MIS mini-keel tibia: un impianto per gli approcci MIS

F Boniforti
Fondazione San Raffalele Giglio

Zimmer Institute
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MIS mini keel

Headlines

- MIS and skin incision
- Modified implant design
- Component alignment - CAS
- Ethics
- Clinical outcome
- Multicenter study

Minimally invasive total knee replacement is a recent **surgical innovation** that has generated great interest among both patients and surgeons.

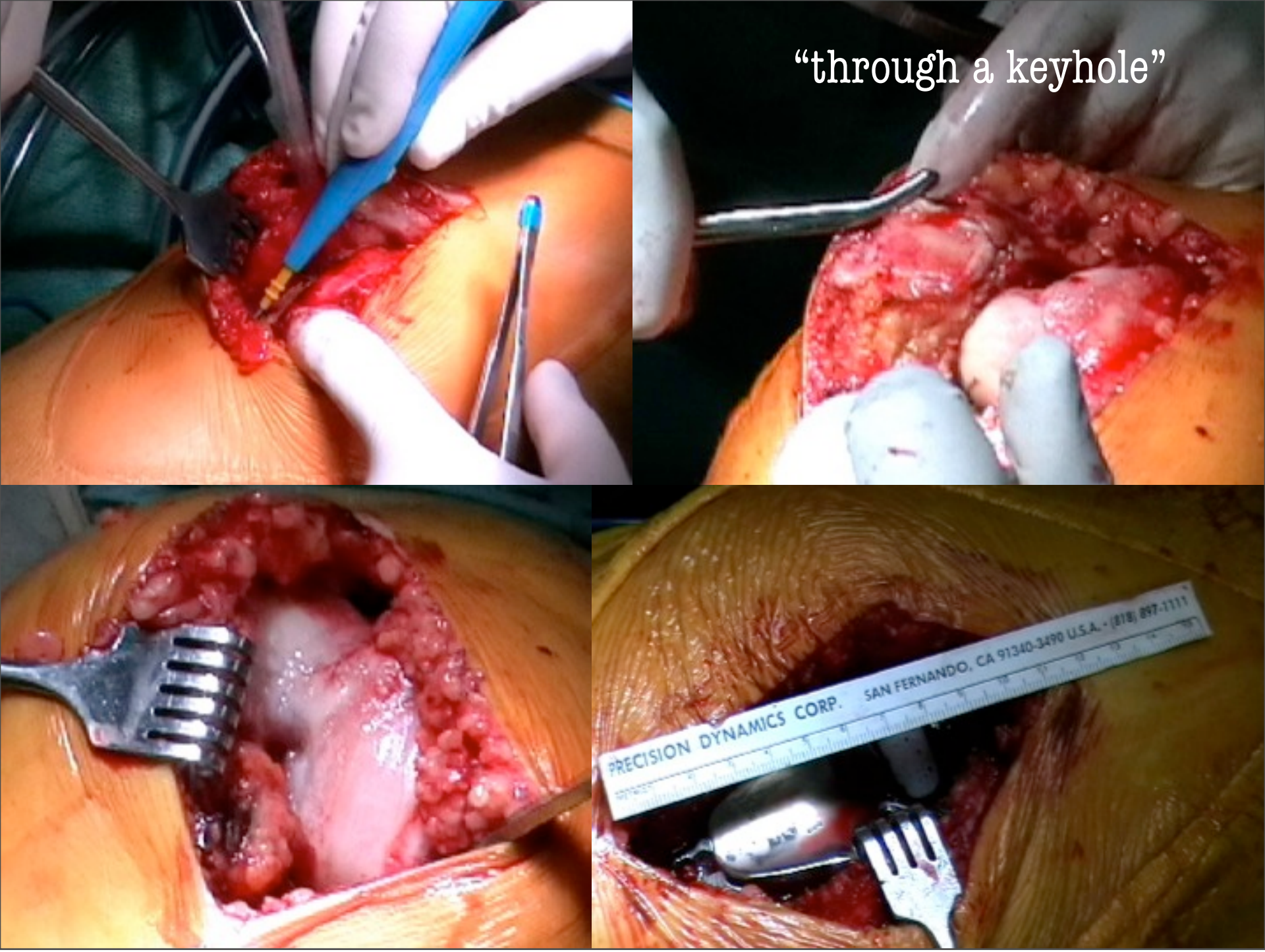
Skin incision

Currently, there is mixed enthusiasm for minimally-invasive
approaches and techniques, and there is general agreement
that **the size of the skin incision** has little physiologic benefit
on early or long-term outcomes after knee replacement.

