



I.R.C.C.S. ISTITUTO ORTOPEDICO
GALEAZZI

MILANO, ENTERPRISE HOTEL

V CONGRESSO NAZIONALE **ORTHOPEA**

COORDINATORE: PAOLO PERAZZO

Esperienza Italiana: One-day surgery in chirurgia protesica

S. Petrillo and S. Romagnoli

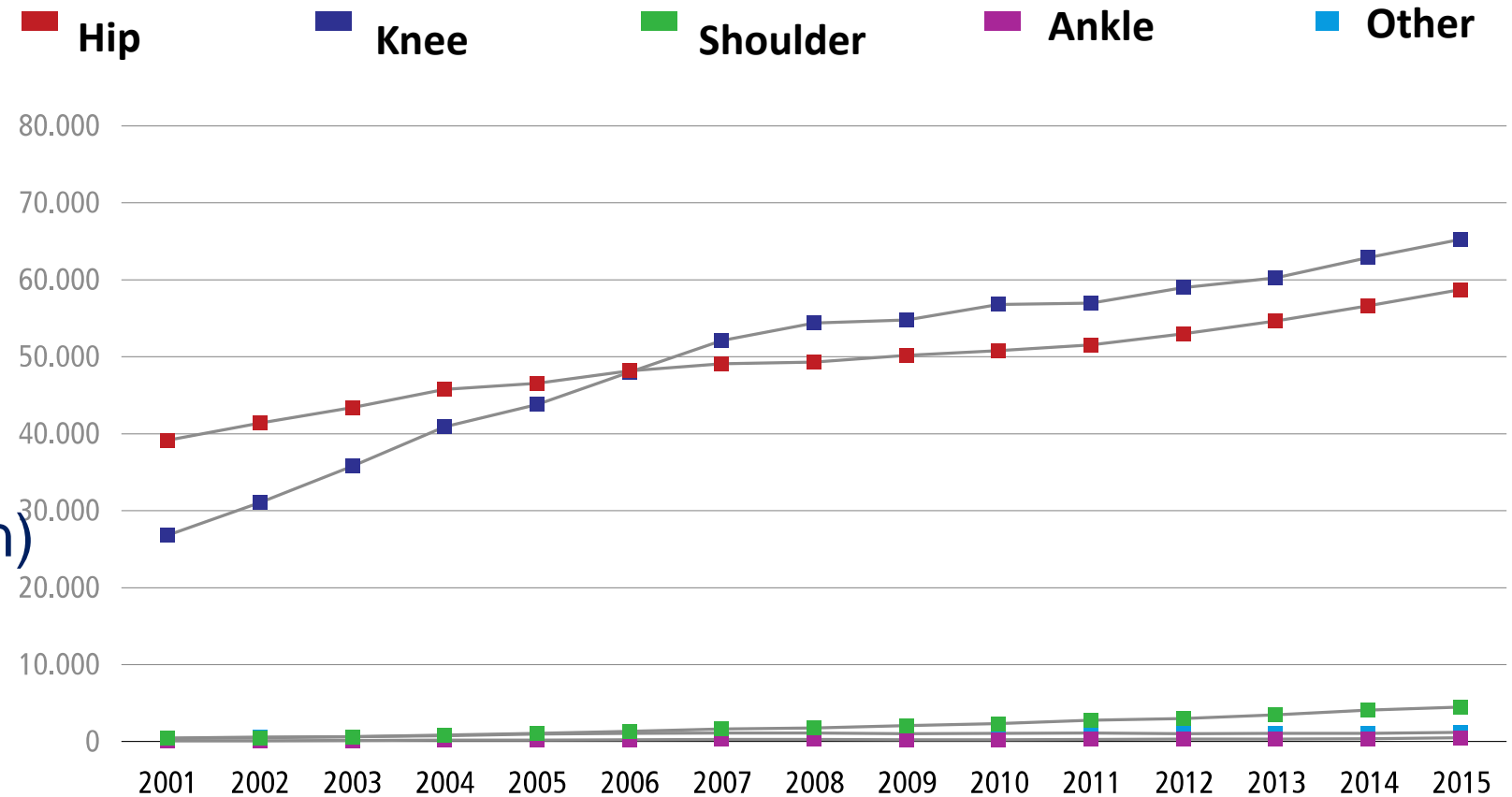
Joint Replacement Department
IRCCS Galeazzi Orthopaedic Institute, Milan-Italy

Knee arthroplasty increase

Knee arthroplasty in Italy

- 28056 in 2001
- 50651 in 2006
- 70105 in 2015

(21,9% in Lombardia region)



From RIAP, National Healthcare system registry 2017

Mean Hospital Stay (in primary): 7,6 days

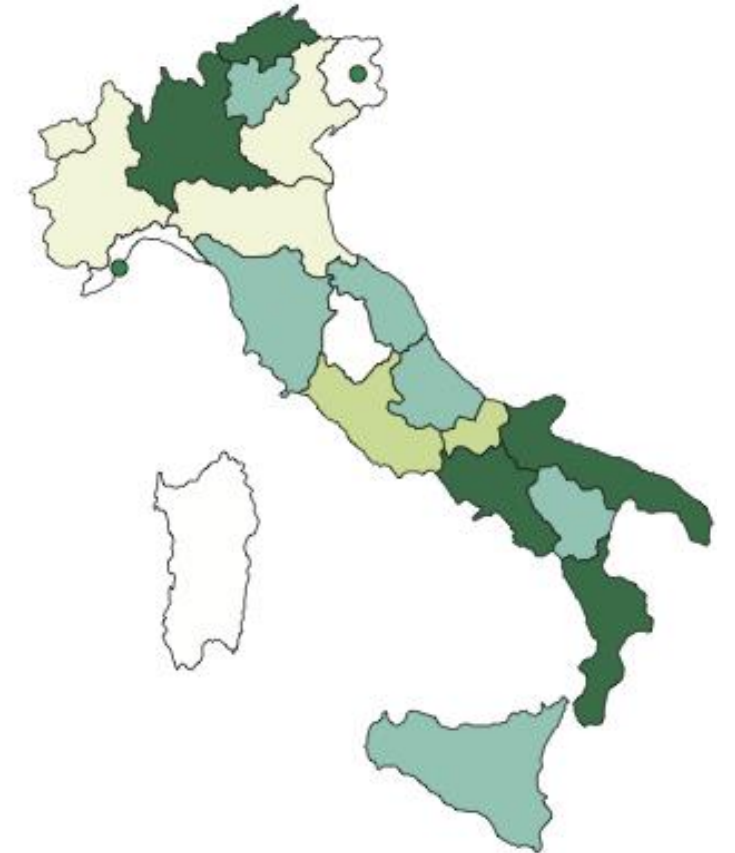
- Lombardia: 6,8 days
- Valle d'Aosta: 5,7 days
- Liguria: 7,4 days
- Bolzano, Marche: 9,3 days

Gender:

- Female 67,9%
- Male 32,1%

Mean Age:

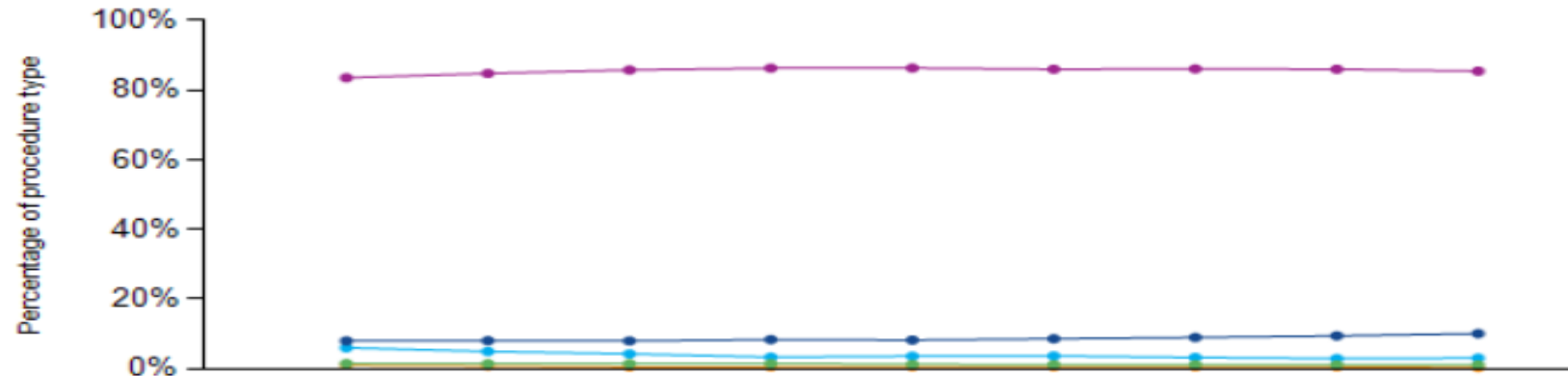
- Under 65 yrs: 24%
- 65-74 yrs: 43,6%
- Over 75 yrs: 32,4%



Knee arthroplasty increase

Type of primary knee replacement procedures.

