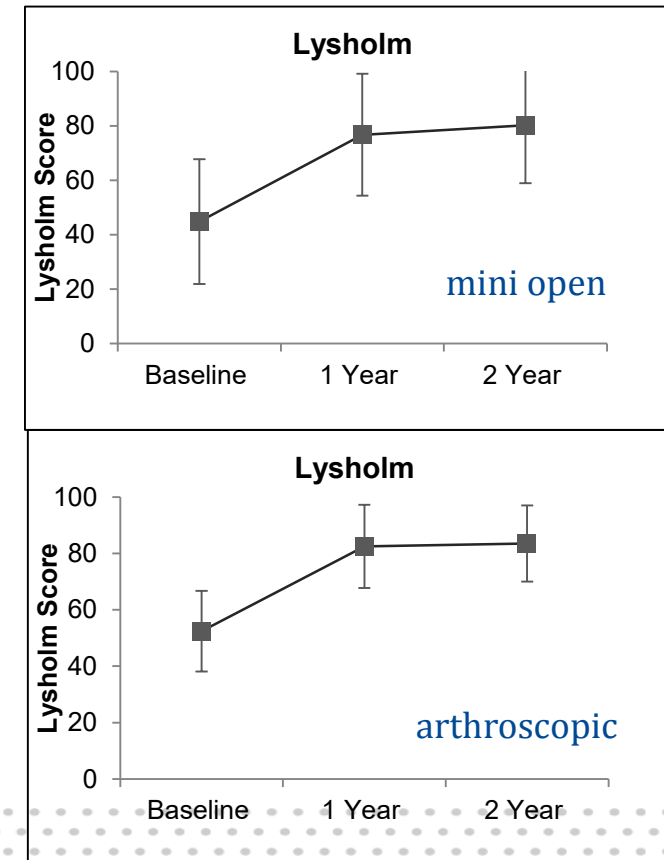
Our results have demonstrated that the limited use of tourniquets for primary total knee arthroplasty surgery is safe and provides the benefit of a reduced pain score, particularly in males with no increase in overall blood loss. pain score, particularly in males with no increase in overall blood loss.

Outcome of arthroscopic AMIC for the treatment of articular cartilage defects in the knee joint is equivalent to mini-open procedures (0044)

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University Hospital of Schleswig-Holstein, Campus Luebeck
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Material/Methods:
case series (n=30)
group 1: mini-open (n=20), group 2: arthroscopic (n=10)
autologous, matrix-induced chondrogenesis (AMIC) in the knee
follow-up: 2 years

Results:
no significant differences in group 1 and 2 comparing results
(Lysholm, KOOS and VAS score)

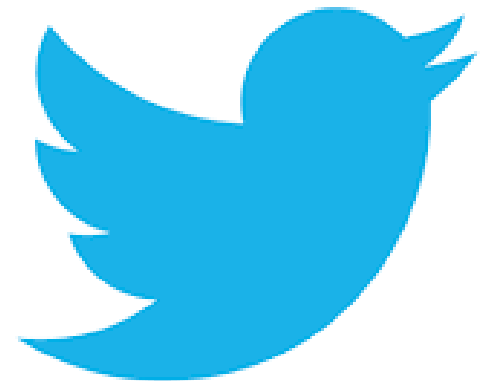


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IMPROVED EARLY FUNCTIONAL OUTCOME WITH THE ATTUNE TOTAL KNEE REPLACEMENT: A PROPENSITY SCORE MATCHED TRIAL (48)

ND Clement, IJ Brenkel, PJ Walmsley (email: pw38@st-Andrews.ac.uk)

Department of Orthopaedics, Victoria Hospital, Hayfield Road, Kirkcaldy

Aim

Attune



PFC Sigma



Vs.

Methods

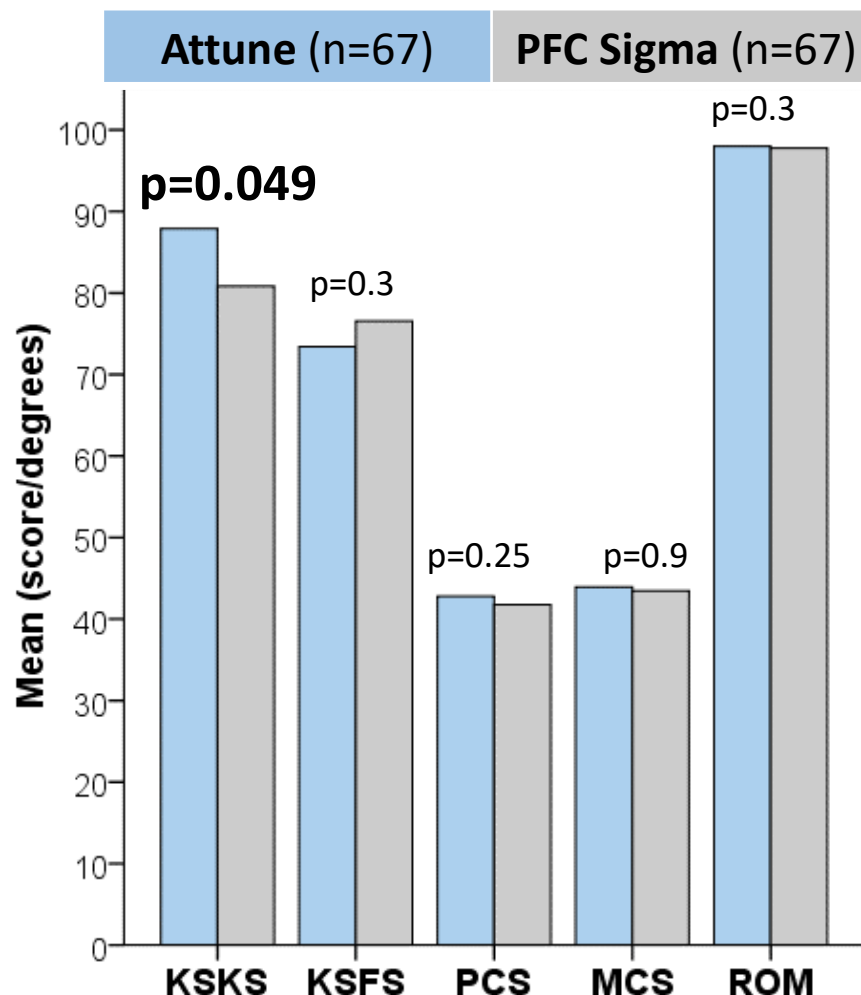
Propensity score matched for:

- Patient demographics
- Pre-operative functional scores

One year outcomes assessed:

- Knee Society Knee Score (KSKS),
- Knee Society Functional Score (KSFS),
- Short Form-12 score
 - Physical (PCS) Mental (MCS)
- Range of movement (ROM)

Results



- No difference in pre-operative demographics or functional scores between groups
- **Attune group had a greater improvement in the KSKS** (difference 8.4, 95% CI 0.1 to 16.7, p=0.049)
- No difference in KSFS, PCS, MCS, or ROM according to group

Conclusion

Attune offers a greater improvement in objective knee specific function at one year when compared with the PFC Sigma

The Effect of Mal-position or Mal-Rotation of Posterior Sloped Proximal Tibial Resection Jigs in Total Knee Arthroplasty

Vachtsevanos L., Veravalli K., Davies AP. **(0051)**
e-mail: Leonidas@doctors.net.uk

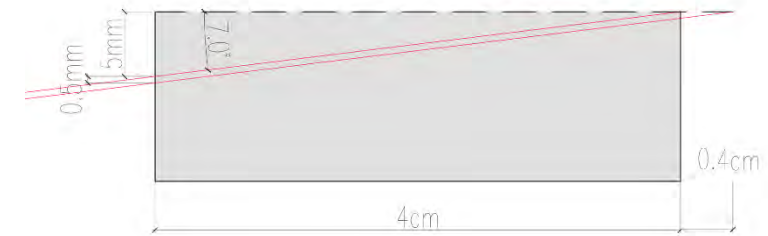
Alignment of implanted components in knee replacement is crucial to the success of the operation. The five most commonly implanted primary total knee replacement systems in the UK currently employ cutting jigs that have between 0 and 7 degrees of posterior slope for the tibial cut. We investigated the effect of malposition of the tibial cutting jig either by mal-rotation and its effect on varus – valgus alignment or by depth of resection caused by the jig being translated anteriorly away from the bone edge at the time of resection.

We have applied trigonometric calculations on a 4cm diameter cylindrical tibial model to generate the outcome data for component malposition.

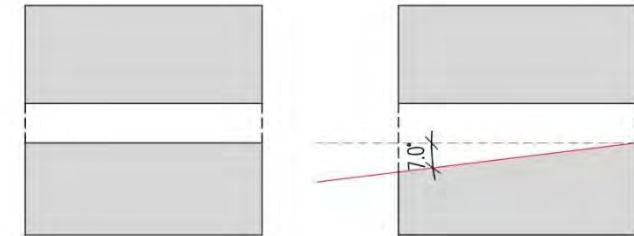
Using a 3-degree posterior slope cutting jig (PFC CR, Genesis 2, Triathlon) translated anteriorly by 10% of the tibial diameter results in increased resection depth of 0.2mm. A 3-degree posterior sloped cutting jig placed in 10 degrees of mal-rotation results in 0.33 degrees of coronal malalignment.

A 7-degree cutting jig (Nexgen) translated anteriorly by 10% of the tibial diameter results in 0.5mm of excess resection. A 7-degree posterior sloped cutting jig placed in 10 degrees of mal-rotation results in 0.78 degrees of coronal mal-alignment.

The Vanguard system uses zero degree cutting guides with slope being built into the implant.



Sagittal view of 5mm tibial resection with 7° posterior slope cutting jig. Additional 0.5mm resection upon anterior mal-position of the jig by 10% of tibial diameter (0.4cm) shown.



Coronal view of balanced gap in the absence of mal-rotation (left). 7° of varus introduced with 90° external rotation of the 7° posterior slope cutting jig (right).

7° posterior slope jig (Nexgen)

Mal-rotation	0°	10°	20°	30°	40°	90°
Coronal Malalignment	0°	0.78°	1.6°	2.3°	3.1°	7°
Anterior Mal-position	0%	10%	20%	30%	40%	50%
Additional Resection	0mm	0.5mm	0.9mm	1.4mm	1.9mm	2.4mm

3° posterior slope jig (PFC CR, Genesis II, Triathlon)

Mal-rotation	0°	10°	20°	30°	40°	90°
Coronal Malalignment	0°	0.33°	0.6°	1°	1.3°	3°
Anterior Mal-position	0%	10%	20%	30%	40%	50%
Additional Resection	0mm	0.2mm	0.4mm	0.6mm	0.8mm	1mm

The potential cutting errors appear to be clinically acceptable in the absence of serious jig translation and rotation.

Do patient PROM scores return to normal following knee replacement surgery?

[0052] Alastair Konarski, David S Johnson, Stockport NHS Foundation Trust, ajkonarski@doctors.org.uk

Introduction

Patient related outcome measure (PROM) scores usually improve following knee replacement surgery. Less is known about proportions returning to normal for the patient's age.

Methods

Retrospective TKR/UKR compared with 273 healthy volunteers¹

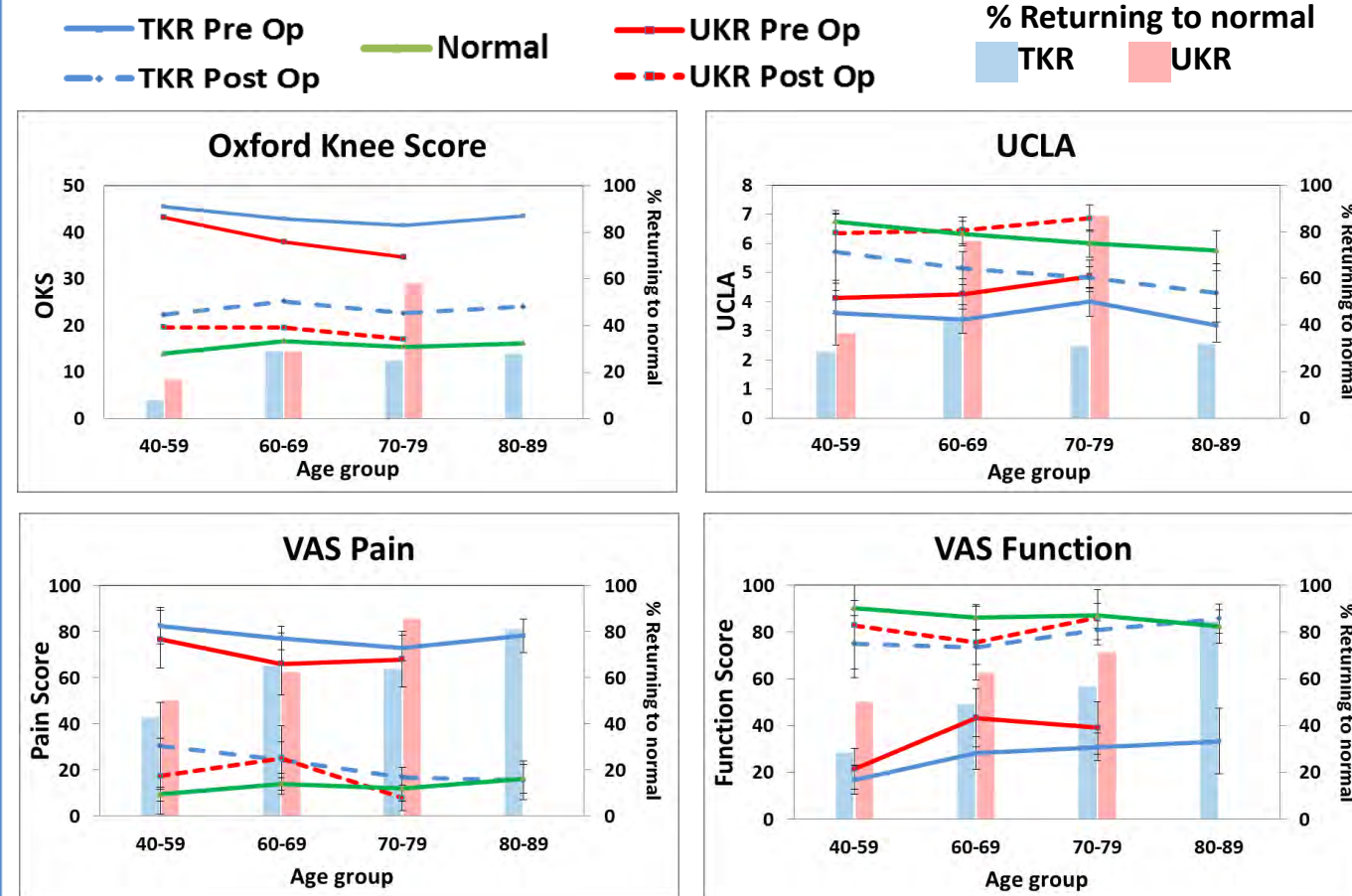
PROMS (272 pre-op / 308 post-op):

- Oxford Knee Score (OKS)
- UCLA Activity (UCLA)
- VAS Pain (VASP)
- VAS Function (VASF)

Analysed by age:

- 40-59/60-69/70-79/80-89

Results



Discussion

Post op score within 95% CI of healthy counted as return to normal. UCLA / VASF decline with increasing age.

Younger patients had a greater increase in post op scores, but were less likely to return to normal for age.

Those receiving UKR more likely to return to normal than those with TKR.

Conclusion

Results can be used to help counsel patients about likely post op outcomes.

1. Knee outcome scores – do we get patients back to normal? T Yarashi, J Rutherford, A Kapoor, S Anand, DS Johnson. JBJS[Br],2011;93BSuppl1:14

Can The Surgical Approach To Total Knee Arthroplasty Affect The Post-Operative Rehabilitation And The Time To Discharge? – A Comparison Study Between Trivector And Medial Para Patellar Approaches. (Abstract Reference:- 0058)

Gautam Reddy, Paula Stritch, Saif Ul Islam, David Teanby, Fahad Attar

Whiston Hospital, St Helens & Knowsley Teaching Hospitals NHS Trust, Liverpool, United Kingdom. Email: gautamreddy20@yahoo.co.uk

Background: Trivector approach to total knee joint arthroplasty is a quadriceps tendon sparing approach.

We postulated that quadriceps tendon sparing approach like Trivector should make post-operative rehabilitation easier compared to Medial Para Patellar (MPP) approach and ultimately reducing the length of hospital stay.

Objectives: To compare the outcome of Trivector approach with MPP approach for patients who underwent Total Knee arthroplasty.

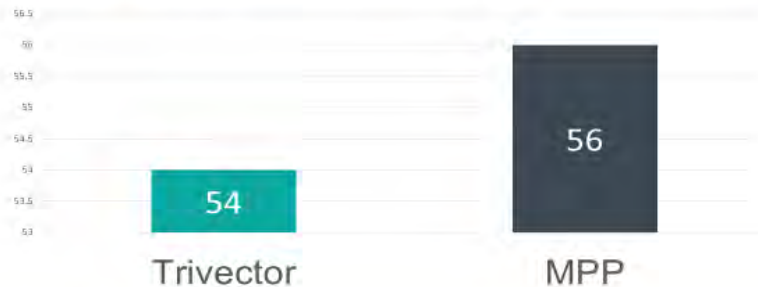
Methods: We prospectively reviewed the results of 50 consecutive patients operated on by two experienced knee surgeons, one routinely performs trivector and the other a MPP approach.

Both groups consisted of 25 patients each.

The types of anaesthetics, post operative analgesia & rehabilitation protocol were the same in both groups.

Results:

Average Surgical Time in minutes (p= 0.31)



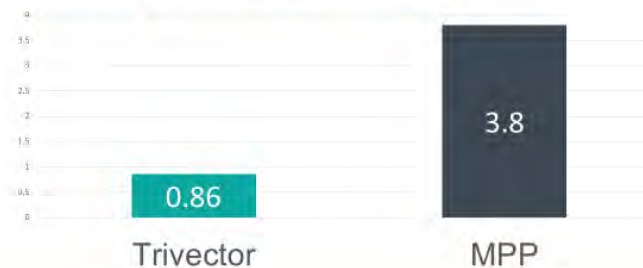
Mean Time taken to perform SLR in days (p= 0.003)



Average Knee Flexion (p= 0.199)



Average Extension at the Time of Discharge +0.86 Vs +3.8 (p= 0.007)



Average Hospital Stay in days (p= 0.11)



Conclusion:

From this study, we conclude that Trivector approach patients took significantly less time to do Straight Leg Raise (SLR) and achieved better range of extension before discharge from hospital compared to Medial Para Patellae (MPP) approach patients.

