

Improving Flexion in TKA

The influence of the Approach

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www.chirurgie-arthrose.com



**4th Advanced Course on
Knee Surgery**

January 22nd – 27th 2012

Basic TKA

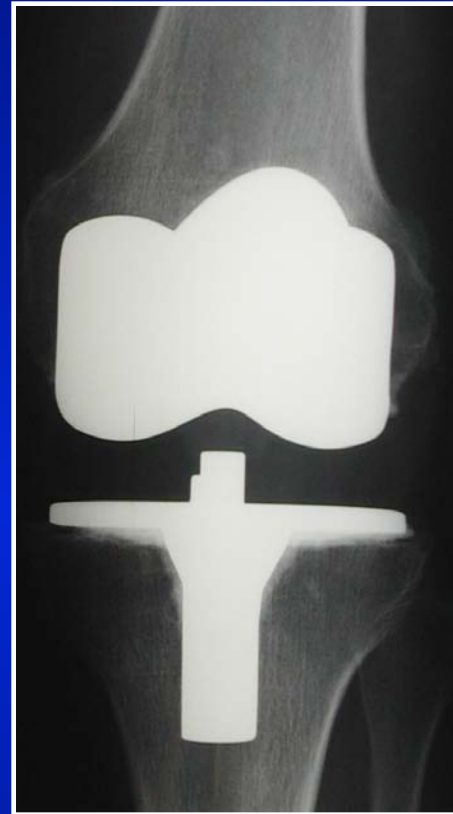


Arthritis

+



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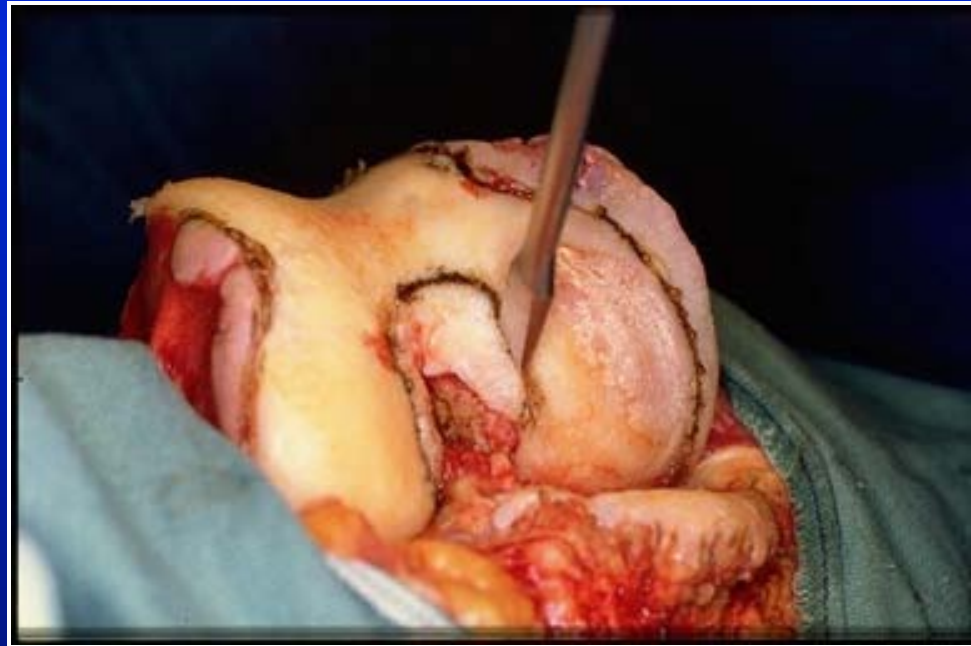
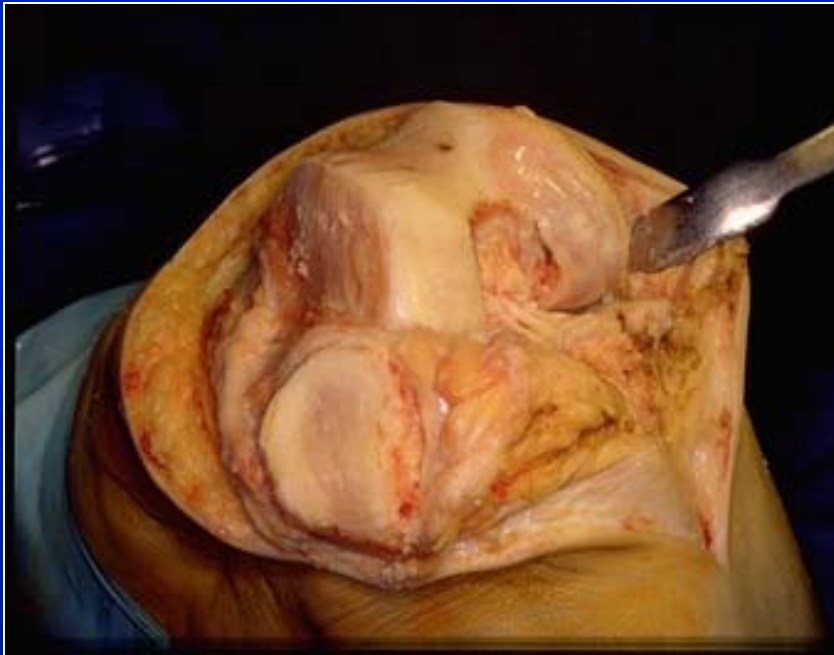
TKA



Pain release
Function improvment

Standard Approach

- Invasive surgery
- Longer recovery time



Year 2000: T Coon and A Tria



**Minimal-Invasive
Of the knee**



Limit the surgical trauma

- Faster recovery
- Return to the ADL and physical activities

MIS in TKA

■ 44-844

Prothèses totales du genou par miniabord

S. Parratte, X. Flecher, J.-N. Argenson

**Limited approach
No eversion of the patella**



Early results

- Faster recovery of the flexion in the first three months
- Comparable at one year
- 2 cm more proximal in the quad: NO difference
- Positionning comparable

Société Française d'Arthroscopie, Réunion Annuelle 2004
(suppl. au n° 8, Rev. Chir. Orthop. 2005, 91, 4S28-4S30)