Country: England, Wales, Northern Ireland



| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------------------|--------|--------|--------|--------|--------|---------|---------|---------|---------|
| TKR using cement | 83% | 85% | 86% | 86% | 86% | 86% | 86% | 86% | 85% |
| TKR not using cement | 6% | 5% | 4% | 3% | 4% | 4% | 3% | 3% | 3% |
| TKR Hybrid | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | <1% |
| Patello-femoral | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Unicondylar | 8% | 8% | 8% | 8% | 8% | 9% | 9% | 9% | 10% |
| Number of procedures | 79,404 | 81,729 | 85,082 | 89,037 | 89,941 | 100,437 | 103,125 | 106,693 | 106,334 |

Increase of cost

- Decrease length stay
- Quality of care



Increasing interest of the scientific community on the topic

The figure displays three sequential screenshots of a PubMed search for "rapid recovery knee arthroplasty". Each screenshot shows the search results for a specific time period, with the number of items found circled in red. The first screenshot (2000-2005) shows 1818 items. The second screenshot (2006-2019) shows 257 items. The third screenshot (2006-2019) shows 1542 items. The results are listed with titles, authors, journals, and publication dates.

Search results
Items: 1 to 20 of 1818

2000-2005
Search results
Items: 1 to 20 of 257

2006-2019
Search results
Items: 1 to 20 of 1542

Article attributes
Associated Data
Author manuscripts
Digitized back issues
MEDLINE journals
Open access
Retracted

Text availability
Include embargoed articles

Publication date
1 year
5 years
10 years
Custom range...

Research Funder
NIH
AHRQ
ACL
ASPR
CDC
DHS
EPA
FDA
NASA
NIST
VA
Customize ...

Clear all
Show additional filters

1. [Prosthetic Joint Infection](#)
Aaron J. Tande, Robin Patel
Clin Microbiol Rev. 2014 Apr; 27(2): 302-345. doi: 10.1128/CMR.00111-13
PMCID: PMC3993098
[Article](#) [PubReader](#) [PDF-2.3M](#)

2. [Why still in hospital after fast-track hip and knee arthroplasty? A randomized, double-blind, placebo-controlled study](#)
Henrik Husted, Troels H Lunn, Anders Troelsen, Lissi Gaarn-Larsen, Billy B Kristensen, Henrik Kehlet
Acta Orthop. 2011 Dec; 82(6): 679-684. Published online 2011 Nov 25. doi: 10.3109/17453674.2011.636682
PMCID: PMC3247885
[Article](#) [PubReader](#) [PDF-739K](#) [Citation](#)

3. [No effect of fibrin sealant on drain output or functional recovery following simultaneous bilateral total knee arthroplasty: A randomized, double-blind, placebo-controlled study](#)
Christian Skovgaard, Bente Holm, Anders Troelsen, Troels H Lunn, Lissi Gaarn-Larsen, Henrik Kehlet, Henrik Husted
Acta Orthop. 2013 Apr; 84(2): 153-158. Published online 2013 Apr 18. doi: 10.3109/17453674.2013.769082
PMCID: PMC3639335
[Article](#) [PubReader](#) [PDF-205K](#) [Citation](#)

4. [Minimally invasive knee arthroplasty: An overview](#)
Alfred J Tria, Giles R Scuderi
World J Orthop. 2015 Nov 18; 6(10): 153-158. doi: 10.3109/17453674.2015.1041102
PMCID: PMC4611102
[Article](#) [PubReader](#) [PDF-1.1M](#) [Citation](#)

1. [Is Recovery Faster for Mobile-bearing Total Knee Arthroplasty?](#)
Adolph V. Lombardi, Keith R. Berend, Richard A. Berger, Sharat K. Kusurkar
Clin Orthop Relat Res. 2009 Jun; 467(6): 1671-1676. doi: 10.1007/s11999-009-0888-1
PMCID: PMC2674171
[Article](#) [PubReader](#) [PDF-170K](#) [Citation](#)

2. [The Feasibility and Perioperative Outcomes of Minimally Invasive Total Knee Arthroplasty](#)
Richard A. Berger, Sharat K. Kusurkar, Michael A. Mont, Peter M. Bonutti, Michael G. Zywi
Clin Orthop Relat Res. 2009 Jun; 467(6): 1677-1682. doi: 10.1007/s11999-009-0889-2
PMCID: PMC2674174
[Article](#) [PubReader](#) [PDF-210K](#) [Citation](#)

3. [Minimally invasive total knee arthroplasty: A randomized, double-blind, placebo-controlled study](#)
Peter M. Bonutti, Michael G. Zywi, Michael A. Mont, Richard A. Berger
Int Orthop. 2010 Apr; 34(4): 491-495. doi: 10.1007/s11999-009-0890-9
PMCID: PMC2903138
[Article](#) [PubReader](#) [PDF-95K](#) [Citation](#)

4. [Minimally Invasive Oxford Medial Knee Arthroplasty](#)
K. L. Luscombe, J. Lim, P. W. Jorgensen
Int Orthop. 2010 Apr; 34(4): 491-495. doi: 10.1007/s11999-009-0890-9
PMCID: PMC2903138
[Article](#) [PubReader](#) [PDF-95K](#) [Citation](#)

1. [Prosthetic Joint Infection](#)
Aaron J. Tande, Robin Patel
Clin Microbiol Rev. 2014 Apr; 27(2): 302-345. doi: 10.1128/CMR.00111-13
PMCID: PMC3993098
[Article](#) [PubReader](#) [PDF-2.3M](#) [Citation](#)

2. [Why still in hospital after fast-track hip and knee arthroplasty?](#)
Henrik Husted, Troels H Lunn, Anders Troelsen, Lissi Gaarn-Larsen, Billy B Kristensen, Henrik Kehlet
Acta Orthop. 2011 Dec; 82(6): 679-684. Published online 2011 Nov 25. doi: 10.3109/17453674.2011.636682
PMCID: PMC3247885
[Article](#) [PubReader](#) [PDF-739K](#) [Citation](#)

3. [No effect of fibrin sealant on drain output or functional recovery following simultaneous bilateral total knee arthroplasty: A randomized, double-blind, placebo-controlled study](#)
Christian Skovgaard, Bente Holm, Anders Troelsen, Troels H Lunn, Lissi Gaarn-Larsen, Henrik Kehlet, Henrik Husted
Acta Orthop. 2013 Apr; 84(2): 153-158. Published online 2013 Apr 18. doi: 10.3109/17453674.2013.769082
PMCID: PMC3639335
[Article](#) [PubReader](#) [PDF-205K](#) [Citation](#)

4. [Minimally invasive knee arthroplasty: An overview](#)
Alfred J Tria, Giles R Scuderi
World J Orthop. 2015 Nov 18; 6(10): 153-158. doi: 10.3109/17453674.2015.1041102
PMCID: PMC4611102
[Article](#) [PubReader](#) [PDF-1.1M](#) [Citation](#)