To reduce skin incision is a Key surgical features

Bent Straight

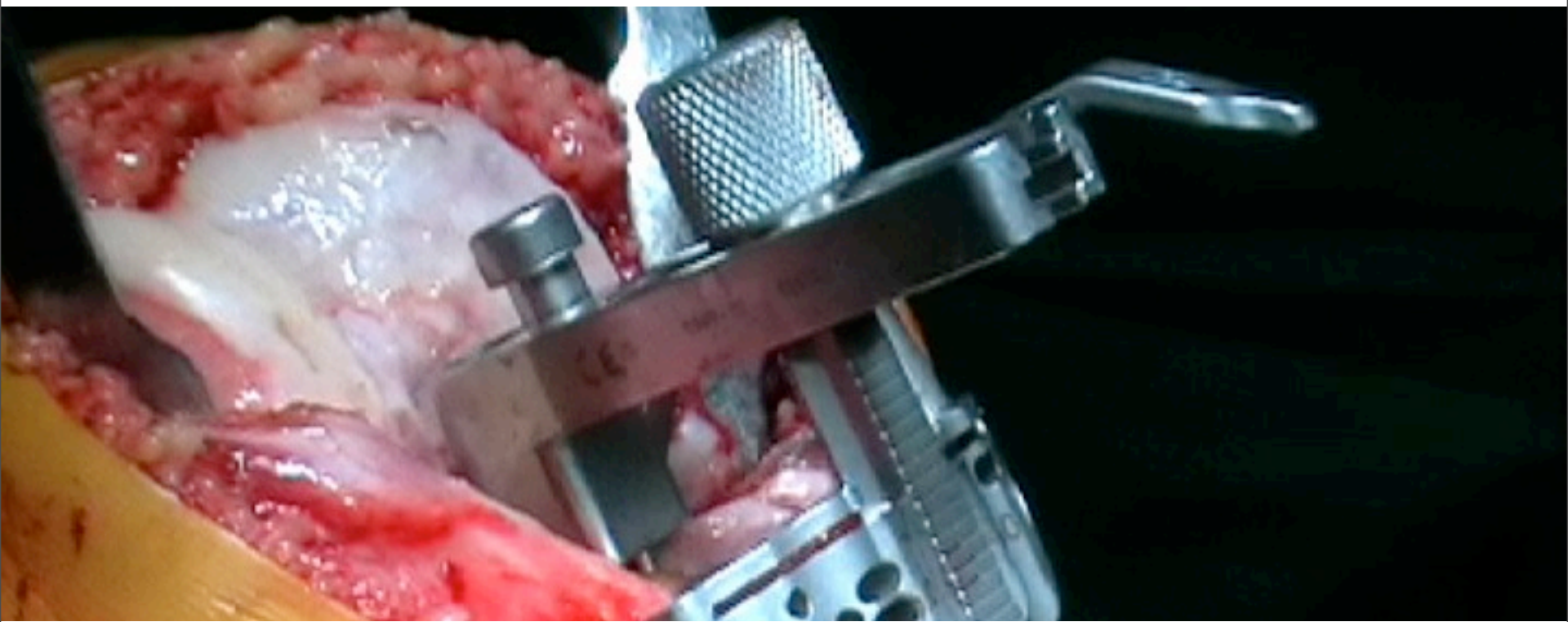
30% difference in lenght

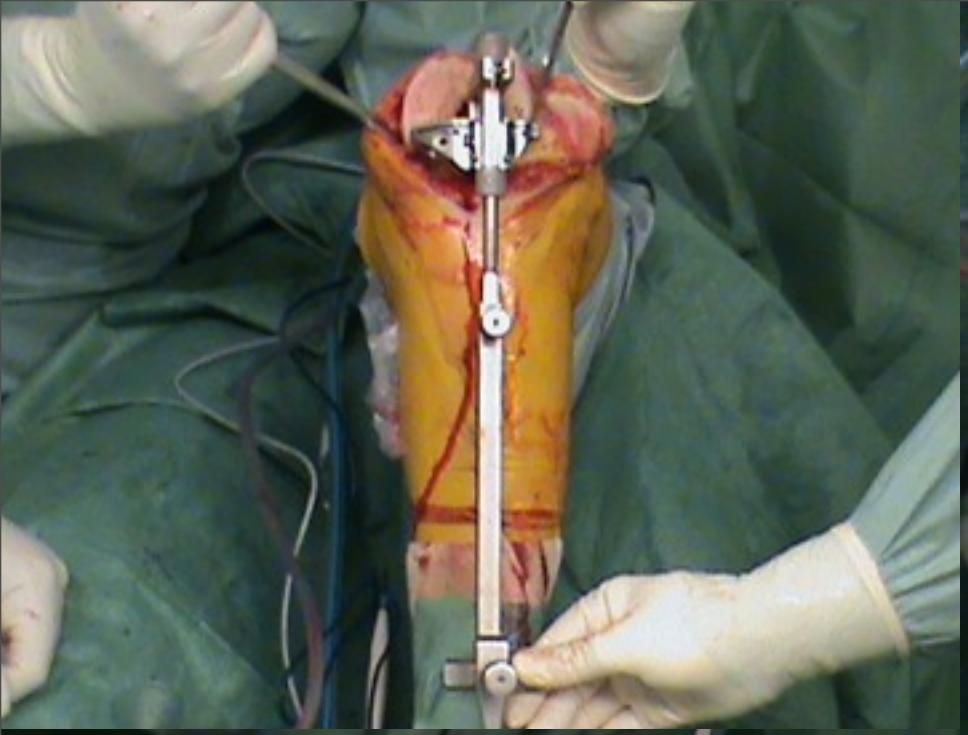
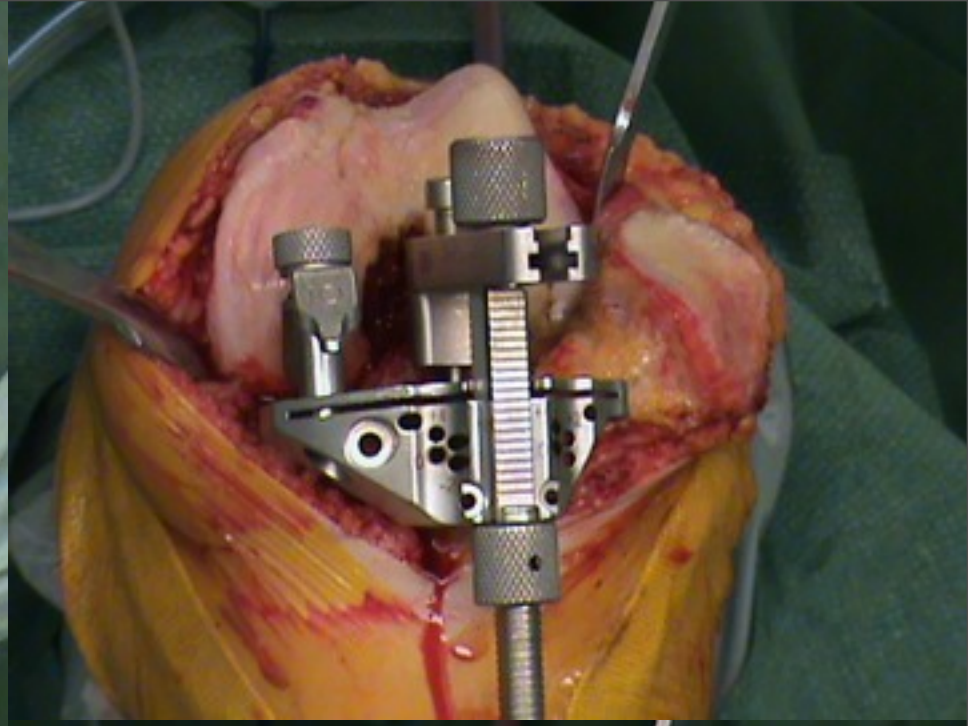
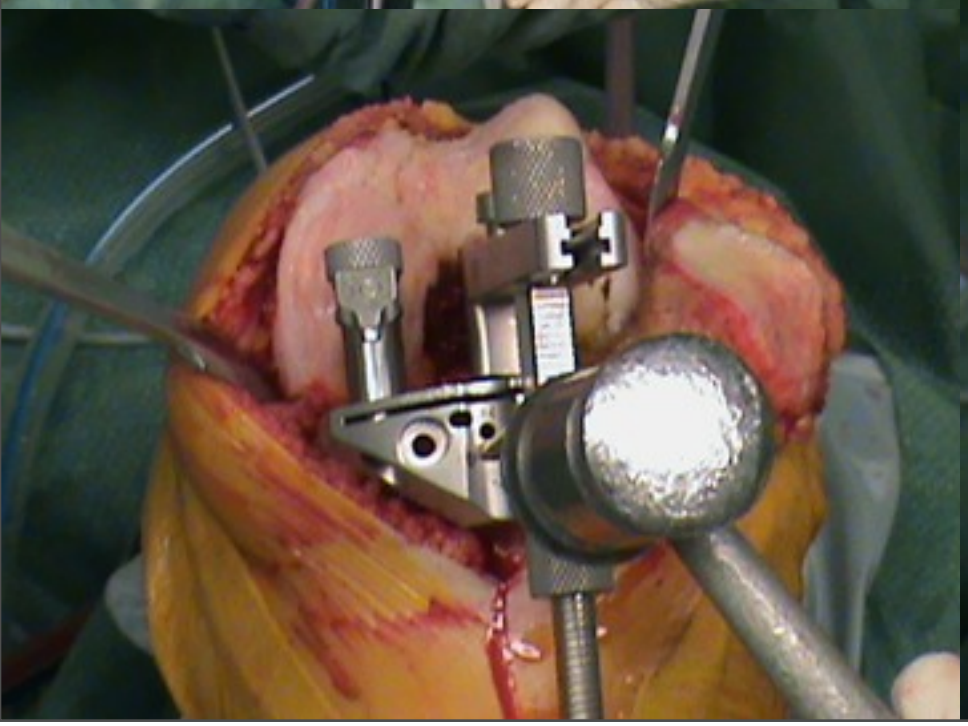
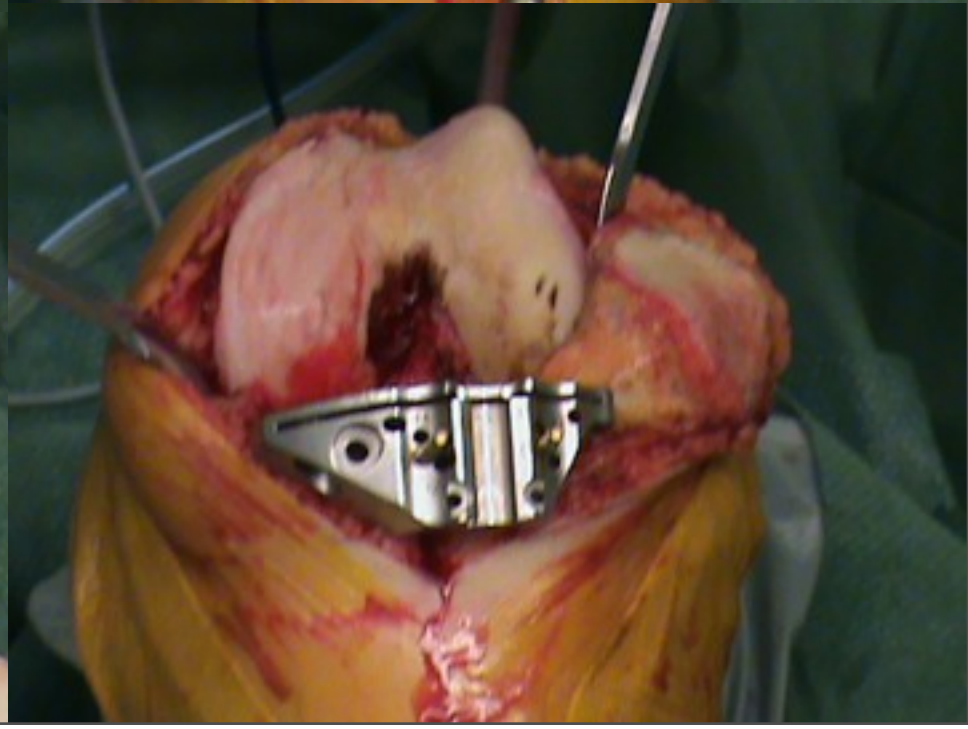

“through a keyhole”
PRECISION DYNAMICS CORP. SAN FERNANDO, CA 91340-3490 U.S.A. • (818) 897-1111