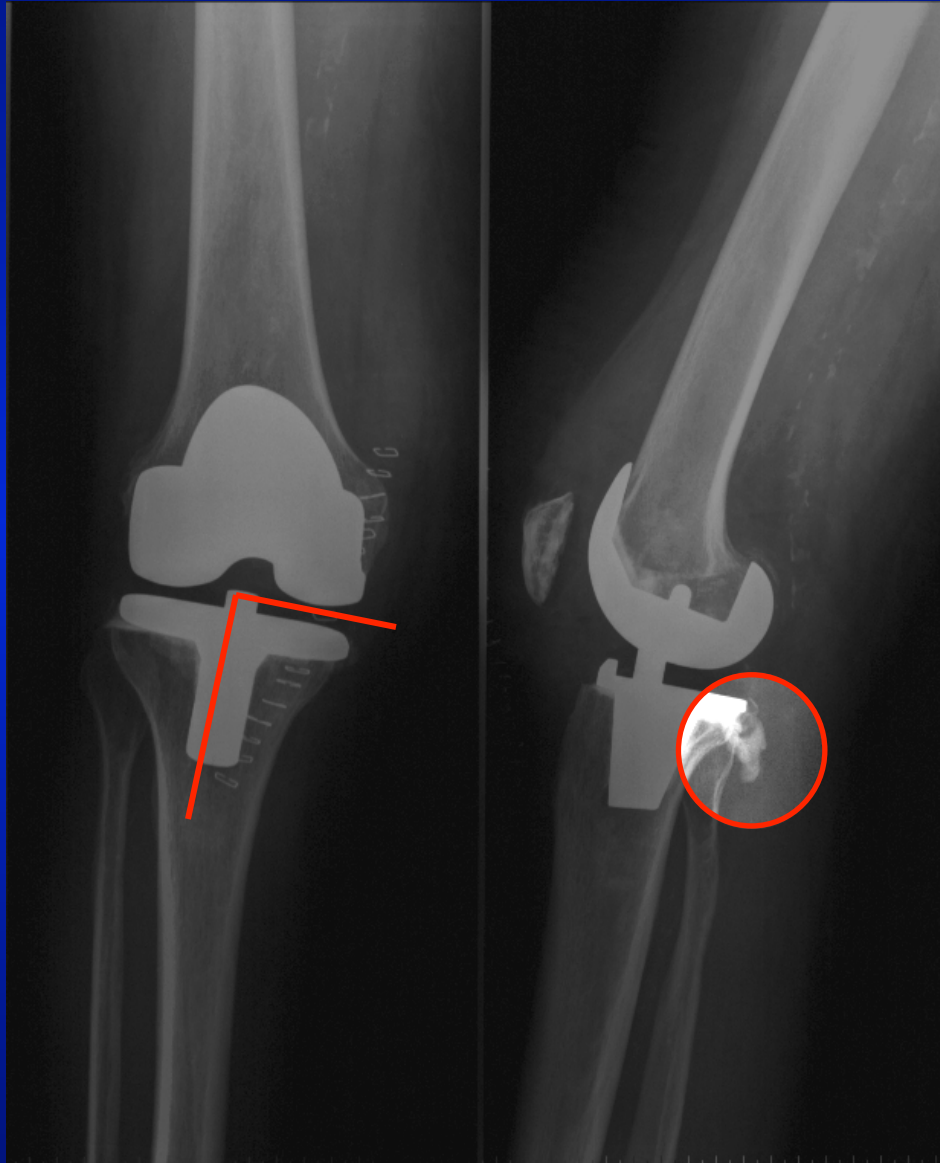
© Masson, Paris, 2005

MISE AU POINT

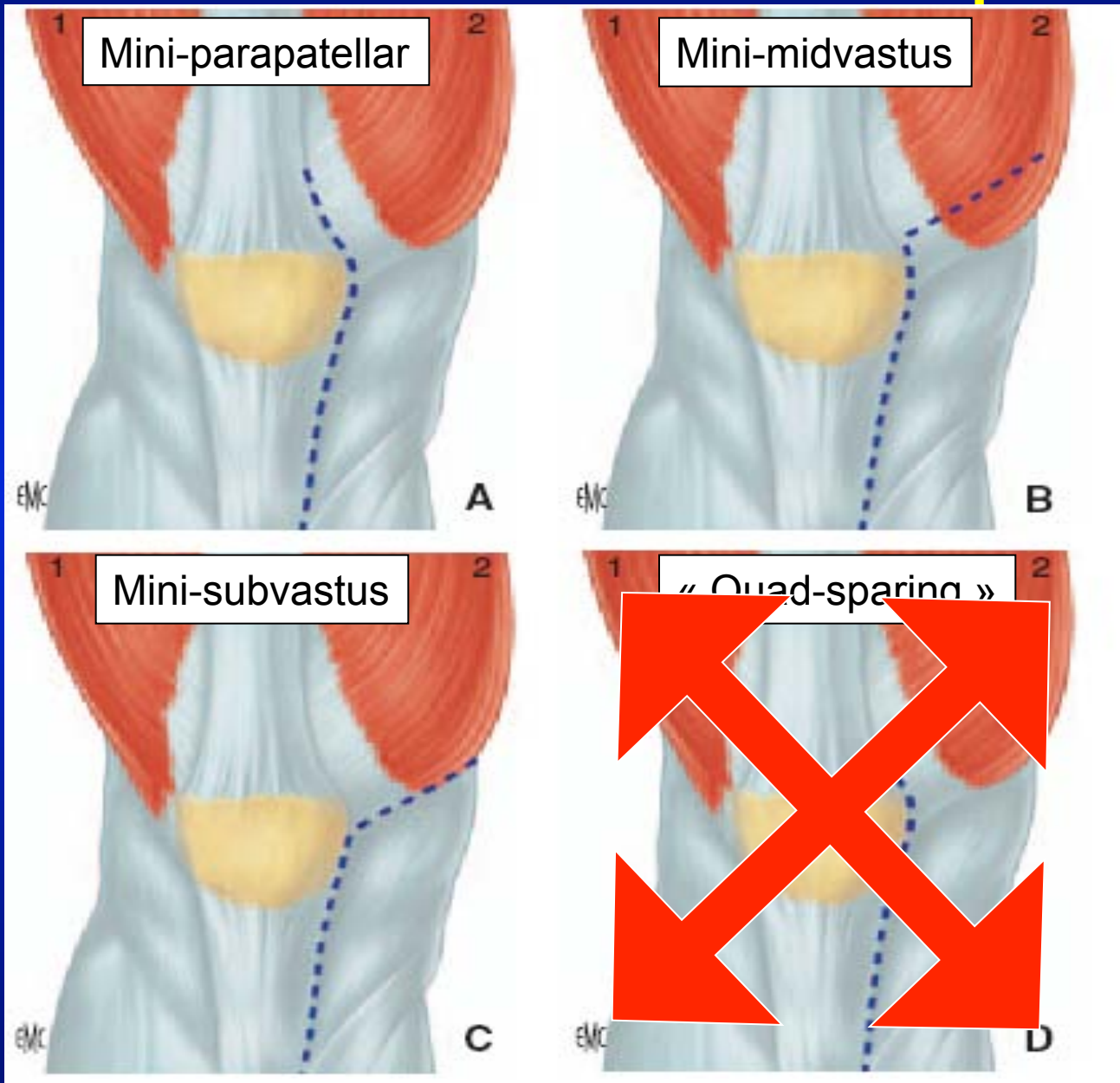
Arthroplastie totale du genou par voie mini-invasive

J.-N. ARGENSON *, S. PARRATTE *, X. FLECHER *

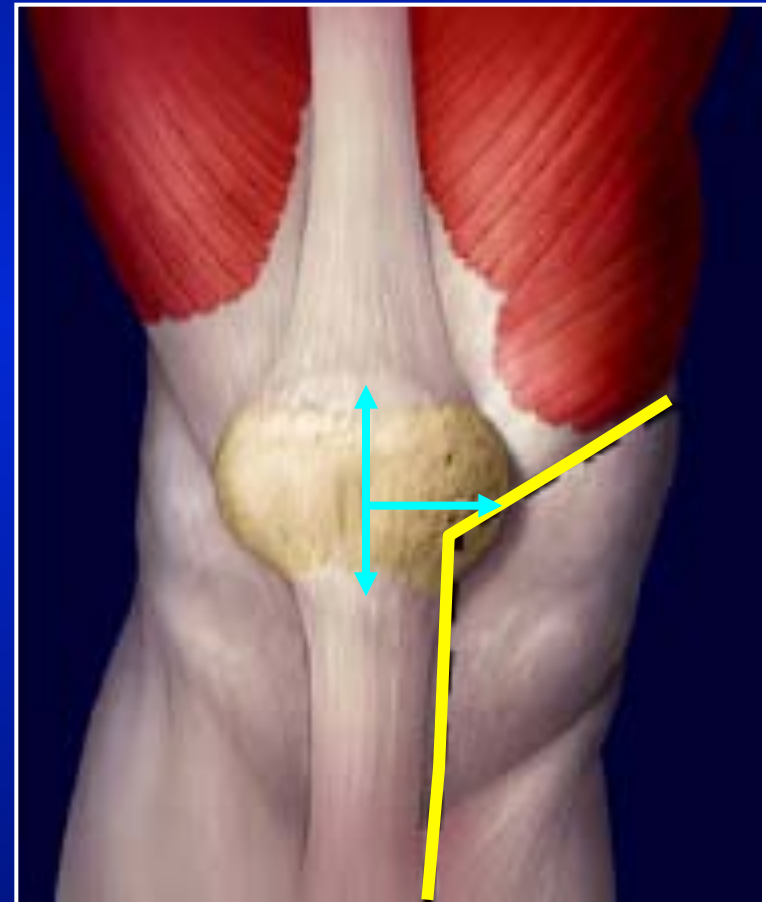
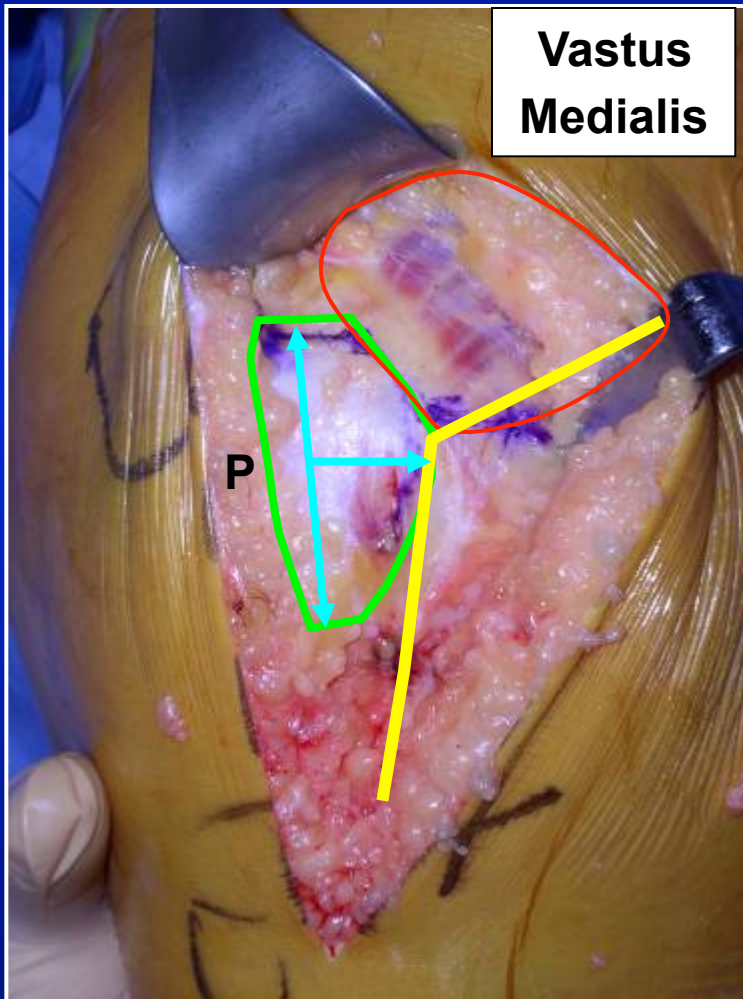
Potential Problems



Varus Knee : different options



Anatomical background



Pagnano et al, CORR 2006

Question



Fashion Surgery....???