PREVIOUS EXPERIENCE

STANDARD PROTOCOL: 2001-2013

14300 arthroplasties Hip/Knee

DISCHARGING INFORMATION

From Orthopaedic to Rehabilitation Department

- 2 days after surgery

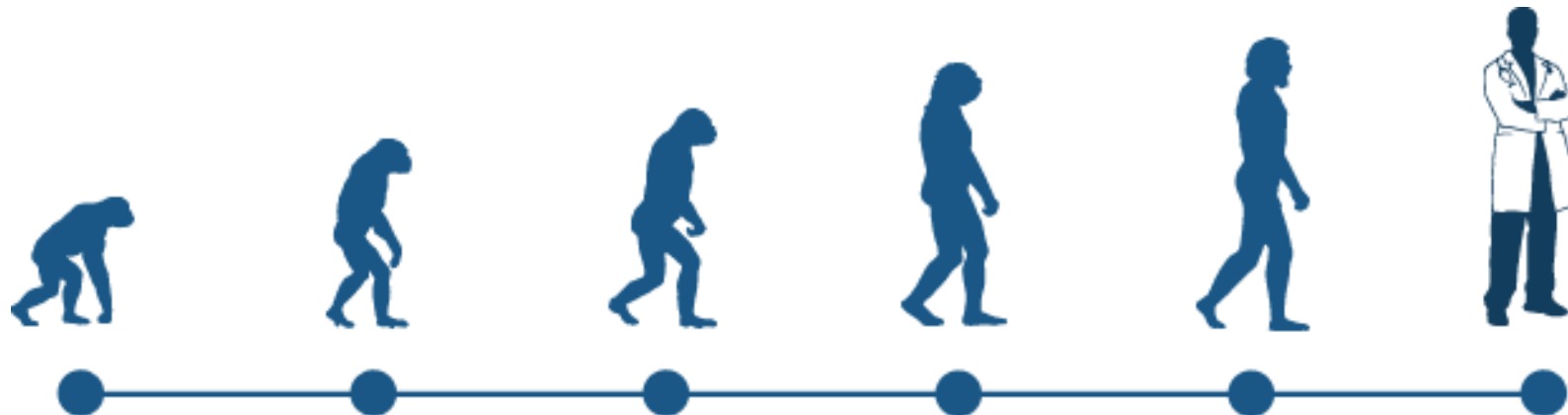
UKA, PFJ arthroplasty, UKA + PFJ, Bi-Uka (even bilateral), THA.

5 days of Physiotherapy

- 3 days after surgery

TKA (even bilateral), Revisions.

7 days of Physiotherapy





FAST TRACK “ERA”

From 2014

ERAS PROTOCOL

(Enhanced Recovery After Surgery)

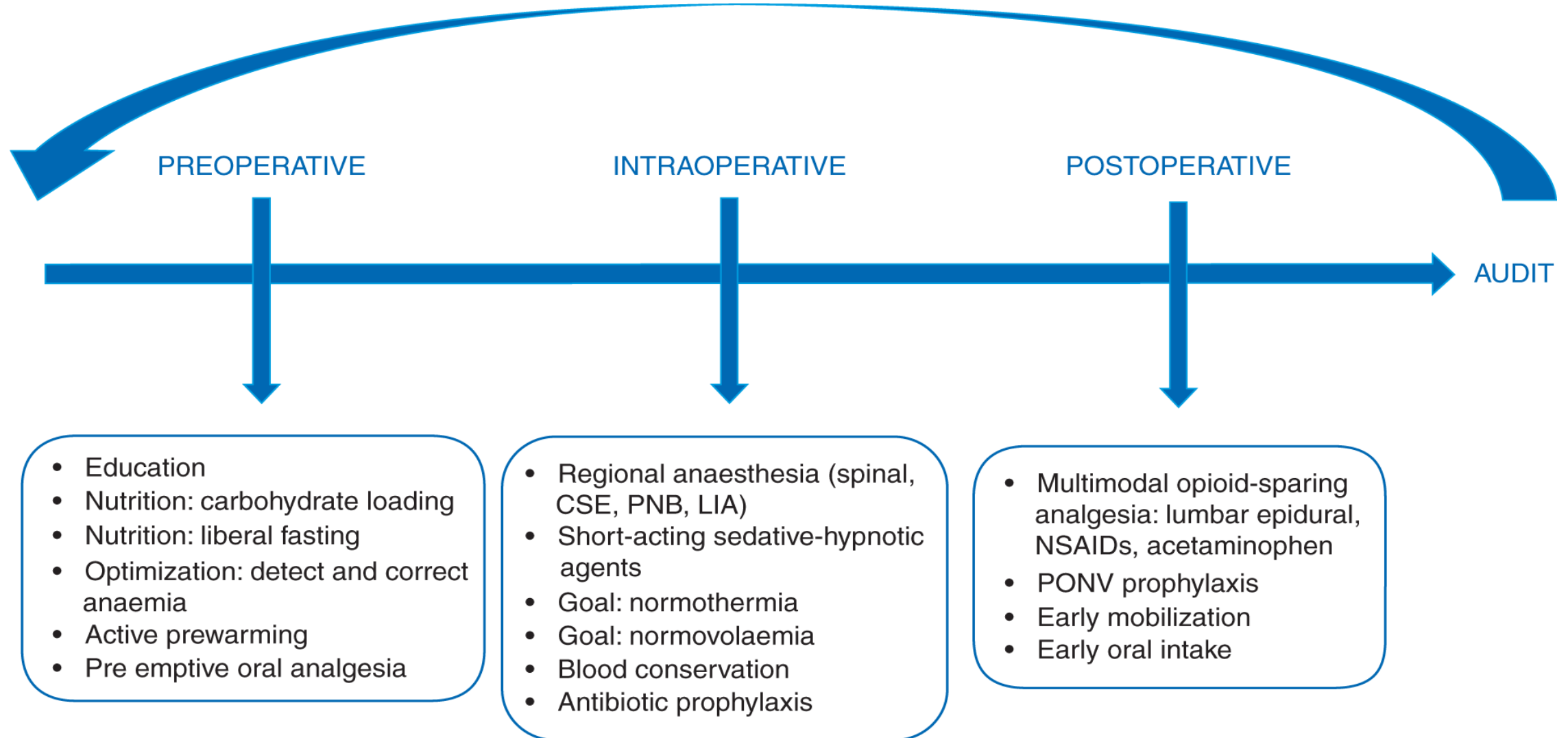
Kehlet 1997, Fearon and Ljungqvist 2001

Aim: Rapid clinical and functional recovery

Reduction of morbidity

Goal: Discharging 4 days after surgery





EXCLUSION CRITERIA

•Social-cultural condition

- Familiar assistance
- Out of Lombardia region
- Age > 80 yrs

•Morbidity

- ASA III
- Hgb (<12 g/dl female, <13 g/dl male)
- Obesity (BMI > 30)

•Preoperative severe functional limitation

EXCLUSION CRITERIA

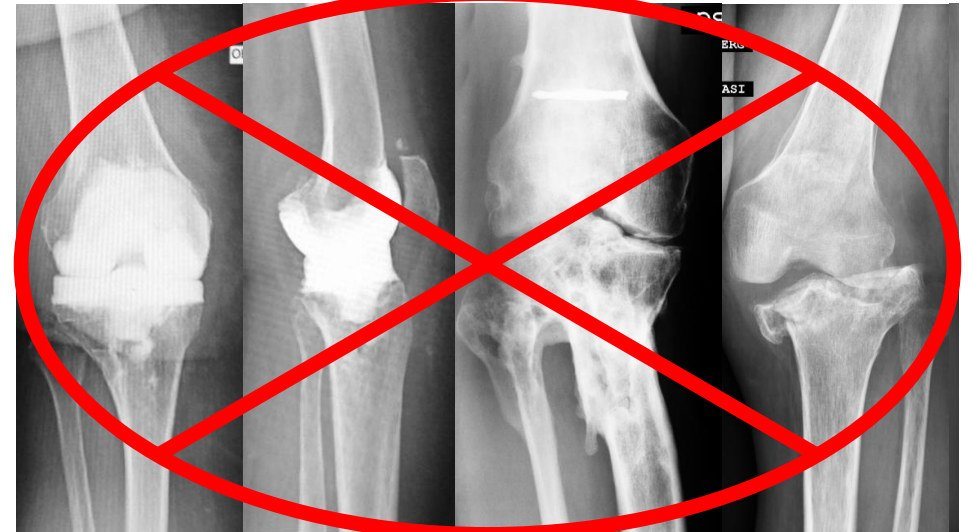
•Pharmacological therapy:

- Antidepressants/Antipsychotics
- Opioids
- Oral anticoagulants
- Immunomodulatory-suppressor therapy



•Indication

- Complex primary
- Revisions
- Septic sequelae





HGB OPTIMIZATION

- Preop. optimization of Hgb levels
- NSAID 7 days preop.