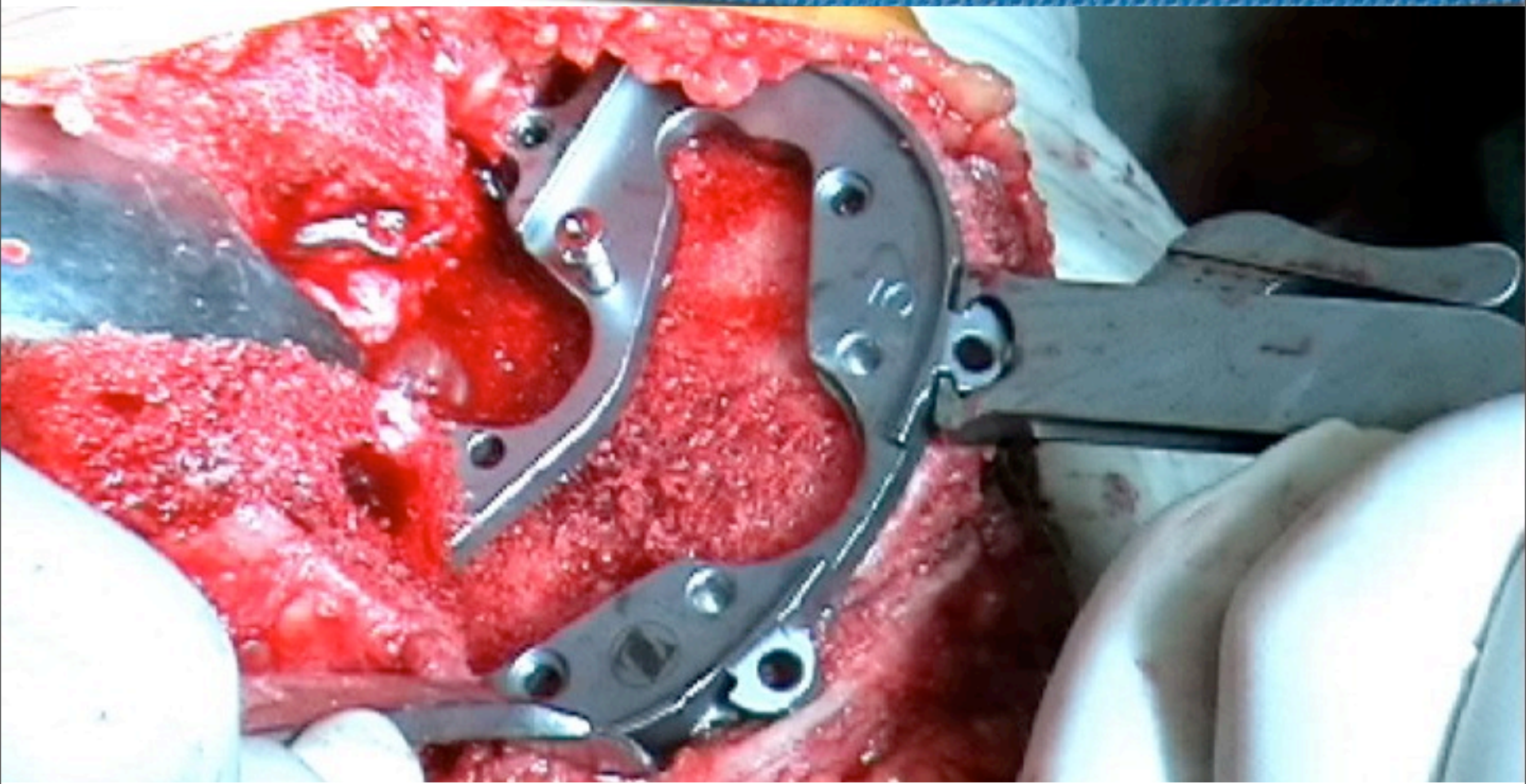
Implant design

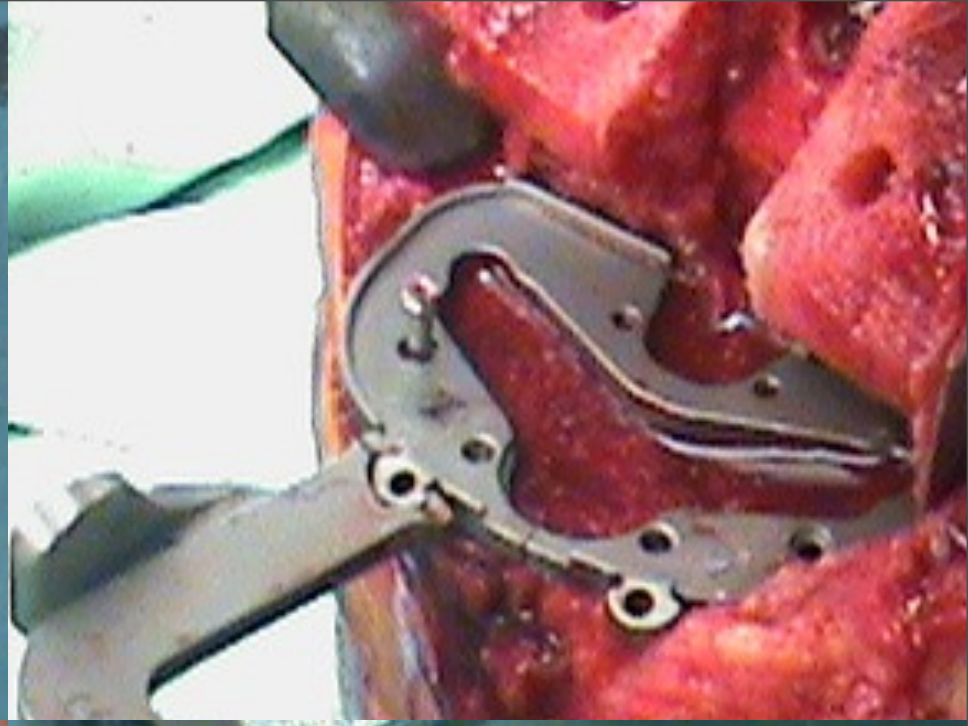
In addition to alternative anatomical approaches, **modified implant designs** are often necessary to facilitate the implantation of the prosthesis through limited incisions.

