


Unicompartmental Knee Replacement - Results

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www.sportsclinicgermany.com

Unicompartmental Knee Replacement


Renewed interest worldwide




Oxford medial




Stryker, Elus




Oxford lateral



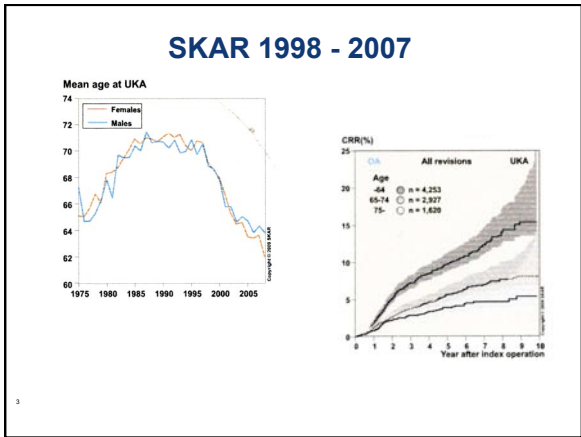
Zimmer, Allegretto



Link Endo Modell



DePuy, Preservation




Uni versus HTO

Stukenberg-Colsman S., *Knee 2001*

62 pat., **rand. prospective**, 7 to 10 years
 survival rate: 77% Uni, 66% HTO
 Good/excell Knee Soc. score: 65% Uni, 71% HTO

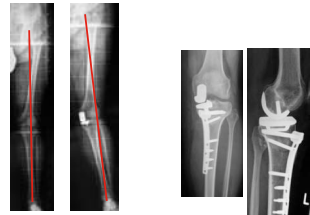
Broughton (jbj 86)
 Uni 76% good, 3/42 revised
 HTO 43% good, 10/49 revised
 Longer f-up: 42% good for uni,
 21% good for HTO
 → younger active patients HTO,
 →> 50-55, inactive: hemi



Uni after HTO ?

- Rees (jbj 01) loosening increased:
 - 3.1% revision after uni
 - 27.8% revision after uni and previous HTO

→ Don't do it



TKA or Uni ?

Callaghan (corr 95): meta analysis usa

2.391 uni: knee rating 80.9


- Complication rate 18 %
- Revision reate 9.2 %

884 tka rating: knee rating 78.3

- Complication rate 30%
- Revision rate 7.2%

Robertsson (acta scand 99) (swedish registry)

- Revision rate tka = 12 %, uni = 16%,
- Less serious complications uni
- Uni cheaper



TKA or Uni ?

Newman (jbj8 98, jbj8 2009): 15 yr f-up **RCT** uni vs tka

- Uni: less morbidity perioperative
- Rapid regaining motion
- Sooner discharge hospital
- More excellent results (even after 15 years)

Yang (04): uni vs tka (50/50 matched pair)

- Less blood loss
- Quicker rehab, earlier ambulation,
- Shorter hospital stay
- Cheaper
- Better flexion (120 degr vs 110)