EDUCATION

- Reduced anxiety and length of hospital stay
- Influence on analgesic assumption
- Real expectation of the patients

REGIONAL ANAESTHESIA

Short-acting spinal anaesthesia
Controlled hypotension



ANTIBIOTIC PROPHYLAXIS

Cefazolin 2 g; 2 days after 12 hrs
Allergies: Vancomycin 500 mg x 2



RIST TECHNIQUE

- **Reduced Instrumentation Surgical Technique**
- Surgical time: <30 min for UKA: <45 min for TKA
 - No tourniquet
- Progressive gap balancing for both UKA and TKA
- Kinematical alignment for UKA and TKA in varus knee
 - Mechanical alignment for TKA in valgus knee
 - Local injective anaesthesia (LIA)
- Drains only in TKA or Revisions (6hrs removal)

TOURNIQUET

- **No evidence of reduced blood loss**

Alcelik et al , J Arthroplasty 2012; Zhang W et al: J Orthop Surg Res 2014

- **High risk of DVT: (RR=2.0-5.0)**

Smith TO et al, Knee 2010; Tai TW et al, KSSTA 2011

Alcelik I et al, J Arthroplasty 2012

- **Increased postop. pain**

Ejaz A et al, Acta Orthop 2014; Zhang W et al, J Orthop Surg Res 2014

- **Slower postop. recovery**

Alcelik I et al, J Arthroplasty 2012; Ejaz A et al, Acta Orthop 2014

- **Reduced ROM: 113° vs 124°**

Alcelik I et al, J Arthroplasty 2012, Ledinl H et al, Acta Orthop 2012

- **Increased fibrinolytic reaction**

Aglietti 1998

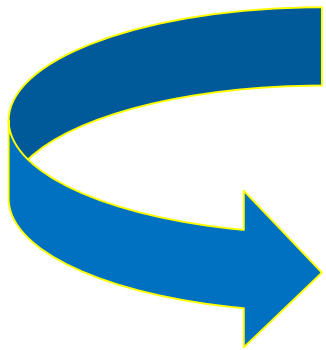
- **Higher risk of wound problems (28%)**

Olivecrona C et al, JBJS Am 2012

- **Higher risk of superficial infection**

Alcelik I et al, J Arthroplasty 2012:

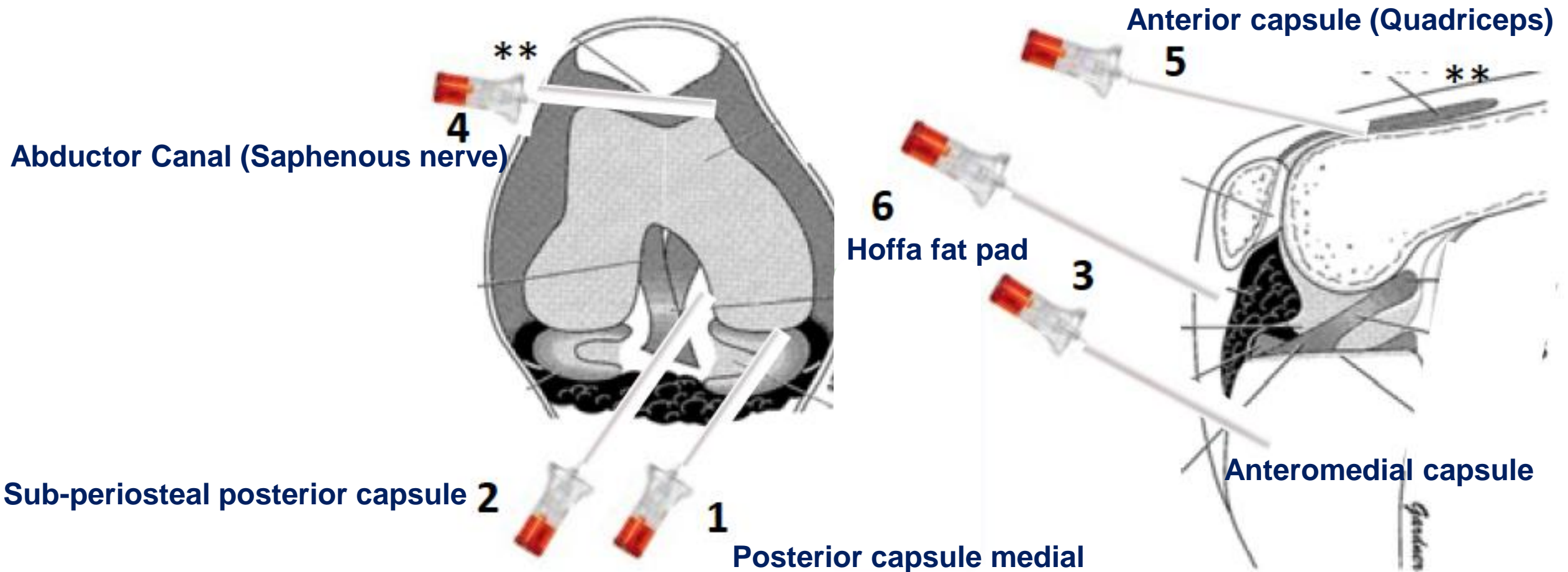
Yi S et al, Arch Orthop Trauma Surg 2014



1. No blood flow in the surgical site
2. No white blood cells, no antibiotic
3. More lactic acid and consequently Ph decrease
4. More favourable environment for pathogens

LIA

Ropivacaine 0.2%+ Adrenalin 0.5 mg + Ketorolac 90 mg: Total 120 ml



- 10-15 mg/kg 10' Preop.
- 10-15 mg/kg in 250 ml of Saline solution for the first 3hrs after surgery
- Intra-articular



- Absorbable suture
- Postop. continuous monitoring in Recovery Room for 6 hrs



Nielsen et al. JBJS Am. 2016: “The combined administration of IV and IA TXA resulted in a clinically relevant reduction in blood loss of 37% compared with IV TXA alone both at 24 hours postoperatively and on postoperative day 2.



6 hrs after surgery

- Drains removal
- Blood recovery (TKA)
- Advanced medication



70% of catheters are not useful



PAIN MANAGEMENT

Pre-emptive

LIA

Ketorolac 30 mg x 2 (D0-D1)

Dexamethasone 12 mg preop. + 8 mg D2

Rescue therapy





PAIN MANAGEMENT

Sawhney et al. Anesth. Analg. 2016: “Participants who received **AC + PI** reported significantly less pain on walking on PODs 1 and 2 compared with those who received **AC only** or **PI only**”.

Koh et al. J. Arthroplasty 2017: “There were no differences in pain levels between **ACB** and **FNB** during the entire study period. During the first 48 h after TKA, **more of the knees that received ACB could perform straight leg raising and knee extension with greater quadriceps strength compared with FNB.**”

Wall et al. BJJ 2017: “The periarticular group used less morphine in the first post-operative day compared with the femoral nerve block group (74%, 95% CI 55 to 99).”

REHABILITATION: PHASE 1-2

0 – 4 hrs. Postop.

- Passive ROM recovery of both legs
- Helps joint drainage
- Review of exercises



- Seated postural passage
- Light feeding
- **Quadriceps Test:**
 - Straight Leg Raise maintained
 - Leg extension

OK: Wake up and walk

NO: Electrostimulation

REHABILITATION: PHASE 3

Objectives:

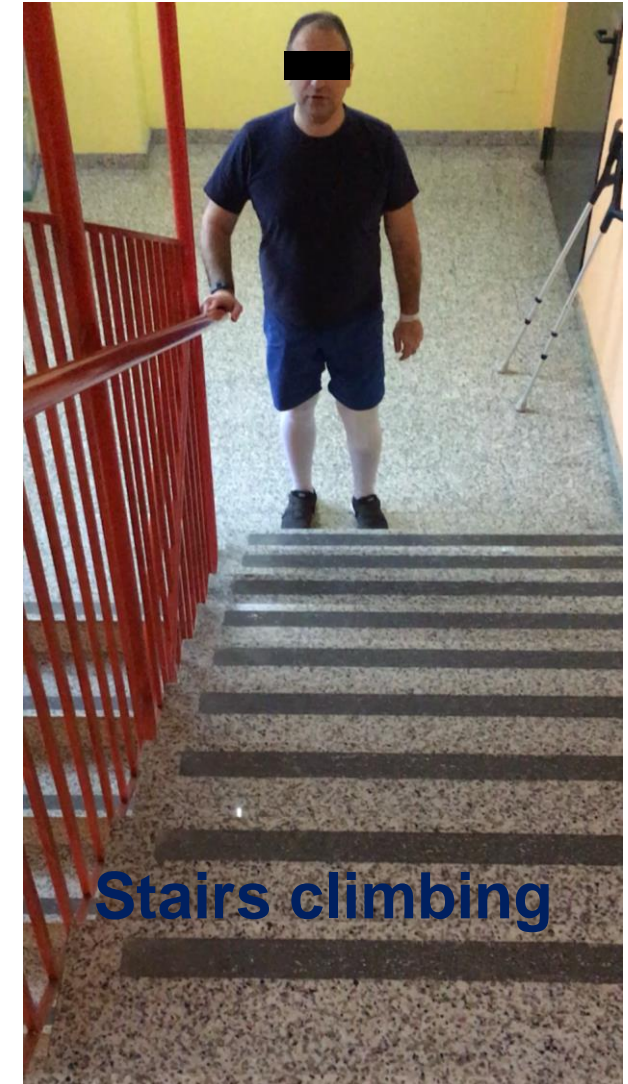
- ROM
- Strength
- Proprioception and Core stability
- Autonomy, full-weight bearing and walking