instruments

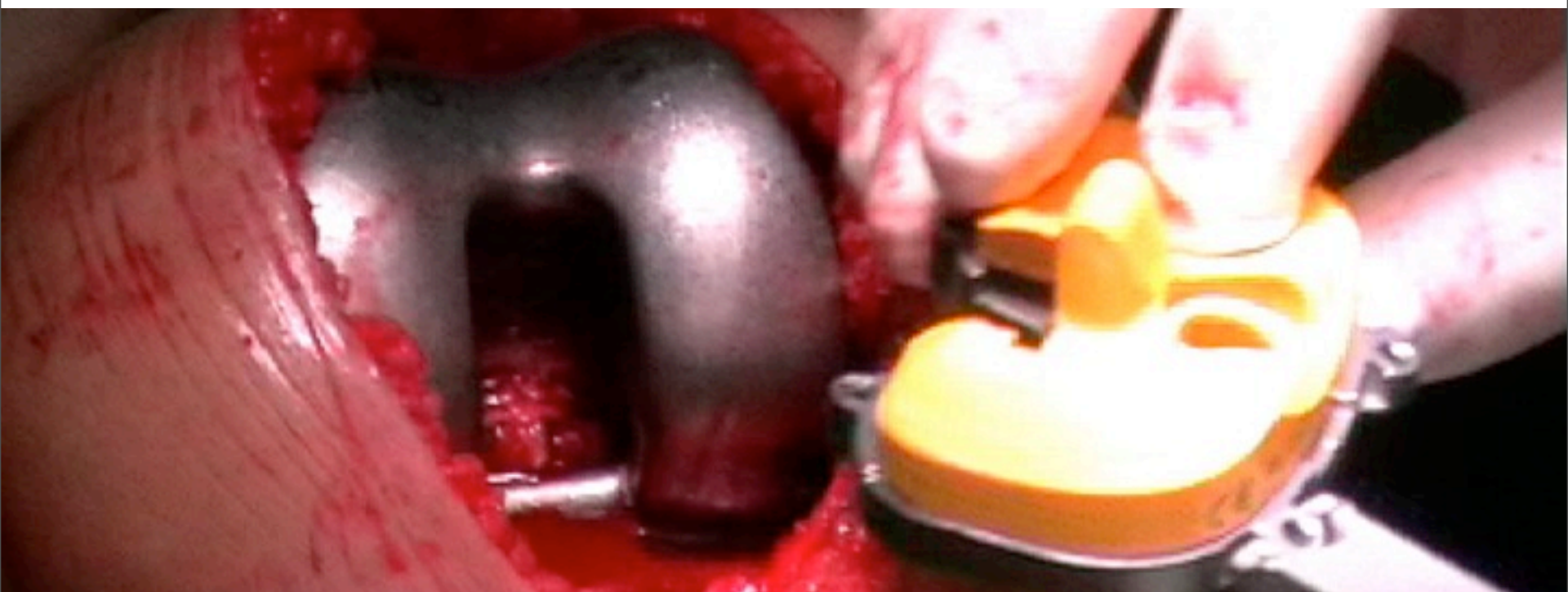




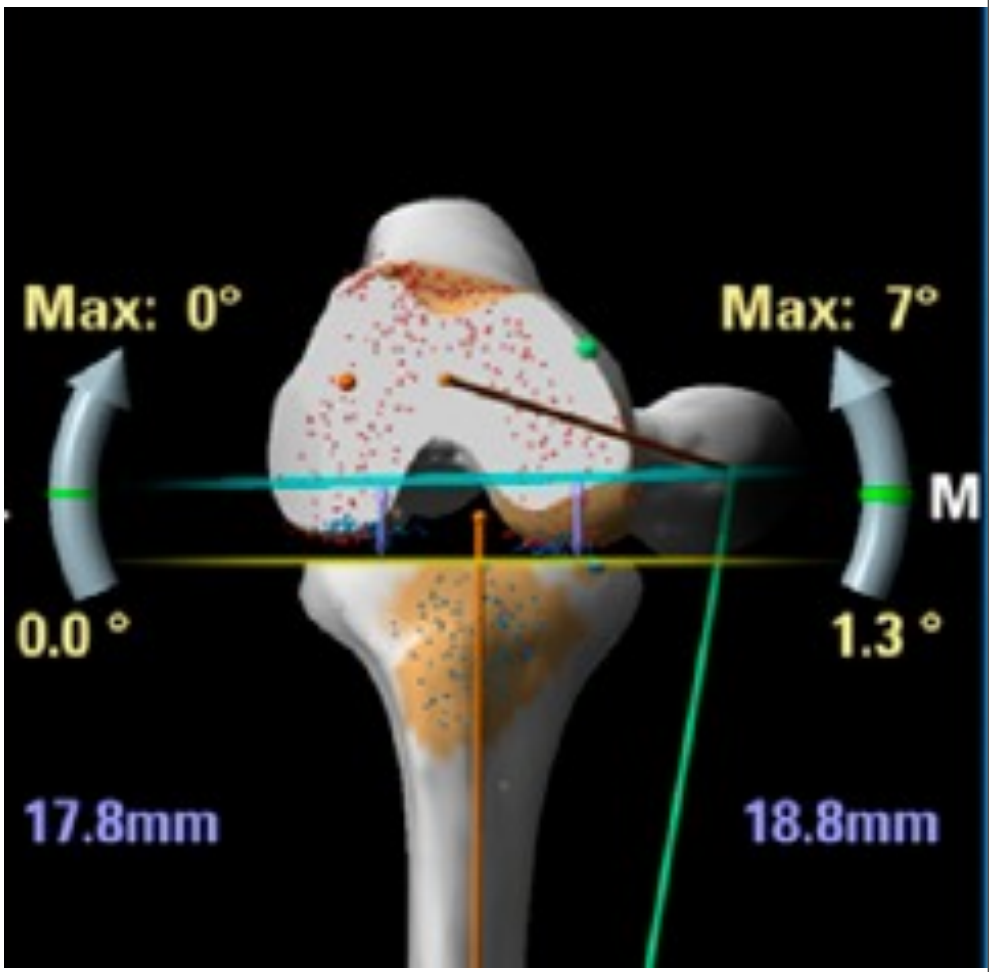
Component **alignment** is one of the principal determinants of longterm functional outcome and implant longevity,



At present,
most arthroplasty surgeons
rely on either the **naked eye**
or alignment jigs to align prosthetic
components during total knee arthroplasty.

The use of **computer-assisted surgery** in an effort to improve component and limb alignment continues to be of interest.

the reliability of navigation to optimize **gap kinematics** is unclear.



Minimally invasive total knee replacement gives rise to several important **ethical questions**. Can we satisfy the principles of beneficence, nonmaleficence, autonomy, and justice by introducing this procedure on a widespread basis?

Principles of Biomedical Ethics

Medical ethics may be considered as a **code** of professional conduct.

Nonmaleficence: "**Primum non nocere**"

Beneficence: intervening to benefit the **well-being** of an individual.

Autonomy: "autos" and "nomos," which together mean **selfrule**.

Justice: surgeons have to promote justice in the **distribution of health care**.

Our desire to **improve the outcome** after surgery is what drives us to develop innovative surgical techniques

outcome

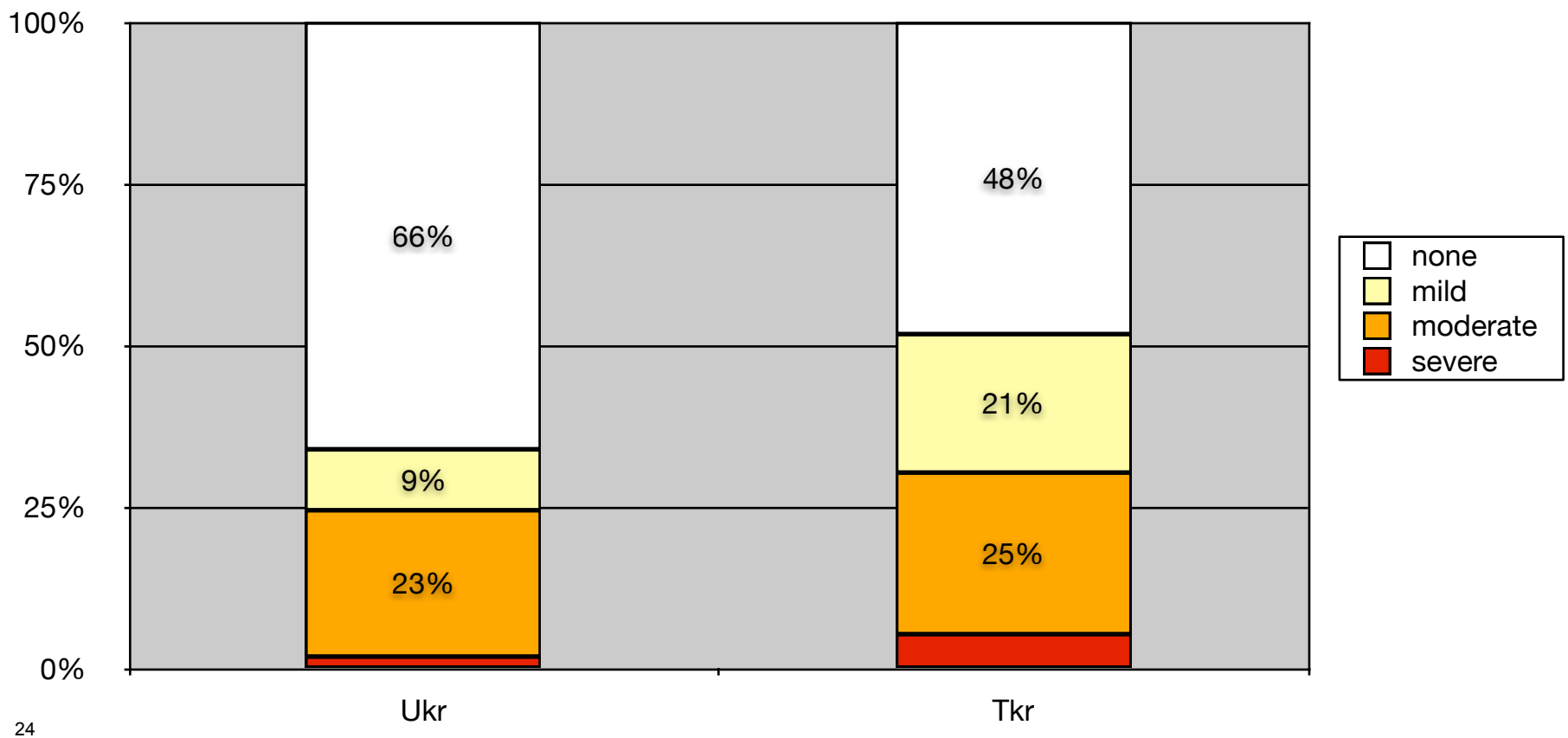
Proponents of minimally invasive surgery have reported a number of **advantages** with such techniques, including reduced early **postoperative pain**, reduced length of **hospital stay** and rehabilitation, **earlier return to work**, decreased **blood loss**, improved **cosmetic appearance**, and high **patient satisfaction**.

Pain

The evolution of perioperative **pain management** and physical therapy protocols has had a profound impact on patient care after total knee arthroplasty.

Patient Satisfaction and Pain in UNI vs TOTAL knee arthroplasty
F Boniforti et al.

EFORT 2003 Elsinki



For a surgical technique to be applied on a regular basis, it must offer outcome measures that are **at least as good as those offered by conventional** techniques

National Joint Registry for England and Wales
4th Annual Report

The National Joint Registry (NJR) for England and Wales
4th Annual Report September 2007

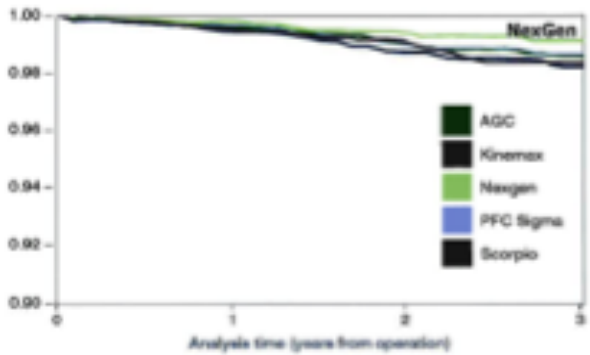
The UK NJR is the most exhaustive and complete audit , providing the most reliable and relevant data about total knee replacement in the UK. This has been generated from collecting data in

- **381 hospitals**
- **Including almost 41,000 Knee Replacements**

The register has sufficient data to report up to 3 years survivorship, and in the latest report, includes the 5 most popular implants. Once again, NexGen, even at the early 3 year review demonstrated dramatic differences to the other available implants.