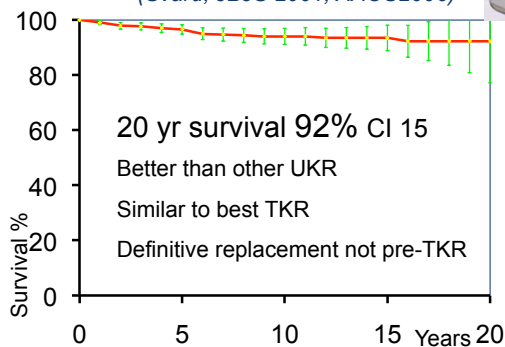
Uni Fixed Bearing Survival



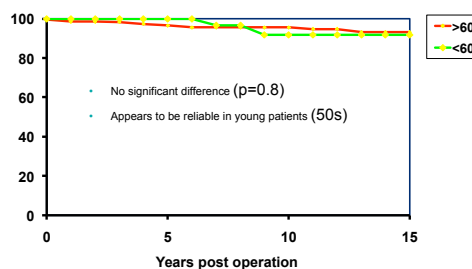
Year	Authors	Compartment	Prosthesis	Number	Survival rate (%) (95% CI)	
					10-year	15-year
1992	Capra and Fehring [32]	Medial/lateral	Marmor	52	94 (?)	-
1993	Heck et al [33]	Medial/lateral	Marmor	294	91 (86-97)	-
1996	Cartier et al [34]	Medial/lateral	Marmor	207	93 (81-100)	-
1998	Tabor and Tabor [35]	Medial/lateral	Marmor	67	84 (?)	79 (?)
1999	Squire et al [36]	Medial/lateral	Marmor	140	89 (84-95)	87 (78-95)
1991	Neider [37]	Medial	St Georg	548	80 (?)	-
1994	Weale and Newman [38]	Medial	St Georg	42	90 (?)	88 (?)
1997	Ansari et al [39]	Medial	St Georg	461	87 (81-93)	-
1991	Scott et al [40]	Medial/lateral	Brigham	100	85 (67-99)	-
1998	Hasegawa et al [41]	Medial	PCA	77	88 (?)	-
1998	Bett [42]	Medial	MBUKA	100	87 (?)	-
1999	Berger et al [43]	Medial/lateral	Miller-Galante	62	98 (96-100)	-
2002	Argenson et al [44]	Medial	Miller-Galante	160	94 (91-97)	-

1 Confidence intervals not published.
(Data adapted from and reproduced with permission from Lippincott Williams & Wilkins from Price AJ, Svard U. Long-term Clinical Results of the Medial Oxford Unicompartmental Knee Arthroplasty. *Clin Orthop* 2005; 435: 171-186.)

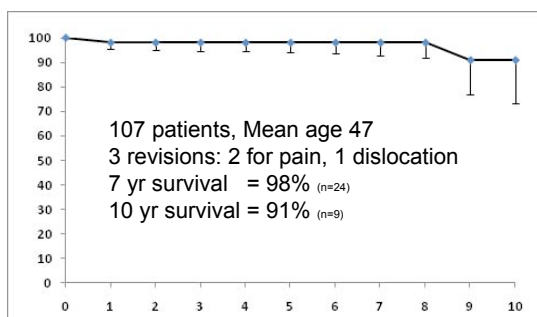
Uni mobile bearing (Svard, JBJS 2001, AAOS2006)



Oxford age < 60yrs (mean 55, n=52, Price et al JBJS2005)



Oxford <50yr, 7 centre study



Oxford 10 year survival: (Phase 1, 2, 3)



Surgeon	Year	Number	Lost	Survival
Keyes	2005	40	0	100%
Goodfellow	1998	144	1	98%
Scott	2004	135	0	94%
Svard	2005	439	0	94%
Emerson	2007	55	0	85%
Vorlat et al	2005	149	18	84%
Dodd, Murray 2009		1000	0	96%

Fixed versus mobile ?

Robertson (jbj's 01)

- Oxford / pca / georg sled
- More difficult technique: more reoperations oxford
- Pca inferior design
- St Georg Sled FB design: good results

Lewold (j arthr 95)

- Oxford vs marmor: more revisions after 6 years for oxford

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Fixed versus mobile ?

Gleeson (knee 04): oxford vs st georg

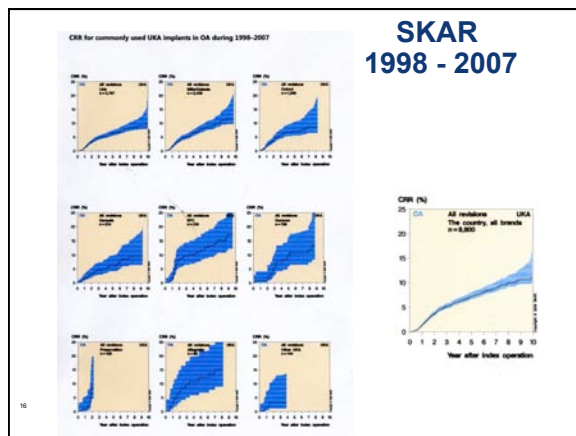
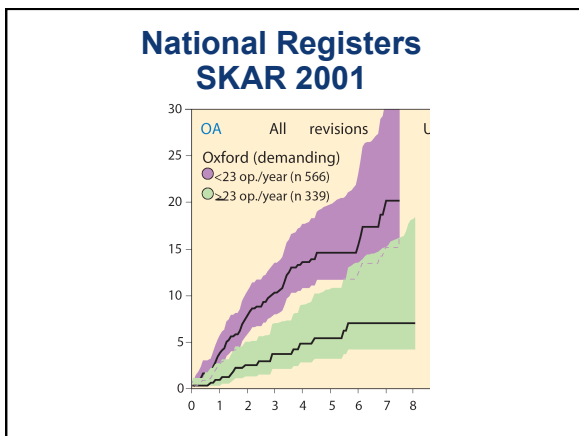
- 3:47 dislocations oxford, 4 revisions
- 3:47 georg sled revisions
- Better pain relief georg