Although patients with trivector approach were discharged early by one day, it was not statistically significant.



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Meniscopexy - A Successful Treatment of the Discoid Meniscus (0061)

JMC Thomas, J Judd, KG Elliott MG Uglow. Southampton Children's Hospital joanna.thomas@uhs.nhs.uk

Introduction:

- We used a meniscopexy technique described by Roberts et al¹ whereby the anterior horn of the lateral meniscus is tensioned.
- Roberts' paper had medium term follow up for 7 patients all of whom had a complete resolution of symptoms at a mean of 4.9 years.

Method:

- We performed meniscopexy on a consecutive series of 14 patients: 9 females and 5 males with an average age of 10 years (range 5-16 years).
- follow up ranged from 3 months – 2 years.

Results:

- There was one revision due to failure of the fixation but the discoid meniscus was not re-torn. No-one has had any re-tears or is symptomatic.

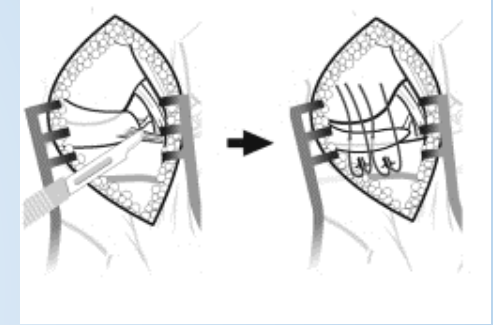
Discussion:

- The microstructure in a discoid meniscus is different to a normal one² but by reducing the intra articular volume and tensioning the free edge we think it prevents the morphological changes to the distal femur.
- Ha CW et al³ have demonstrated that the radiographic changes that occur in the distal femur in a patient with a discoid meniscus occur after 10 years of age.

Conclusion:

- Meniscopexy has the advantage that when performed early in a symptomatic knee if the discoid meniscus fails as it's natural history would suggest it will, the lateral femoral condyle will have a more "normal" shape which will not prevent the effective use of meniscal transplant at a later date.

Our centre is now using this technique routinely for symptomatic presentation of the discoid meniscus.



Meniscopexy (anterior horn transfer) for discoid lateral menisci.

Gilbert RE, Gallacher PD, Roberts AP.

[Ann R Coll Surg Engl](#). 2010 Apr;92(3):257.

¹ Meniscopexy (Anterior horn transfer) for discoid lateral meniscui. Gilbert RE, Galacher PD, Roberts AP. [Ann R Coll Surg Engl](#). 2010 Apr;92(3):257

² Arthroscopy. 2009 Mar;25(3):262-8 j.arthro.2008.10.006. Epub 2008 Histomorphologic study of discoid meniscus. Papadopoulos A, Kirkos GA. [Sure Sports Traumatol Arthrosc](#)

³ The utility of the radiographic condylar cut-off sign in children and adolescents with complete discoid lateral meniscus. Ha CW, Jang JW, Kim M, Lee, HJ, Park YB



CORRELATION OF MUSCLE STRENGTH AND GAIT STABILITY IN PATIENTS WITH END STAGE OSTEOARTHRITIS (0062)

Simons M.R.¹, Tawy G.F.², Rowe P.J.², Gleeson N.³, Biant L.C.⁴

¹University of Edinburgh, ²University of Strathclyde, ³Queen Margaret University, ⁴University of Manchester

Introduction

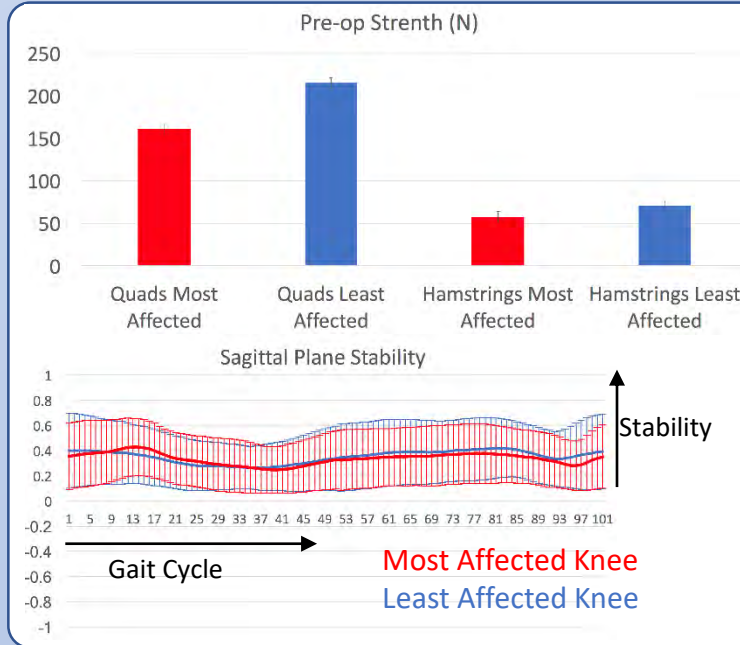
- Quadriceps and hamstring muscles groups play important role in knee mobility and stability.
- Pain inhibition results in disuse atrophy of surrounding muscles
- Knee osteoarthritis may lead to altered biomechanics

Aim

- Correlate peak quadriceps and hamstring muscle force with knee range of motion (ROM) and stability in gait.

Methods

- 50 Patients requiring TKR
- Pre-op Electromyography of Quads (RF & VL) and Hamstrings (BF & SM/ST)
- Peak muscle force, knee ROM and stability of gait recorded with bespoke motion capture system



Results

- Mean overall strength of quadriceps and hamstrings correlated with stability of gait.
- The most affected knee was on average weaker and less stable compared to the least affected knee.
- Isolated quadriceps strength did not correlate with knee ROM ($r < 0.5$, $p > 0.05$)



Dynamometer



Motion Capture System

Conclusions

- Targeted physiotherapy of specific muscle groups may improve dynamic stability and allow personalised rehabilitation

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4 points for Day 1

3 points for Day 2

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(0063) No Difference Between Aspirin or Dabigatran Venous Thromboprophylaxis in Primary Total Knee Arthroplasty

O’Mahony C, Williams M, McHale S, Hockings M – Torbay Hospital

CONTACT
comahony@nhs.net

Introduction

- Controversy exists regarding efficacy and cost-effectiveness of VTE prophylaxis after knee arthroplasty.
- A trust-wide policy proposed aspirin (150mg) as standard in April 2015, but is discordant with NICE recommendations (CG92)[1].
- We compared efficacy and safety outcomes for aspirin against a recent historical cohort on dabigatran

	Dabigatran	Aspirin
Number of joints	123	95
VTE investigations within 90 days (%)		
Venous duplex	6 (4.9)	4 (4.3)
CTPA	3 (2.4)	4 (4.3)
All VTE* events within 90 days (%)	2 (1.6)	0
DVT† (%)	0	0
PE‡ (%)	2 (1.6)	0
RTT within 30 days (%)	2 (1.6)	3 (3.2)
1 Deep SSI		2 Deep SSI
Mortality 90 days (%)	2 (1.6)	0

Methods

- Data collected over six months in 2013 (N=155) and 2015 (N=136) included: demographic details, pharmacological VTE used; VTE events within 90 days; and 30 day return to theatre (RTT) rates.
- VTE events were defined as pulmonary embolisms (fatal and non fatal) and clinically significant deep vein thrombosis (above knee). Unexplained death was treated as fatal PE. Data collected from NJR, local databases, and patient notes.
- Analysis of all patients was performed, as well as subgroup analysis of 2013 Dabigatran patients versus 2015 Aspirin patients. A 1-tailed Fischer’s exact test was used for statistical analysis.

Torbay vs national Rates Knees

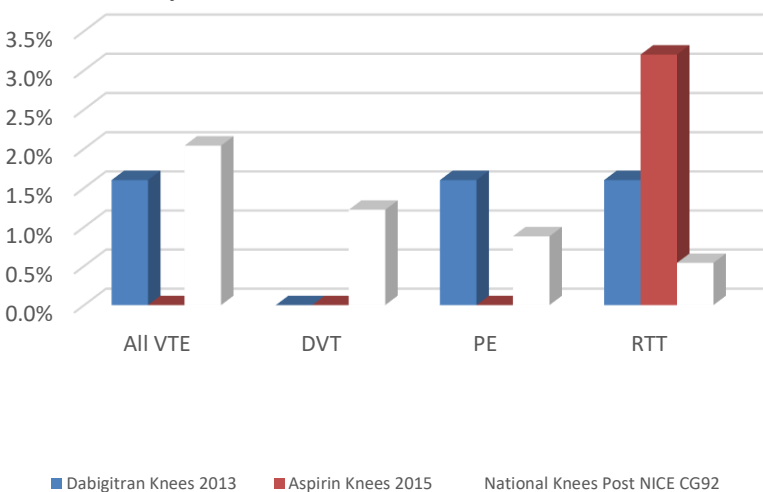


Figure 1a. Chart demonstrating total knee arthroplasty complication rates for dabigatran using, aspirin using group and nationally.

Results

- 123 (78%) patients used dabigatran pre-intervention. 95 (70%) patients used aspirin post intervention. Dabigatran versus aspirin demonstrated a VTE event rate of 1.6% versus 0. One patient (0.64%) returned to theatre after developing a deep surgical site infection pre-intervention compared to two patients (1.47%) post-intervention.
- Dabigatran and Aspirin groups were found to be similar in terms of implants used, age, gender, ASA and BMI allowing meaningful comparison. Rates of investigations for VTE appeared consistent.
- All VTE event rate was lower using aspirin and appears better than the national rate[2]
- RTT rate was higher than the national rate, of less than 0.5%. Neither finding reached statistical significance.
- Given the low rates being discussed (often around 1%) in order to show a statistically significant difference in absolute risk of 1.5%, 3200 patients would be required to reach statistical significance.

Conclusion

- Aspirin is non-inferior to dabigatran for VTE prophylaxis after TKA.
- RTT and VTE event rates using aspirin in line with National Joint Registry rates and represents a significant cost saving.

Table I. Complication rates for lower limb arthroplasty patients comparing dabigatran and aspirin VTE prophylaxis. “RTT, return-to theatre, “ SSI, Surgical site infection)

1. National Institute for Clinical Excellence. Venous thromboembolism: reducing the risk for patients in hospital . Clinical guideline [CG92] Published date: January 2010 Last updated: June 2015.

2. Jameson. S. S., Charman. S. C., Gregg. P., Reed. M. R., Van der Meulen. J. H. (2011) The effect of aspirin and low-molecular weight heparin on venous thromboembolism after hip replacement: A non-randomised comparison from information in the National Joint Registry. *The Journal of Bone and Joint Surgery*. 93 (11): 1465-1470.



Revision Knee surgery in under 65 year old patients: 16 year follow up- survivorship and radiological analysis-using TC3 implants 0073

S P Patange Subba Rao¹, C Oikonomou¹, J P Whittaker¹, R Spencer-Jones¹.
¹ The Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry.



Introduction

Long term survivorship for revision knees has been poorly documented in the literature. There is a paucity of survivorship data of revision implants for patients less than 65 years at the index surgery. We aim to investigate the long term results and survival of the TC3 revision implants over a 16 year period¹.

Methods and Materials

We reviewed a consecutive series of patients receiving a direct exchange total condylar knee revision surgery using a single implant design (Depuy TC3™) over a sixteen year period 1998 to 2014. All the operations were performed in the Robert Jones and Agnes Hunt Hospital(RJA). All the operations were performed by a single surgeon (RSJ). The data was collected retrospectively using EPR (electronic patient record) Graphnet care solutions version 2.0.80.235 (2013) was used to extract post-operative notes, bloods and microbiology results. A Diagnosis of infection was excluded based upon pre-operative bloods CRP/ESR and WCC, histology using aspirate samples and frozen section tissue samples intra operatively and radiographs for loosening. Synapse, Fujifilm™ medical imaging systems, UK (version 2013) was used to review all final radiographs. SPSS version 20.0 for Windows (SPSS Inc., Chicago, IL, USA).software was used to compute the survival statistics.

Results

Demographics	
No of patients (knees)	68 (74)
Sex	
Male	32
Female	36
Median age at surgery	59 yrs (39-65 yrs)
Median follow up	11 yrs (6-16 yrs)
Deaths (knees)	2 (3)
Lost to follow up (knees)	1 (1)
No for final follow up (hips)	67 (70)
Laterality	42 Right 32 Left
Diagnosis	
Aseptic loosening	45
Instability	17
Component malalignment	4
Metallolysis	2
Subluxing patella despite soft tissue procedures	4
Conversion of Uni with ligament instability	1

Table 1: Patient demographics and diagnosis.

Table 2. Implant Properties.

	Total Number Of Knees(n)
Mobile Bearing	37
Rotating platform	
Fixed Bearing	37
Non Rotating platform	
Femoral sleeves	37
Tibial sleeves	36
Patella button	64
Median Femoral size	3 (2-5)
Median Tibial size	3 (2-5)
Distal femoral augments	20
Tibial augments	4
Median Size of poly insert	15 (10-35)
Femoral stem size ranges	13X75-24X125
Tibial stem size ranges	13X30-20X75

Table 6: All causes of failure of implants

Reasons	Total Number(knees)
Aseptic loosening	8(1)
Metallolysis	1(1)
Infection	4(4)

Table 7: Failure of implants and implant considerations

Reasons	Total Number(knees)
Rotating Platform	2(2)
Non Rotating Platform	12(12)
Femoral and Tibial sleeves and failure	4(4)
Failure with no sleeves	9(9)

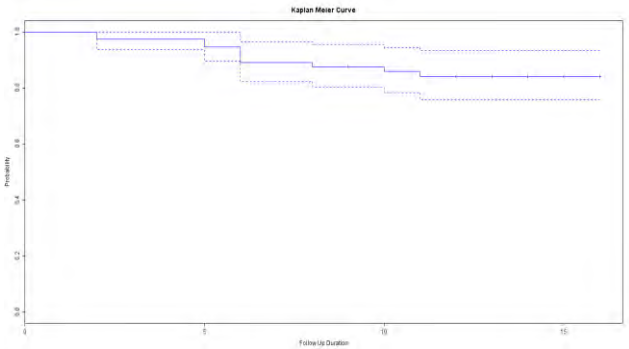


Fig 1: Kaplan Meier survival curve with 95 % CI with dotted lines

Discussion

Revisions and Failures:

The Kaplan–Meier survivorship of TC3 with failure as an endpoint was 84 % at 10 years and at 82.5% final follow up 16 yrs in our cohort of patients. The presence of sleeves, long or short stem sizes, in the femur or tibia or patellar buttons, had no statistical correlation to the revision surgeries. There were a higher number of knees with fixed bearing design without sleeves which underwent revision surgeries.



Fig 2.Radiographs of Rotating Platform TC3 8 yrs post implantation



Fig 3.Radiographs of Non Rotating Platform TC3 15 yrs post implantation

Conclusions

We believe that the TC3 revision knee system (Depuy™) implants for index revision procedures in our hands provides excellent survivorship results. We believe that our cohort is the single largest series of such kind to be reported for survivorship. This survivorship data is better than any implants in current literature².

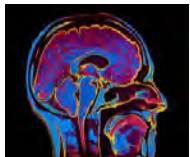
References

- Kim Y H, and Kim J S Revision Total Knee Arthroplasty with Use of a Constrained Condylar Knee Prosthesis, J Bone Joint Surg Am. 2009;91:1440-7 d doi:10.2106/JBJS.H.00425
- Aggarwal V K, Goyal N, Deirmengian G, Rangavajulla A, Parvizi J, and Austin M S. Revision Total Knee Arthroplasty in the Young Patient: Is There Trouble on the Horizon?. J Bone Joint Surg Am. 2014;96:536-42 d http://dx.doi.org/10.2106/JBJS.M.00131

Contact

S P Patange Subba Rao
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The Structural, Psychological, Functional and Pain Sensitization Characteristics of Preoperative Knee Osteoarthritis Patients with Evidence of Neuropathic Pain. A Prospective Observational Study.



(0075)

Thomas Kurien¹, Robert Kerslake², Richard G. Pearson¹, Brigitte E. Scammell¹

¹Academic Division of Trauma and Orthopedics, The University of Nottingham,

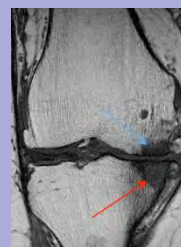
²Sir Peter Mansfield Imaging Centre, University of Nottingham

Email Thomas.Kurien@nottingham.ac.uk

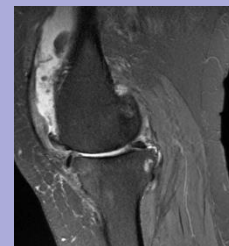


Background

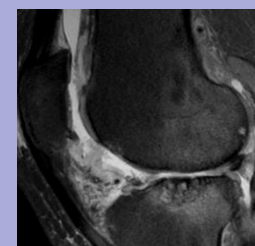
Neuropathic pain in patients with osteoarthritis (OA) listed for total knee replacement (TKR) surgery is clinically under-recognized by orthopedic surgeons worldwide. Up to 34% patients with chronic OA have neuropathic pain. In the US it is estimated that 3.5 million primary TKR procedures will be performed by 2030 but up to 20% of these patients will continue to suffer from chronic postoperative pain in spite of objective measures of surgical success.



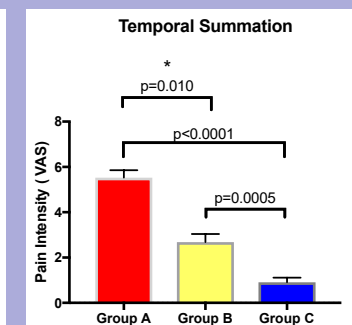
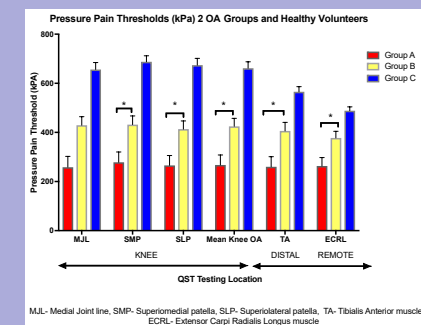
BMLs



Effusion
Synovitis



Hoffa
Synovitis



Methods

50 patients (mean age 66.4 years [8.3 SD]) with chronic knee OA awaiting TKR surgery and 22 healthy volunteers (mean age 56.7 years [9.0 SD]) with no OA or chronic pain condition were also recruited for comparison. All subjects underwent a 3-Tesla Knee MRI which was scored using the semi-quantitative MOAKS (MRI Osteoarthritis Knee Score) for severity of synovitis, effusion size and the total bone marrow lesions (BML) all of which are known peripheral drivers of pain in OA.