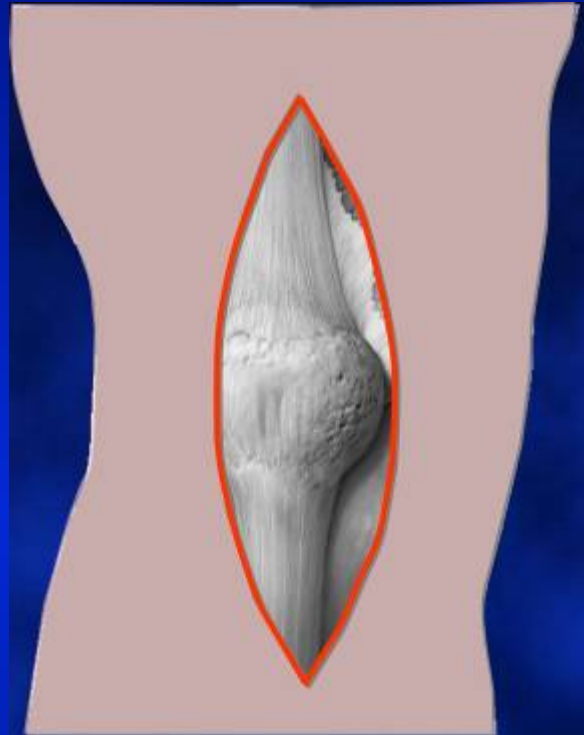
MAYO CLINIC

Limited skin
Incisions

Theoretical
advantages ?

Faster recovery

- ROM
- Pain
- Hospital stay



Bonuti et al, JBJS Am, 2004

Pagnano et al, CORR 2006

Pagnano et al, J of Arthroplasty 2006



Potential Draw-backs

Technically challenging
Implant malposition
Increase Surgical time
Skin, septic complications

Goals of the study

Hypothesis: MIS Subvastus approach will improve early objective results after TKA

2012 Specialty Day Meeting - San Francisco, California

Mark Coventry Award Paper

A Retrieval Analysis of High Flexion Versus Posterior Stabilized Tibial Inserts

Presenter: **Douglas D. R. Naudie, MD, FRCSC**

Co-Authors: Nicholas R. Paterson, BSCh, Matthew G. Teeter, BSCh, **Steven J. MacDonald, MD, FRCSC**, and Richard W. McCalden MD, MPhil(Edin), FRCSC

Chitranjan Ranawat Award Paper

Efficacy of Postoperative Intraarticular Analgesia Following Total Knee Arthroplasty:

A Randomized, Double-Blinded, Placebo-Controlled, Prospective Study

Presenter: Nitin Goyal, MD

Co-Authors: James McKenzie, BS, **Peter F. Sharkey, MD, Javad Parvizi, MD, William J. Hozack, MD**, and Matthew S. Austin, MD

John Insall Award Paper

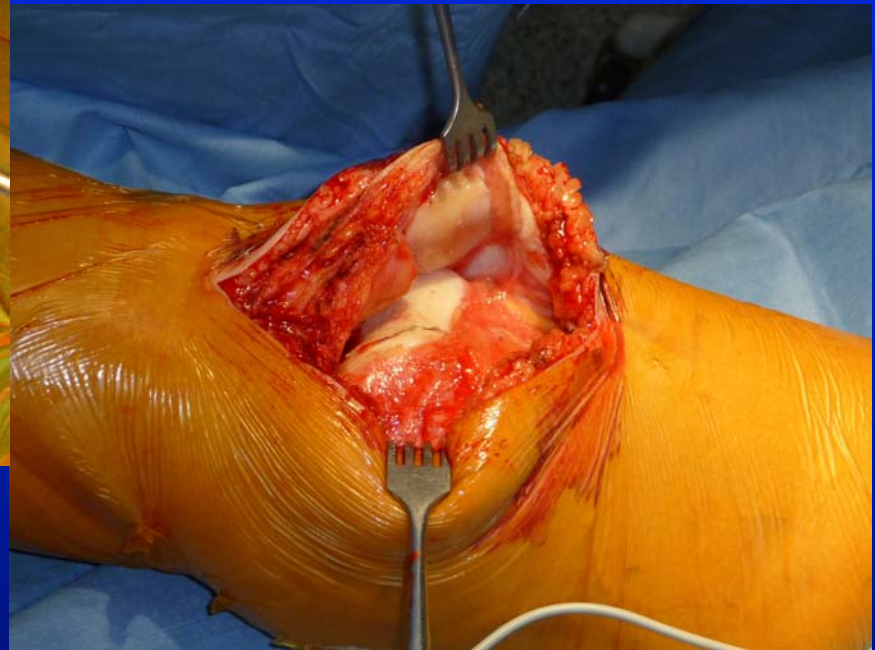
A Randomized Controlled Trial of Minimally Invasive TKR: Comprehensive Gait and Strength Testing Outcomes.

Presenter: **Mark W. Pagnano, MD**

Co-Authors: Julien Wegrzyn, MD, PhD, Sebastien Parratte, MD, PhD, Krista Coleman-Wood, PhD, PT, and Kenton R. Kaufman, PhD, PE

MIS Subvastus vs mini-para-patellar

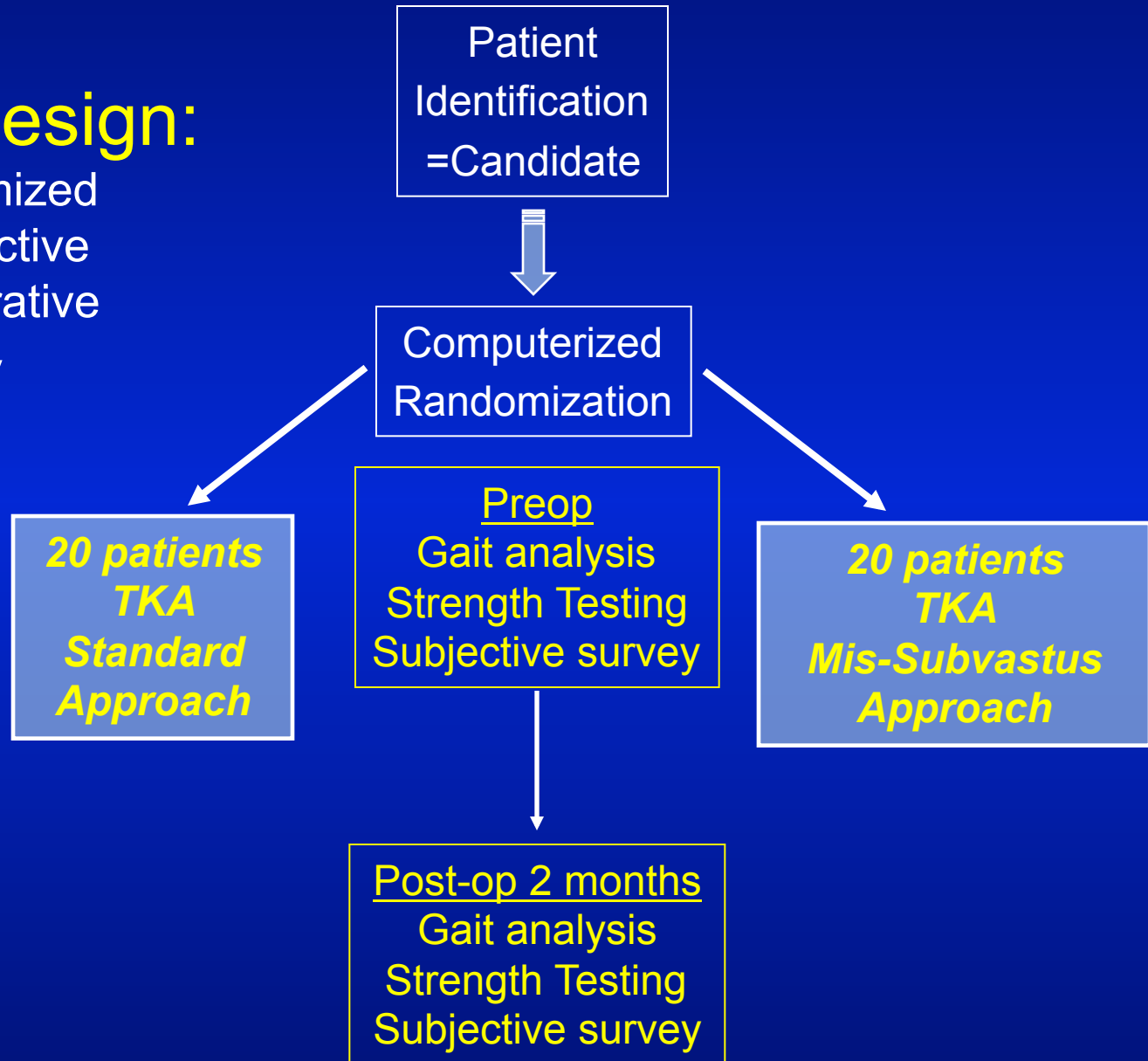
No eversion of the patella in both groups