Confalonieri (Knee 04): RCT AMC vs. Allegretto

- No differences in outcome or complications after 5 years

→MB series less wear, better survival, possible dislocation bearing, less forgiving

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SKAR 1998 - 2007

OA / UKA	n	p-value	RR	95% CI
Link	3,797		ref.	
Marmor/Richards	28	0.64	1.32	0.42-4.14
Brigham	14	0.61	1.44	0.36-5.82
Oxford	1,299	0.47	1.11	0.84-1.46
MillerGalante	2,439	0.41	1.09	0.89-1.32
Durston	136	0.05	1.68	1.01-2.81
PFC	219	<0.01	1.90	1.31-2.76
Allegretto	85	0.32	1.35	0.75-2.43
Genesis	514	0.52	1.13	0.77-1.66
Preservation	125	0.96	1.99	0.96-3.72
Other	144	0.44	0.64	0.20-2.00
Gender (male is ref.)		0.41	0.93	0.79-1.10
Age (per year)		<0.01	0.95	0.94-0.96
Year of op. (per year)		0.94	1.00	0.96-1.04

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- ### National Registers
- **SKAR 2001** - ↑ number per centre → ↑ Survival
 - **SKAR 2007** - 92% at 10yrs,
 - 1995 Worst, 2007 Best - Experience/Training
 - **NZJR 2005** ↑ number per surgeon → ↑ results
 - >10 per year → 0.5% failure per year
 - **UKJR 2008** - 0.7% failure per year (incomplete reporting)
 - 2x better than ANJR - Course & centre size
 - Dislocation 0.2%. Death & Infection half of TKR

Complications Uni

Fracture tibia

- Berger (corr 99): 4.8%
- Related to 3 pins in medial tibia cortex
- Usually revision needed

Lateral compartment degeneration

- 25% indication revision in swedish register (Robertson)

Wear

- Long term f-up MB: limited
- Long term FB: limited but higher percentage
- 45% indication revision in swedish register (Robertson)

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Complications Uni

Loosening after 10 yr f-up: 5-10%

- 25 % of revisions for loosening (gioe corr 03)

Fracture component: infrequent

Bearing dislocation mb medial

- Rare (Murray)

Bearing dislocation mb lateral

- 10.5% Robinson (knee 02)

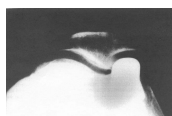
20

Complications Uni

Hernigou (jbjs 02): Patellofemoral problems

Progression OA:

- 35% after medial hemi
- 12% after lateral hemi



Impingement of femur on patella:

- 40 % in lateral hemi
- 24% in medial hemi

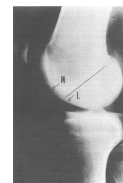


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Complications Uni

Impingement: patellofemoral symptoms

Causes impingement: femur component proud of trochlea-condylar junction



Junction

- Medial : 3 mm above Blumensaat
- Lateral 4 mm below Blumensaat

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Revision after Uni?

Gill (corr 95): TKA after Uni/HTO

- More bone reconstructions needed
- Exposure easier than after HTO
- Knee scores somewhat less than after HTO

Lai, Rand (corr 93)

- 81% good results after revision uni – TKA
- Predictable surgery

Padgett, Insall (jbjs 91)

- Revision TKA after uni is not simple

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Revision after Uni ?

Levine (j arthr 96): TKA after hemi 29 patients

- 7 contained bone grafts
- 4 tibial wedges
- 2 femoral wedges
- Better than TKA after HTO
- Comparable with primary TKA:

McAuley, Engh (corr 01): n=39

- 10 bone graft,
- Primary femoral components
- 14 stemmed tibia components,
- 8 tibia wedges
- Better than revision TKA

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Revision after Uni ?

Jackson (j arthr 94): uni vs HTO

- TKA after HTO: difficult approach, more serious complications
- TKA after uni, tibia bone loss
- Clinical scores similar

Chatain (rev chir 04): 54 revisions

- Better than after TKA and HTO
- Tibial stems necessary in bone defect
- → usually easy to do with good skills

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Revision after Uni ?

Robertsson (acta scand 00):

- Better patient satisfaction than after TKA revision
- Not completely comparable with primary TKA:
- Tibia stem/wedges/bone graft

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Conclusions Uni

Survival rate slightly less than TKA
(but revisions are more often performed!)