All subjects completed self-reported questionnaires to assess for neuropathic pain (PainDETECT®), depression (Beck Depression Inventory), anxiety (State-Trait Anxiety), pain catastrophizing (Pain Catastrophizing Scale) and function (Oxford Knee Score) as well as an objective assessment of the subject's somatosensory system using Quantitative Sensory Testing (QST) to identify peripheral and central sensitization.

The OA patients were divided into two age- and sex-matched groups according to neuropathic pain determined by the PainDETECT® questionnaire with a High PainDETECT® Score ≥ 19 indicating neuropathic pain assigned to Group A, and those with nociceptive or unclear pain based on PainDETECT® score ≤ 18 assigned to Group B. The 22 healthy volunteers with no chronic pain condition or osteoarthritis were assigned to Group C.

Results

30% pre TKR OA patients had a PainDETECT® score ≥ 19 indicating neuropathic pain. Facilitated temporal summation and widespread hyperalgesia indicative of central sensitization was higher in the neuropathic pain patients (Group A) than those OA patients with predominantly nociceptive or mixed pain phenotype (Group B) or healthy volunteers (Group C) (Kruskal Wallis Rank Test (Group A-B, $p < 0.0010$), Group A-C, $p < 0.0005$) and ANOVA (Group A-B, $p < 0.018$, Group A-C, $p < 0.0001$).

Significance

20% of all patients undergoing TKR surgery continue to suffer debilitating chronic postoperative pain despite objective measures of surgical success. Identification of neuropathic pain in OA and individualized medical treatment for those patients prior to TKR surgery may improve clinical outcome for this under-recognized cohort of patients.

0080 - Attune TKA has a decreased revision and reoperation rate & improved clinical outcome compared to PFC: A single surgeon series of 1,000 TKAs

Bloch BV, Shahid M, James PJ. Nottingham University Hospitals NHS Trust

benjamin.bloch@nuh.nhs.uk

Background:

We report the outcome of the first 500 Attune and the last 500 PFC Sigma TKRs (both DePuy, Warsaw, Indiana), performed by or under the supervision of the senior author.

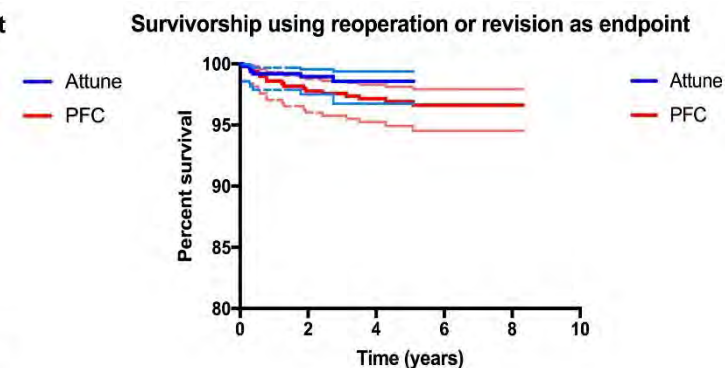
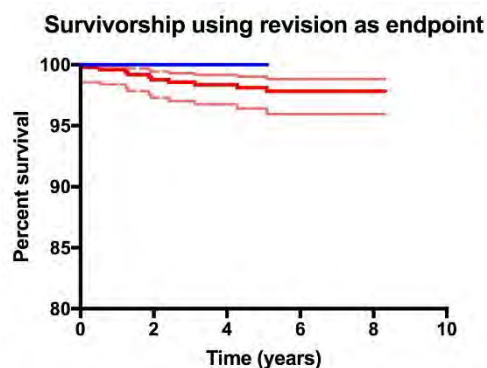
Patients	Attune	PFC
Age	67 (47-83)	68 (32-92)
Follow-up	3y (1.6-5.1)	5.7y (1.8-8.3)
BMI	31 (18-59)	32 (18-53)
% Male	44%	42%
CR : PS design	52% : 48%	0.6% : 99.4%
Patella resurfaced	63%	96.4%
% Mobile bearing	94%	63%
Mean Oxford Knee Score Improvement	17.2	16.0



Revision & Re-operation:

No Attunes have been revised. 10 PFCs were revised, at mean 2.2y post-op. There were 6 re-operations in each group, including MUA, patellar resurfacing, DAIRs and arthrolysis.

Survivorship:



Conclusion

The Attune TKA system at short- to mid-term follow up has decreased revision and reoperation rates and improved clinical outcomes compared with the PFC Sigma.

GMK Sphere total knee replacement: an international, multicentre, prospective observational study – ODEP

SJ Everett, I Afzal, A Carr, K Vejsbjerg, R Stoner, J Skinner, G Scott, P Van Overschelde, DF Kader, RE Field.

Contact: s.j.everett@doctors.org.uk. South West London Elective Orthopaedic Centre.

Background

- Medially stabilised knee
- “Ball and socket” medial compartment
- ODEP Study
- Commenced October 2012

Aim

- To present 3 year outcome data for the GMK Sphere

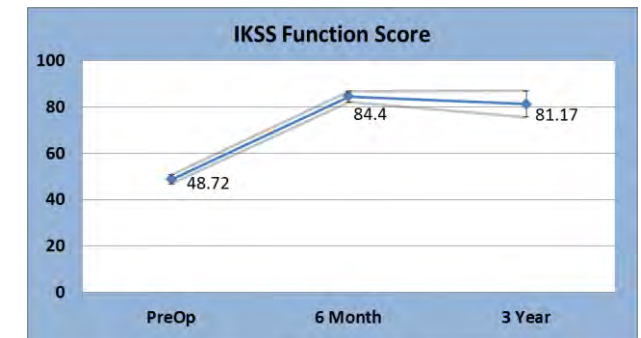
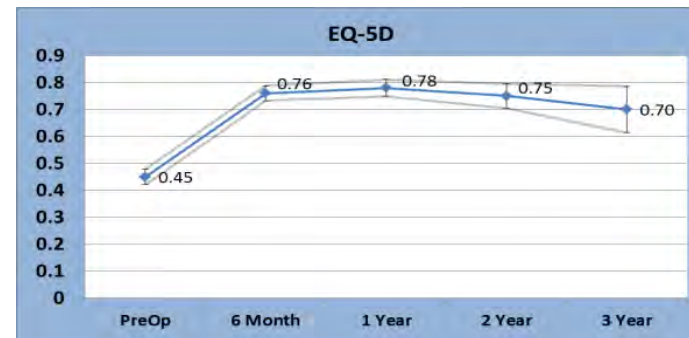
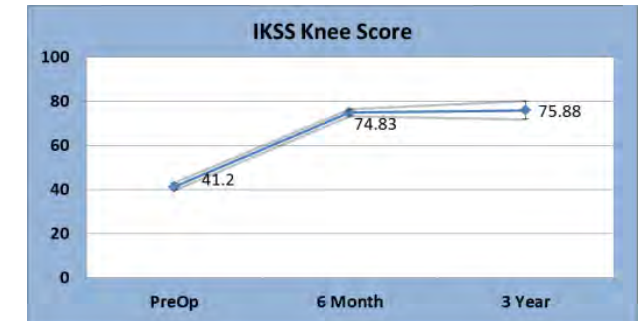
Patients/Methods

- Ongoing prospective observational study
- 335 operations since Oct 2012
- 9 surgeons at 4 centres
- Mean age 67.6. Mean BMI 30.2.
- 5 patients withdrew, 2 died and 2 knees revised.
- EuroQol (EQ-5D), Oxford Knee Scores and Knee Society scores collected in research clinics and telephone consultations.
- By the beginning of November 2016, six month, one, two and three year data had been obtained for 269, 219, 136 and 57 patients, respectively.



Results

Mean scores and 95% confidence intervals

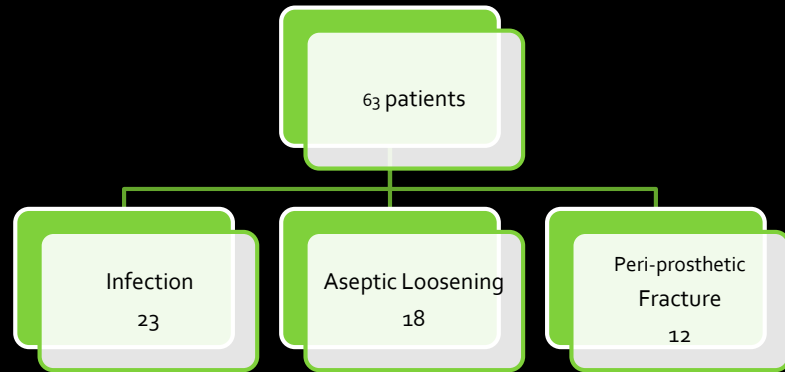


Conclusions

- At three years follow-up, study patients demonstrated improved function and quality of life.
- Patient matching and evaluation of more cases, at more time points will allow outcome comparison with other implant options.

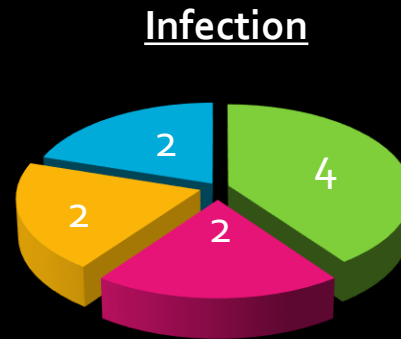
OUTCOME OF DISTAL FEMORAL REPLACEMENTS FOR NON-TUMOUR INDICATIONS (0084)

DI Wood, SM Barkley, A Gordon, JM Wilkinson, SC Buckley, AJ Hamer, RM Kerry, I Stockley
Lower Limb Arthroplasty Unit, Northern General Hospital, Sheffield. Contact: david.wood22@nhs.net



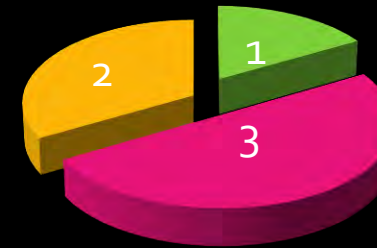
	Infection n=23	Aseptic Loosening n=18	Peri- prosthetic Fracture n=12
No. Previous Operations	4 (2-11)	2 (1-5)	1 (1-3)
No. Further Operations	10	6	2
Time to Re-revision (months)	25.5 (9-141)	47 (33-120)	52.5 (18-87)
Follow-up (months)	36 (5-120)	34 (7-14)	54 (12-120)

Causes for Implant Failure



■ Infection
■ Instability
■ Trunnion Failure

Aseptic Loosening



■ Infection
■ Loosening
■ Fracture

Peri-prosthetic Fracture



■ Loosening

Conclusions:

- High risk surgery in patients with poor quality bone and soft tissues
- Endoprotheses are a viable option for peri-prosthetic fractures

The contribution of neuropathic pain on the ability to kneel after total knee replacement (0085)

Smith JRA, Mathews JA, Bakewell Z, Osborne L, Williams JL

Musgrove Park Hospital, Taunton

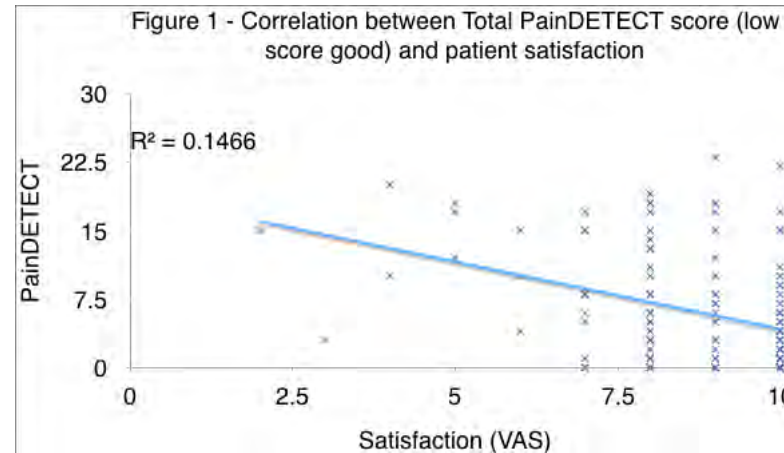
correspondence : james.smith@nbt.nhs.uk

Introduction

- Persistent neuropathic pain affects a proportion of patients who undergo total knee replacement (TKR)
- Its affect on the ability of a patient to kneel following replacement has not been studied.
- We aimed to assess the contribution of neuropathic pain in individuals that have difficulty kneeling following TKR, and its impact upon patient satisfaction.

Methods

- 137 patients prospectively at one year follow-up
 - Oxford Knee Score (OKS) and painDETECT (neuropathic pain score)
 - Patient satisfaction VAS (0-10)
 - Short patient survey and routine clinical data.
- Patients were categorised by their ability to kneel following TKR using question 7 of the OKS (0 and 1 non-kneelers)
- Patients that had not tried kneeling were excluded from analysis.



Results

- Median satisfaction and OKS for the whole cohort was 9 and 40 respectively.
- Lower painDETECT scores correlated significantly with a greater patient satisfaction score ($p < 0.0001$, figure 1).
- Satisfaction scores were significantly higher for kneelers ($p = 0.001$, figure 2).
- PainDETECT score was significantly lower for kneelers than non-kneelers (figure 3), though both means lay in the nociceptive domain.
- Significant results were demonstrated specifically for figure 4:
 - pain with light touch ($p = 0.037$)
 - extremes of temperature ($p = 0.048$)
 - slight pressure ($p = 0.0009$).

Figure 2 - Patient Satisfaction (VAS) ($p = 0.004$)

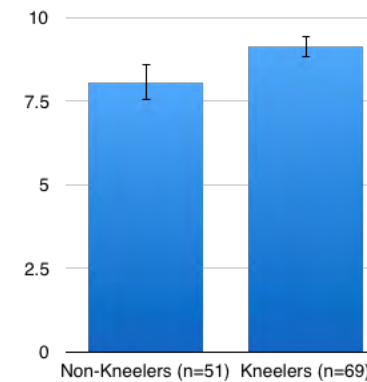


Figure 3 - PainDETECT total score $p = 0.014$

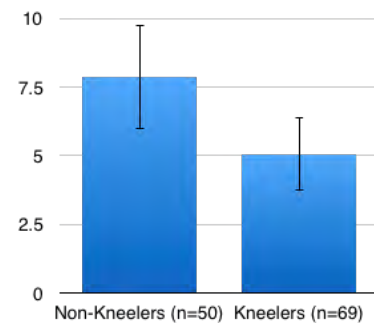
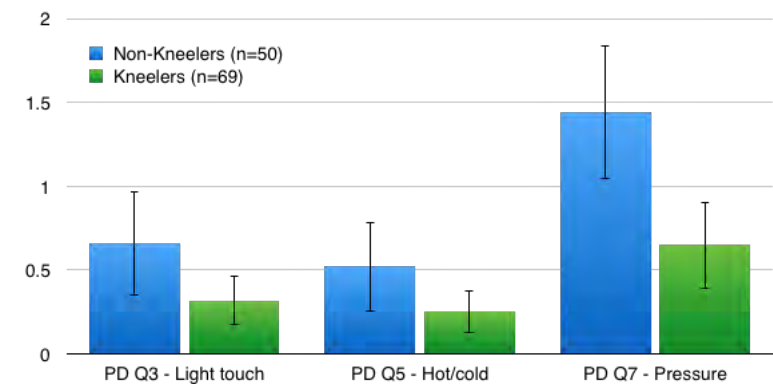


Figure 4 - Significant differences in PainDETECT neuropathic score



Conclusion

Patients who can kneel following total knee replacement have a lower incidence of pain, and are more satisfied. Whether this pain is neuropathic or nociceptive in origin requires further study.

Assessment of the tibial tuberosity-trochlear groove distance in trochlear dysplasia- a new radiographic method

R Keehan, A Gill, L Smith, R Ahmad, J Eldridge

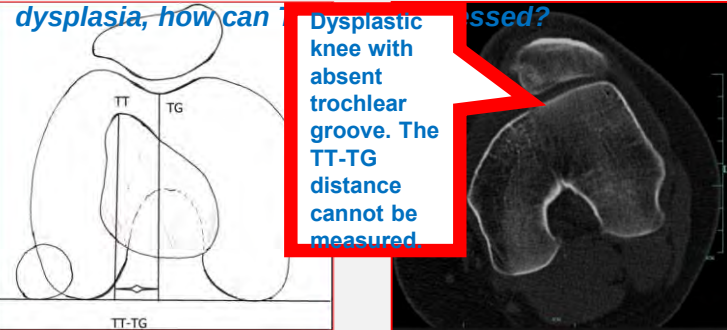
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Background

The tibial tuberosity - trochlea groove distance (TT-TG, below left) is an important radiological measurement in the assessment of patellofemoral instability, and the planning of its surgical treatment. A distance exceeding 15-20mm is abnormal, and is a risk factor for instability. It is difficult or impossible to identify the trochlear groove component of the TT-TG in the setting of trochlear dysplasia, which is a common contributing abnormality in patellofemoral instability.

Research question: In the setting of trochlear dysplasia, how can it be assessed?