Material and Methods

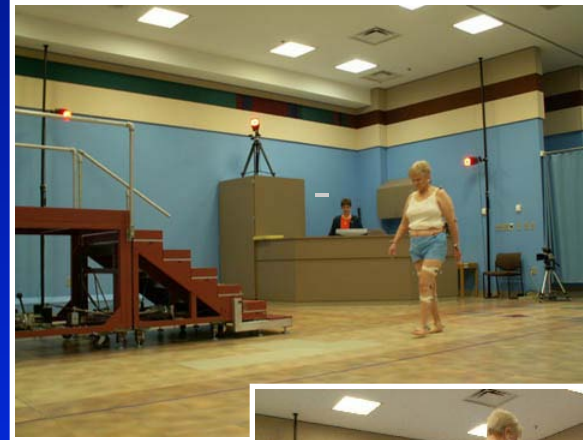
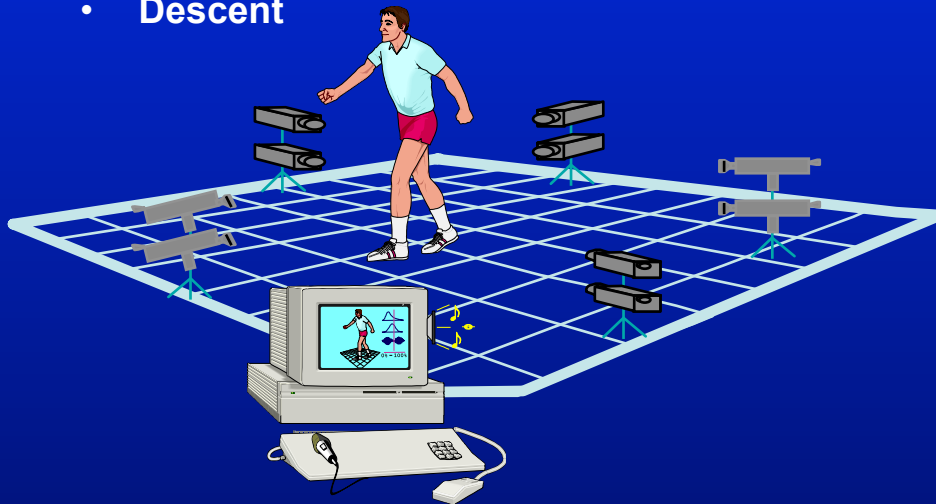
- **Study Design:**

Randomized
Prospective
Comparative
Study



Material and Methods

- **Gait Analysis**
- **10 camera real-time system**
(Motion Analysis, Santa Rosa, CA)
- **Ground Conditions**
 - Level – 15 m walkway
 - Stairs – 7 steps
 - Ascent
 - Descent



Material and Methods

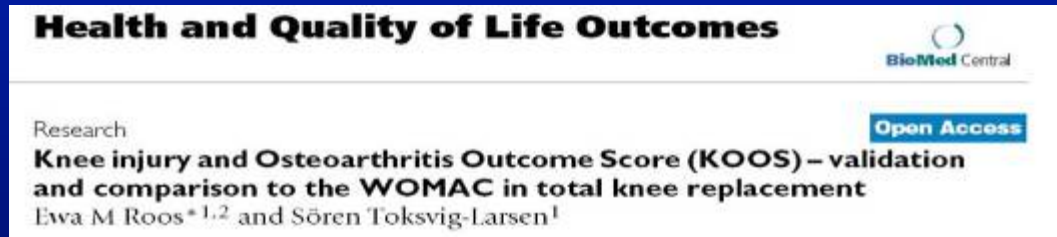
- Strength Testing

Biodex Systems 3 Pro
Isometric Strength
Flexion
Extension



Material and Methods

- Subjective evaluation
 - Patient Milestone: pain, medications, crutches...
 - SF12: Health related QOL questionnaire
 - Knee Osteoarthritis Outcomes Score (KOOS)
 - self-administrated questionnaire (8 to 10 mn)
 - Free access: www.koos.nu
 - “Improved WOMAC”
 - *Validated and correlated with SF-36 QOL questionnaire*



Results

Gait Pattern: NO difference

	Pre-op			Two months post-op			<i>p</i>
	<i>Mean</i>	$\pm$	<i>SD</i>	<i>Mean</i>	$\pm$	<i>SD</i>	
Spatio-temporal parameters							
<i>Level Walking</i>							
Double limb support (%)	32	$\pm$	6	29	$\pm$	4	0.003
Involved single limb support (%)	34	$\pm$	4	38	$\pm$	2	0.022
Walking speed (m/s)	0.85	$\pm$	0.15	0.97	$\pm$	0.16	<0.0001
Cadence (steps/min)	31.58	$\pm$	5.72	35.68	$\pm$	5.61	<0.0001
Stride length (m)	0.99	$\pm$	0.14	1.09	$\pm$	0.13	<0.0001
Kinematics / Kinetics							
<i>Level walking</i>							
Knee varus angle (°)	8.02	$\pm$	3.52	3.88	$\pm$	4.21	0.005
Knee valgus angle (°)	1.58	$\pm$	3.06	5.66	$\pm$	3.10	<0.0001
Knee varus moment (Nm/kg)	0.41	$\pm$	0.18	0.32	$\pm$	0.08	0.005
Ankle plantarflexion moment (Nm/kg)	1.08	$\pm$	0.18	1.18	$\pm$	0.14	0.030
Knee power generation (W/kg)	0.25	$\pm$	0.14	0.52	$\pm$	0.18	<0.0001
Ankle power generation (W/kg)	1.45	$\pm$	0.55	1.69	$\pm$	0.51	0.014
<i>Upstairs</i>							
Knee flexion angle (°)	80.45	$\pm$	5.17	89.23	$\pm$	2.72	0.009
<i>Downstairs</i>							
Knee extension moment (Nm/kg)	0.20	$\pm$	0.06	0.31	$\pm$	0.02	0.007

Results

Patient rated outcomes : NO difference

	Mini-subvastus approach							Medial parapatellar approach						
	Pre-op			Two months post-op			<i>p</i>	Pre-op			Two months post-op			<i>p</i>
	<i>Mean</i>	$\pm$	<i>SD</i>	<i>Mean</i>	$\pm$	<i>SD</i>		<i>Mean</i>	$\pm$	<i>SD</i>	<i>Mean</i>	$\pm$	<i>SD</i>	
Scores														
<i>Knee Society Score</i>														
Total (/100)	49	$\pm$	14	81	$\pm$	7	<i><0.0001</i>	46	$\pm$	12	76	$\pm$	14	<i><0.0001</i>
Function (/100)	58	$\pm$	9	81	$\pm$	10	<i><0.0001</i>	59	$\pm$	8	81	$\pm$	16	<i><0.0001</i>
Pain (/100)	19	$\pm$	8	47	$\pm$	5	<i><0.0001</i>	19	$\pm$	7	44	$\pm$	10	<i><0.0001</i>
<i>KOOS</i>														
Pain (/100)	17	$\pm$	5	27	$\pm$	6	<i><0.0001</i>	18	$\pm$	5	30	$\pm$	6	<i><0.0001</i>
Symptoms (/100)	15	$\pm$	4	20	$\pm$	5	<i>0.003</i>	16	$\pm$	3	24	$\pm$	5	<i><0.0001</i>
ADL (/100)	30	$\pm$	9	52	$\pm$	8	<i><0.0001</i>	29	$\pm$	7	52	$\pm$	12	<i><0.0001</i>
Sports (/100)	13	$\pm$	5	21	$\pm$	4	<i>0.003</i>	17	$\pm$	5	20	$\pm$	4	<i>0.900</i>
QOL (/100)	9	$\pm$	2	16	$\pm$	3	<i><0.0001</i>	11	$\pm$	3	18	$\pm$	3	<i><0.0001</i>
<i>SF-12</i>														
Physical subscale (/100)	30	$\pm$	8	41	$\pm$	8	<i>0.002</i>	32	$\pm$	6	44	$\pm$	7	<i><0.0001</i>
Mental subscale (/100)	54	$\pm$	9	56	$\pm$	7	<i>0.600</i>	54	$\pm$	8	56	$\pm$	6	<i>0.603</i>
<i>UCLA activity scale</i>														
	4	$\pm$	1	7	$\pm$	1	<i><0.0001</i>	4	$\pm$	1	6	$\pm$	1	<i><0.0001</i>