Faster recovery, smaller operation, better function, less serious complications

Mini invasive: effective after learning curve

MB vs FB Uni:

- less wear
- survival slightly better with good operative technique
- bearing dislocation rare

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Conclusions Uni

Lateral oa: ?

Limited slope tibia and slight undercorrection of axis deviation important

Better than HTO in elderly inactive patients

Revision after uni

- effective with stem, bone grafts,
- patient satisfaction better than after total knee revision

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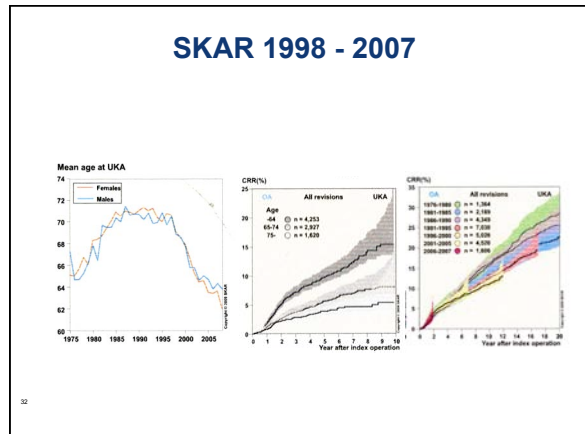
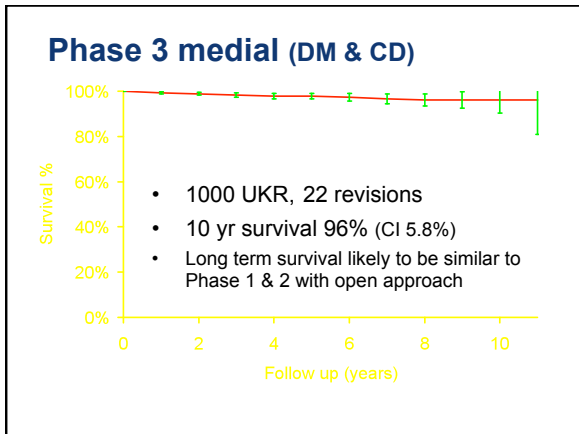
Indications Uni

- Correctable varus < 10 degrees
- Intact ACL
- Intact lateral compartment
- Asymptomatic patellofemoral joint
- < 10 dgr ffc, > 90 dgr flexion
- Not in case of inflammatory disease

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Thank you for your attention





Svard 20 yr results (AAOS 06)

- Single centre, 4 surgeons
- Prospective, none lost
- 683 UKR, 572 patients
- Age mean 69 (48 to 94)

30 Revisions (Svard)

• Lateral OA	8	1.2%
• Loosening	7	1.0%
• Dislocation	6	0.9%
• Pain	5	0.7%
• Deep Infection	3	0.4%
• Bearing fracture	1	0.1%
• PFJ problems	0	
• Wear	0	

Revisions straight forward

- Bearing exchange 5
- Primary TKR 21
- Revision TKR 3
- UKR → UKR 1

22 (2.2%) Revisions

• Lateral OA	7	0.7%
• Deep Infection	5	0.5%
• Dislocation	5	0.5%
• Pain	3	0.3%
• Loose femur	1	0.1%
• ACL rupture	1	0.1%

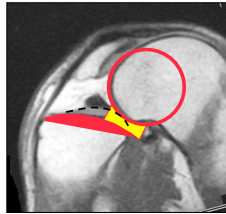
Revisions straight forward

- Bearing replaced 5
- Primary TKR 12
- Bicompartamental 2
- Revision TKR 3



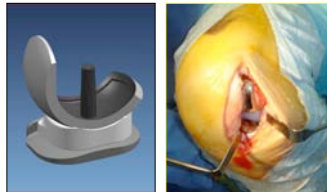
Mobile Lateral

- Starke Beugung
 - Femur subluxiert posterior
 - Konvexes Tibiaplateau



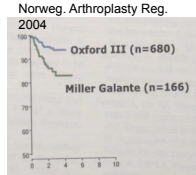
Domed Tibia

- Verstärkt Führung
- Modifizierte Technik
- Kinische Studie
 - Freie Beugung
 - Keine Luxationen



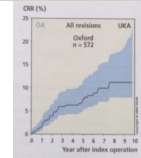
Verfügbar für
Spezialisten

Unicondylar Knee



Mobile bearing – high congruency
Reduction of shear and abrasion
Revision rate under 10 % over 15 years

Pschoyios JBJS 1998, Murray JBJS1998, Svard JBJS 2001....