Methods

30 non-dysplastic knee MRIs from a consecutive series of 92

Exclusions:

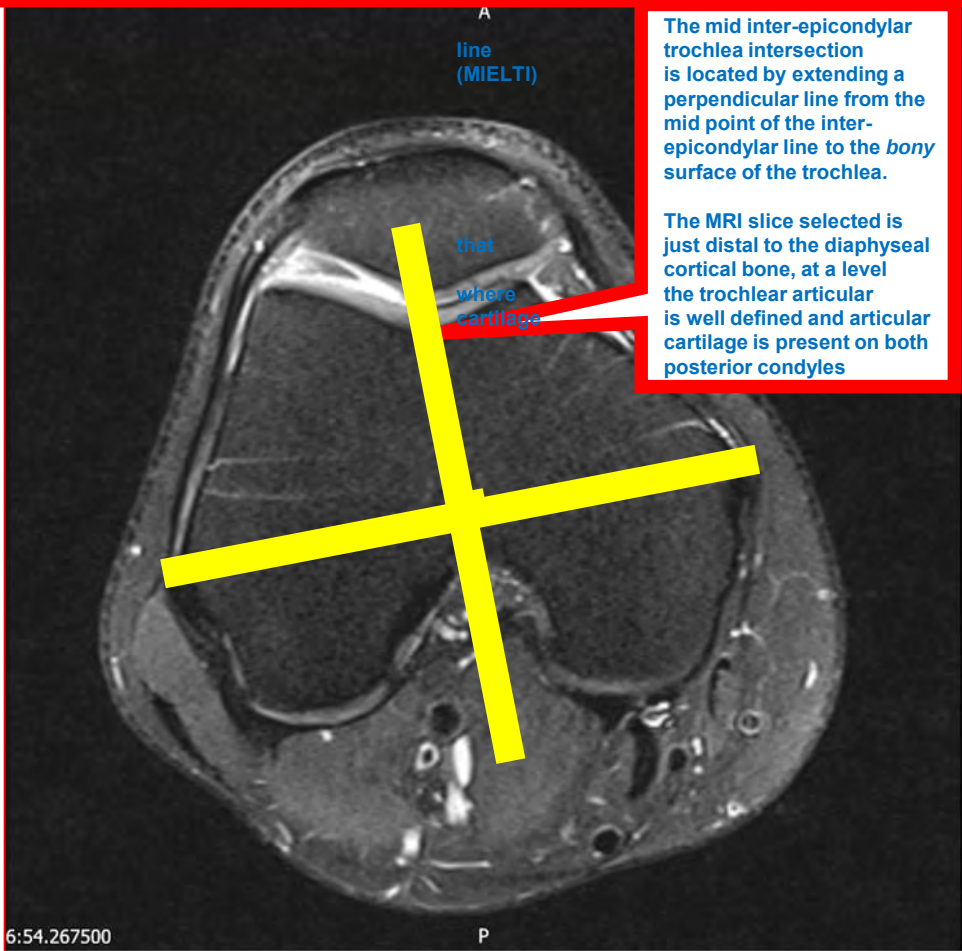
Trochlear dysplasia, sulcus angles $>135^\circ$, Osgood Schlatter's disease, metalwork/movement artefacts, patella tendon tibial attachments not demonstrated

3 independent observers (medical student, orthopaedic registrar, orthopaedic consultant)

Blinded measurements of TT-TG and TT-MIELTI measured by each observer on each of the 30 MRIs

1 re-measurement of TT-TG and TT-MIELTI on all 30 MRIs by medical student after 6 weeks

Mid inter-epicondylar line trochlea intersection (MIELTI)



The mid inter-epicondylar trochlea intersection is located by extending a perpendicular line from the mid point of the inter-epicondylar line to the bony surface of the trochlea.

The MRI slice selected is just distal to the diaphyseal cortical bone, at a level the trochlear articular is well defined and articular cartilage is present on both posterior condyles

Results

We used the intra-class correlation coefficient (ICC) statistical test: A value 0.75-0.90 demonstrates 'good' to 'excellent' reliability

TTTG measurement	Reliability between 3 observers	ICC = 0.83	p<0.001
	Repeatability, one observer	ICC = 0.90	P<0.001
TTMIELTI measurement	Reliability between 3 observers	ICC = 0.77	p<0.001
	Repeatability, one observer	ICC = 0.86	P<0.001
TTTG compared with TTMIELTI	Observer 1	ICC = 0.88	p<0.001
	Observer 2	ICC = 0.96	P<0.001
	Observer 3, time 1	ICC = 0.87	p<0.001
	Observer 3, time 2	ICC = 0.92	P<0.001

Conclusions

The TT-MIELTI appears to compare reliably with the TT-TG when measured by a range of observers who have varying expertise.

The TT-MIELTI may therefore be a useful alternative to the TT-TG in the assessment and management of patellar instability with associated trochlear dysplasia.

Further study is required to assess the usefulness of this landmark in the clinical setting with dysplastic knees.

References

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2. The tibial-tuberosity trochlear groove distance: a comparative study between CT and MRI scanning. P.B. Schoettle et al. The Knee 13 (2006) 26–3128
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Rawaf DL, Yassen SK, Borton ZM, Khakha RS, Risebury MJ, Wilson AJ

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Introduction

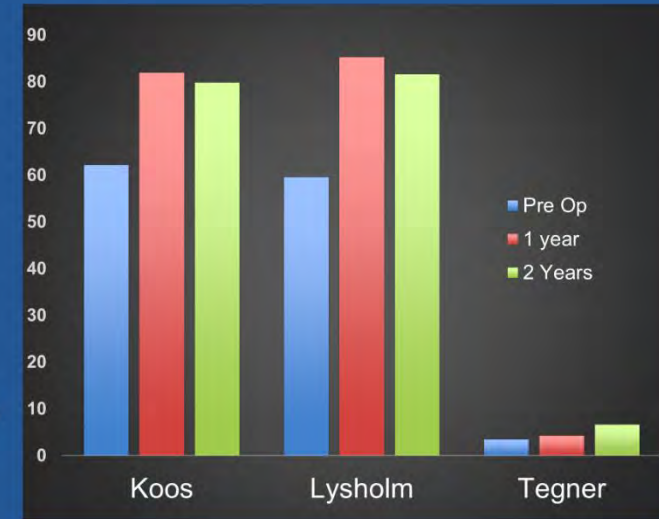
The ALL is increasingly recognised as an important extra-articular stabilising structure in the ACL-deficient knee. Although there have been arthroscopic advances on traditional ACL reconstruction techniques, failure to address extra-articular structures may lead to increases in ACL graft rupture.

Methods

- November 2012 – August 2015
- Patient presenting with explosive pivot shift, and in all revision ACL cases
- Minimally invasive approach
- Anchor graft proximal and posterior to lateral femoral condyle
- Fixed via second incision midway between Gerdy's tubercle & fibular head.
- Evaluated pre & post operatively with standard subjective & objective scoring indices

Results

- 96 patients (74 male, 22 female)
- Mean age 33 years (16-62)
- Mean follow-up of 33 months (14-47)
- 41 revision ACL, 8 multiligament cases
- **Graft type:**
 - 53 hamstring autograft
 - 34 FibreTape alone
 - 9 allografts reinforced with FibreTape
- One ACL graft failure during study period

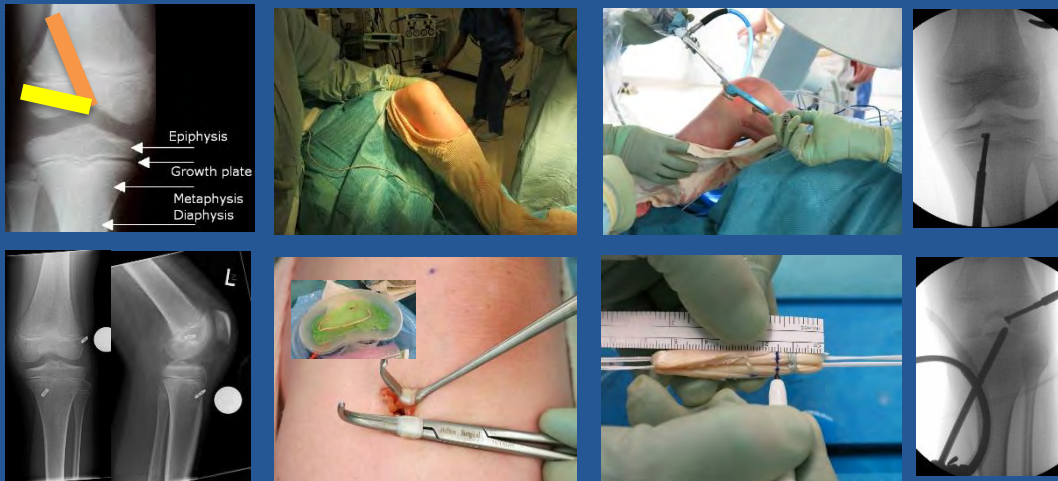


Conclusion

Early results suggests that ACL reconstruction failure can be reduced even in high risk surgical cases by ensuring concomitant reconstruction of the ALL

Introduction

There is an increasing incidence of cruciate ligament injuries in the paediatric population representing a significant management challenge. Graft rupture rates are significantly higher than in adults and graft options are limited due to inadequate sizing. Our solution uses live parentally donated hamstring allograft.

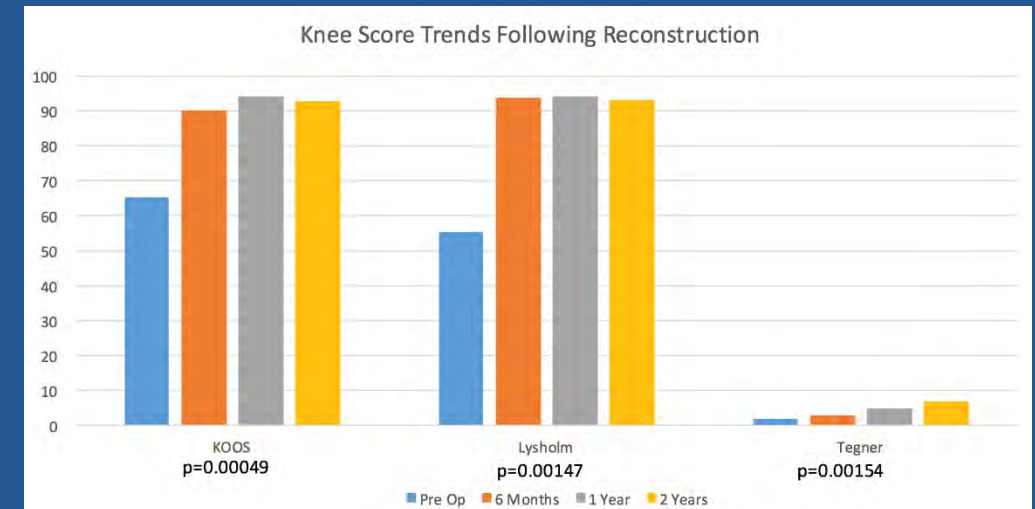


Methods

- Children presenting with a cruciate-deficient knee and symptomatic instability
- Transphyseal surgical technique on the tibia using a central vertical tunnel
- Either extraphyseal or transphyseal approach on femur depending on Tanner stage
- Patients were evaluated pre & post-operatively with standard subjective and objective scoring indices

Results

- 4 ACL, 1 PCL
- Mean age 11.25 years (10-12)
- Mean follow-up 13.75 months (6-38)
- KT assessment showed side-to-side difference under 2mm
- No reported complications or failures to date



Conclusion

Adequate graft size can be achieved using parentally donated hamstrings allograft in paediatric cruciate ligament reconstruction. Early follow-up & results suggests excellent patient outcomes with no earlier failures reported

Compared to Standard Anatomic Reconstruction

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Introduction

- Anatomic ACL reconstruction yields superior biomechanics to non-anatomic reconstruction
- Some authors advocate midbundle positioning, whereas others prefer a position more within the footprint of the anteromedial fibres
- We noted a higher failure rate amongst grafts placed at the midbundle position

Methods

- Interrogation of prospectively maintained database
- All primary single-bundle ACL reconstructions with minimum 24 month follow-up were included
- Failure rate of grafts placed at the midbundle (MB) position compared to those placed more anteromedially (AM)
- All reconstructions performed through TransLateral All-Inside technique

Cohort

- 272 ACL reconstructions met inclusion criteria
- 110 Knees in MB group
- 162 in AM group

Results

- 8 failures identified in the MB group (7.3%)
 - 3 failures in the AM group (1.9%)
- $p=0.0287$



Subgroup analysis:

- Excluding allograft (n=256, p=0.0355)
- Quadrupled semitendinosus autograft (n=239, p=0.0355)

Conclusion

Our series suggests positioning the femoral tunnel slightly within the AM footprint may reduce graft failure compared to a MB position



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Introduction

- Medial opening wedge high tibial osteotomy (MOWHTO) is commonly used to treat patients with medial osteoarthritis secondary to varus malalignment
- It has traditionally been associated with high pain scores, complications with union and hardware prominence
- Modern techniques have improved clinical outcomes, however, pain and swelling remains an issue for some patients

Aims

- To identify whether the use of a cancellous bone wedge allograft improves clinical outcomes and time to union

Methods

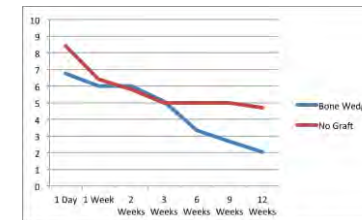
- A prospective cohort study with three interventions was designed
- Group 1: HTO using a Tomofix plate (Depuy-Synthes) with no bone graft
- Group 2: HTO using a Tomofix plate with bone graft
- Group 3: HTO using a Activmotion plate (Newclip Technics) with bone graft
- **Outcomes:**
- KOOS, OKS, EQ-5D and APQ scores collected pre-operatively and 12 weeks
- Opioid use and pain scores were measured in the first 48 hours post-operatively, with repeat scores at weeks 3,6,9 and 12 weeks
- Union was assessed radiologically at 3 months

High Tibial Osteotomy
Tomofix – no graftHigh Tibial Osteotomy
Newclip – with graft

Results

- There was a significant reduction in pain scores, opioid use and swelling in groups using bone graft in the immediate post-operative period up to 2 weeks, compared to those without ($p < 0.05$)
- These scores became equivocal at 2-4 weeks
- There were no associated complications using allograft

VAS Pain Post-Op



Mean PROMs Post-Op

OKS	OKSAPQ	KOOS Total	KOOS Sym	KOOS Pain
35.6	20	68.304	62.5	71.527

KOOS ADL	KOOS Sport	KOOS WOMAC	KOOS WOMAC	VAS Health
80.698	41.875	51.563	20.37	83.62

Conclusion

- Bone wedge allograft can be safely used in high tibial osteotomy surgery with the benefits of reduction of pain and swelling in the immediate post-operative period.

High Tibial Osteotomy
Tomofix – with graftFemoral head allograft
preparation

Optimal Graft Tension in Anterior Cruciate Ligament Reconstruction – An Experimental Study (0095)

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Introduction:

No consensus on optimal graft tension at time of surgery

Methods:

Seventeen high volume ACL surgeons at national round table multi-ligament meeting

Results:

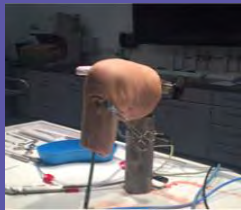
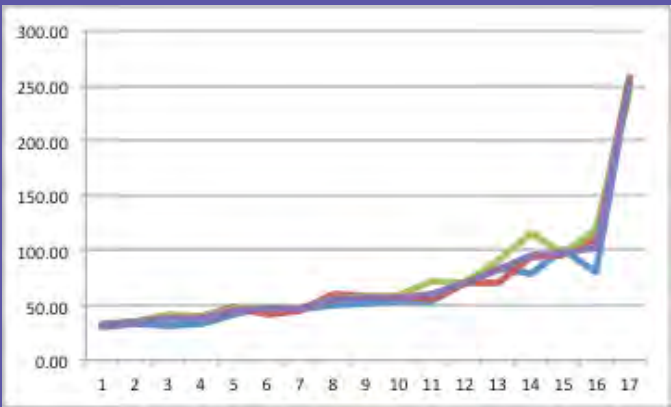
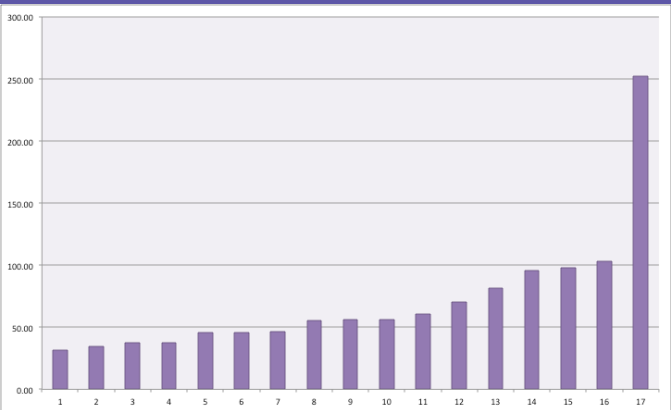
Volume of ACL Reconstruction:	0-50: 2	50-100: 11	>100: 4
Mean Graft Tension:	71N	(31.85-252.19)	
Intra-observer variance:	6N		
Choice of Graft:	Hamstring: 15	BTB: 2	
Method of femoral fixation:	Suspensory: 14	Interference: 3	
Degree of flexion at fixation:	0 degrees: 4	30 degrees: 11	
	60 degrees: 2		
Method of tension application:	Freehand traction: 6	41.8 (31-55)	
	Instrument traction: 5	53.3 (37-70)	
	Instrument twist: 6	115.2 (60-252)	

Conclusion: A mean tension of 71N was achieved in our cohort. Consistent tension can be achieved irrespective of the technique used. Instrumented twist achieves the highest tensile loads.

Evidence:

Meta-analysis suggests optimal tension range as: 78.5-90N

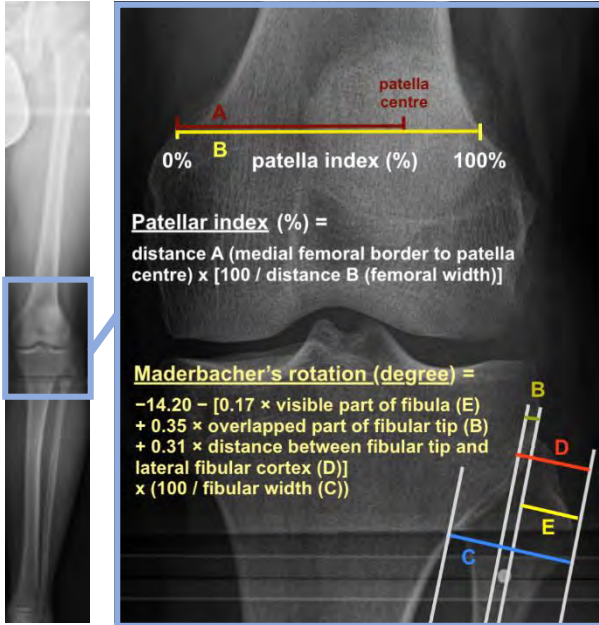
Individual techniques and graft tension recorded on cadaveric specimen



Rotation on long-leg radiographs influences the surgical accuracy of osteotomies around the knee (0097)

Ahrend M^{1,2}, Winter A³, Dawson MJ³, Elson DW¹

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Introduction:

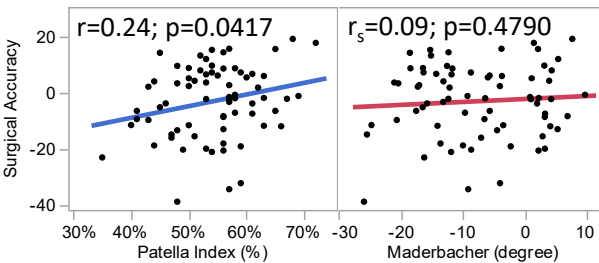
- The patella is conventionally directed forwards when performing long-leg radiographs. This standardises the measurement of alignment parameters, but rotational variation does occur.
- Hypothesis:** Rotational variation influences surgical accuracy following knee osteotomy.