Results

Strength: NO difference

Strength of thigh musculature

Involved knee extension (N.m)	73.51	±	11.98 ^a	89.26	±	13.02 ^b	0.022	71.23	±	12.19 ^e	85.35	±	12.02 ^f	0.038
Involved knee flexion (N.m)	52.14	±	19.78 ^c	53.87	±	19.51 ^d	0.630	49.84	±	12.64 ^g	53.25	±	12.02 ^h	0.468
Non involved knee extension (N.m)	104.51	±	14.62	104.61	±	14.29	0.983	101.12	±	16.63	106.22	±	16.59	0.160
Non involved knee flexion (N.m)	62.93	±	13.50	61.15	±	12.77	0.666	63.19	±	15.06	62.36	±	12.06	0.826

Results

Delay to Return to ADL=> NO difference

Number of post-operative days...	Mini-subvastus approach			Medial parapatellar approach			<i>p</i>
	<i>Mean</i>	$\pm$	<i>SD</i>	<i>Mean</i>	$\pm$	<i>SD</i>	
To discontinue walker	11.50	$\pm$	7.58	11.50	$\pm$	8.74	1.00
To discontinue cane	14.44	$\pm$	11.01	19.94	$\pm$	14.29	0.21
To discontinue narcotic pain medication*	15.78	$\pm$	10.49	15.8	$\pm$	12.54	0.98
To drive a car	21.59	$\pm$	8.49	26.56	$\pm$	10.62	0.14
To negotiate stairs independently without walker/ cane	17.82	$\pm$	8.34	21.22	$\pm$	11.38	0.32
To walk a 6-block distance	27.06	$\pm$	11.62	31.64	$\pm$	15.46	0.33
To take care for normal daily activity	11.83	$\pm$	11.63	12.56	$\pm$	10.00	0.84

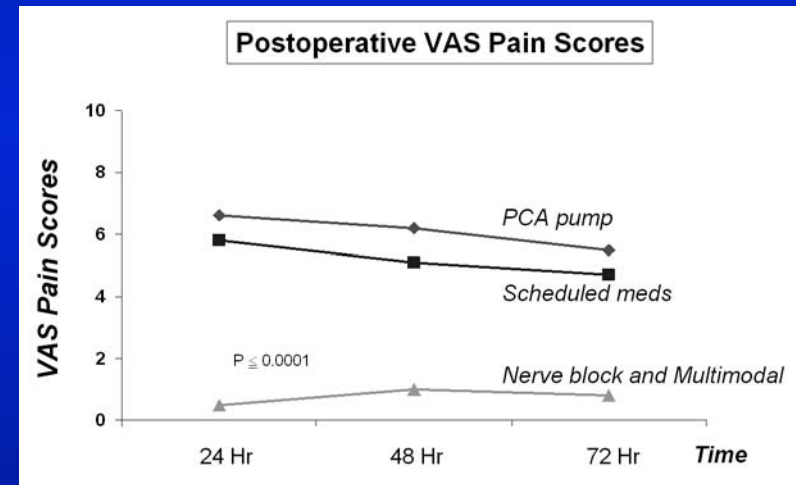
* which included: Oxycontin, Oxycodone, Percocet, Tylenol #2 or #3, or Demerol.

Discussion=> Real revolution

Not the approach of the knee but the approach of the patient

=> Peri-operative management

- Patient conditionning
- Pain management
 - multi-modal
 - Preemptive
- Faster rehabilitation programm



Parratte S and Pagnano M: seminar in arthroplasty

TKA today: High level

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PATIENTS' EXPECTATIONS OF KNEE SURGERY

BY CAROL A. MANCUSO, MD, THOMAS P. SCUOCO, MD, THOMAS L. WICKIEWICZ, MD, EDWARD C. JONES, MD,
LAURA ROBBINS, DSW, RUSSELL F. WARREN, MD, AND PAMELA WILLIAMS-RUSCO, MD, MPH

Investigation performed at the Outcomes Unit, Department of Orthopaedic Surgery, Hospital for Special Surgery, New York, NY



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- Patients are different
- Patients expectations are different

Culture...