SKAR 2004



Unicondylar Knee- Results

	#	Follow-up	10- years survival rate	E/G	ROM
Berger CORR 1999	62	7.5	98%	98%	120°
Argenson JBJS-A 2002	160	5.5	94%	97%	128°
Perkins J. Arthropl. 2002	40	6.0	74%	79%	114°
Bourne JBJS-A 2004	107	10.0	86%	88%	126°
Pennington JBJS-A 2003	46	11.0	92%	92%	--

Cum. Revision rate 16 to 25% if less than 25 implantations/year! SKAR



Unicondylar Knee- Results

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Cum. Revision rate 16 to 25% if less than 25 implantations/year! SKAR

Patient criteria

Age and Activity

Hiking 8x BW in 40° flexion
Jogging 9x BW in 50° flexion

M. Kuster 1997

Australian Register 2007
5 years revision rate Uni
Age at time of operation most important
prognosis factor

> 75 years 6%
< 55 years 13%

J. Bartlett, ESSKA 2008

Similar data: Finnish Register

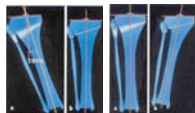
HTO for varus malalignment

Bony deformity? Age /Activity?



The ideal candidate - HTO

- under 55-65 years
- Varus tibia (TBVA >5°)
- ACL, PCL may be deficient
- BMI < 30
- Lateral side intact
- ROM normal, extension deficit may be corrected
- No nicotine abusus
- Pain tolerance



Bonnin, Orthopäde 2004

HTO Survival Rate

	5 years	10 years	> 10 years
Insall	85%	66%	
Yashuda	63%	18%	
Berni			
Ruda			
Matth			
Rinin			
Ivarss			
Herni			
Agllet			
Levig			
Gstöt			
Van F			
Akizuki		98%	90%
Flecher			85%
Billings	85%	53%	

Cochrane Database :
Brouwer et al 2007
 Silver Evidence:
 70% of patients have
 benefit from an osteotomy
 for 10 years

Results Osteotomy

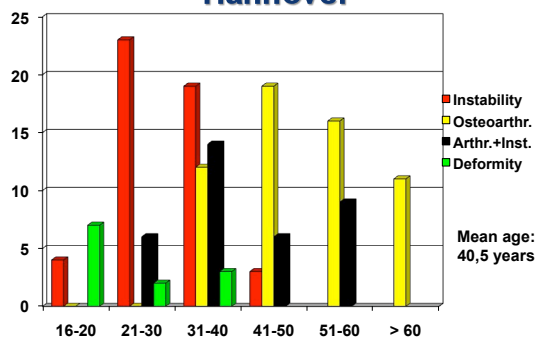
Babis et al, JBJS-A (8), 2002

- 29 double osteotomies planned with computer simulation (OASIS)
- follow-up 83 mo. (27-137)
- 96% survival rate (49 mo.), 1 total knee
- Knee Society Score 34 preop, 90 at follow-up

Conclusions

- These studies demonstrated favourable results after Tomofix
- The results are better than reported in the literature
- The revision rate was minimal (1,7%)
- The results were comparable with Uni and Total Knee
- Osteotomy must be viewed different in the present and future

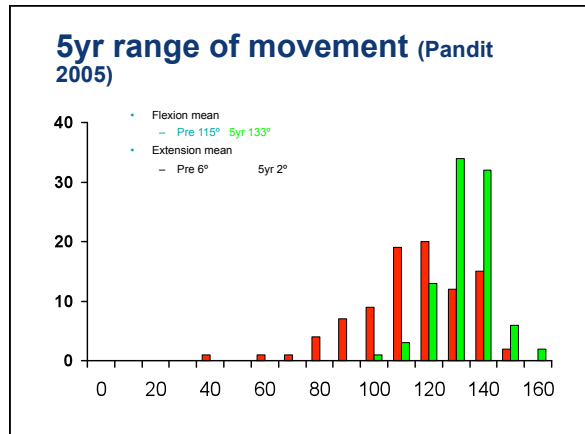
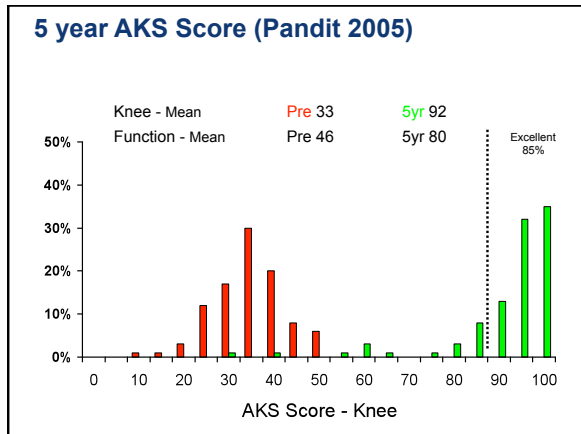
Age distribution knee osteotomy Hannover