Methods:

- The study defines a new patella index: ratio (%) of the patella centre relative to the femoral width, at the level of the patella.
- Another method recording rotation measures proximal fibula and tibia overlap (Maderbacher¹).
- Surgical accuracy is the absolute deviation of the achieved correction from the intended correction (Schröter²).
- Limb rotation was assessed upon 71 pre- and post-operative long-leg radiographs (29:42 left:right; 13:58 valgus:varus) from 61 patients who underwent osteotomy around the knee.
- Statistical correlations were calculated between both methods and subsequently against surgical accuracy.

Results:

- Maderbacher yielded mean rotation of $-7.5 \pm 9.1^\circ$. The patella index mean was $54.2 \pm 7.5\%$.
- Moderate correlation was found between both methods ($r=0.44$; $p=0.0001$; 95% CI: 0.23-0.61).
- Surgical accuracy was $-3.1 \pm 12.8\%$ (range: -38.6% (under-correction); 19.3% (over-correction)).
- Surgical accuracy correlated weakly with patella index ($r=0.24$; $p=0.0417$), but not with Maderbacher ($r=0.09$; $p=0.4790$).



Conclusion:

- Limb rotation on long-leg radiographs weakly influences surgical accuracy. The new patella index should serve to remind radiographers of ideal conduct and surgeons to check rotation during knee osteotomy planning.

Reference: ¹Maderbacher, G., Schaumburger, J., Baier, C. et al. Knee Surg Sports Traumatol Arthrosc (2014) 22: 2982. doi:10.1007/s00167-014-3327-4
²Schröter, S., Ihle, C., Elson, D.W., Döbele, S., Stöckle, U., Ateschrang, A. Knee Surg Sports Traumatol Arthrosc (2016) 24: 3410. doi:10.1007/s00167-016-3983-7

Get your coding right

Write clearly or type notes

Enter patient details / date on every page

Record all diagnoses / procedures in full

Record all co-morbidities each and every admission

Record organism if infection

Don't use abbreviations

Don't use “?” diagnosis – describe symptoms

Evaluation of tools to address the ceiling effect in patient reported outcomes following total and unicompartmental knee replacement for high functioning patients

Problem: Ceiling effect of standard PROMS for high functioning patients

Aim: Assess high function knee questionnaires and effect on ceiling effect after TKR and UKR

Method: Cohort of highest functioning TKR and UKR patients recruited
Prospective database at minimum 2 years following surgery
Completed Total Knee Function Questionnaire (TKFQ) and an Aberdeen Score

Results: 83 patients were recruited at mean 5.7 (SD1.8) years after surgery .
42 TKR + 41 UKR. Median Womac Score was 97 out of 100 (IQR 88-100)
Aberdeen Score failed to eliminate a ceiling effect with scores heavily skewed towards high function in all patients.
TKFQ scores were normally distributed across this cohort, demonstrating elimination of the ceiling effect.
Comparison of scores between TKR and UKR patients revealed no significant difference ($p=0.751$) in this selected cohort.

Conclusion: A role for tools of this nature in the assessment of best outcomes following knee arthroplasty.
Allow for comparison of otherwise unidentified gains of differing techniques



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Outcomes of cemented medial meniscal-bearing knee replacement by age (0101)

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Background

- *Effect of patient age on long-term functional outcomes following medial UKR is unclear.*
- National Joint Registry (NJR) reports higher rates of revision in younger patient groups.

Study aim

- Describe 10-year functional and survival outcomes for different age groups at time of surgery.

Methods

Prospective cohort study - 1 centre

- **1000 consecutive medial UKR**

Age group	n at surgery	n at ten years
<55	116	45
55-64	304	136
65-74	374	157
≥75	206	53

Results:

Function

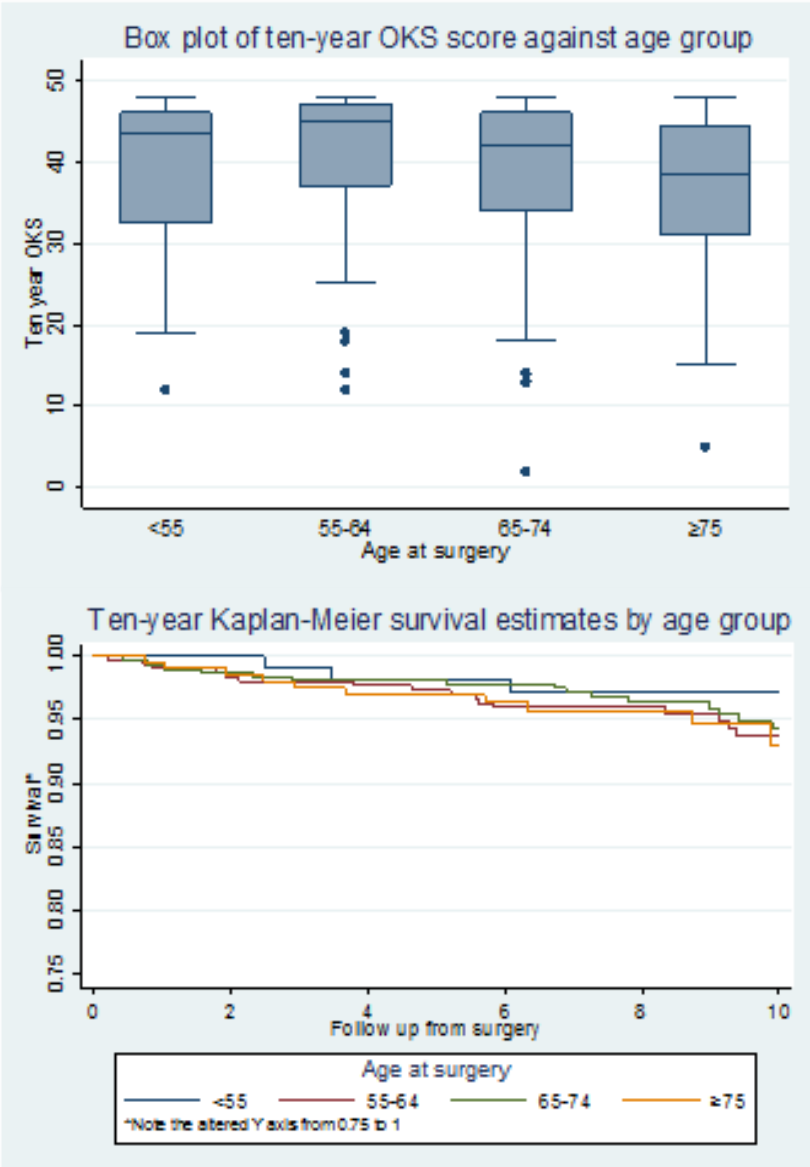
- **Significant improvement in all age groups ($p < 0.001$).**
- Mean improvement at 10-years in OKS from youngest age group: 17.5, 18.1, 15.9, 13.4 ($p = 0.06$).
- 75%, 87%, 76% and 70% had excellent or good outcomes as per OKS criteria ($p = 0.02$)
- 10-year outcomes comparable between groups, but highest in the 55-64 age band (see figure, $p = 0.002$).

Survival

- 52 revisions in cohort (94.2% survival at ten years).
- **No significant difference in survival at ten years between groups (see figure, $p=0.6$).**
- Development of disease progression was not associated with age ($p=0.2$).

Conclusion

- **10-year outcomes after medial UKR were good for all age groups.**
- In contrast to NJR, we have shown equivalent Kaplan-Meier survival estimates between age groups to ten years..





CONTEMPORARY INDICATIONS FOR MENISCECTOMY

WOULD YOU THROW THE BABY OUT WITH THE BATHWATER? (0103)

S.G.F. Abram, L. Bayliss, W.F.M. Jackson, N. Bottomley, D.J. Beard, A.J. Price.
NDORMS, University of Oxford. Poster 0103 (simon.abram@ndorms.ox.ac.uk)

- Currently intense debate regarding effectiveness of arthroscopic meniscectomy with some calls to discontinue this surgery.
- Patients with meniscal tears make up a heterogeneous population: patient selection criteria are critically important.

METHODS

A systematic search of MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) applying Cochrane methodology.

Three patient populations (historic vs. contemporary indications):

1. MRI proven meniscal tears with or without osteoarthritis (OA)
2. MRI proven meniscal tear with early to no OA (Kellgren-Lawrence grade 0-2 or Ahlbäck grade 0)
3. MRI proven unstable pattern meniscal tear, early or no OA, mechanical symptoms (contemporary indications).

RESULTS

1. **Eight trials:** 7 trials reported no benefit, 1 reported benefit versus control
2. **Three trials:** 2 reporting no benefit and 1 reporting a benefit versus control
3. **No trials**

SUMMARY

- **Indiscriminate practice of arthroscopic meniscectomy is not beneficial.**
- **There is, however, a lack of high quality evidence applying contemporary patient selection.**
- **There is an urgent need for high quality randomised controlled trials in this group of patients.**

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Medial Opening-Wedge High Tibial Osteotomy



Medial Closing-Wedge Distal Femoral Osteotomy

Introduction

- Coronal knee realignment can be achieved with medial opening-wedge high tibial osteotomy (mowHTO) & medial closing-wedge distal femoral osteotomy (mcwDFO)
- Traditional approaches involve large incisions with significant morbidity
- Minimally invasive surgery (MIS) is increasingly used at our institution
- We sought to establish whether MIS influences the radiological outcomes and complication rates of mowHTO and mcwDFO

Methods

- Data were retrieved from our prospectively maintained database
- mowHTO and mcwDFO between July 2015 and June 2016 were assessed
- 35 knees from 34 patients underwent surgery using a traditional approach
- 38 knees from 37 patients underwent MIS
- Radiological outcomes were analysed using independent samples t-tests
- Complications in the MIS group were recorded up to 3 months follow-up



Traditional Longitudinal Approach



Traditional Medial Oblique Approach



Minimally Invasive Approach

Results

- No significant demographic differences existed between the two groups
- Mean correction wedge size was 7.1mm (range 3-17mm) and there was no significant difference between groups ($p=0.67$)
- Accuracy of radiological correction as determined by achieved Mikulicz point versus target correction showed no differences between, or within, the two groups ($p>0.05$)



- 3 complications (2 infections & 1 partial pull-off of the tibial tubercle) were identified in the MIS group, which is equal to a rate of 7.8%
- This complication rate is similar to that associated with the traditional approach as reported in other research

Conclusion

Osteotomy around the knee can be safely undertaken utilising minimally invasive approaches with no increase in complication rate or detriment in radiological outcomes

Anatomical Variations in the Distal Femur? A CT Data Analysis of 24,042 Knees. (0106)

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Study Objective:

To determine the variations in the distal femoral geometries using implant information for patients receiving a customized total knee replacement.

Methods:

- Retrospective review of 24042 CT datasets used to design customized TKR.
- Measured Femoral A/P and ML; Distal Offset and Posterior Offset (Figure 1)

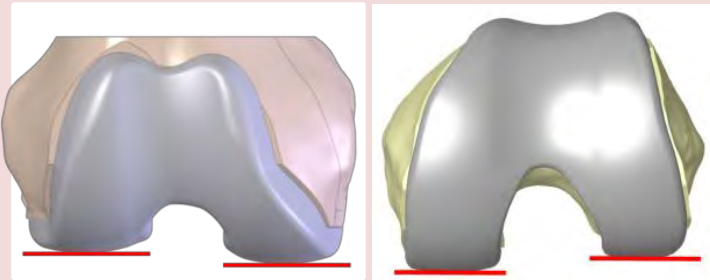


Figure 1: Measurement of Distal (left) and Posterior (right) offset of the femur

Results:

- Approximately 1/3rd of patients would have sizing issue of +/- 3mm if they received a off-the-shelf (OTS) femoral component.
- 61% of knees exhibited distal offset of >1mm (Figure 2).
- 83% of femurs exhibited a >2mm (3° femoral rotation) of posterior condylar offset (Figure 3) as needed in OTS femurs.

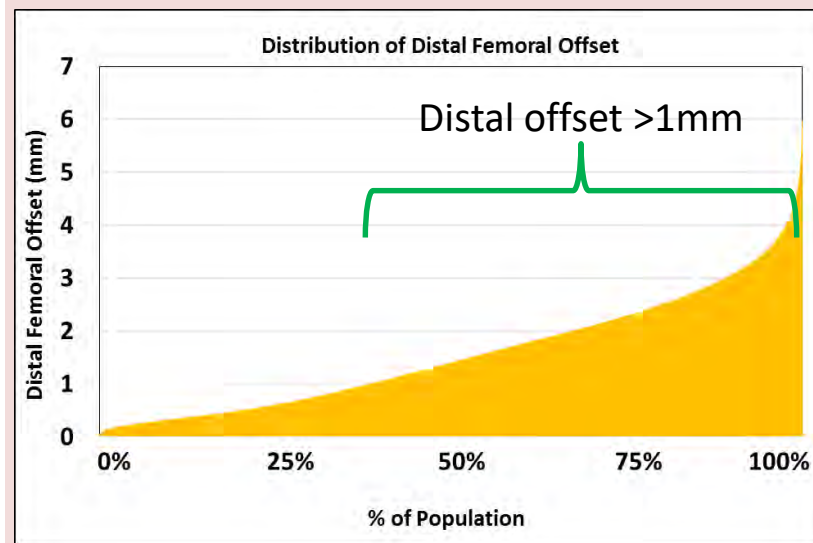


Figure 2: Variation in Distal Offset

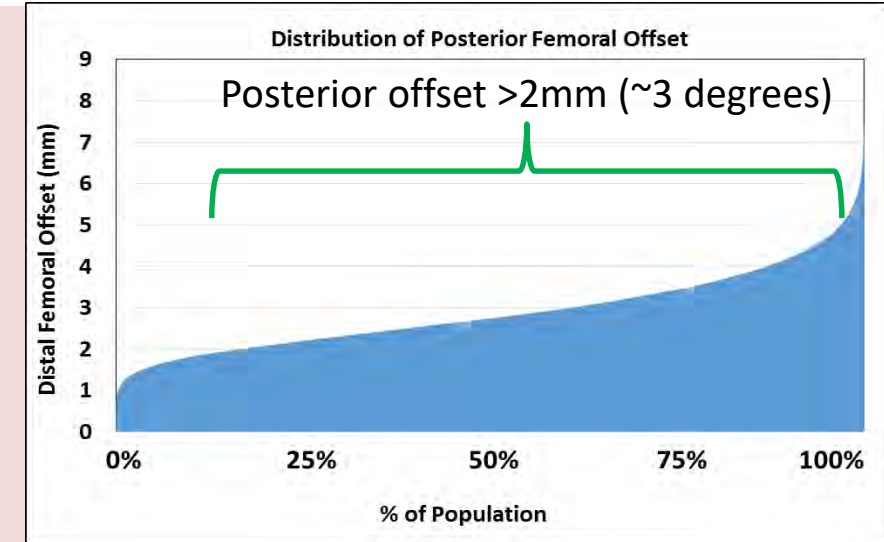


Figure 3: Variation in Posterior Offset

Discussion:

- There is a high variability in distal condylar offsets which cannot be replicated by symmetric femoral implants.
- Posterior condylar offsets are not equal and do not correlate to femoral size.
- This could lead surgeons using OTS implants to release soft tissue and impart incorrect femoral rotation to fit a fixed geometry OTS implant into a highly variable patient population.

Anatomical Variations in the Proximal Tibial Design of a Customized TKR? A CT Data Analysis. (0107)

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Study Objective:

To determine the variations in the proximal tibial geometries using implant information for patients receiving a customized total knee replacement.

Methods:

- Retrospective review of 24042 CT datasets used to design customized TKR.
- Measurements performed:
 - Medial tibial slope,
 - Medio-lateral tibial width,
 - Tibial asymmetry (Figure 1)

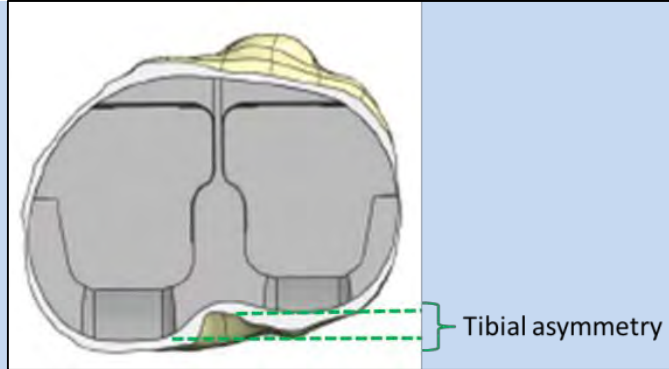


Figure 1: Tibial asymmetry measurement

Results:

- 52% of tibias had a posterior slope between 5-10° and 27% of knees had a slope > 10°
- Asymmetry is highly variable, with all ML groups exhibiting high and low asymmetry cases (Table 1).
- Only 12% of tibias were symmetric (<2mm asymmetry). 22% of tibias were asymmetric (>5mm)

Table 1: Variation of tibial asymmetry

Asymmetry (mm)	Overall (%)	Tibial ML width			
		<65 (%)	65-75 (%)	75-85 (%)	≥85 (%)
<1	3%	4%	3%	3%	3%
1-2	9%	22%	11%	7%	6%
2-3	19%	14%	20%	19%	16%
3-4	24%	26%	26%	21%	25%
4-5	21%	26%	20%	22%	20%
≥5	22%	8%	19%	27%	27%

Discussion:

- Tibial posterior slope and asymmetry of the tibial profile vary considerably, even for tibias with similar ML widths.
- Tibial trays that are either symmetric or have a fixed asymmetry based on ML size, may face challenges between maintaining proper rotation and adequate coverage.

Factors Affecting Completion of PROMs in Orthopaedic Patients (0108)

STE Tullie & MH Jones

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Background

Low completion rates can affect the validity of Patient Reported Outcome Measures (PROMs). This study aimed to understand the factors that affected the patients' completion of pre-operative PROMs using an internet based system.

Methods

Patients were emailed a request to complete a web based PROM prior to treatment and, if necessary, verbally reminded at the consultation or by telephone.

All patients undergoing surgery during a four-week period were interviewed to determine the factors that influenced their decision to complete PROMs. They were asked set questions using a Likert score.

Results

60 patients were approached and 59 full interviews were conducted. In total 28 (46.7%) completed PROMs prior to admission for surgery. The factors affecting completion and response to the emails are shown in figures 1 & 2.

Knowing that completion was the consultants' wish and that it could help future patients were the most important considerations for the patient with both scoring a median Likert score of 5.