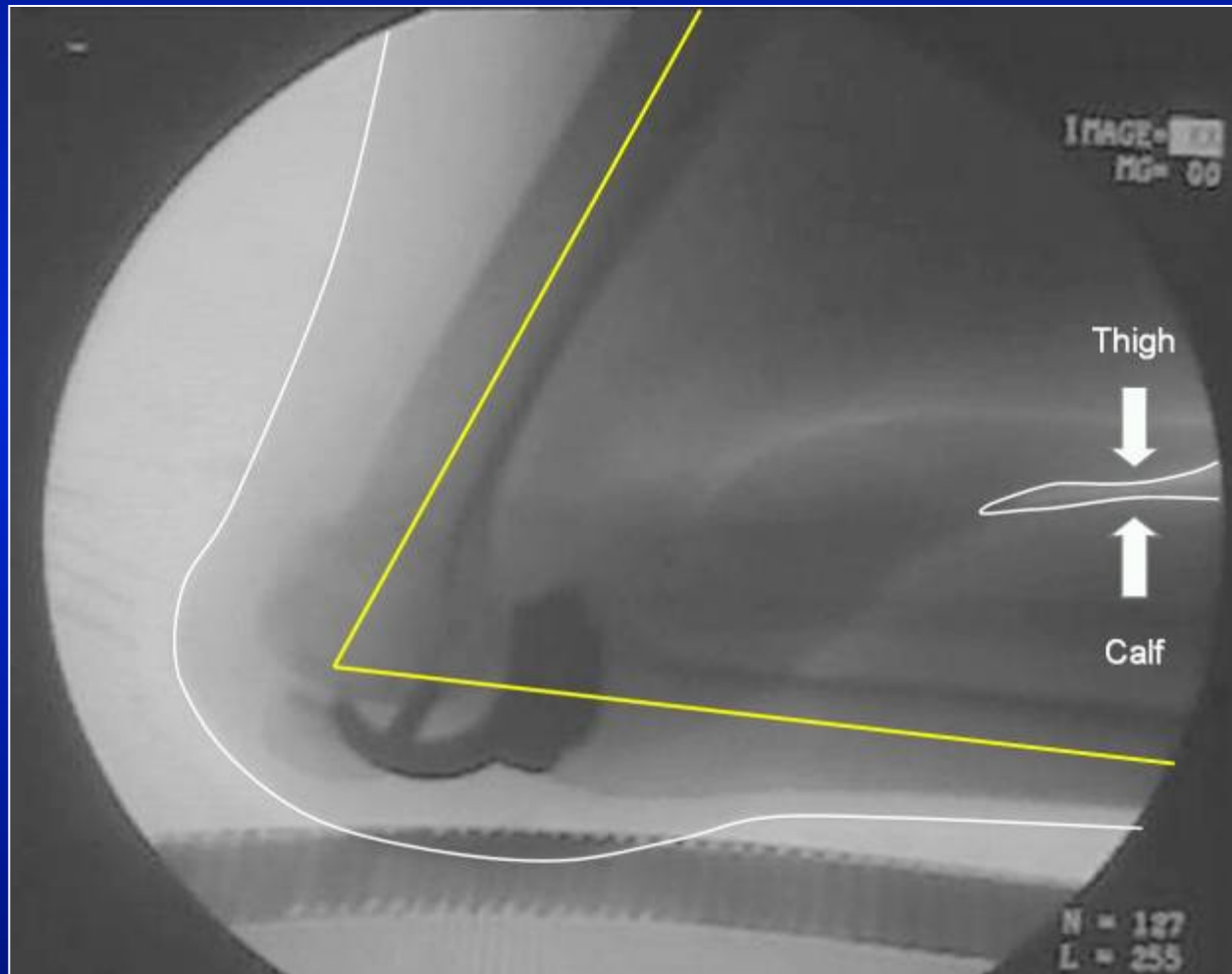


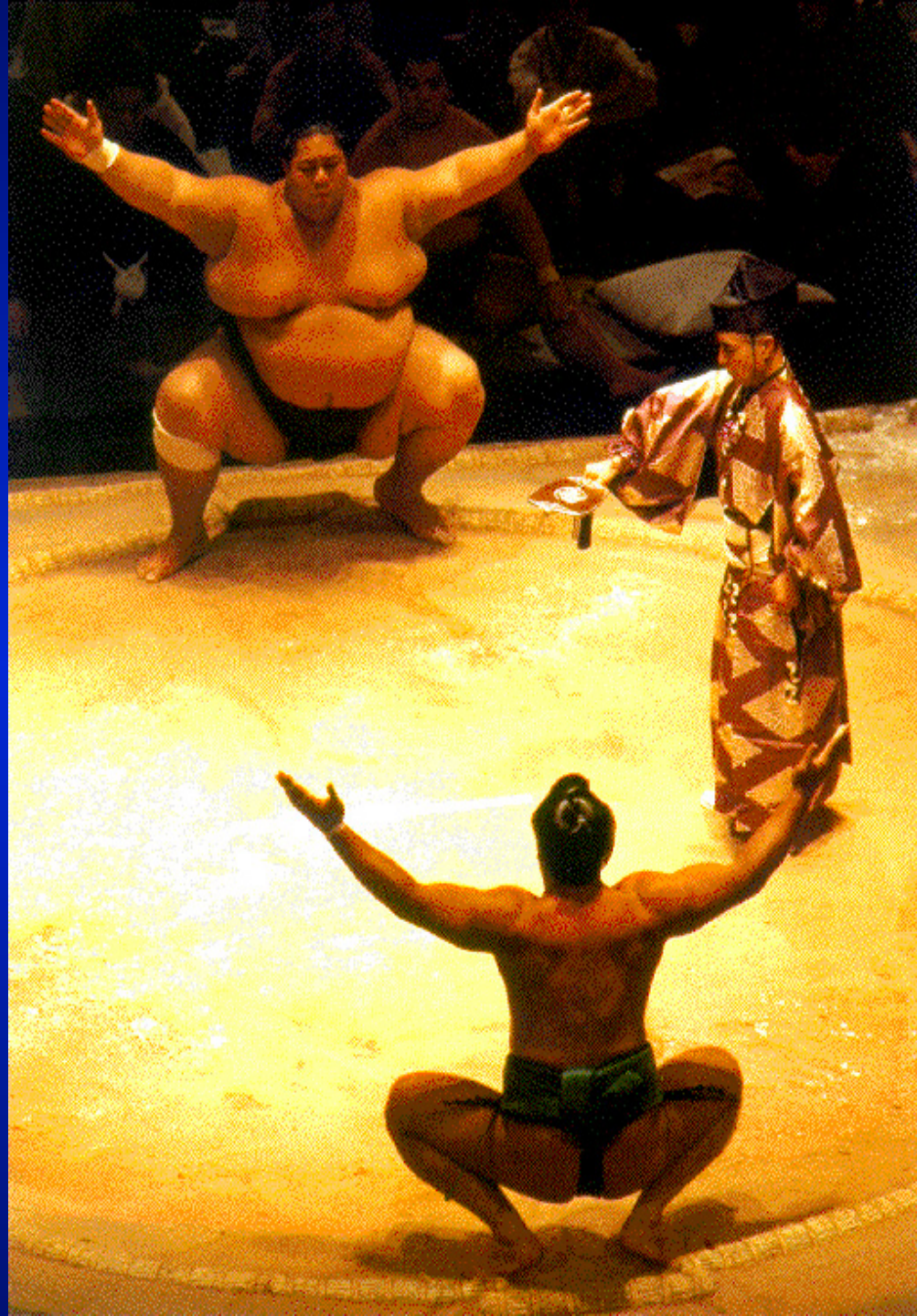
Muslim holiday of **Ramadan**

Japanese table

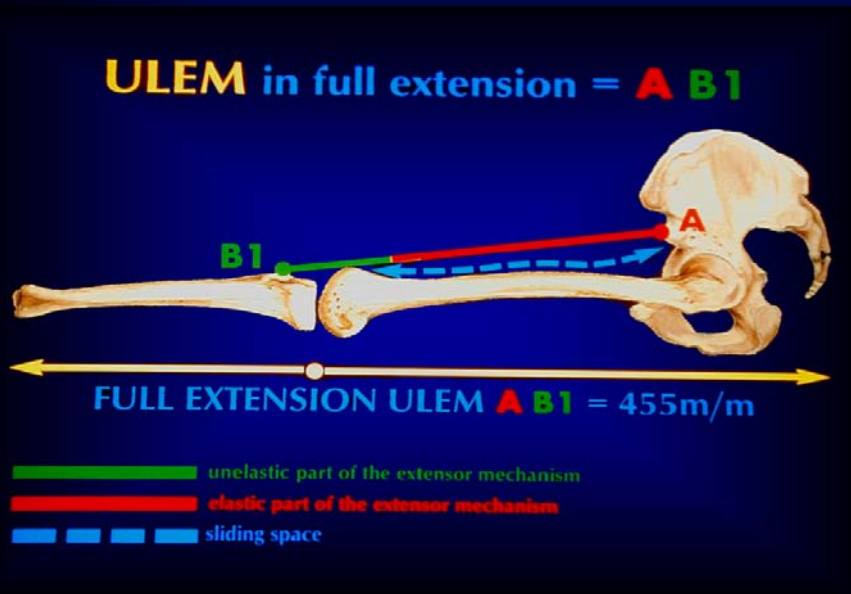


TKA Soft Tissue





Usefull Length Extensor Mechanism

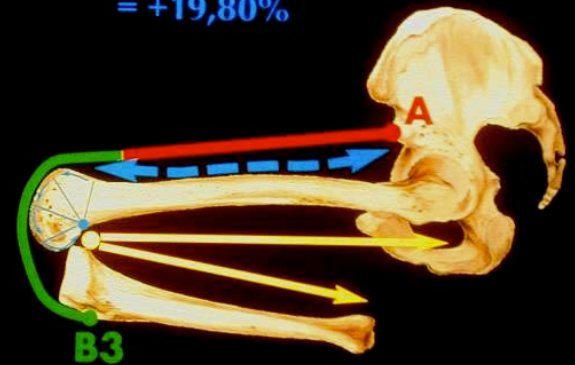


ULEM in hyper flexion 160° AB3

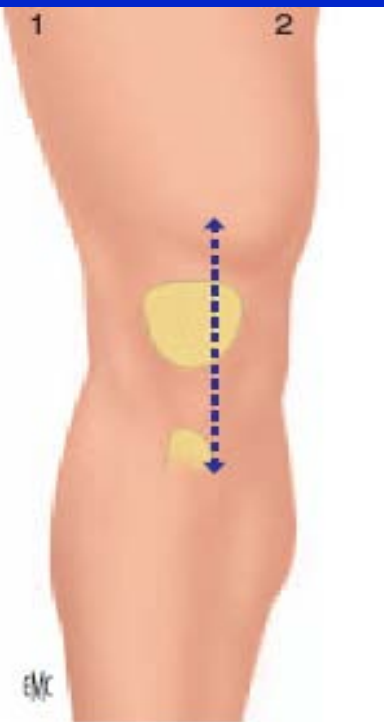
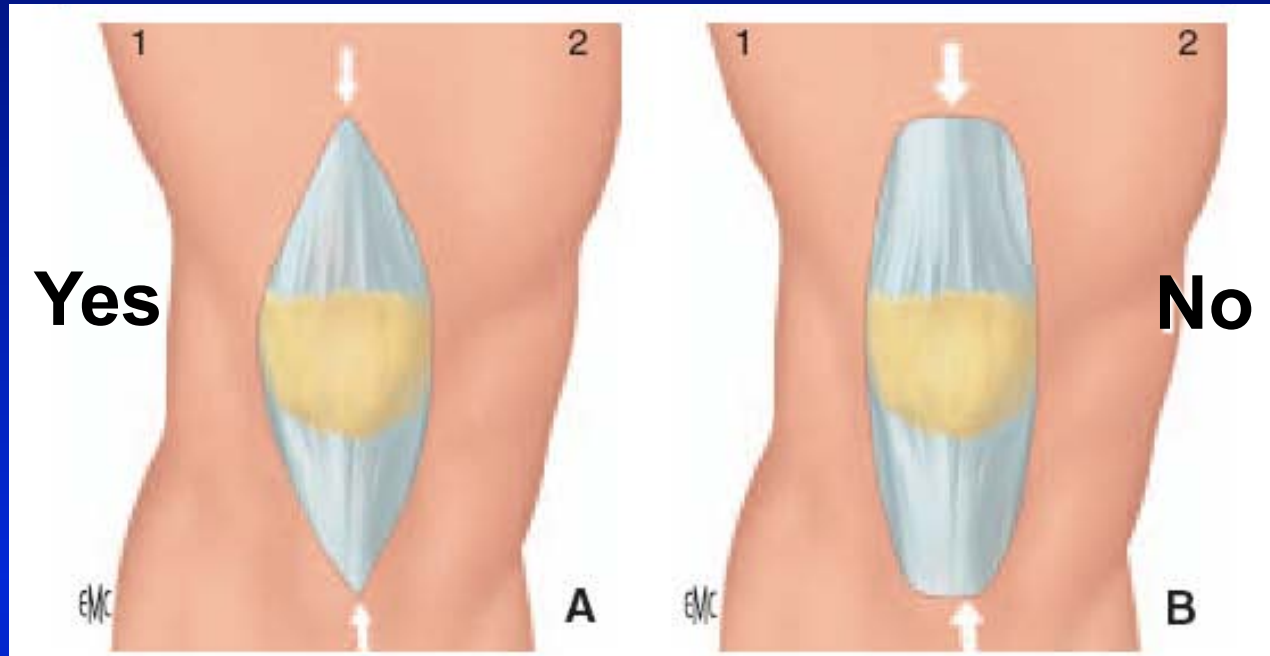
FLEXION = 160°