Compared to NexGen

- **Scorpio and Kinemax have double the revision rate**
- **AGC has a 50% higher revision rate**
- **PFC Sigma has a 61% higher revision rate.**



several studies have
failed to confirm improved outcomes;
indeed, a number of potential
disadvantages
of minimally invasive joint
replacement have been reported

Early Recovery After Total Knee Arthroplasty Performed with and without Patellar Eversion and Tibial Translation

A Prospective Randomized Study

By David F. Dalury, MD, Brian D. Mulliken, MD, Mary Jo Adams, RN, BSN, Christina Lewis, MPT, Rebecca R. Sauder, DPT, and Jennifer A. Bushey, MPT, OCS

Investigation performed at the Department of Orthopaedic Surgery, St. Joseph Medical Center, and Orthopaedic Associates, Towson, Maryland

TABLE II Quadriceps Strength

	Preop. (kg)		6 Wk (kg)		12 Wk (kg)		6 Mo (kg)	
Parameter	Eversion	Subluxation	Eversion	Subluxation	Eversion	Subluxation	Eversion	Subluxation
Mean	10.48	10.34	8.53	9.40	12.02	11.25	13.65	12.56
Stand. dev.	7.67	7.62	5.35	5.13	7.21	7.48	7.98	7.35
Minimum	0.76	0.00	0.60	1.13	1.89	0.76	4.35	2.83
Maximum	34.02	29.48	21.17	26.08	30.05	36.29	31.37	30.99
P value	0.87		0.24		0.26		0.18	

TABLE IV Rates of Patient Knee Preference Based on Pain, Motion, and Strength

	Pain (%)			Motion (%)			Strength (%)		
Preferred Knee	6 Wk	12 Wk	6 Mo	6 Wk	12 Wk	6 Mo	6 Wk	12 Wk	6 Mo
Eversion	35	36	49	43	39	41	43	33	24
No preference	24	27	27	22	32	30	35	43	54
Subluxation	41	36	24	35	29	30	22	24	22

Total Knee Arthroplasty Performed With and Without Patellar Eversion. A Prospective Randomized Study

F. Boniforti, et al. 2009. ***Fondazione San Raffaele Giglio, Cefalù***

30 Knees randomized to one of two different surgical approaches with patellar eversion, or patellar subluxation

The patients and physical therapists were blinded to the type of treatment

Clinical outcomes, including the Knee Society scores, range of motion, pain, lift off test, crutches support, stairs claimb and walking ability, were measured preoperatively, at two, and six weeks after surgery, and three, and six months later.

Results

At two and six weeks after surgery no significant differences between the groups were found with regard to the **ROM**

In terms of **pain** 3 patients E and 2 S refered moderate to severe simptoms treated by non steroid anti-inflammatory drugs.

Three and six months after surgery all patients have had ROM>110°, and **simptoms free**.

Eleven patients E and nine patients S claimbed **stairs freely** within three monts.

The physical **therapist** examination did not measured any significantly differences between E and S patients.

To become accepted by and acceptable to the majority of orthopaedic surgeons, minimally invasive surgery must be subjected to properly designed and rigorously controlled studies to test its **safety, efficacy, and durability**. Before minimally invasive surgery can be adopted as a standard of care, statistical data from multiple centers must be collected, analyzed, and subjected to peer review.

Anno 2006
Gruppo di Studio MIS Mini Keel

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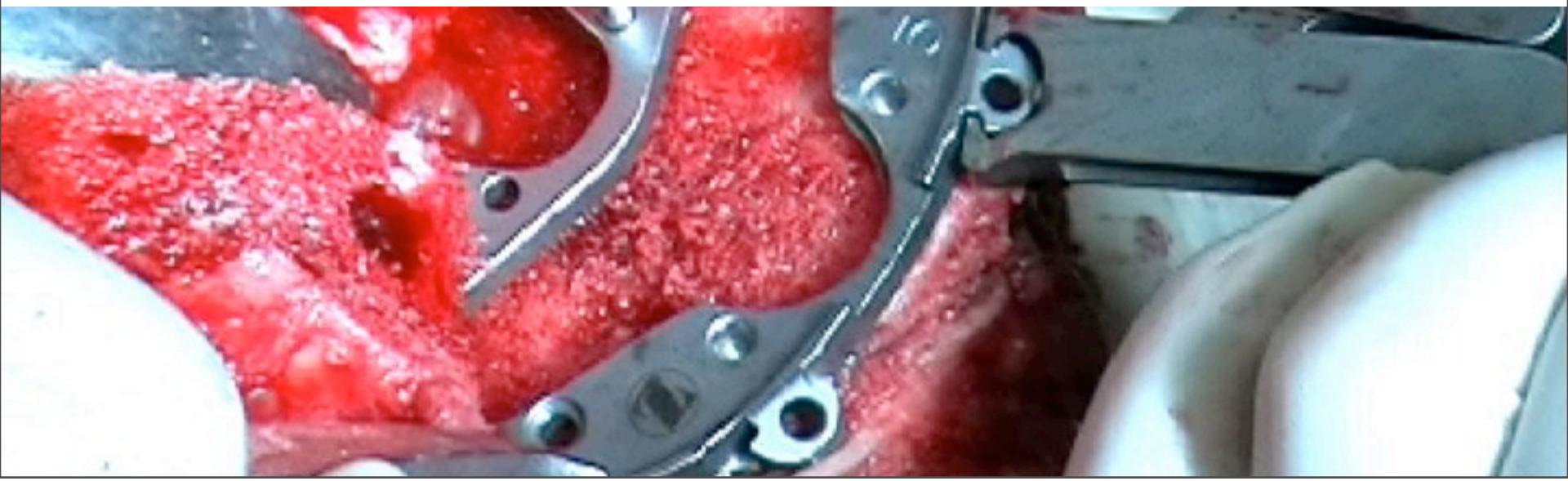
Prof.	P Aglietti	Firenze
Dr.	L Solimeno	Milano
Dr.	F Terragnoli	Brescia
Dr	F Boniforti	Cefalù

OBIETTIVO

Studio prospettico
sui risultati clinici della chirurgia protesica MIS
con utilizzo del piatto tibiale mini keel



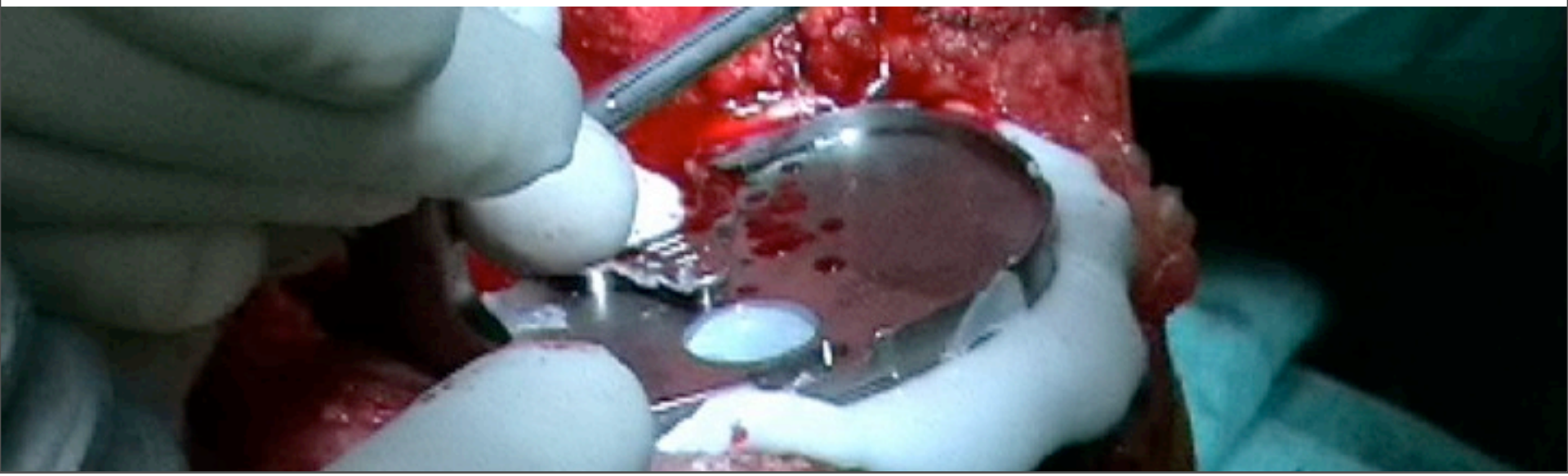
Statistics

“put in a couple of hundred within a few weeks”

