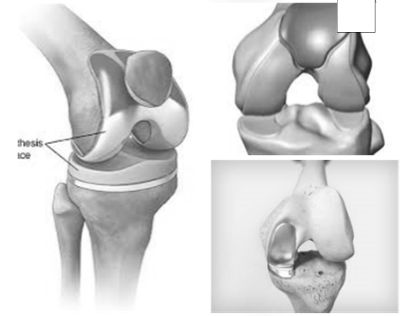


Unicompartmental Knee Replacements

1

Unicompartmental Knee Replacements (UKR)

- Total Knee Replacement (TKR)
- Patellofemoral Replacement
- Lateral UKR
- Medial UKR



2

Unicompartmental Knee Replacements (UKR)

- Unicompartmental/unicompartmental knee replacements
 - Unicompartmental knee replacement vs TKA
 - Historically 5% of patients candidates with OA (in US 4.7% of arthroplasties UKAs)
 - Current data USA/UK 30-50% pts would qualify

3

Total Knee Replacements

- Commonly performed
- Infection rate 1-2% in Medicare population
- Durable
- Removing all cartilage-including normal cartilage
- 10-15% of TKA patients will have chronic pain

4

Unicompartmental Knee Replacements (UKA)

- High surgical learning curve-technically more difficult
- Half the major/minor complication rate
- Only removes affected cartilage
- Shortened recovery/ better physiological function
- Infection rate < 0.5%
- Higher revision rate

5

MEDIAL UNICONDYLAR KNEE REPLACEMENTS (UKR)

6

Unicompartmental Knee Replacements (UKR)

- Medial UKA-90% of UKAs
- Lateral-10% of UKAs

Figure 1. (A) Preoperative and (B) 6-week postoperative weight-bearing radiographs of a 68-year-old female who underwent medial unicompartmental knee arthroplasty. (C) and (D) illustrate the patellofemoral joint and medial bicompartmental knee arthroplasty.

Medial Patellofemoral Lateral Medial bicompartmental

7

Unicompartmental Knee Replacements (UKR)

- Why UKA vs TKA?
 - Minimally Invasive
 - Cruciate mechanism- "normal" kinematics
 - ROM better than TKA
 - Function better than TKA
 - Pain relief equivalent to TKA

8

Unicompartmental Knee Replacements (UKR)

- Who are candidates for medial UKAs?
 - Full thickness medial OA
 - Intact ACL
 - Intact cartilage lateral
 - <15 degree flexion contracture
 - > 90 degrees flexion

Pandit et al, JBJS 2011

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Unicompartmental Knee Replacements (UKR)

- NOT contraindications:
 - Patellofemoral joint OA!!
 - Chondrocalcinosis/AVN
 - Age
 - Activity level
 - Obesity

Pandit et al, JBJS 2011

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Unicompartmental Knee Replacements (UKR)

- Contraindications:
 - Inflammatory Arthritis
 - ACL deficient knee
 - Previous upper tibial osteotomy

Pandit et al, JBJS 2011

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UKR SURVIVORSHIP

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OXFORD UKR




- Most common UKA utilized
- 41 years of use/research
- Developed in Oxford, England
- National Registries

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Unicompartmental Knee Replacements: Survivorship


- Bottomly et al. *JBJS*, 2016
 - 10 year follow-up results (Oxford UKR)
 - 1084 UKAs, avg. age 66.5yrs at time of surgery
 - 10 year survival rate for revision or exchange of any part of prosthesis was 93.2%
 - High volume center in UK



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Unicompartmental Knee Replacements: Survivorship

- Emerson et al. *JBJS*, 2016
 - 10 year follow-up results (Oxford UKR)
 - 173 UKAs, single US surgeon
 - 10 year survival rate for revision or exchange of any part of prosthesis was 88 %



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Unicompartmental Knee Replacements: Survivorship

- Argenson et al. *JBJS*, 2013
 - 20 year follow-up results
 - 160 UKAs, avg age 66 at time of surgery
 - 70 knees alive at 20 yr follow-up, avg age 88 yrs old
 - ROM 127 degrees

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Unicompartmental Knee Replacements: Survival

- Argenson et al. *JBJS*, 2013
 - 14/70 (20%) had required a revision
 - 9/14 converted to TKA average 13 years after initial procedure
 - Survival rate with revision for any reason was 83% at 15 years, and 74% at 20 years

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Table 10.1 Survival Rates for Oxford Medial Arthroplasties Phase 1 & 2 at 10, 15 & 20 years. Only the most recent report of a series is included.