Main exercises:

- Squat
- Leg extension
- Triple extension



REHABILITATION: PHASE 3



DISCHARGING CRITERIA

Orthopaedics:

- X-Ray evidence of well-performed surgery
- No wound problems-secretions
- No distal haematoma extension >10 cm from the skin incision
- No intraarticular effusion



Clinical:

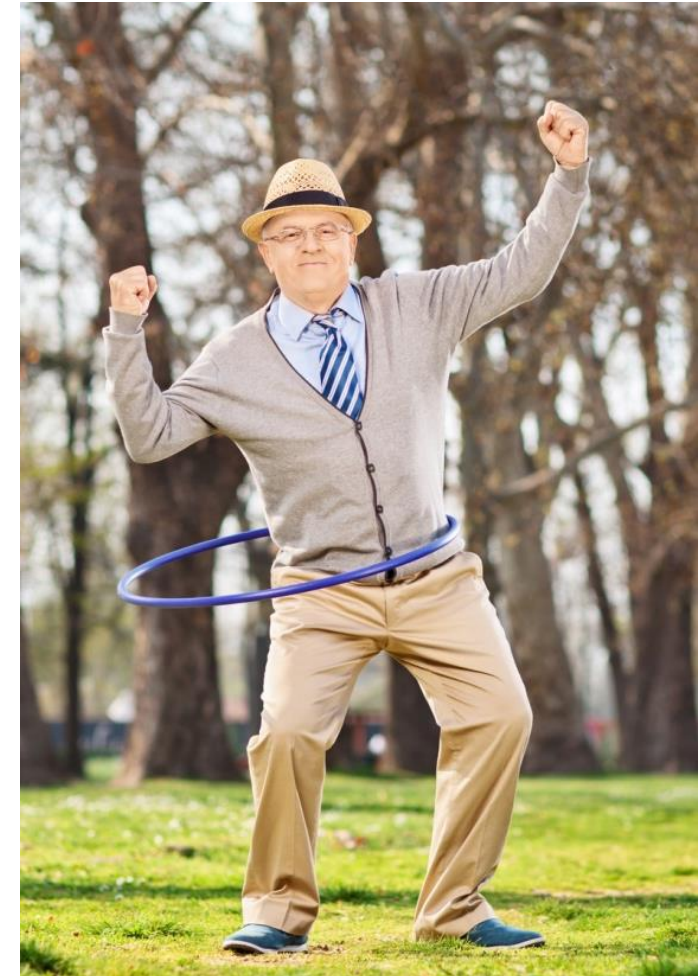
- Stable vital parameters (BP, CF, O2 sat not far >20% from normal)
- Body temperature <37 °C
- Stable Hgb (not <8 g/dl)



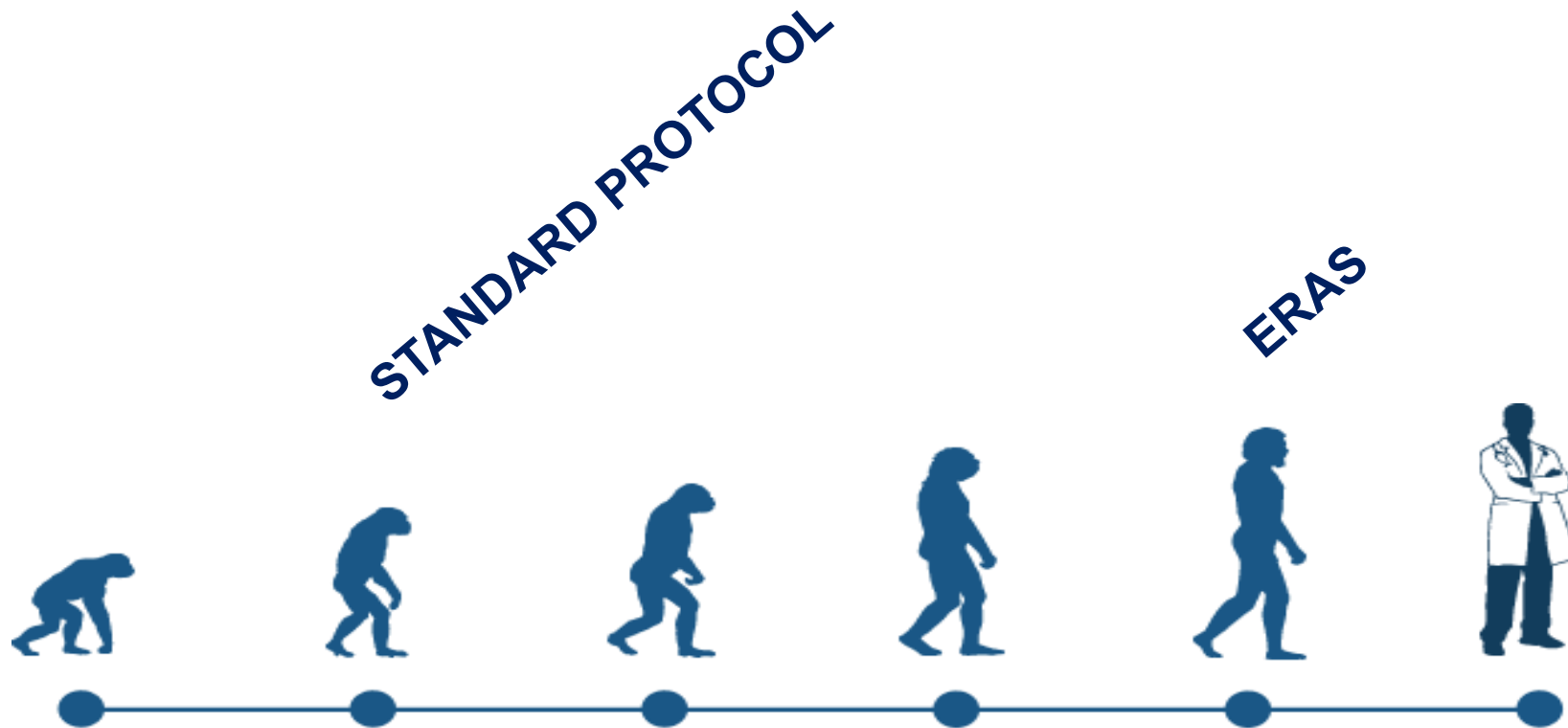
DISCHARGING CRITERIA

Physiotherapy:

- Autonomy in dressing, personal hygiene and personal care
- Ability to get on and off the bed independently
- Ability to sit and stand up from a chair / toilet
- Knee flexion = 90 °, full extension
- Ability to elevate the limb while keeping the knee extended
- Ability to walk with a single crutch
- Ability to control pain with oral pain medication