Bulstrode C. pers. com. 1997

Coorte di pazienti

“alunni di una classe”

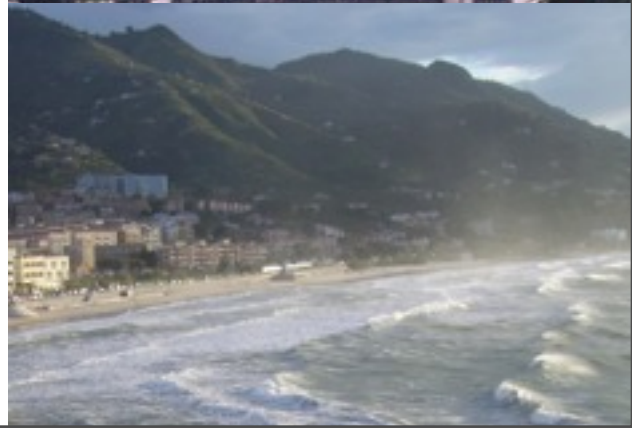



Geografia
Pavia, Milano, Brescia
Firenze
Cefalù

Differenze

Storia
Clima
Logistica

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Surg Laparosc Endosc Percutan Tech. 2007 Apr;17(2):79-82.
PMID: 17450084 [PubMed - as supplied by publisher]
2: Grigg AP, Gibson J, Bardy PG, Reynolds J, Shuttleworth P, Koelmeyer RL, Szer J, Roberts AW, To LB, Kennedy G, Bradstock KF. Related Articles


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1: Bagley AM, Gorton G, Oeffinger D, Barnes D, Calmes J, Nicholson D, Damiano D, Abel M, Kryscio R, Rogers S, Tylkowski C.
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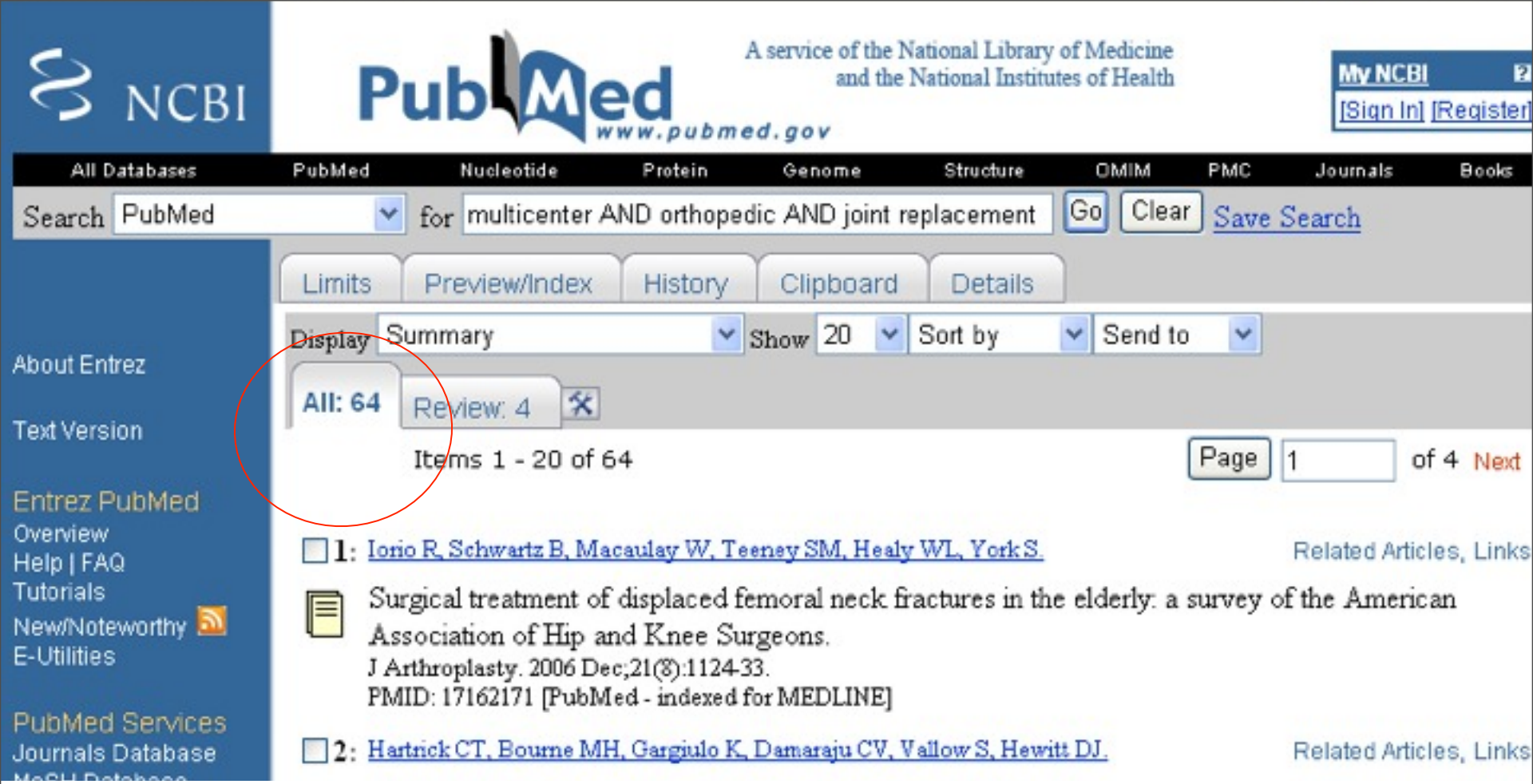
Outcome assessments in children with cerebral palsy, part II: discriminatory ability of outcome tools.
Dev Med Child Neurol. 2007 Mar;49(3):181-6.
PMID: 17355473 [PubMed - indexed for MEDLINE]
2: Oeffinger D, Gorton G, Bagley A, Nicholson D, Barnes D, Calmes J, Abel M, Damiano D, Kryscio R, Rogers S, Tylkowski C.
Related Articles, Li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1: Iorio R, Schwartz B, Macaulay W, Teeney SM, Healy WL, York S.
Related Articles, Links
Surgical treatment of displaced femoral neck fractures in the elderly: a survey of the American Association of Hip and Knee Surgeons.
J Arthroplasty. 2006 Dec;21(8):1124-33.
PMID: 17162171 [PubMed - indexed for MEDLINE]
2: Hartrick CT, Bourne MH, Gargiulo K, Damaraju CV, Vallow S, Hewitt DJ.
Related Articles, Links

COORDINAMENTO

Parametri comuni

Anestesia e analgesia: spino-peridurale con pompa elastomerica; infiltrazione della capsula con marcaina e adrenalina (100 cc) oppure con ropivacaina. Anestesia generale se necessario.
Uso del Tourniquet: non è un parametro di esclusione
Regole nell'impianto della mini-keel: - foro per lo stelo d'estensione in senso antiorario per compattare la spongiosa (risparmio osseo).
Cemento solo sulla mini-keel e non sull'osso tibiale
Drenaggio: solo uno.
Cemento: Simplex (con antibiotico o senza). - cemento liquido nel foro senza pressurizzarlo
Protocollo riabilitativo: deambulazione in prima giornata, CPM il giorno dell'intervento.