Implant	Principal Surgeon* or Author	Date	Ref	No. of Knees	Age (yrs)	Time (yrs)	Survival (%)	No. of Revisions	Reasons for revision
Phase 2	Emerson*	2010	54	64	20	84%	0		
Phase 2	Mooney	1998	54	71	10	98%	1	Disease progression (2), infection (1), pain (1), loosening (1)	
Phase 2	Blanchard*	2004	135	70	10	96%			
Phase 1.2	Kumar	1999	100	71	10	85%	7	Patient selection (see text), disease progression (2), fracture (1)	
Phase 1.2	Price	2005	12	55	10	91%	24	Survival -60-99%, +60-91%	
Phase 2	Wolul	2006	159	65	10	84%			
Phase 1.2	Kirkham	2007	1113	64	10	85%			
Phase 1.2	Lojander*	2010	17	70	10	80%			
Phase 1.3	Said*	2011	683	70	15	92%	29	Disease progression (10), loosening (7), infection (5), pain (3), bearing dislocation (2)	

Table 10.3 Reported 10-year survival of Oxford Phase 3.

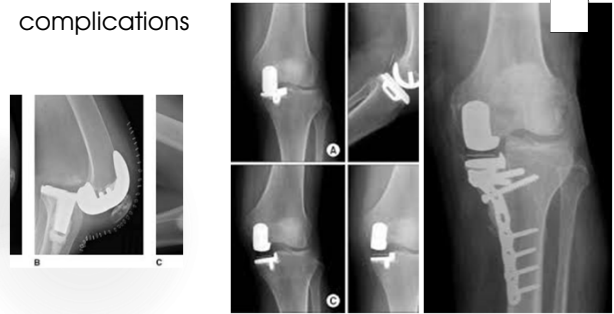
Principal Surgeon* or Author	Date	Ref	No. of Surgeons	No. of Knees (at start)	10 year Survival (%)	% of Knee Replacements that are UKA
Parke	2011	51	2	1900	95	>50%
Troslide*	2013	52	1	1219	95	>50%
Kirkness*	2012	53	1	794	94	50-50%
Jones	2012	54	56	1009	94	>50%
Lem	2012	55	1	400	94	
Davidson	2012	56	1	124	90	20-30%
Keay*	2013	57	1	107	97	
Brent-Evans	2013	58	35	827	91	20-30%
Favor-Martin	2013	59	1	416	95	

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UKR COMPLICATIONS VS TKA

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complications



20

Unicompartmental Knee Replacements (UKR): Complications

- Dutchman et al. JBJS, 2014
 - 29,333 patients between 2005 and 2011
 - 27,745 (94.6%) TKAs, 1588 (5.41%) UKR
 - 30 day incidence of morbidity and mortality
 - Significant differences in outcome : DVT, PE, operative time, and length of stay favored UKR

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Unicompartmental Knee Replacements (UKR): Complications

- Bolognesi et al. JBJS, 2013
 - 68,603 TKA pts vs 3098 UKR pts in Medicare population
 - 2000-2009
 - Rate of UKR increased six-fold from 2000 to 2009
 - TKA group greater mortality at 90 days, 180 days, and one year
 - TKA group higher rate of DVT and infection
 - Revision rate TKA 1.2% at one year and 3.7% at 5 years
 - Revision rate UKR 2.3% at one year and 8.0% at 5 years

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Unicompartmental Knee Replacements (UKR): Complications

- Berend et al. Orthopedics 2010
 - 1000 consecutive UKAs
 - 2004-2008
 - Deaths 0%
 - Transfusions 0.5%
 - VTE 0.1%
 - Deep infection 0.1%
 - Manipulation 0.7%



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Unicompartmental Knee Replacements (UKR): Complications