Published Phase 2 medial with recommended indications

	Follow up	Number	Dislocations
Coates (1996)	3 yrs	70	0
Murray (1998)	8 yrs	88	0
Kumar (1999)	6 yrs	100	0
Svärd (1999)	6 yrs	255	1
Vorlat (2000)	5 yrs	38	1
Rajesakar (2003)	6 yrs	135	1
Emerson (2007)	10 yr	55	0

Dislocation rate 0.4%



Summary Oxford UKR

- Results
 - Rapid recovery
 - Excellent function
 - Good long term survival, even in young
- Treatment of choice for Medial OA

Unicondyläre Prothese - Ergebnisse

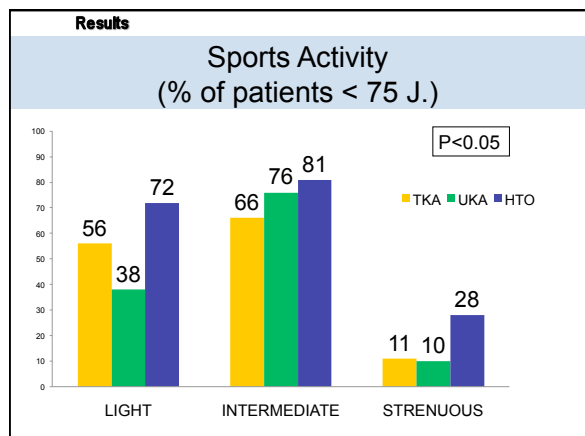
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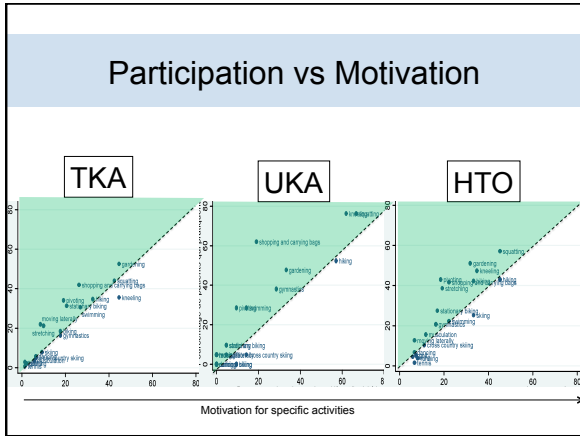
Kum. Revisionsrate 16 bis 25% wenn Fallzahl pro Klinik unter 25/Jahr !

HTO Results Multicenter Outcome Study France

- M. Bonnin et al., 572 Pat. HTO / UKA / TKA
- Operation 2003 - 2004

	n	Age	BMI (kg/m ²)	FU (Months)
TKA	347	74.8 ±9	27.9 ±4,7	44.5 ±7,7
HTO	139	59 ±8	27.1 ±4	49.8 ±10
UKA	41	72 ±9	26.7 ±3,7	45.6 ±9



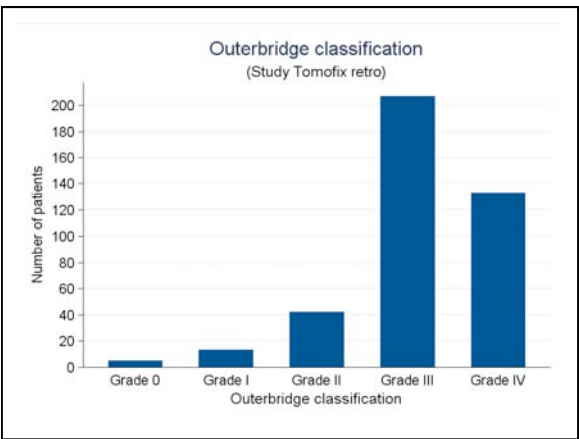
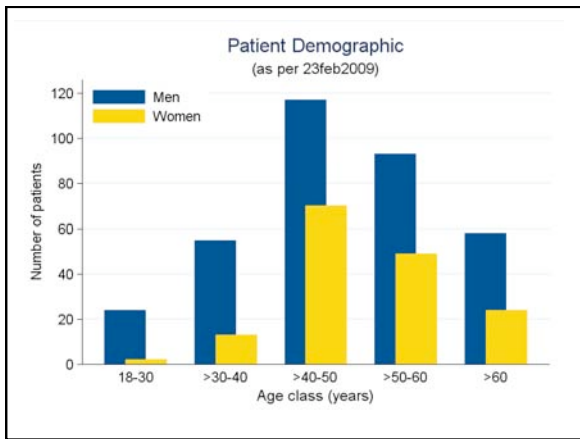