References: 1. Schamber EM, Takemoto SK, Chenok KE, Bozic KJ. 2013. Barriers to completion of Patient Reported Outcome Measures. J Arthroplasty. 28(9):1449-53. 2. Patel J, Lee JH, Li Z, SooHoo NF, Bozic K, Huddleston JI 3rd. 2015. Predictors of Low Patient-Reported Outcomes Response Rates in the California Joint Replacement Registry. J Arthroplasty. 30(12):2071-5.

Figure 1: Factors Affecting Completion

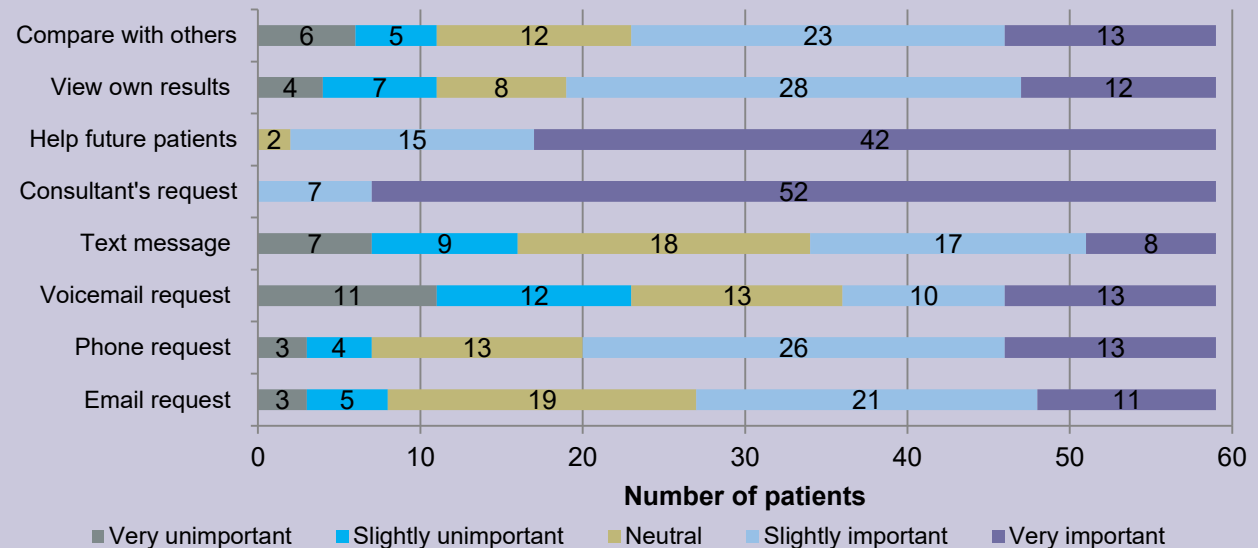
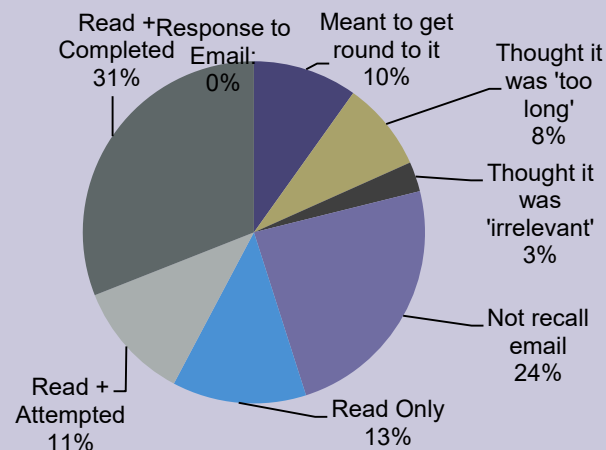


Figure 2: Response to Email



Conclusions

It is essential to ensure that the emailed PROM requests reach the patients as electronic collection of PROMs has been shown to improve completion rates¹.

As pre-operative completion of PROMs is the most important predictor of follow up completion² several different methods of encouraging patient compliance are required. Consultants should stress the importance of PROM completion to patients as this will influence their behaviour.

Estimated lifetime revision risk for medial meniscal-bearing unicompartmental knee replacement (0113)

JA Kennedy, E Burn, A Judge, DW Murray

james.kennedy@ndorms.ox.ac.uk

Background

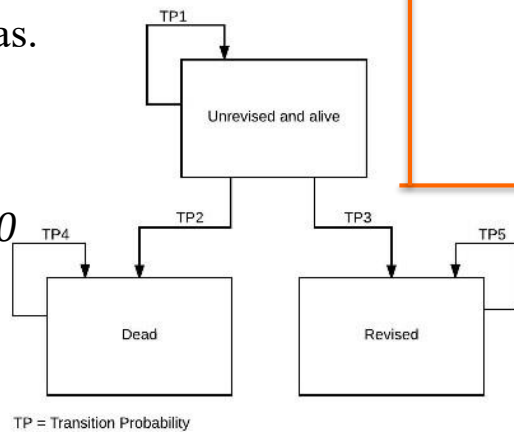
- **Lifetime revision risk for medial UKR** unknown.
- Unable to estimate using traditional methodology.
- Parametric methods used widely in Health Economics and other fields.

Study aim

1. To **determine lifetime revision risk** for males and females of varying ages.

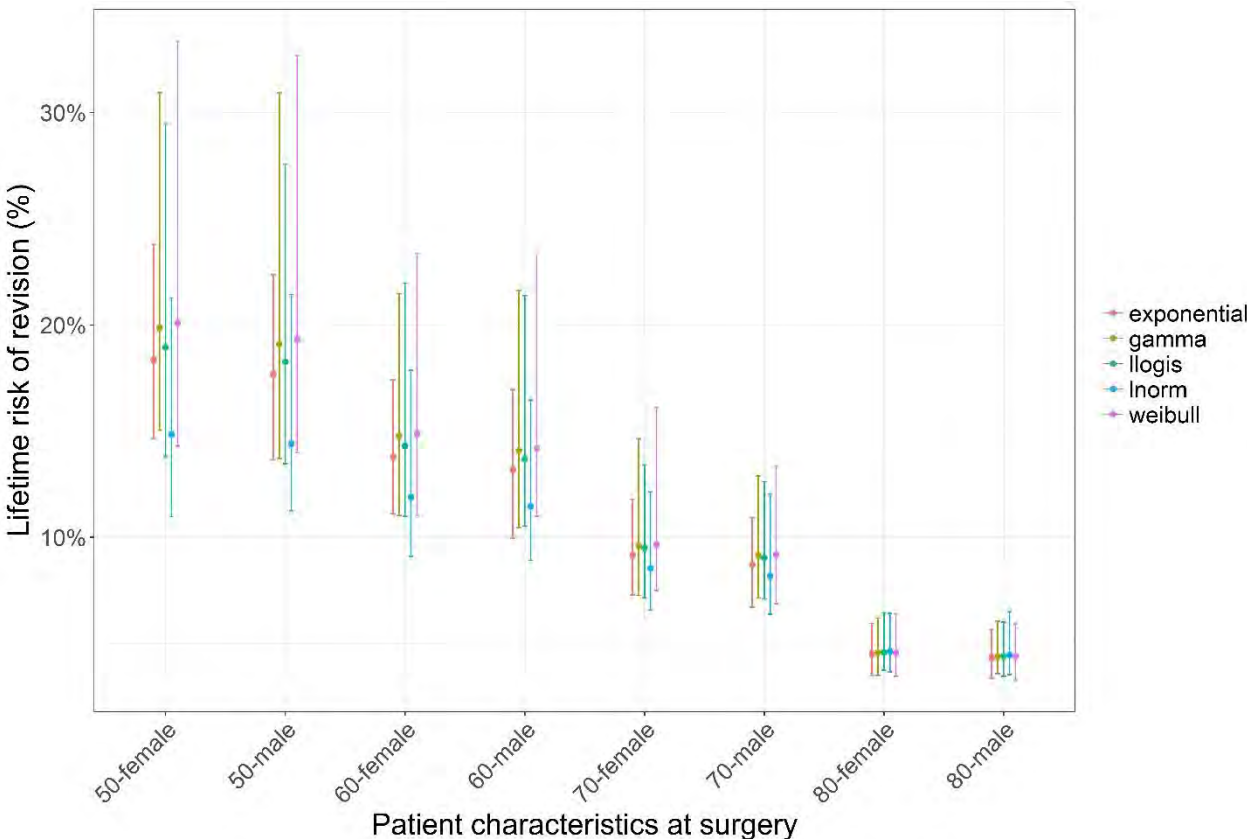
Methods

- **Markov chain, three state model.**
- **Mortality rates:** Office for National Statistics, rate halved to account for surgical selection bias.
- **Revision rates:** probabilistic (Monte Carlo) parametric regression from 1000 UKR cohort. Assumption that revision risk negligible after patient reaches 90 years of age.



Results

- Lifetime revision risk reduces with age.
- Age at surgery was not a significant revision risk predictor in any model.
- Estimates range from **3.2% at 80 years old to 33% for those at 50 years old** at surgery.



Limitations

- Parameterised predictions of future risk may not reflect observed data due to **assumptions regarding underlying hazard.**

Conclusion

- Lifetime risk of revision can inform patients prior to surgery.
- Parametric methods allow predictions from smaller data sets.

Tariff 2017/19

Now managed by NHS Improvement

13.25% reduction on 2016/17 tariff despite input from BOA EWG

Main losers – Revision TKR / TKR for trauma

Now uses HRG 4+

Critical to get coding of co-morbidities correct

www.baskonline.com for updates

Correlation of Intercondylar Notch Type, Notch Width Index and 'α angle' with Anterior Cruciate Ligament injury in females, using Magnetic Resonance Imaging

Authors: Theodoros Bouras, Stephen Burke, Hilary Bosman

Homerton University Hospital

Correspondence email address: theodoros.bouras@homerton.nhs.uk

Purpose of study:

1. Correlate the femoral notch width index, femoral notch type and α angle with the incidence of ACL injury in females
2. Decide which is the most valuable prognostic factor

Materials & methods:

1. Retrospective single institution study
2. 119 females, mean age 29±5 / 2 groups of study: ACL rupture and intact ACL
3. Femoral notch width index >0.3 considered normal
4. α angle was defined as the angle between the longitudinal femoral axis and the Blumensaat line (BL)
5. Femoral notch shape was classified in three types: Type A describing a stenotic notch, Type U a notch with a wider contour and Type W a wider Type U with two apices apparent

Conclusions:

1. Type A stenotic femoral notch can be considered as a valuable predictive factor for ACL injury
2. Notch width index and 'α angle' are weak indicators in ACL injury prognosis

Baseline characteristics of the study groups

[§]Values are mean (standard deviation) or ⁺n (%).

	ACL Rupture	Control	p-value
	(n = 58)	(n = 61)	
Age [years] [§]	29.9 (5.3)	28.4 (5.3)	0.982
Notch width [§]	18.0 (1.8)	17.8 (2.0)	0.701
Intercondylar width [§]	70.4 (4.0)	70.4 (4.1)	0.955
Notch width index [§]	0.26 (0.03)	0.24 (0.03)	0.694
- Pathological (< 0.27) ⁺	37 (71.2)	40 (67.8)	0.702
Notch shape			
- Type A ⁺	26 (44.8)	16 (26.2)	0.016
- Type U ⁺	26 (44.8)	43 (70.5)	
- Type W ⁺	6 (10.3)	2 (3.3)	



Predictors of ACL Rupture

	Odds Ratio	95% CI	p-value
Age [years]	1.07	0.99 – 1.15	0.082
Type A Notch*	2.78	1.11 – 6.94	0.028
Notch width < 0.27	0.73	0.29 – 1.80	0.480
Intercondylar width	0.99	0.90 – 1.09	0.883
A-Angle	1.02	0.92 – 1.13	0.745

* Type U and W were aggregated and were used as reference group

Can A New System for Unicompartmental Knee Arthroplasty Aid Trainee Surgeons? (117)

HA Wilson, A Alvand, R Mafi, DJ Beard, N Bottomley, WFM Jackson, AJ Price

hannah.wilson@ndorms.ox.ac.uk



NDORMS

NUFFIELD DEPARTMENT OF ORTHOPAEDICS,
RHEUMATOLOGY AND MUSCULOSKELETAL SCIENCES
Medical Sciences Division



UNIVERSITY OF
OXFORD

Background

Microplasty instrumentation was introduced in 2012 to the Oxford MUKA kit with the aim to allow more accurate and reproducible tibial resection depth and femoral positioning.

This study investigates outcomes for an initial series of Microplasty OUKAs, involving trainees.

Methods

- Retrospective study of consecutive pts around the introduction of microplasty instrumentation in a single centre.

Comparison of:

- Re-operation rates
- Meniscal bearing insert size as a marker of tibial resection depth (optimum bearing sizes 3/4)
- Accuracy of femoral component alignment, as determined from post-operative radiographs.
- Oxford Knee Scores (OKS) were used to compare outcomes.

Results	Phase 3 (n= 155)	Microplasty (n=161)	P value
Mean Age (SD)	66.4 (14.4)	68.5 (11)	0.076
Mean BMI (SD)	30.2 (4.8)	30.6 (5)	0.6
Sex (M:F)	10:13	13:9	0.31
Pre OP OKS	19 (7.6)	20 (7)	-
Consultant	84	91	-
Trainee	71	70	-

Conclusions

MUKA has shown excellent mid term implant survival and outcomes.

The introduction of Oxford MUKA microplasty instrumentation has shown:

- No significant difference in complication rates
- No difference in patient outcomes
- A more conservative tibial plateau resection, with more optimal bearing sizes implanted, even when used by less experienced UKA surgeons.
- More accurate placement of the femoral component overall, and when used by experience UKA surgeons

	Phase 3	Microplasty	P value
Re-Operation	2 (1.9%)	3 (1.3%)	0.52
Survival @ 4 years	99.6 (97.8-100)	98.5% (97.4-99.6)	0.45
Optimal Bearing Size	110 (71%)	135 (83.9%)	0.006
*Trainees	*44/71 (62%)	*59/70 (84.3%)	0.003
Femoral sag alignment	5.9° (5.0) flexed	7.3° (4.8) flexed	0.02
**Consultant	6.2°	7.9°	0.018
*Trainees	5.7°	6.5°	(NS)
ΔOKS	19.0 (10.4)	19.3 (8.6)	0.76

Factors associated with mid-flexion laxity in total knee arthroplasty: an intra-operative kinematic analysis of 585 cases (0118).

McGarvey C^{1,2}, Gelbart B^{1,2}, M Muteba², Firer P^{1,2}

1. University of the Witwatersrand, Johannesburg,
2. Linksfield Park Knee and Sports Medicine Clinic, Johannesburg

Introduction:

- The purpose of this study was to clarify factors associated with mid-flexion laxity in total knee arthroplasty (TKA).
- Mid-flexion laxity (MFL) defined as: mid flexion gap size - extension gap size.
- Flexion laxity (FL) defined as: flexion gap size - extension gap size

Method:

- Prospective data collection
- 585 consecutive TKRs 2013 – 2016
- Cinetique TKR (Medacta, Switzerland)
- Gap-balancing technique without soft-tissue release
- Gap size and coronal balance measured intra-operatively at 0°, 45° and 90° with tensiometer

Results:

Table 1. Multivariate regression analysis of factors associated with MFL

Independent variable	Coefficient	P-value
Flexion laxity	0.629	<0.001
Distal femoral cut	0.078	0.062
Coronal balance at 90°	0.063	0.419
Coronal balance at 45°	0.073	0.267
Coronal balance at 0°	0.161	0.035

Conclusion:

- MFL was most strongly associated with FL
- As FL increased from -1 to 1, the % of cases with MFL >2mm increased from 4.5% to 21% (p=0.11)

Use of the “runway” as an independent guide to rotational alignment of the tibial cutting jig in total knee replacement (TKR) (0120).

McGarvey C^{1,2}, Gelbart B^{1,2}, Firer P^{1,2}

1. University of the Witwatersrand, Johannesburg,
2. Linksfield Park Knee and Sports Medicine Clinic, Johannesburg



Introduction:

- When using a tibial cutting jig with posterior slope, incorrect rotational alignment can affect coronal balance
- “Runway” defined as a virtual rectangle overlying the tibial eminence

Method:

- 82 consecutive TKRs May - June 2016 (2 surgeons)
- Rotational alignment of tibial cutting jig determined by runway only
- Position of jig marked on tibial plateau and compared to anatomic axis of rotation (AAT) after resection

Results:

- Runway identified in 80/82
- 57 specimens resected whole and analysed
- Inter and intra-observer reliability ICC = 0.76 and 0.89
- Mean deviation of runway from AAT = 3.7° (Range 0-12°, SD 3.0°)

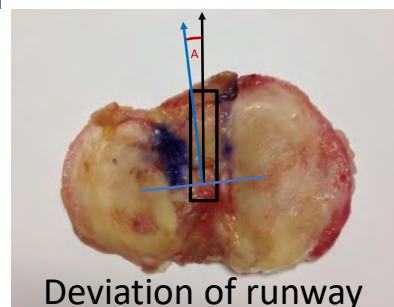
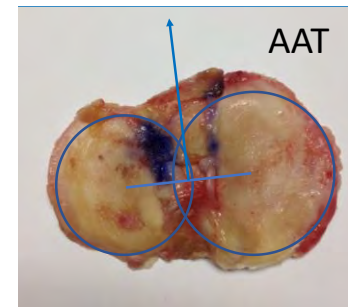
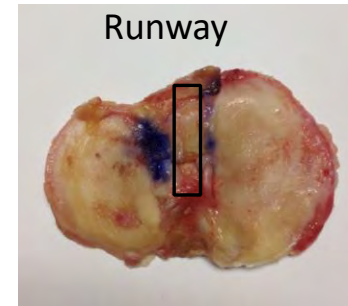
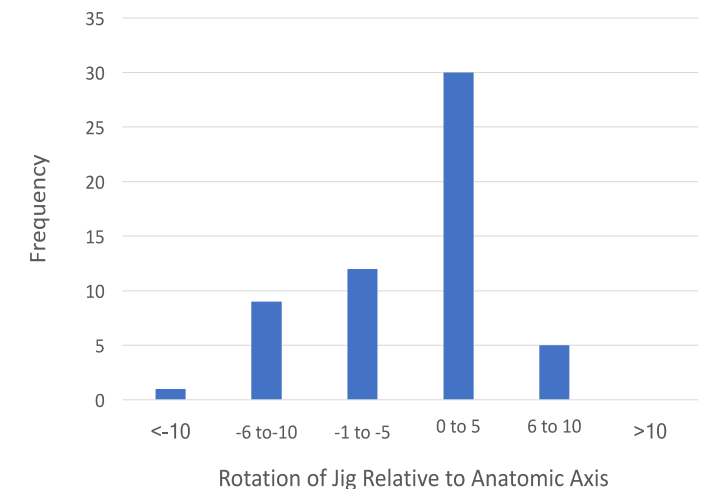


Figure 1. Deviation of jig from AAT (negative = internal rotation, positive = external rotation)



Conclusion:

- Jig placed within 5° of AAT in 42/57 cases (73.6%)
- Jig placed within 10° of AAT in 56/57 cases (98.6%)

The Role of Fibres Within the Tibial ACL Attachment

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0125

Introduction

Recent anatomical studies have reported:

- A "ribbon-like" ACL mid-substance¹
- A "C"-shaped tibial attachment with dense anterior and medial attachments²
- Questioning the contribution of central and posterolateral fibres
- No previously reported sequential cutting studies at the level of the tibial attachment

Aims

The purpose of this study was to:

- Clarify the load bearing function of the fibres of the tibial ACL attachment in resisting tibial anterior and rotational displacements
- Conduct a post-hoc blinded anatomical assessment
- Compare the anatomic centroid of the ACL fibres with the centre of effort for restraint of tibial displacements

Hypothesis

- Most of the load transmitted by the ACL would correspond with the narrow attachment of the most anterior and medial tibial fibers.