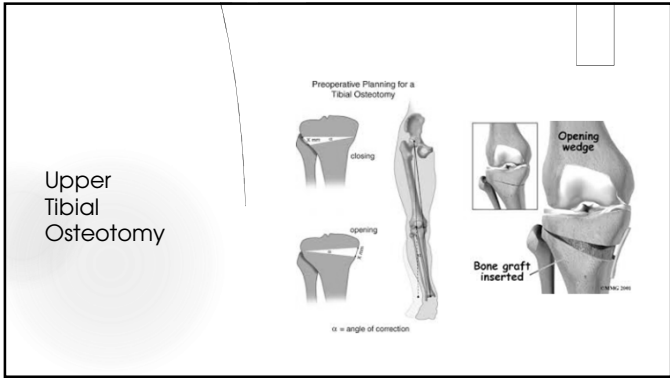
- Brown et al. JOA 2012
 - Total Complications UKA vs TKA
 - TKA 11.0% (252 of 2290 pts)
 - UKA 4.3% (27 of 629 pts)



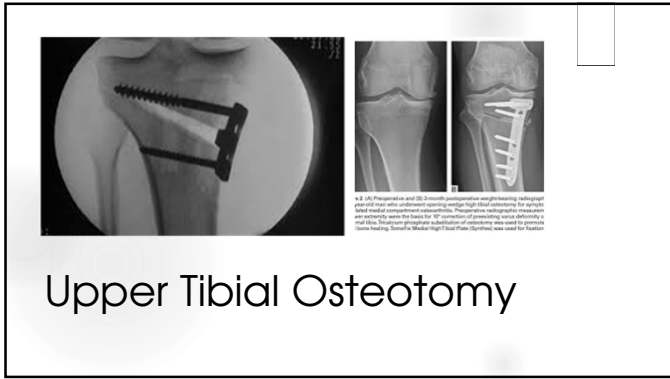
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UKR VS UPPER TIBIAL OSTEOTOMY

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- ## Unicompartmental Knee Replacements (UKR): Complications
- Krych et al. *JBJS*, 2017 (MAYO)
 - 240 pts between ages 18-55 yrs old
 - 1998-2013
 - UKA 183 pts
 - Tibial osteotomy 57 pts
 - F/u 3 mos, 1, 2, and 5 years

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- ## Unicompartmental Knee Replacements (UKR): Complications
- Krych et al. *JBJS*, 2017 (MAYO)
 - Osteotomy group: survivorship 77% at an average of 7.2 years
 - UKA group: survivorship was 94% at an average of 5.8 years
 - UKA group: activity level and function significantly favored UKA group on all follow-ups

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UKR: COST-EFFECTIVENESS

30

UKA Cost-Effectiveness

- Kazarian et al. JBJS 2018
 - Lifetime cost-effectiveness for TKA, UKR, and non-surgical treatment (NST) for unicompartmental knee arthritis
 - Surgical treatments less expensive and provided greater number of quality-adjusted life yrs than NST from age of 40-69

Cost-Effectiveness of Surgical and Nonsurgical Treatments for Unicompartmental Knee Arthritis
A Markov Model

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UKA Cost-Effectiveness

- Kazarian et al. JBJS 2018
 - UKA dominated other options
 - "Preferential use of UKA in all US patients with unicompartmental OA would result in an estimated lifetime societal savings of 987 million to 1.5 billion US dollars per annual wave of patients undergoing treatment"
 - Recommended UKA over TKA in order to maximize cost effectiveness

Cost-Effectiveness of Surgical and Nonsurgical Treatments for Unicompartmental Knee Arthritis
A Markov Model

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UKA Cost-Effectiveness

- Ghomrawi et al. JBJS 2015
 - Effect of age on Cost-Effectiveness of UKR compared to TKA in the US
 - "Unicompartmental knee arthroplasty is an economically attractive alternative in pts 65 or older, and modest improvements in implant survivorship could make it a cost-effective alternative in younger patients"

Effect of Age on Cost-Effectiveness of Unicompartmental Knee Arthroplasty Compared with Total Knee Arthroplasty in the US.

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OVERVIEW UKAs

- DURABLE/EXCELLENT SURVIVORSHIP
- LOWER COMPLICATION RATE VS TKA
- HIGHER FUNCTIONAL OUTCOMES THAN TKA
- COST-EFFECTIVE
- HIGHER REVISION RATE THAN TKA

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UKR: REVISION RATES

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Why are UKR revised up to 4 times more often than TKAs??