TomoFix™ retrospective study

Functional outcome assessment in patients treated with open wedge high tibial osteotomy (HTO) for knee osteoarthritis using TomoFix™.

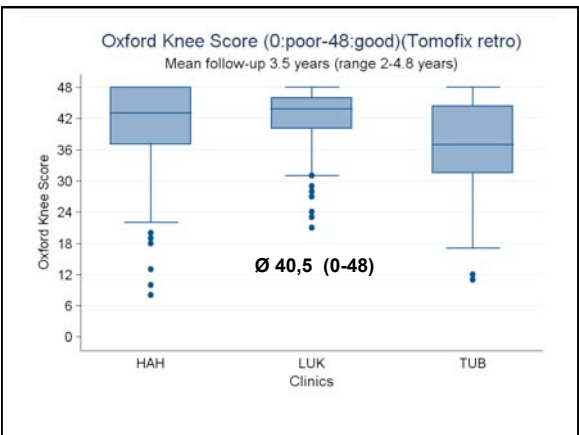
506 patients, 3 centers, op. 4/2004 to 4/2006, 75% follow-up rate, BMI 27, 9,8 mm opening

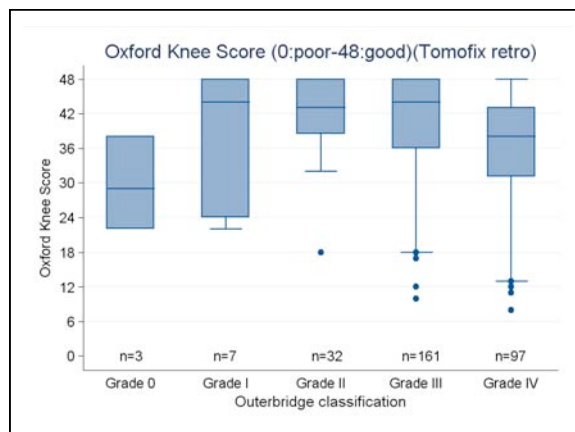
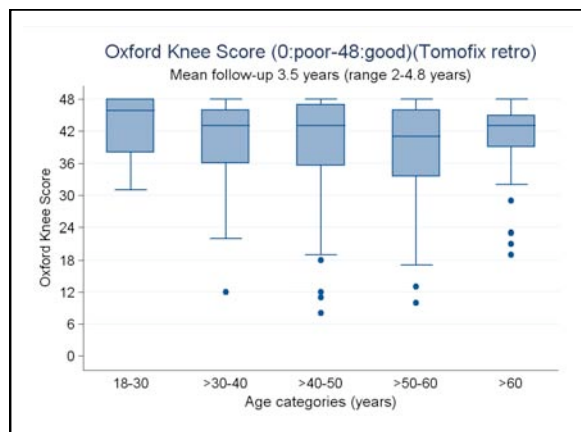
- D. Freiling
- S. Meyer
- S. Friedmann
- P. Lobenhoffer
- A. Staubli
- S. Schröter
- D. Hoentsch



Oxford Knee Score (OKS)

- > Subjective score
- > Internationally accepted
- > Available in English
- > Translated/Validated by AOCCID
- > 12 questions, 5 answers
- > (excellent 4 P., bad 0 P.)
- > 48 points: excellent result
- > 0 points: bad result
- > Comparison with Unicompylar and Total Knee
- > Present version of OKS:
 - > 48 points best result
 - > 0 points worst results





Literature

		Oxford Knee Score
Tomofix	35 Mo.	41
Oxford Uni cemented	60 Mo.	39
Oxford Uni non- cemented	12 Mo.	39
Total Knee	24 Mo.	37
Total Knee	24 Mo.	39
Total Knee	24 Mo.	40
Total Knee	24 Mo.	35
Total Knee	24 Mo.	35