ULEM AB3 = 545m/m

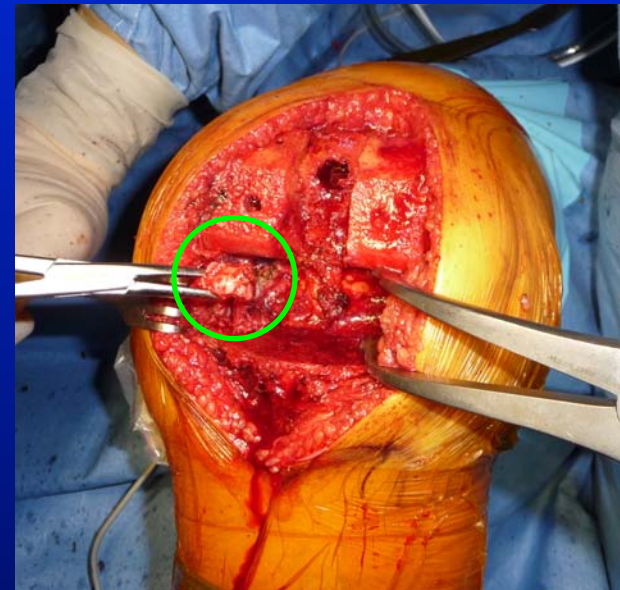
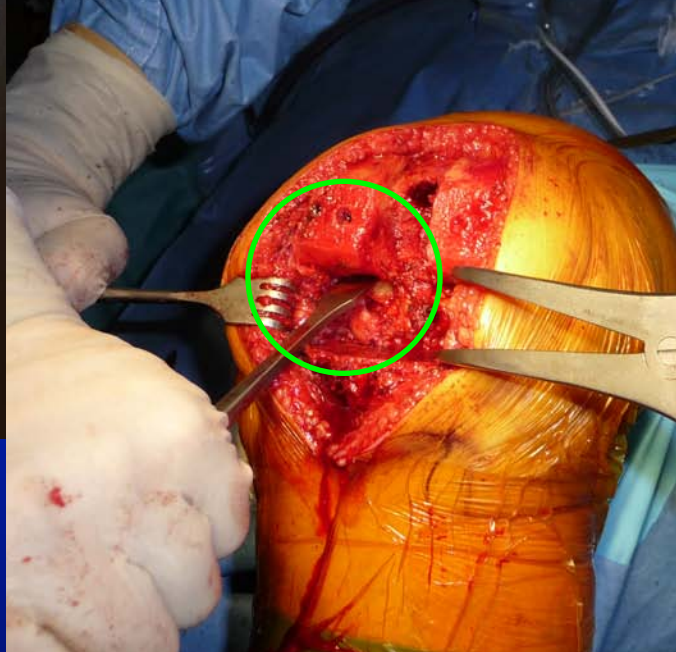
= +19,80%



Shape of the approach more than size



Posterior aspect



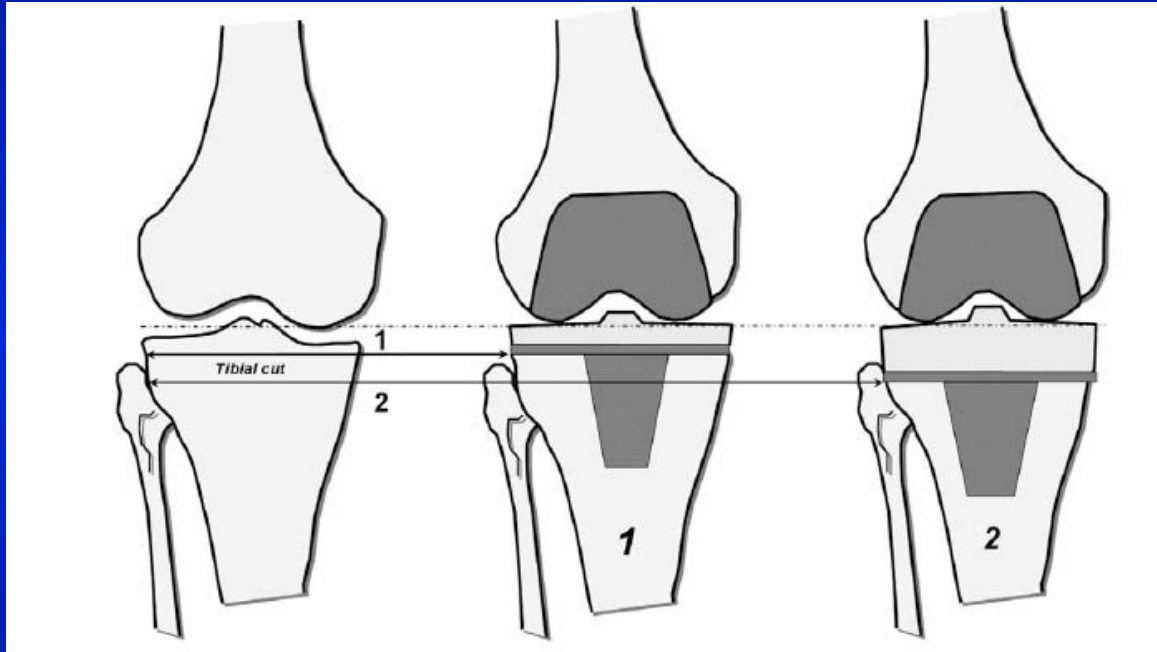
Fixation and cement



Optimal implantation

Spaces

Stability / mobility



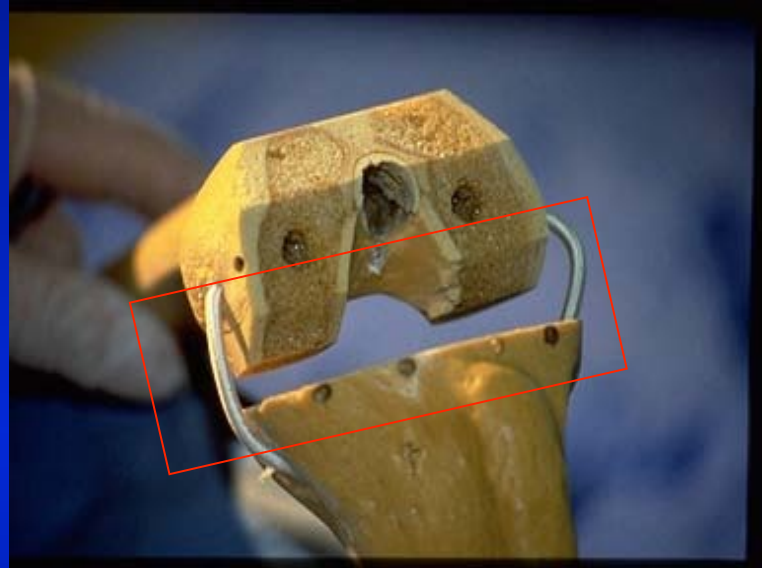
THE JOURNAL OF BONE & JOINT SURGERY • JBJS.ORG
VOLUME 90-A • NUMBER 1 • JANUARY 2008

Instability After Total Knee Arthroplasty

By Sebastien Parratte, MD, and Mark W. Pagnano, MD

An Instructional Course Lecture, American Academy of Orthopaedic Surgeons

Approach in TKA = Bone and ligaments



FRONTAL: « Known one »

SAGITTAL: « forgotten »

AXIAL: « Mystery »

Align 3D and fill the envelope!!!