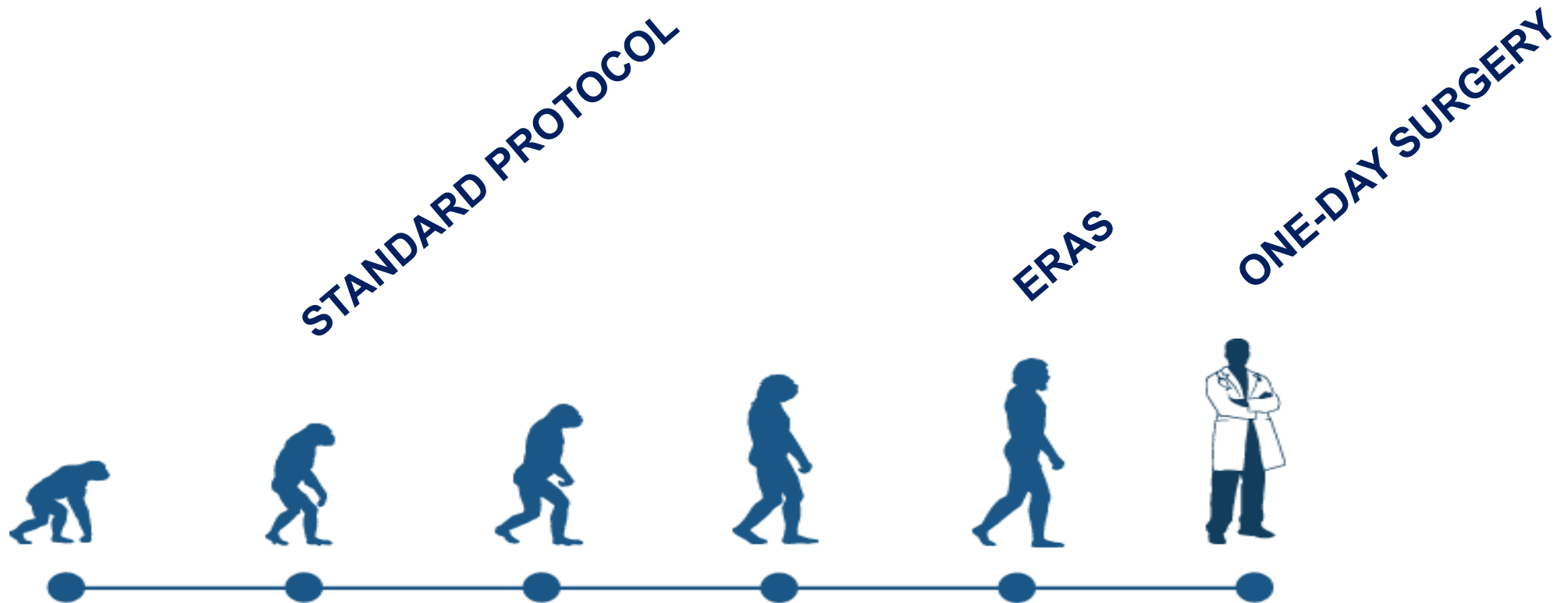


THE NEW CHALLENGE





THE NEW CHALLENGE





MATERIALS AND METHODS

- **Prospective comparative study**

Inclusion Criteria

- Lombardia region
- Social conditions
- Age : female ≤ 70 yrs, malei ≤ 75
- BMI < 30
- ASA I-III

Exclusion Criteria

- Revisions and fractures
- Anaemia
- Depression
- TAO/NAO



STUDY PROTOCOL

Short-acting anaesthesia
Hypotension
Cryotherapy
Celecoxib 200 mg 1 h preop



RIST TECHNIQUE

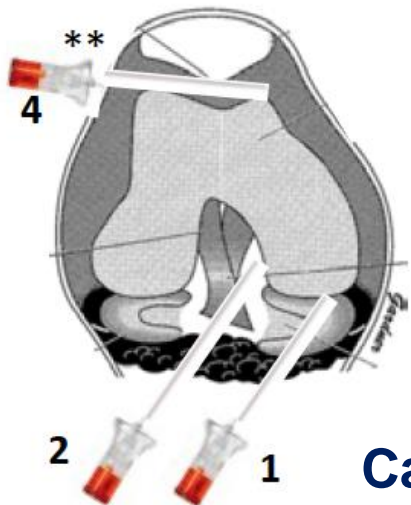
- Reduced Instrumentation Surgical Technique
 - Surgical time: <40 min for UKA
 - No tourniquet
 - Progressive gap balancing
 - Kinematical alignment UKA

STUDY PROTOCOL

LIA

Ropivacaine 0.2%+ Adrenalin 0.5 mg + Ketorolac 90 mg: Total
120 ml

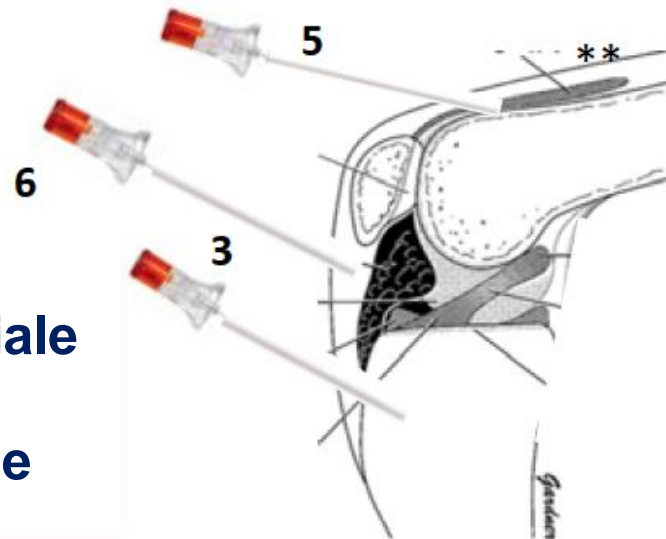
Sfondato sottoquadricepitale



Hoffa

Capsula anteromediale

Capsula posteromediale



- 10-15 mg/kg 10' Preop.
- 10-15 mg/kg in 250 ml
- Intra-articular





STUDY PROTOCOL

- Ketorolac 30 mg x 2 (D0-D1)
- Dexamethasone 12 mg preop. + 8 mg D

6 hrs after surgery

- Drains removal
- Medication





RESULTS

| | GROUP A (one day) (n=11) | GROUP B (ERAS) (n=11) |
|------------------------|-----------------------------|--------------------------|
| AGE | 63 \pm 5,9 | 63,7 \pm 7,5 |
| SEX M (%) F(%) | 6 (54,5) 5 (45,5) | 7 (63,6) 4 (36,3) |
| BMI, kg/m ² | 25,9 \pm 3 | 26,5 \pm 2 |
| ASA I (%) II (%) | 4 (36,3) 7 (63,6) | 4 (36,3) 7 (63,6) |



RESULTS

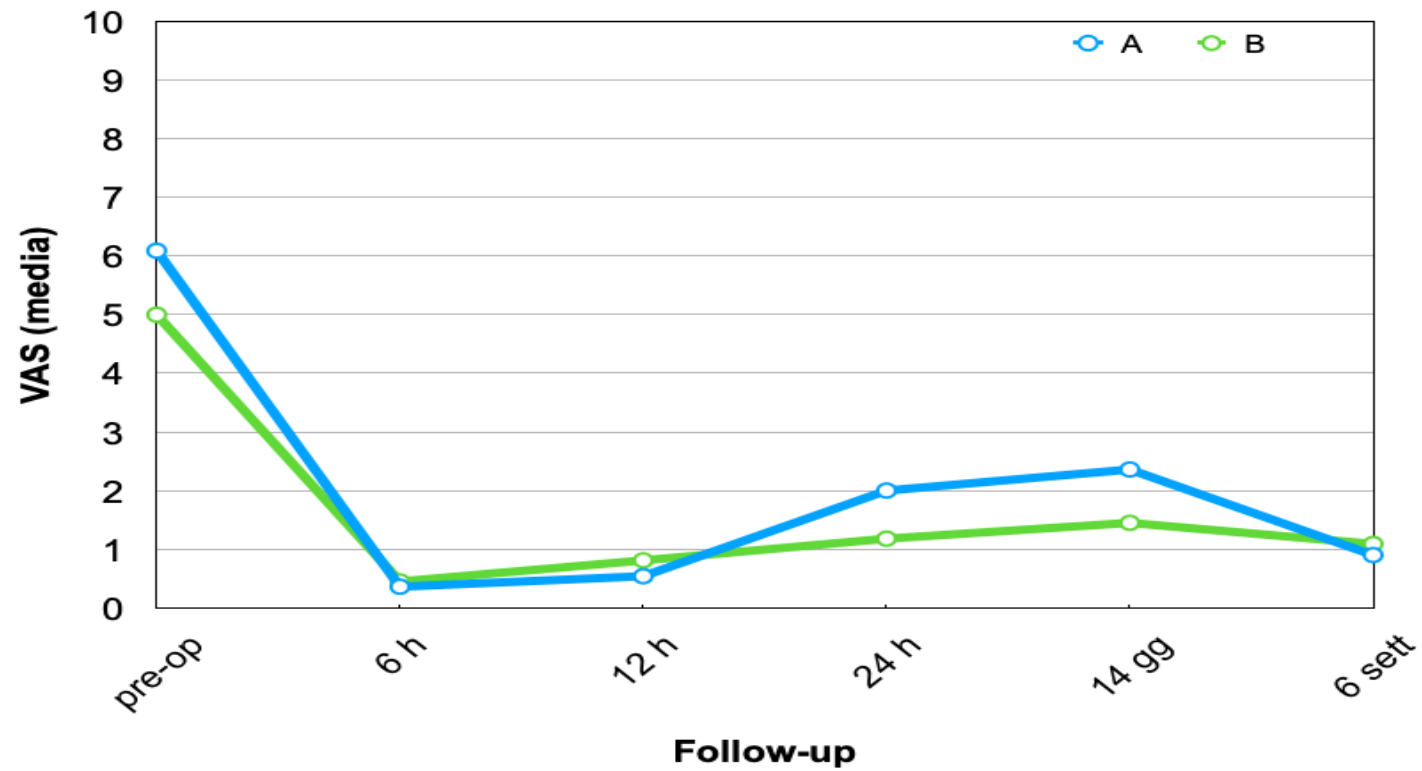
COMPLICATIONS

- Early infection (E. Cloacae) in one patient of group A
- Early infection (SARS-COV II) in one patient of group B