Pandit et al (JBJS 2009) Geiger (AOTS 2008)
 Pandit et al (JBJS 2006) Karachalios JBJS 2008
 Spencer (JBJS 2007) Breugem CORR 2008

AO Foundation Clinical Investigation (AOCID)

- ### Complications
- **18 complications** **3,5%**
 - **Pseudarthrosis** **9**
 - **Infections** **9**
 - **Total Knee Implantation** **9/506 (1,7%)**
 - **3 patients: 1 year after HTO**
 - **2 patients: 2 years after HTO**
 - **4 patients: 3 years after HTO**
 - **3 patients on waiting list for total knee**

Studies Tomofix

Salzmann GM, Imhoff, AB et al AJSM 2009

65 patients Tomofix 36 months postop

91% engaged in sports activity

2 sessions /4 hours per week

Lysholm 70, Tegner 4,3

Downhill skiing, mountain biking

Studies Tomofix

Niemeyer, P., Suedkamp, NP et al Arthroscopy 2008

43 patients 24 months postop

68% excellent / good

68% returned to predisease sports

86% clinical improvement at 24 months

Main improvement between 6 and 12 months

1 revision surgery (delayed healing)

Studies Tomofix

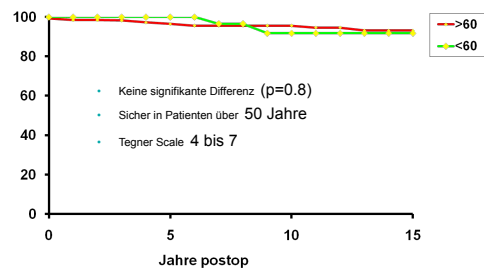
Takeuchi, R. et al, KSSTA 2008, 2009, Arthroscopy 2009

Simultaneous bilateral opening-wedge high tibial osteotomy with early full weight-bearing exercise

Clinical results and radiographical evaluation of opening wedge high tibial osteotomy for spontaneous osteonecrosis of the knee

Medial opening wedge high tibial osteotomy with early full weight bearing

Oxford im Alter < 60 Jahre (Mittelw. 55, n=52, Price et al ESSKA 2000)



Survival hemi ?

Murray (jbjs 98) oxford med

- 98% 10 year n=143, 1 disl.

Svard (jbjs 01) oxford med

- 10 yr f-u: 95%

Tabor (j arthr 98) marmor fb

- 10 yr f-up: 84%
- 15 yr f-up: 79%

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Survival hemi ?

Robertsson (acta scand 99) swedish registry

- CRR tka = 12 %, CRR hemi = 16%, cheaper, less serious complications

Naudie (jbjs 03) Miller Galante FB med

- 10 yr f-up: 90% survival

70

Survival hemi ?

Squire (corr 99): marmor

- 15 yr f-up: 10% survival
- 46% had increasing lateral oa
- 10 % had Tibial loosening and wear

Gioe (corr 03) : am registry 516 hemi

- 5 yr f-up: 92%
- 10 yr f-up: 88%
- 51% lateral oa
- 25% loose
- 20% pe wear

Bert (j arthr 98): medial fb

- 87% 10 yr f-up, 10 % revision for lateral oa

71

Survival hemi ?

Argenson (jbjs 02)

- 94% 10 yr f-up
- 3x pf oa
- 2x pe change
- 1 progr. Lateral oa

Deshmukh (corr 01) *overview results*

- Survival from 85-98%
- No big difference with mb/fb
- Recent mb studies strict inclusion/operative technique better

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Younger patients with hemi ?

Tabor et al (j arthr 99):

- 16% revisionrate 10 YR yonger patients < 60 yr

Pennington (jbjs 03):

- 11 yr f-up: 93% survival Miller Galante FB med
- Average age 54 yr

→ ? Reservations !

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Posterior slope and acl in hemi ?

Hernigou (jbjs 04)

- Relation slope and anterior tibia translation
 - Normal slope (< 7 degr) = normal ap laxity
 - > 13 degr slope: acl # and revision
- In presence of acl # and limited slope: 11/18 patients good function

→ Conclusion: slope is important , not too much

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Over/undercorrection leg alignment ?

Ridgeway, Engh (jbjs 02):

- Undercorrection and small pe: more failure
- Correct restoration joint kinematics and laxity

Hernigou (corr 04):

- Overcorrection: increase degeneration lateral side of the knee
- Undercorrection: increased wear of PE

→ axis between 1-9 dgr varus in medial oa is best

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