Method

- 12 cadaveric knees in a robotic biomechanical testing system
- Native laxity tests at 0°, 30°, 60° and 90° of flexion.
 - Anterior draw: 90 N
 - Internal rotation: 5 N-m
- Simulated pivot-shift: 10 N-m valgus; 4 N-m internal rotation; at 0°, 15°, 30° and 45° of flexion
- ACL attachment defined
- 10 sequential cuts: anterior to posterior; 5 medial to lateral; 5 lateral to medial
- Data amalgamated to represent "C"-shape attachment (Figure 2)
- Blinded anatomic assessment of the fibre attachment sites

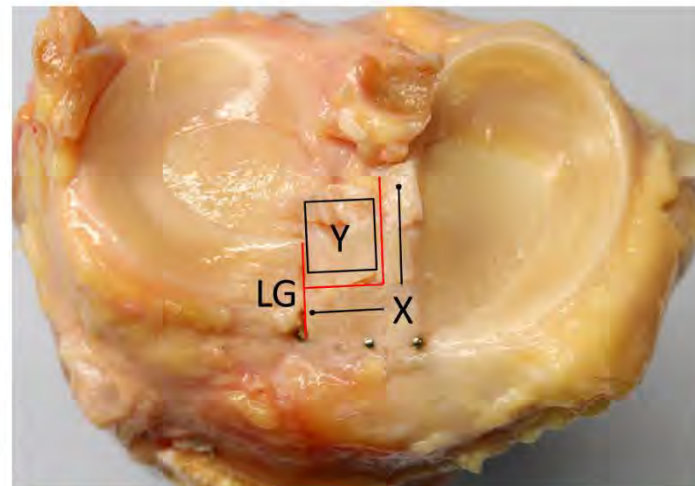


Figure 1. ACL attachment divided into 9 equal regions and fibres within the lateral gutter (LG). "C" shaped attachment (X); Central and Posterolateral fibres (Y)

Results

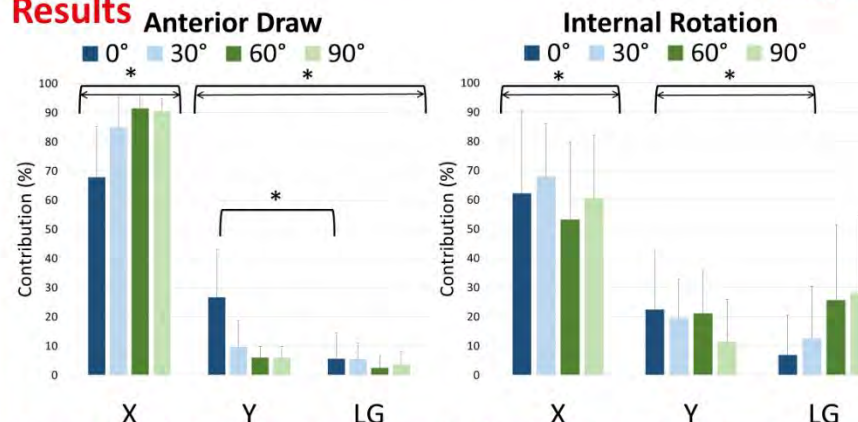


Figure 2. Contribution to the restraint of anterior draw (ATT) and an internal rotation torque (IR). * Significant difference ($P < 0.05$)

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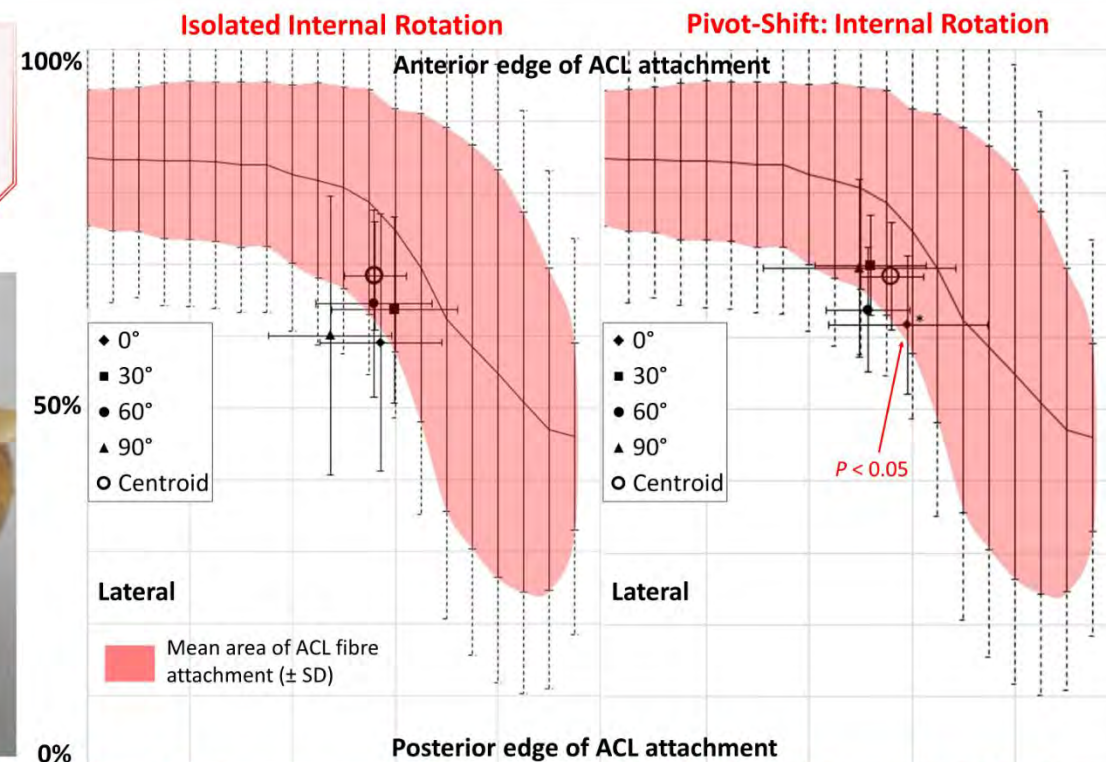


Figure 3. Overlay comparison of the anatomic centroid of tibial ACL fibres with the centre of effort for the restraint of tibial internal rotation and the simulated pivot-shift. No significant differences were seen here except for the pivot shift extension (arrow). All findings for anterior translation were within the "C".

Conclusion

1. Central, posterior and lateral fibers of the ACL tibial attachment had a minor role in the restraint of tibial anterior translation and internal rotation; Peripheral AM and anterior fibers were the most important
2. A 'C'-shaped attachment of the ACL is consistent with the contribution of the ACL to the restraint of tibial displacements
3. The correct orientation of a flat graft would mimic the 'ribbon-like' attachment, enable anterior placement whilst minimizing notch impingement without compromising rotational stability. This should be considered when determining the configuration and position of both single- and double-bundle ACL grafts.

References

1. Smigielski R, Zdanowicz U, Drwiega M, Ciszek B, Ciszowska-Lyson B, Siebold R (2014) Ribbon like appearance of the midsubstance fibres of the anterior cruciate ligament close to its femoral insertion site: a cadaveric study including 111 knees. Knee Surgery, Sports Traumatology, Arthroscopy:1-8
2. Siebold R, Schuhmacher P, Fernandez F, Smigielski R, Fink C, Brehmer A, Kirsch J (2014) Flat midsubstance of the anterior cruciate ligament with tibial "C"-shaped insertion site. Knee Surgery, Sports Traumatology, Arthroscopy:1-7. doi:10.1007/s00167-014-3058-6

GRAFT COMPRESSION IN ACL RECONSTRUCTION

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² Basingstoke and North Hampshire Hospital, Basingstoke.

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0127

Introduction

A common problem during ACL reconstruction is asymmetry of proximal-distal graft diameter leading to tunnel upsizing and potential graft-tunnel mismatch. Compression downsizing provides an ACL graft of uniform size, allowing easy passage into a smaller tunnel.

Aims

The purpose of this study was to quantify the graft compression technique, effects on graft biomechanics, and changes in graft stability.

It was hypothesized that: compression downsizing would produce a significant reduction in cross-sectional area (CSA) that would subsequently expand during in vitro joint simulation; that no significant changes in graft biomechanics would be observed; graft fixation stability would be improved.

Patients & Methods

1. Peroneus longus (PL) Bioclense® treated allograft tendons divided into compressed (1mm in diameter) and control groups producing 68 test samples (Figure 1). Biomechanical analysis was performed (Figure 2):
 - Cyclic strain when loaded 70-220 N for 1000 cycles¹
 - Ultimate failure load
 - Ultimate tensile strength
 - Young's modulus
2. Cross sectional area was measured during joint simulation using a tendon preserving mould technique (Figure 3)².
3. Stability of the graft within bone tunnels was assessed in vitro; grafts were mounted in porcine femurs and displacement at the bone tunnel aperture recorded during similar cyclic loading, using high definition video (Figure 4).

Figure 1. Test Groups

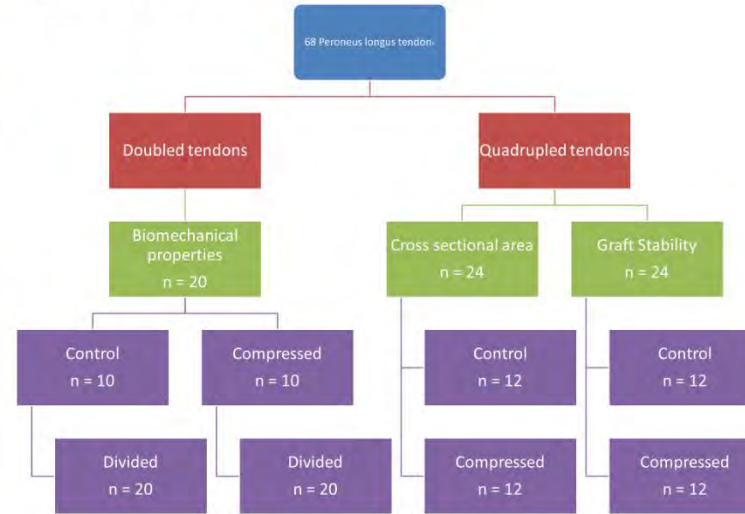


Figure 3. Cross-Sectional Area measurement²

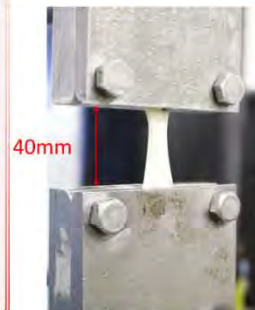


Figure 2. Biomechanical Testing

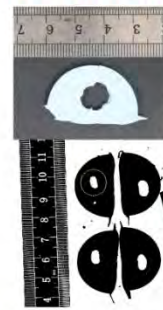


Figure 4. Graft-Tunnel stability under cyclic loading Biomechanical Testing

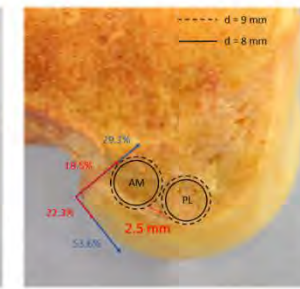
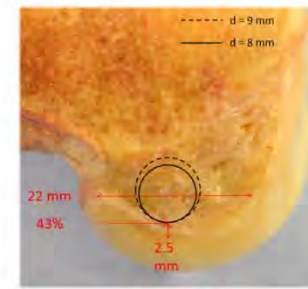
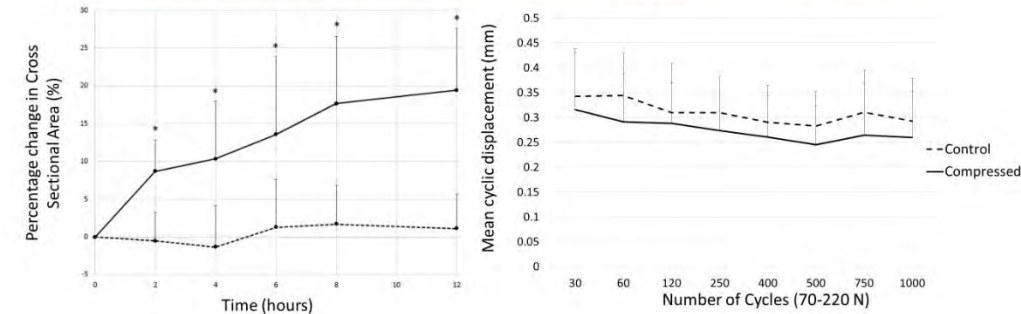


Figure 5. The relative effect of compression when positioning bone tunnels for single- and double bundle reconstructions

Results

	Control	Compressed	Significance
Cyclic Elongation (mm)	1.6 ± 1.1	1.8 ± 1.0	P>0.05
Cyclic Strain (%)	0.04 ± 0.03	0.05 ± 0.02	P>0.05
UFL (N)	1629 ± 430	1664 ± 332	P>0.05
UTS (M/mm ²)	82 ± 24	93 ± 21	P>0.05
Young's Modulus (Mpa)	671 ± 185	764 ± 164	P>0.05



Conclusion

1. No detrimental biomechanical effects on allograft PL tendons were observed
2. Following graft compression, the compressed tendons significantly increased in size during in vitro joint simulation
3. No significant difference was observed in graft stability between groups. Graft compression did not cause adverse mechanical effects in-vitro
4. During ACL reconstruction it may enable ease of graft passage, anatomic positioning within the attachment and preservation of bone stock.

References

1. Coleridge SD, Amis AA (2004) A comparison of five tibial-fixation systems in hamstring-graft anterior cruciate ligament reconstruction. Knee surgery, sports traumatology, arthroscopy : official journal of the ESSKA 12 (5):391-397.
2. Goodship AE, Birch HL (2005) Cross sectional area measurement of tendon and ligament in vitro: a simple, rapid, non-destructive technique. Journal of biomechanics 38 (3):605-608



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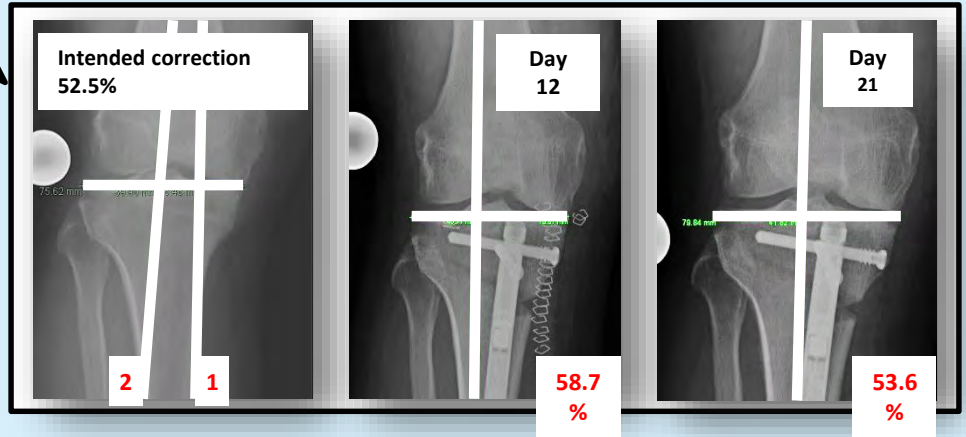
BASK E Poster 0128 : Improving accuracy in high tibial osteotomy: Use of magnetic nail distraction technology

A Winter JJ Saraswathy MJ Dawson North Cumbria University Hospitals NHS trust. alison.winter@doctors.org.uk

Could magnetic nail distraction improve accuracy in HTO surgery ?

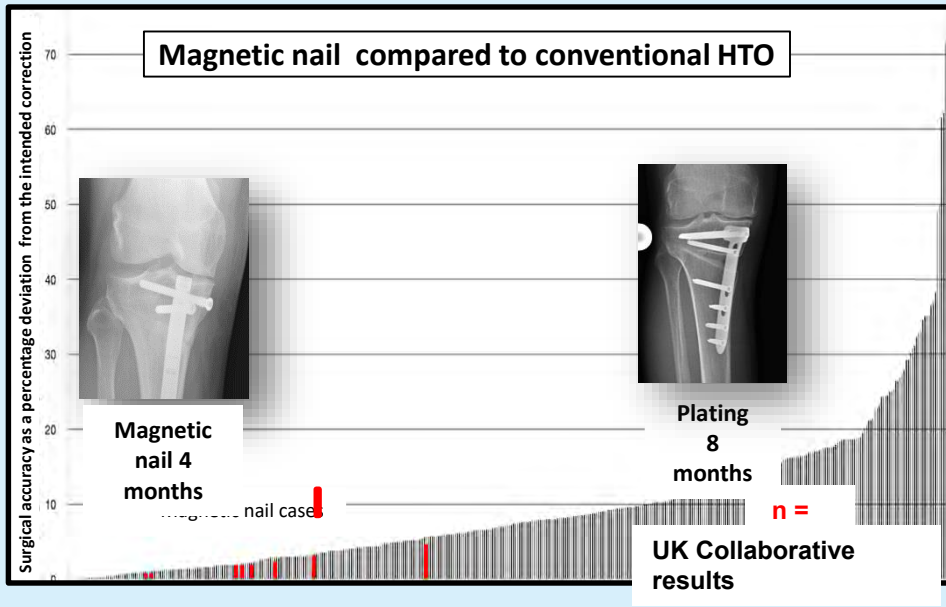
Methods

- 10 consecutive HTOs with Nuvasive magnetic nail.
- Unilateral painful medial compartment OA.
- After latent period patients perform lengthening schedule.
- Regular radiographic assessment of mechanical axis.
- Correction by compressing or distracting gap for up to 100 days.