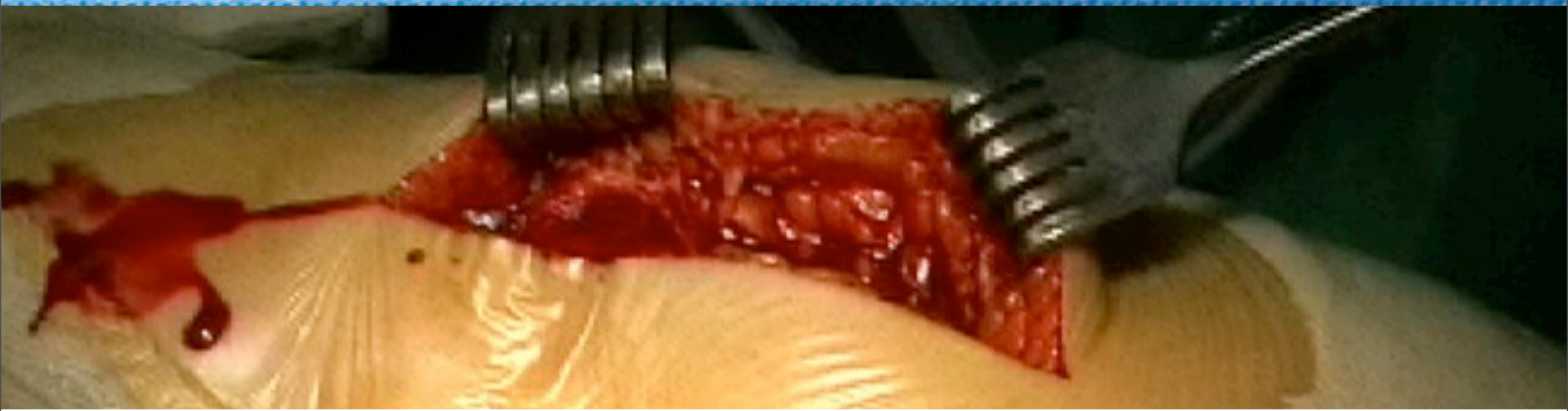
CRITERI DI INCLUSIONE

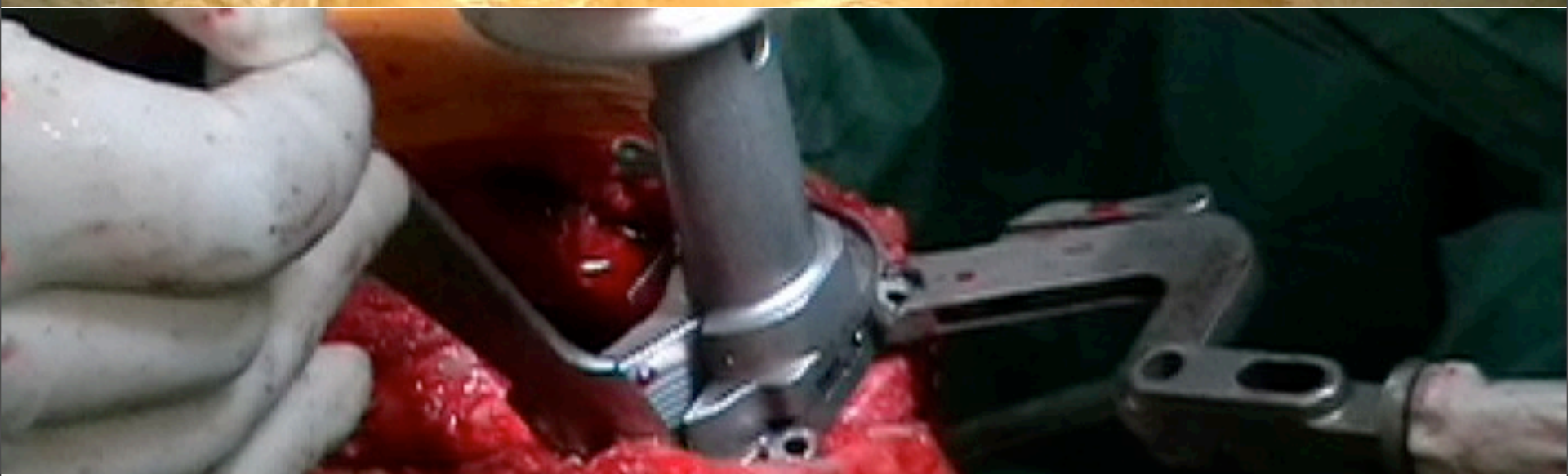
Varo ≤ 15° valgo ≤ 10°
ROM ≥ 90°
No limite d'età
osteoporosi lieve/media
artrite Reumatoide
Precedente Osteotomia
No se:
Revisione
obesità, osteoporosi grave, rotula bassa o compromesso (per esempio, è sotto terapia sichiatrico, o è affetto da malattia di Alzheimer), abuso di sostanze alcoliche, o altre sostanze.
Il paziente ha un'infezione attiva o latente nella regione affetta o in una regione circostante.
Il paziente ha un'infezione localizzata in un sito distante dal ginocchio, ma che potrebbe diffondersi ad essa per via ematogena.
Il paziente ha una riconosciuta ipersensibilità al nickel/cemento.

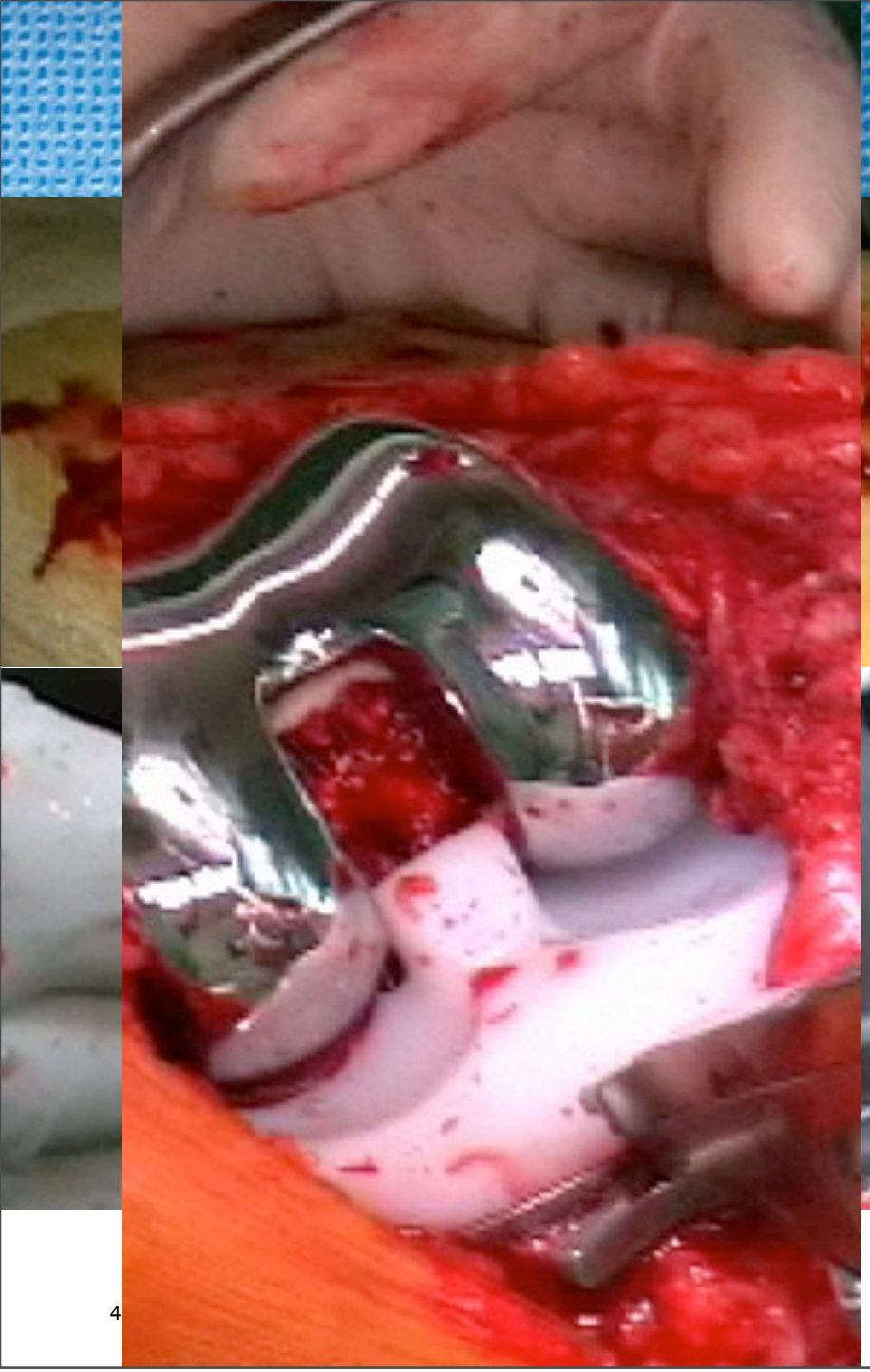
FOLLOW UP

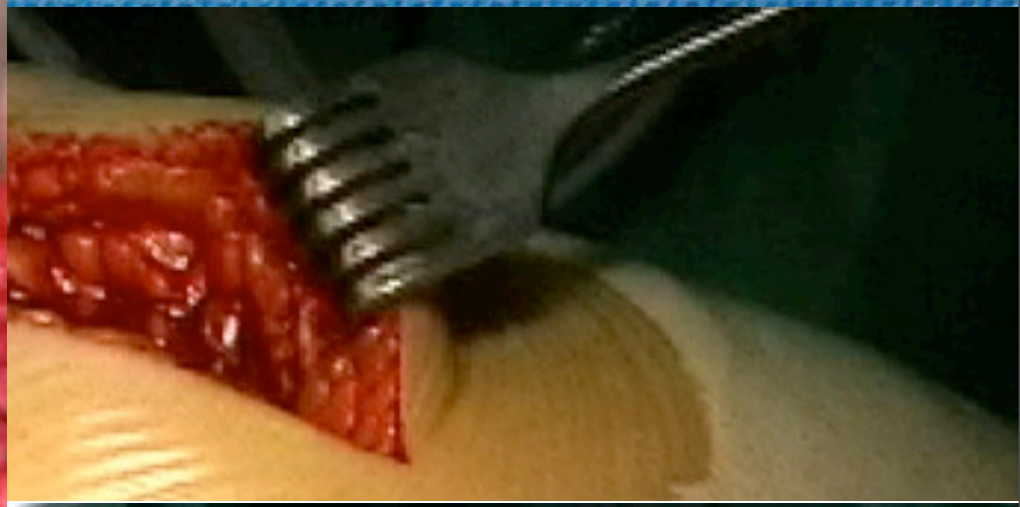
Clinica: KSS, HSS, SF-36
Radiologia: rx angolo β proiezione A/P e angolo σ in laterale. Penetrazione del cemento con CT.
Parametri di riabilitazione: giorno in cui il paziente alza autonomamente la gamba (straight leg raising test), giorno in cui il paziente piega autonomamente la gamba a 90°.
Qualità della vita dall'intervento, a 6 mesi, a 1 anno, a 2 anni e a 3 anni.