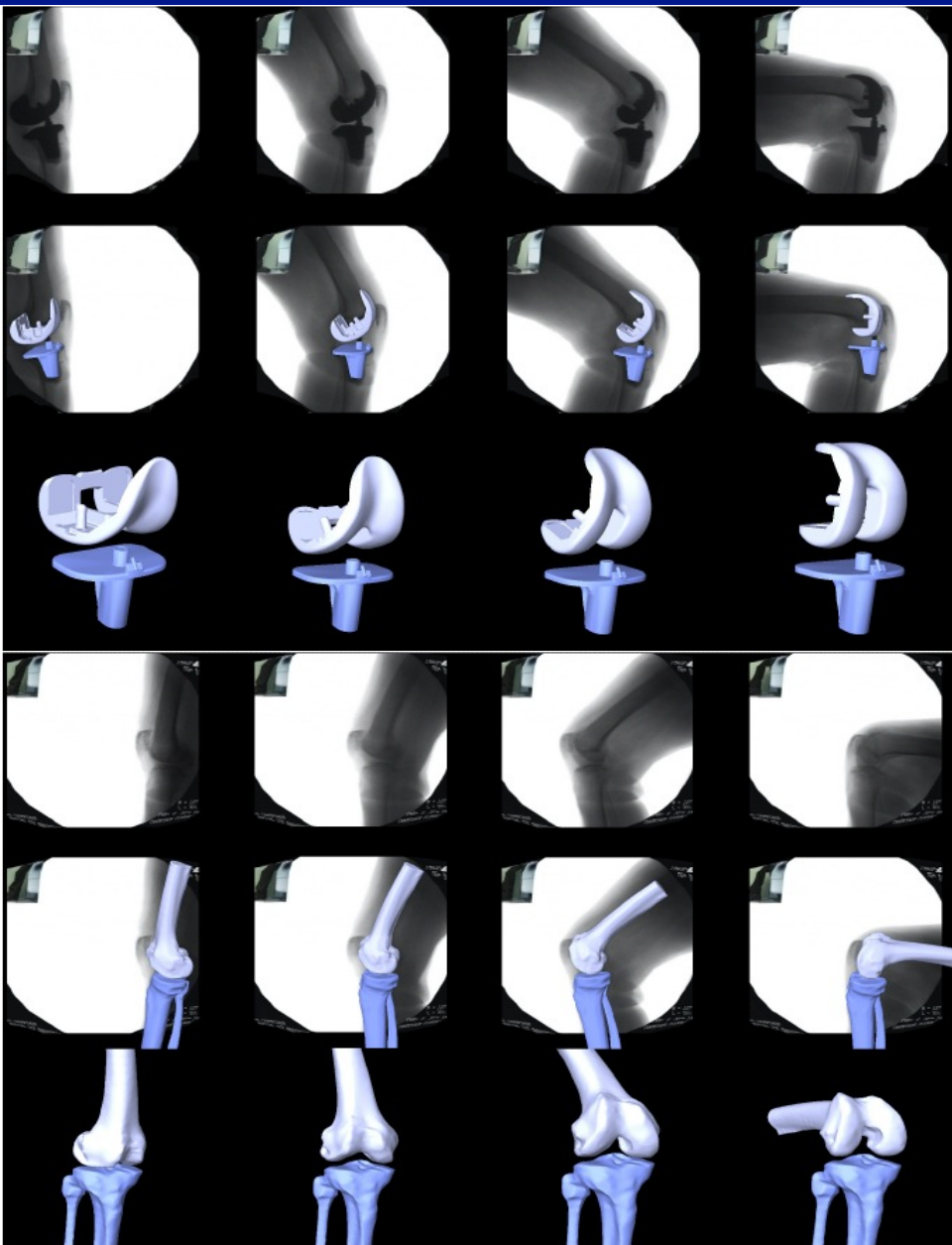
Harry Potter

And
the
perfect
TKA

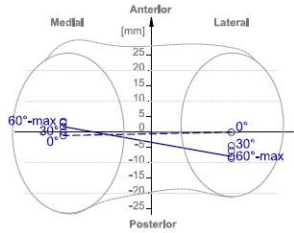
J. K. ROWLING



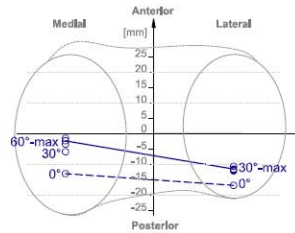
Kinematics ?



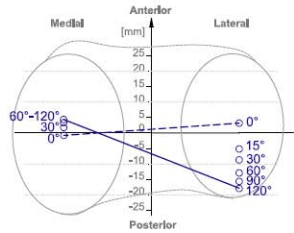
Same pattern Not as good



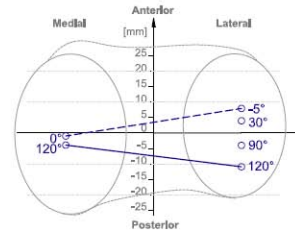
(a) Current study, contralateral knee (15 subjects, avg.71.8 year old, range 62-84 year old, max=avg.96.3°) .



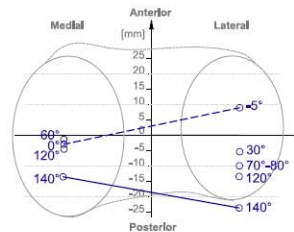
(b) Current study, TKA knee (15 subjects, avg.71.8 year old, range 62-84 year old, max=avg.103.4°) .



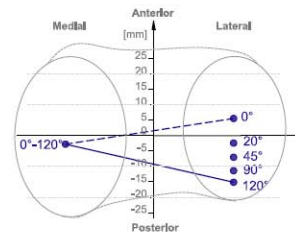
(c) Asano et al. (2001), healthy knee (6 Japanese, avg.32years, range 25-43years old).



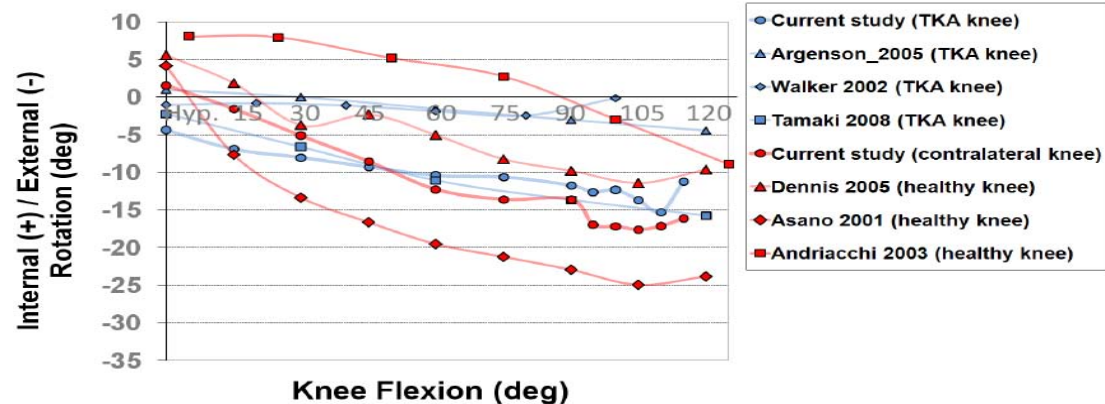
(d) Iwaki et al. (2000), healthy knee (6 cadaver knees).



(e) Johal et al. (2005), healthy knee (10 Caucasians, avg.25 years old, range 20-30years old).



(f) Pinskerova et al. (2004), healthy knee (6 cadaver knees).



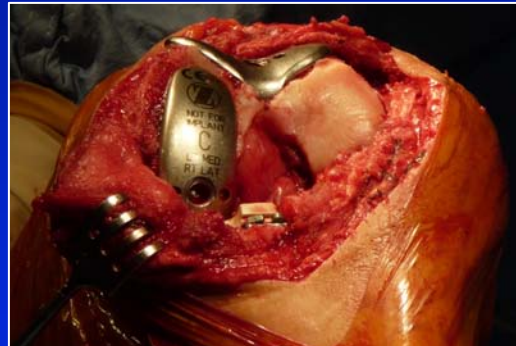
Bicompartmental experience Preserve ACL

Since October 2008

S Parratte, JM Aubaniac, JN Argenson

AAOS 2009

Knee Society 2009



Pr Aubaniac 1977

Clin Orthop Relat Res
DOI 10.1007/s11999-009-1018-0

SYMPOSIUM: PAPERS PRESENTED AT THE ANNUAL MEETINGS OF THE KNEE SOCIETY

Survival of Bicompartmental Knee Arthroplasty at 5 to 23 Years

Sebastien Parratte MD, Vanessa Pauly MS,
Jean-Manuel Aubaniac MD, Jean-Noel A. Argenson MD



Conclusion

- Not only the approach of the knee but the approach of the patient
- Knee prosthesis basic principals: spaces
- Is it possible to really obtain good kinematics without preserving the four bar mechanism?
-