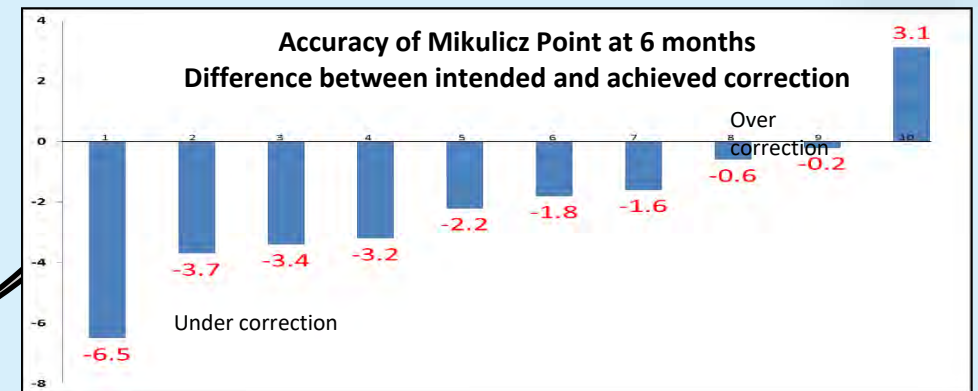


Results

- 10 patients achieved within 6.5% of intended correction. (Range -6.5% to +3.1%)
- One screw back out led to small accuracy loss.
- Bony consolidation within 7 months all patients.



North Cumbria NHS
University Hospitals
NHS Trust



Conclusion

Magnetic nail technology improved accuracy and accelerated bone consolidation in our series. This innovation provides a research tool and increased precision in osteotomy.

Should the Iliotibial Band Defect Be Closed After Lateral Tenodesis?

0129

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²OrthoSport Victoria, Melbourne, Australia

³Fortius Clinic, London

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Introduction

- Persistent instability is a problem after ACL reconstruction
- ACL injury is associated with injury to the lateral structures of the knee¹
- Recent evidence suggests the distal attachments of the Iliotibial Tract (ITT) are the most important in the restraint of rotation laxity²
- Lateral tenodesis has been associated with joint overconstraint³
- Closure of the ITB defect has been suggested to avoid muscle herniation and patient discomfort⁴

Aims

The purpose of this study was to evaluate:

- Evaluate the kinematics of the knee following a proximally-based (modified Lemaire) and distally-based (Ellison) lateral extra-articular tenodesis (LET)
- The effect closure of the ITT had on lateral compartment rotation

Hypothesis

Closure of the Iliotibial tract will overconstrain the knee joint significantly

Method

- 12 cadaveric knees were mounted in a robotic biomechanical testing system with a novel pulley system to load the ITT (30 N) (Figure 1)
- Native kinematics tested: anterior draw (90 N); internal rotation (5 N-m); simulated pivot-shift (10 N-m valgus; 4 N-m internal rotation)
- Coronal transection of all anterolateral oblique fibers at the anterior border of the LCL
- Ellison LET performed first; tensioned by anatomic placement of bone graft in the harvest site (Figure 2)
- Lemaire LET tensioned with 20 N in parallel to the long axis of the femur



Figure 1. Iliotibial tract loaded with 30 N within a 6 degrees of freedom robotic testing system

Figure 2. Transection of all the oblique fibers of the anterolateral capsule

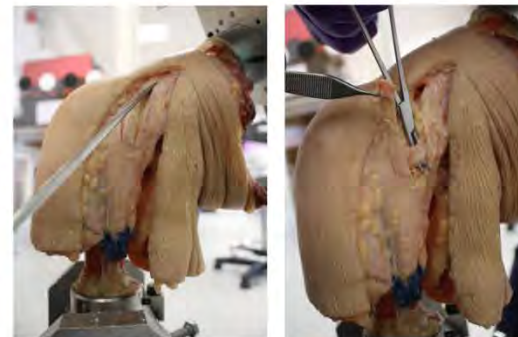


Figure 3. Distal osteotomy and graft passage medial to the lateral collateral ligament during the Ellison lateral extra-articular tenodesis.

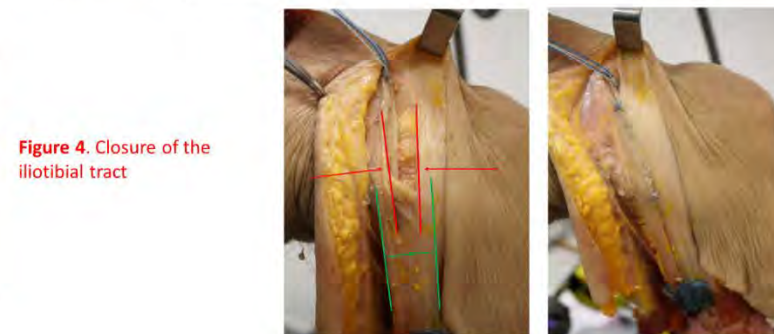
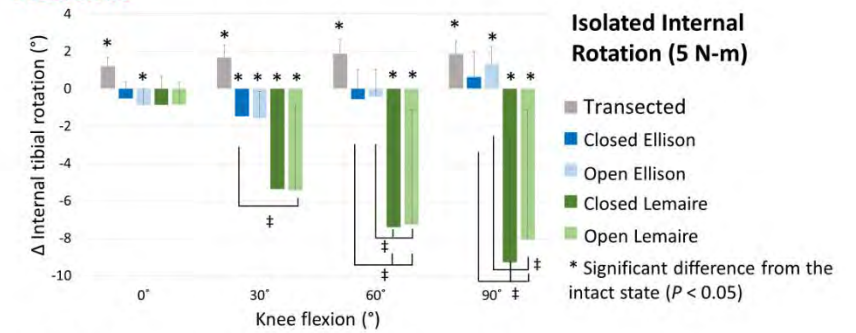


Figure 4. Closure of the iliotibial tract

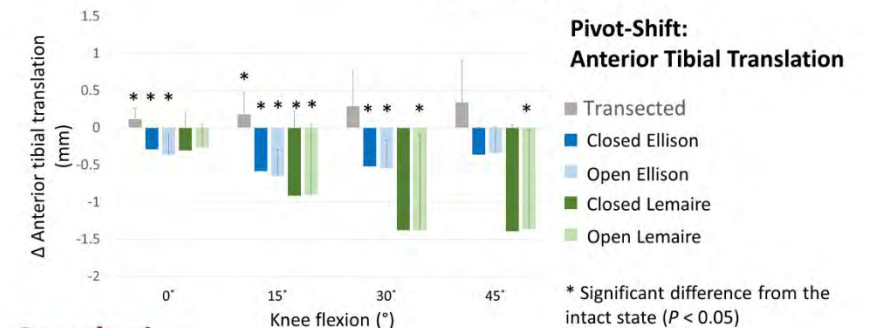
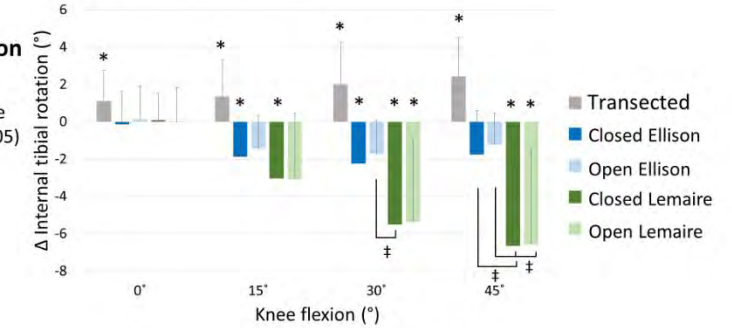
Results



Pivot-Shift:

Internal Rotation

* Significant difference from the intact state ($P < 0.05$)



Conclusion

- Closure of the ITT defect following an Ellison or Lemaire lateral tenodesis does not significantly over constrain the kinematics of the knee
- The ITT defect can be left open or closed depending on surgical preference and patient specific factors

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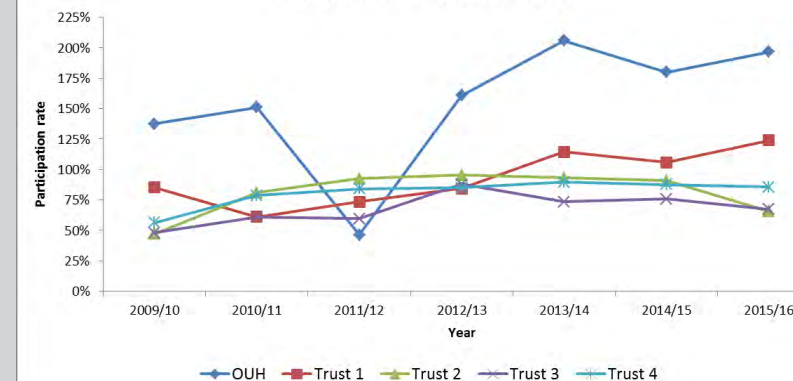
PROMs & Episode linkage in unicompartmental knee replacement – Coding consternations (No. 130)

RM Middleton, HA Wilson, A Alvand, N Bottomley, WFM Jackson, AJ Price
rob.middleton@ndorms.ox.ac.uk

Background

- PROMs for unicompartmental knee replacement (UKR) & total knee replacement (TKR) are pooled
- Accurate PROMs analysis requires identification of relevant procedures and linkage to questionnaires
- Oxford University Hospitals NHS Foundation Trust (OUH) has a high UKR caseload (approx. 45%)
- In our unit TKR is generally performed for more advanced or complex disease, with lower Oxford Knee Score (OKS) gains expected
- We identified OUH as a negative outlier for OKS gain from provisional 2016 data, triggering this review
- Our hypothesis was that our UKR cases were not linked, thus reducing our published OKS gain

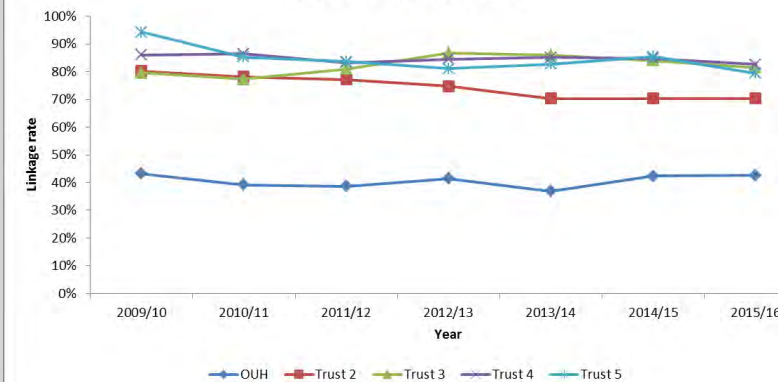
PROMs Participation rates



Methods

- 2009-16 NHS Digital data used to compare our Trust to 4 others for participation rate & linkage rate
- OPCS-4, NHS Digital and local clinical codes reviewed
- Analysis of 'orphan' UKRs by NHS Digital
- Analysis of 2012/13 data to assess impact on OKS

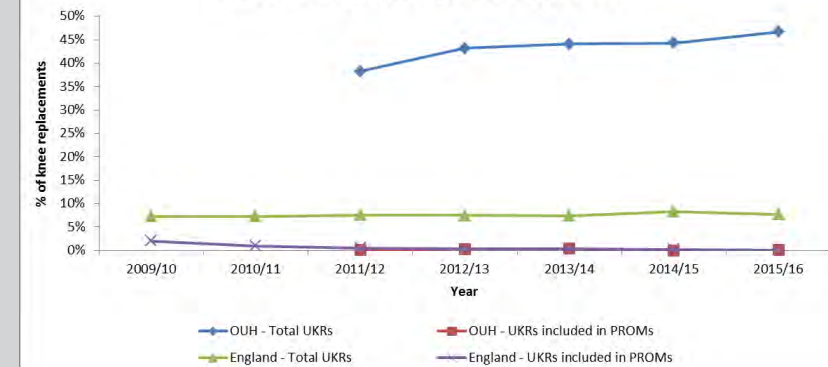
PROMs Linkage rates



Results

- Average participation of 154% (OUH) vs 81% (others)
- Average linkage of 41% (OUH) vs 82% (others)
- Coding conflicts discovered (W58 vs W52/53/54)
- Average of 43% UKRs excluded vs 7% (National)
- Local OKS gain of 16.24 vs published gain of 15.29

Have UKRs been captured in PROMs?



Discussion

- Our linkage rate for primary knee replacement is half that of the compared trusts
- Our UKR coding meets OPCS-4 coding standards
- PROMs methodology uses alternative codes and fails to recognise essentially all UKRs performed
- Inherent bias when comparing PROMs between units with differing UKR caseloads
- Inclusion of UKRs increased OKS gain by ~1 point
- Now collaborating with NHS bodies to review PROMs methodology & clinical codes in recognition that their chosen codes conflict with OPCS-4 codes

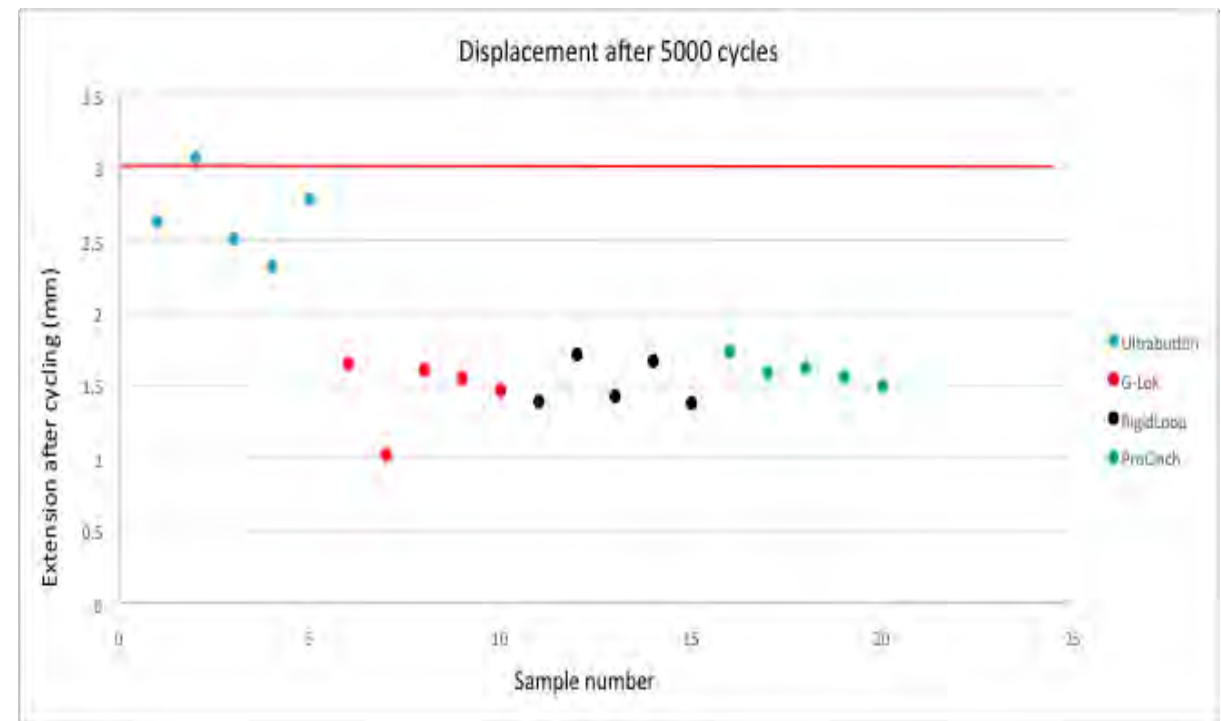
The biomechanical comparison of fixed v/s adjustable loops for ACL femoral suspension under high loads with extended cyclic loading (No. 0139)

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- ◆ **Purpose:** First study to biomechanically test and compare some of the contemporary untested fixed and adjustable loops available in the market today under high loads and cycles representative of early ACL rehabilitation to evaluate if they provide adequate fixation.
- ◆ **Methods:** Five samples each of one fixed loop (G –Lok) versus three adjustable loop devices were compared under incremental loads (10 - 500N) and extended cycles (500-5000 cycles) followed by pull to failure protocol. The Ultrabutton had to be adjusted by the company personnel.
- ◆ **Results:** The average lengthening of all the loops was less than 3mm which is the accepted marker for clinical failure. The ultimate strength was satisfactory for all the devices tested and exceeded forces more than 1200 N in all loops.
- ◆ **Conclusion:** The fixed loop device was the least prone to lengthening but the newer adjustable loop devices also lengthened less than 3mm suggesting that they could provide satisfactory femoral fixation in ACL reconstruction.





The Effects Of Implementing A Virtual Knee Clinic To Streamline Elective Services (ref 0141)

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“338 unnecessary appointments were saved. At a cost of £120 per appointment, this leads to a real terms cost saving of £40,560 in 10 months.”

Introduction

Traditionally it has been the case for orthopaedic consultants to review GP referrals for the orthopaedic outpatient clinic where possible in amongst other clinical commitments. This could sometimes lead to unsuitable patients being reviewed and both patients and clinicians becoming frustrated. Building on the “Virtual” fracture clinic work from Glasgow, a new screening tool was implemented to review referrals.

The Virtual Clinic

Referrals had to meet the criteria of BMI under 40, recent radiographs and appropriate clinical details including significant past medical history. Consultant were given dedicated clinical time to review and either triage the patient to the most appropriate clinic type, or return the referral with advice to the GP. 10 months of data was collected prior to the protocol and 10 months after implementation.

Pre-Screening Returns	Post Screening Returns
15.5%	30.2%



Results

1781 patients were referred pre-protocol with an average of 15.5% of these being returned. Post protocol there were 2110 patients referred with 30.2% returned. There was an increase in 195% of referrals returned to the GP ($p < 0.0001$). The highest proportion of these was for mild to moderate osteoarthritis on the radiograph which has been proven to be unsuitable for intervention.

Discussion

The new screening tool allows more appropriate referrals to be seen in clinic allowing less frustration to clinicians and patients by reducing therapeutic inertia. It allows advice to be given to GPs on further management for the patient. 338 appointments were saved. At a cost of £120 per appointment, this leads to a real terms cost saving of £40,560 in 10 months. Furthermore there is a higher conversion rate of clinic appointment to listing for theatre due to more appropriate cases being seen.