- Resolution delay of abductor canal block in one patient of group A

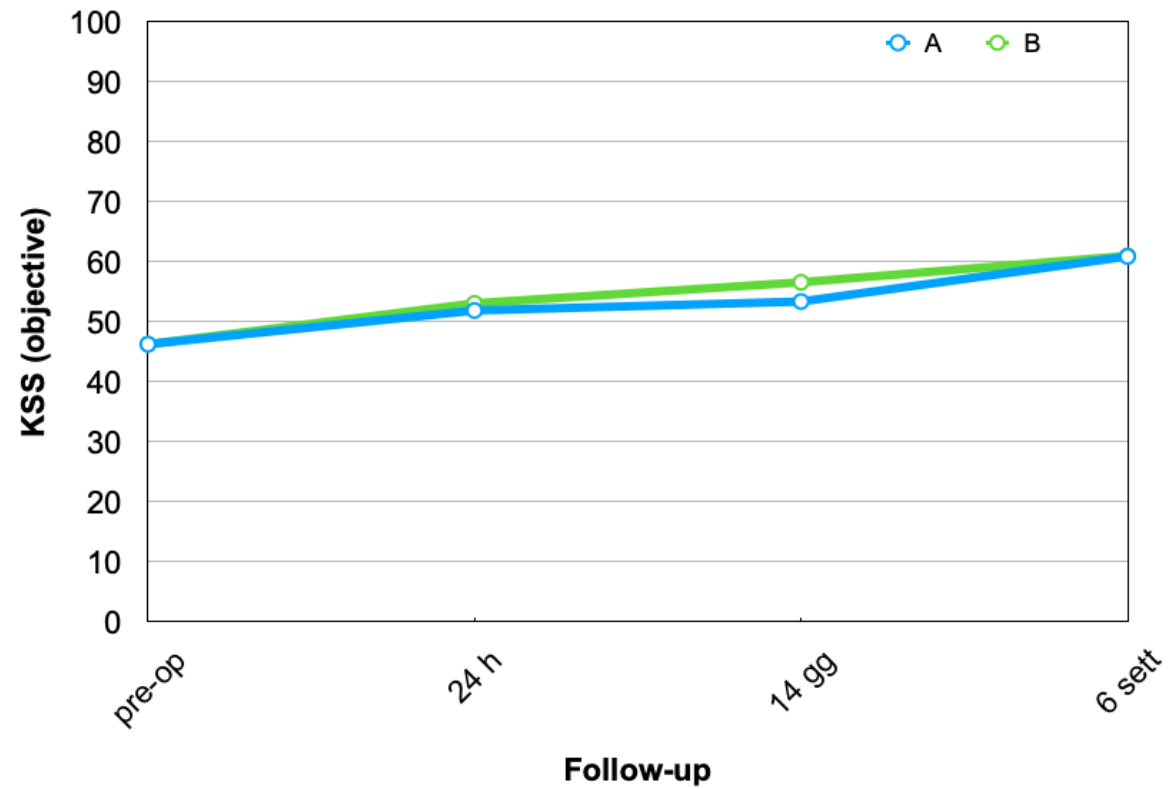


VAS



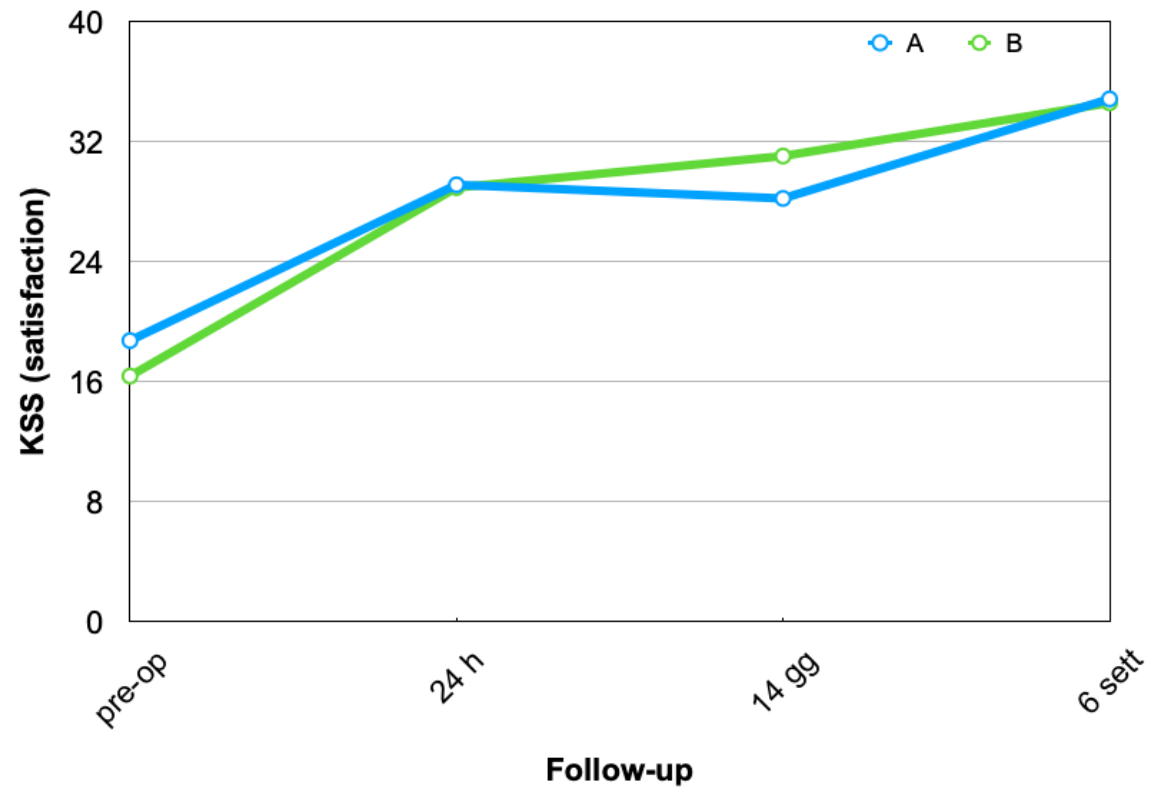


KSS



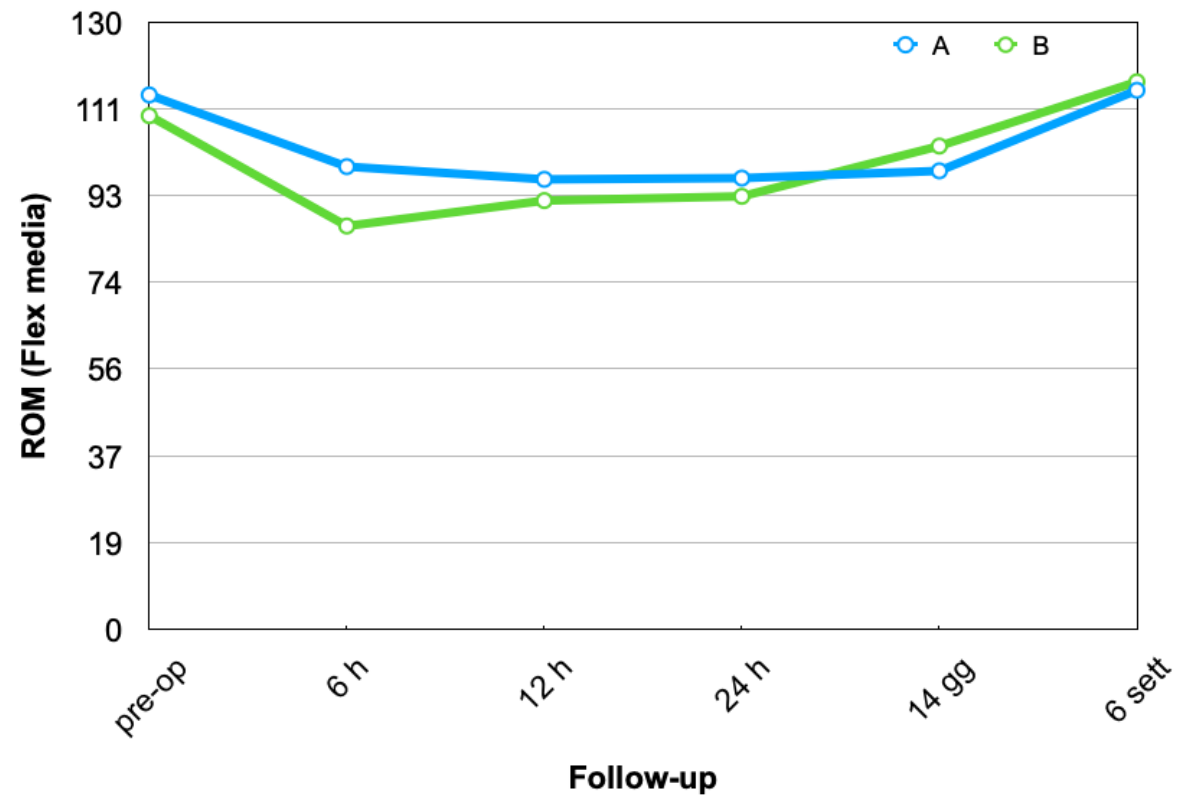


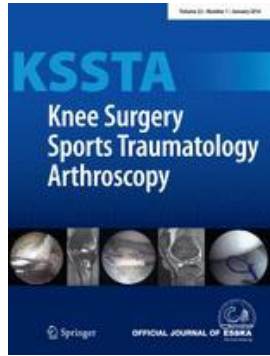
KSS





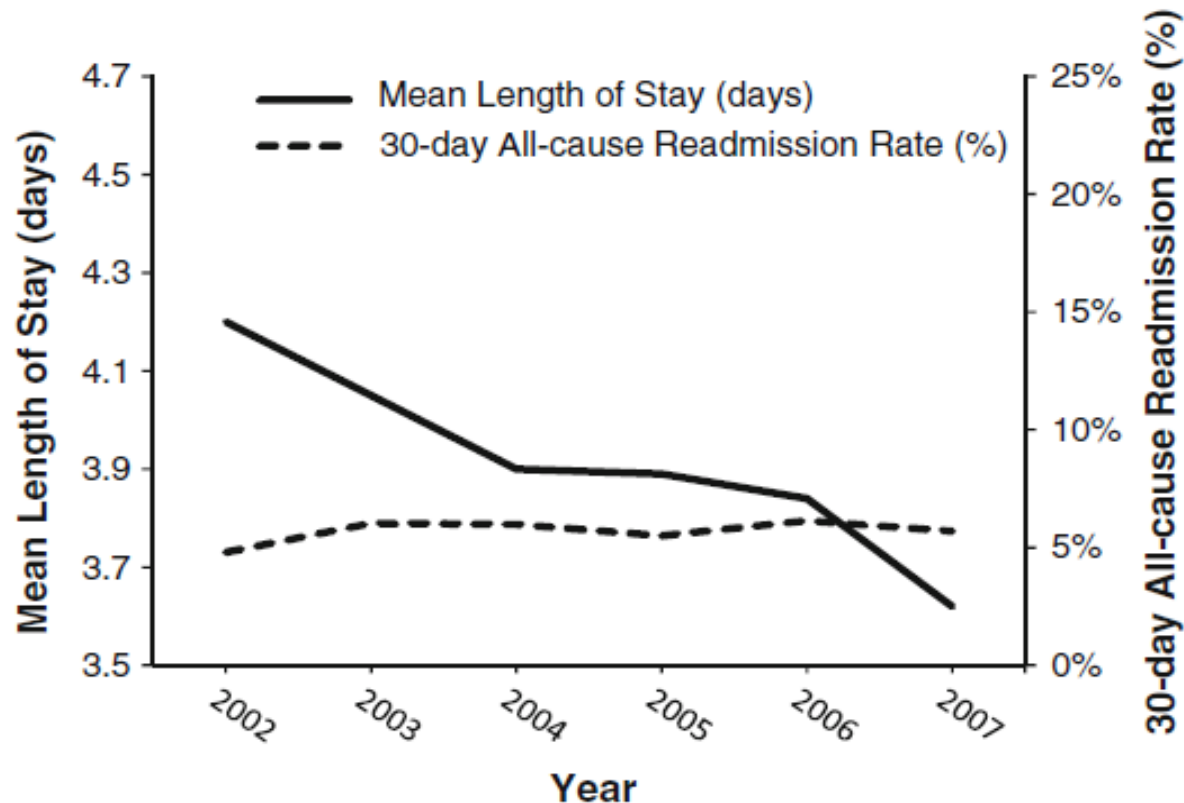
ROM





Outpatient surgery for unicompartmental knee arthroplasty is effective and safe

Nanne P. Kort¹ · Yoeri F. L. Bemelmans¹ · Martijn G. M. Schotanus¹



Decreased length stay: 1,5 to 6,2 days
Decreased cost: 764 to 7'375\$

Same Re-admission rate
Implementation of clinical pathway

Length of Hospitalization After Joint Arthroplasty: Does Early Discharge Affect Complications and Readmission Rates?

Jesse E. Otero, MD, PhD^{*}, J. Joseph Gholson, MD, Andrew J. Pugely, MD, Yubo Gao, PhD, Nicholas A. Bedard, MD, John J. Callaghan, MD

Department of Orthopaedic Surgery and Rehabilitation, University of Iowa Hospitals and Clinics, Iowa City, IA

Table 15
Risk Factors for 30-D Complication Including Readmission After UKA.

| Independent Variable | Complication or Readmission Adjusted Odds Ratio (95% CI) |
|-------------------------|---|
| Age >80 vs <50 | 1.6 (0.4-5.7) |
| Age 70-80 vs <50 | 1.2 (0.4-3.6) |
| Age 60-70 vs <50 | 1.0 (0.4-2.8) |
| Age 50-60 vs <50 | 0.7 (0.2-2.2) |
| Male vs female | 1.6 (0.9-2.9) |
| Black vs white | 0.8 (0.2-2.8) |
| Other vs white | 1.0 (0.5-1.9) |
| BMI >30 vs ≤30 | 1.2 (0.7-2.1) |
| Diabetes | 1.3 (0.7-2.5) |
| Smoking | 2.1 (1.0-4.3) |
| COPD | 1.9 (0.7-5.2) |
| Steroid use | 1.8 (0.4-8.5) |
| Bleeding disorder | 1.3 (0.3-5.6) |
| Hct ≤36 vs >36 | 2.0 (0.9-4.4) |
| Creatinine ≥1.2 | 0.6 (0.1-1.3) |