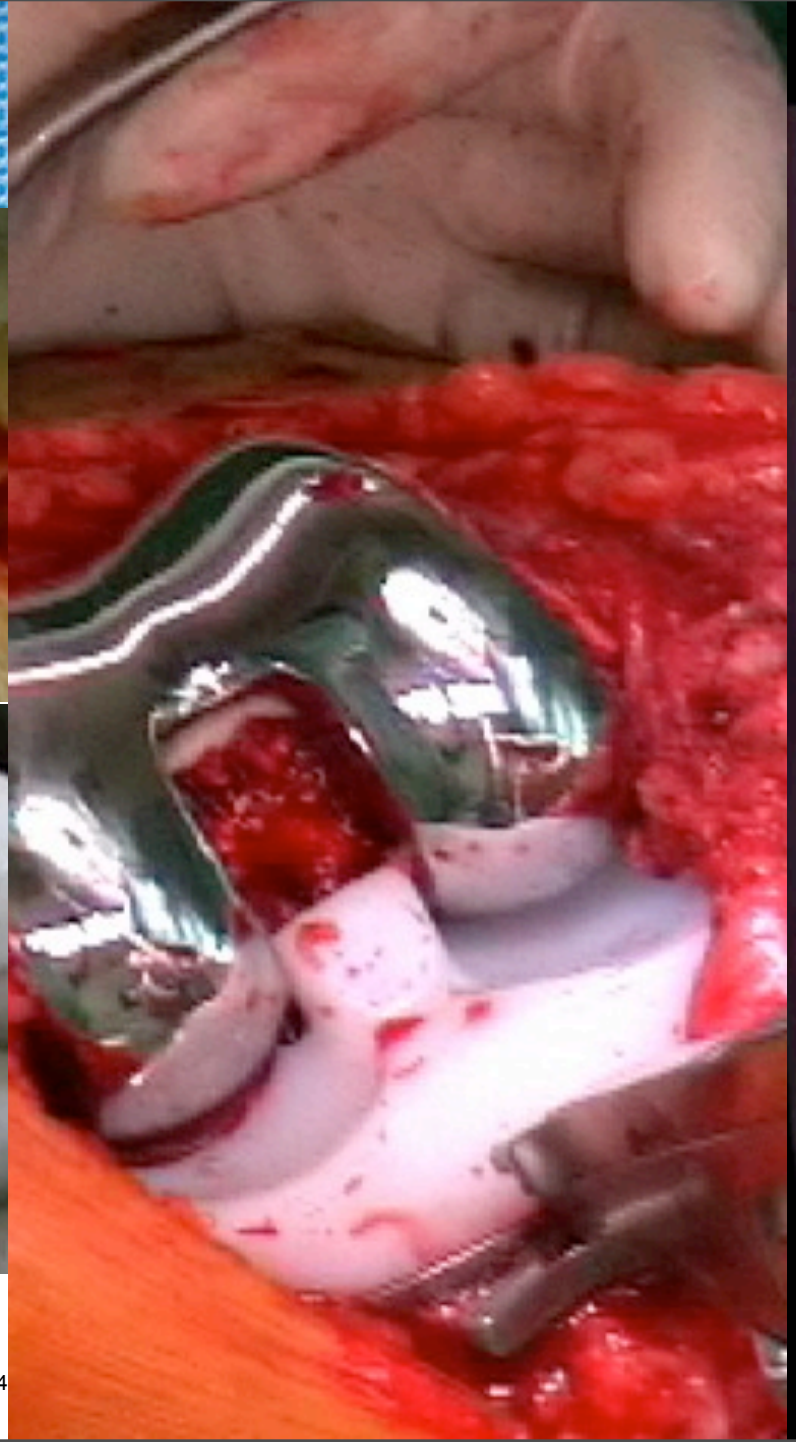
N°	Iniziali Paziente	Sesso	Età	Data intervento	Altezza [m]	Peso [kg]	BMI	Lato Ginocchio operato	HSS pre-op	KSS pre-op	Gradi Varo/ Valgo pre-op	Accesso Midvastus / Parapatell	Taglia Femore	Taglia Tibia	Spessore Inserto
ex	*A.P.*	*F*	*75*	*11-11-06*	*1,65*	*80*	*29,38*	*Dx*	*34*	*45*	*15° Varo*	*Midvastus*	*D*	*4*	*12*
1	MA	m	76	16-11-06	1,75	115	*37,55*	d	35	35		Midvastus	f	6	14
2	LC	f	79	21-11-06	1,60	88	*34,38*	s	28	35		Midvastus	e	4	12
3	OC	f	73	22-11-06	1,55	80	*33,30*	d	30	35		Midvastus	d	3	12
4	DD	m	68	23-11-06	1,70	74	*25,61*	s	35	30		Midvastus	f	5	12
5	GM	f	70	28-11-06	1,50	65	*28,89*	d	30	30		P	d	3	12
6	CF	f	77	29-11-06	1,50	65	*28,89*	s	35	35		Midvastus	f	5	10
7	CN	f	75	30-11-06	1,65	70	*25,71*	s	35	40		Midvastus	e	4	10
8	DF	f	68	06-12-06	1,59	68	*26,90*	s	32	30		P	e	4	12
9	DA	f	58	12-12-06	1,40	80	*40,82*	d	30	35		P	d	4	12
10	PS	f	70	13-12-06	1,50	65	*28,89*	s	35	40		P	e	4	10
11	LV	m	70	07-12-06	1,71	71	*24,28*	d	40	45		Midvastus	f	5	14
12	BC	f	43	05-12-06	1,64	68	*25,28*	s	30	38		Midvastus	e	5	12
13	SG	f	76	14-12-06	1,71	88	*30,09*	s	28	32		P	f	6	12
14	CG	m	61	09-01-07	1,75	85	*27,76*	s	28	30		Midvastus	f	5	10
15	LC	f	70	09-01-07	1,54	74	*31,20*	d	35	40		P	d	4	12
16	FF	f	72	10-01-07	1,60	75	*29,30*	d	30	32		Midvastus	d	4	12
17	LM	f	64	11-01-07	1,58	78	*31,24*	s	30	35		P	e	4	10
18	PC	f	64	11-01-07	1,60	75	*29,30*	d	32	34		P	e	4	12
19	CC	f	70	17-01-07	1,55	68	*28,30*	d	30	35		Midvastus	f	5	12
20	CG	f	68	19-12-06	1,50	83	*36,89*	d	35	40		P	d	4	14
21	FM	f	79	20-01-07	1,72	75	*25,35*	d	30	40		Midvastus	e	4	12
22	LN	m	59	24-01-07	1,74	84	*27,74*	s	35	35		Midvastus	e	6	10
23	BC	m	51	01-02-07	1,70	95	*32,87*	s	35	35		P	e	6	10
24	CA	f	74	01-02-07	1,60	80	*31,25*	s	20	25		P	e	4	10
25	CS	f	72	06-02-07	1,54	68	*28,67*	d	25	30		Midvastus	e	4	12
26	MG	f	70	06-02-07	1,58	65	*26,04*	d	30	40		Midvastus	e	5	12
27	PC	m	64	06-02-07	1,70	74	*25,61*	s	25	35		Midvastus	e	5	14
28	SL	f	76	13-02-07	1,68	80	*28,34*	s	30	35		Midvastus	e	5	14
29	CH	f	69	13-02-07	1,59	69	*27,29*	d	30	35		P	e	5	12
30	DC	f	69	15-02-07	1,60	74	*28,91*	s	32	32		Midvastus	d	4	12











During the last decade, improved access to the medical literature provided by the **Internet** and the press has caused a shift in the modern patient's **expectations and knowledge.**

patients need to understand that they might not experience **all of the benefits** of a new procedure during the **learning-curve phase** of that technique.

Although minimally invasive surgery may appeal to younger,
more **active patients** (those who are between thirty and
sixty years old), their primary concern should be **function and durability**.

Patient selection further confounds the evaluation of minimally invasive total knee replacement because not all individuals are suitable for a minimally invasive approach.


Fondazione Istituto San Raffaele
Ospedale G. Giglio di Cefalù
Grazie