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UKAs and Revision Rate

- Bini et al. *JBJS*. 2013
 - All UKAs done at Kaiser Permanente 2002-2009
 - Median F/U 2.6 yrs
 - Looked at surgeon experience/hospital volume

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UKAs and Revision Rate

- Bini et al. *JBJS*. 2013
 - 1746 UKAs-various implants/companies
 - Revision 4.98%
 - Oxford UKR 1.7%
 - 9.5% for all poly tibia-currently off the market
 - 4 times revision rate with specific models

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UKAs and Revision Rate

- Bini et al. *JBJS*. 2013
 - BMI not associated with failure
 - Surgeon yearly volume played significant role
 - Twofold higher risk for revision if surgeons performed 12 or fewer unicompartmental knee replacements a year

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UKAs and Revision Rate

- Baker et al. *JBJS*. 2013
 - 23,400 Oxford UKAs
 - 2003-2010 in UK
 - Revision rate calculated according to center volume and surgeon volume



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UKAs and Revision Rate

- Baker et al. *JBJS*. 2013
 - 919 surgeons and 366 centers performed at least one replacement



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UKAs and Revision Rate


- Baker et al. *JBJS*. 2013
 - Low Volume centers (50 or fewer over 8 yrs of study)
 - 92.3% 5 years survival rate
 - High Volume centers (More than 400 procedures)
 - 94.1% 5 year survival



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UKAs and Revision Rate

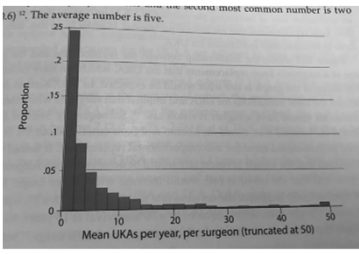
- Baker et al. *J.BJS*, 2013
 - **Low Volume surgeons** (25 or fewer over 8 yrs of study)
 - 90.1% 5 years survival rate
 - **High Volume surgeons** (More than 200 procedures)
 - 96.0% 5 year survival



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UNITED KINGDOM NATIONAL JOINT REGISTRY

- ▶ ½ off surgeons doing knee replacement do some UKAs
- ▶ For those doing UKAs, most common number implanted per year is 1, second most is 2



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UNITED KINGDOM NATIONAL JOINT REGISTRY

- ▶ Surgeons doing one or two UKA per year have a 4% failure rate a year-40% 10 year survival
- ▶ Surgeons doing 30 plus per year have a 1% failure rate per year

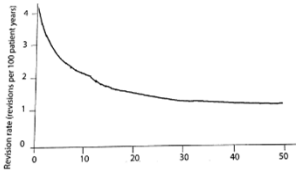


Figure 10.7 Relationship between revision rate and the number of UKA done per surgeon per year in NJR ¹⁴.

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UNITED KINGDOM NATIONAL JOINT REGISTRY

- ▶ Relationship between the revision rate and the percentage of a surgeon's knee replacements that are UKAs
- ▶ Optimal usage around 50%

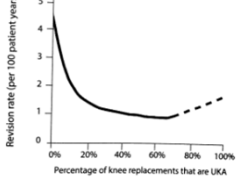


Figure 10.8 Annual Revision Rate for UKA plotted against the proportion of a surgeon's practice that are unicompartmental ¹⁴.

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UKAs and Revision Rate

- Baker et al. *J.BJS*, 2012
 - NJR England/Wales
 - 2003-2010
 - 402,714 TKAs, 35,749 UKAs

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UKAs and Revision Rate

- Baker et al. *J.BJS*, 2012
 - 23% of UKA revisions for unexplained pain
 - 9% of TKA revisions for unexplained pain
 - 5 year rate of revision for unexplained pain
 - UKA 1.9%
 - TKA 0.2%

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UNICOMPARTMENTAL
KNEE REPLACEMENTS

- Lower complications than TKA
- Better functional outcomes
- Excellent survivorship/durability
- Higher revision rate
 - Related to implant type
 - Surgeon volume
 - % of joints done that are UKRs

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THANK YOU!

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