| ASA class 3 or 4 | 1.2 (0.7-2.2) |
| Operative time >120 min | 0.9 (0.4-2.1) |
| POD 0 vs POD 1 | 2.3 (0.8-6.8) |
| POD 2 vs POD 1 | 1.1 (0.5-2.4) |
| POD 3 vs POD 1 | 1.3 (0.6-3.1) |
| POD 4+ vs POD 1 | 4.3 (1.8-10.5) |

UKA, unicompartmental knee arthroplasty; CI, confidence interval; BMI, body mass index; COPD, chronic obstructive pulmonary disease; CAD, coronary artery disease; WBC, white blood cell; Hct, hematocrit; ASA, American Society of Anesthesiologists; POD, postoperative day.

Bold text represents a significant independent risk factor.

Criteria related to bad outcome:

- Age
- Smoking
- Bleeding disorders
- ASA III or IV



Selection of patients

Education

Management of co-morbidities



TO KEEP IN MIND

- **Cross & Berger (2014 Int. Orth): Readm. 1% (Infection)**

1% (Infection)

- **Gondusky et al. (2014 J. Arthroplasty):**

1% (Reoperation); 0.6% (haematoma); 0.6% (wound drainage)

- **Kort et al. (2014 KSSTA):**

Readm. 5%(manipulation under anaesthesia); Prolonged HS: 15% (fear to go home)



CONCLUSIONS

Rapid recovery protocol is safe and effective in Knee Arthroplasty

Reduced costs for Institutions

Improved quality of care

Necessity of accurate patients selection

Crucial: teamwork with anaesthesiologists, nurses, physiotherapists

The new challenge is outpatient surgery

Italian National Healthcare system not cutting edge as European Northern countries

Necessity of home nurses and physiotherapists

Frequent: private physiotherapists

Remember: “fear to go home syndrome” exists

Remember: be ready to manage readmissions and complications

**Qualità ed appropriatezza
Better and Faster**



**16-17
Settembre
2021**

THANKS FOR YOUR ATTENTION