SSSR
Swiss Society of
Musculoskeletal Radiology

Knee Prosthesis Models & Materials, Surgical Techniques and Approaches

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INTRODUCTION

VARUS

VALGUS

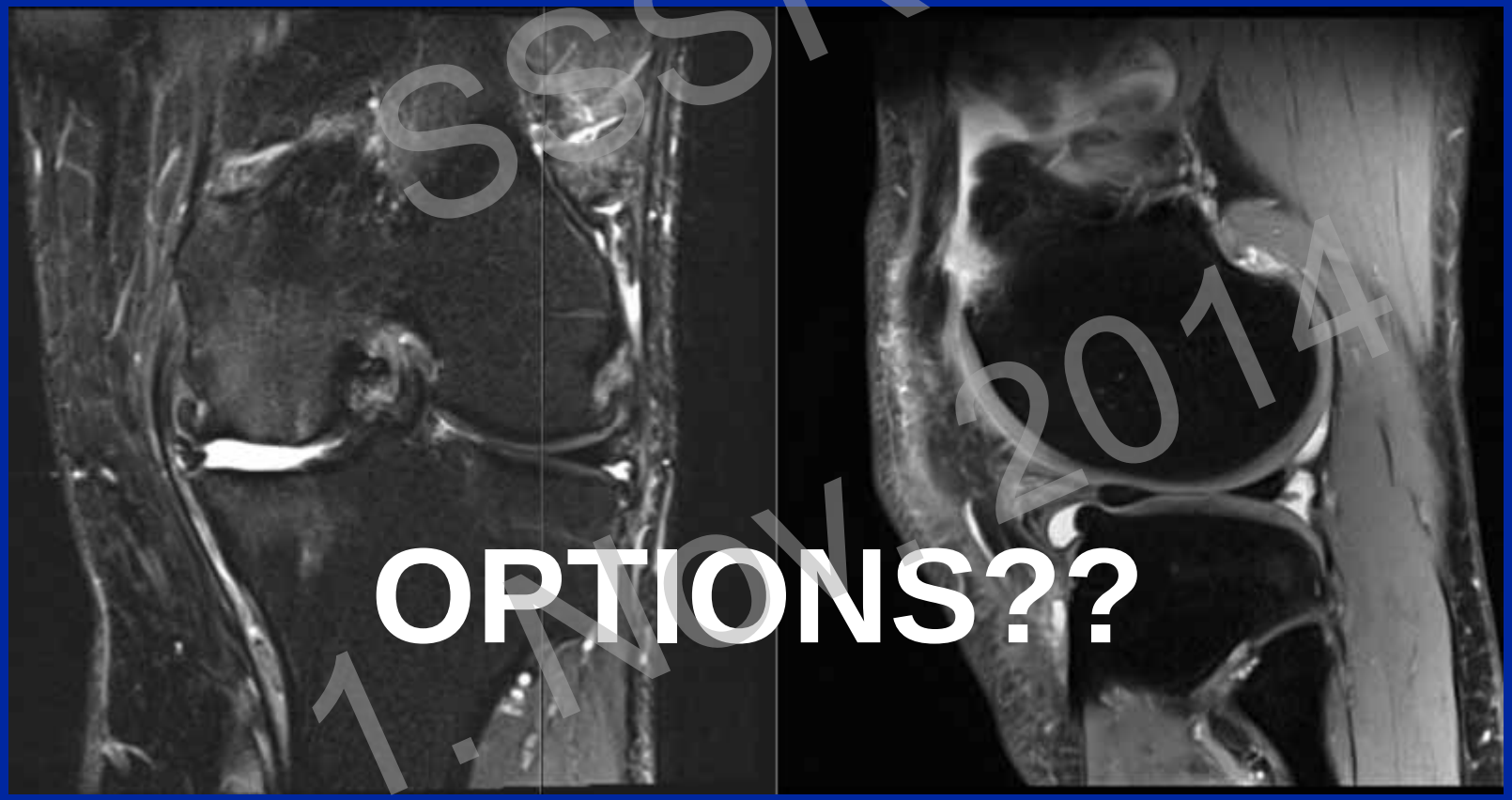
46 Y OLD MALE

Pain in the medial compartment left more than right

- **Status post 2 times partial medial meniscectomy**
- **Varus of 11 °**
- **Medial unicompartmental osteoarthritis**

46 Y OLD MALE

MRI for evaluation of the lateral and patellofemoral compartment



OPTIONS??

46 Y OLD MALE

Conservativ:
- Lateral shoesole raise
- Corticosteroid Infiltration

Operativ:
- High tibial open wedge valgus osteotomy
- ~~Unicompartmental knee prosthesis~~

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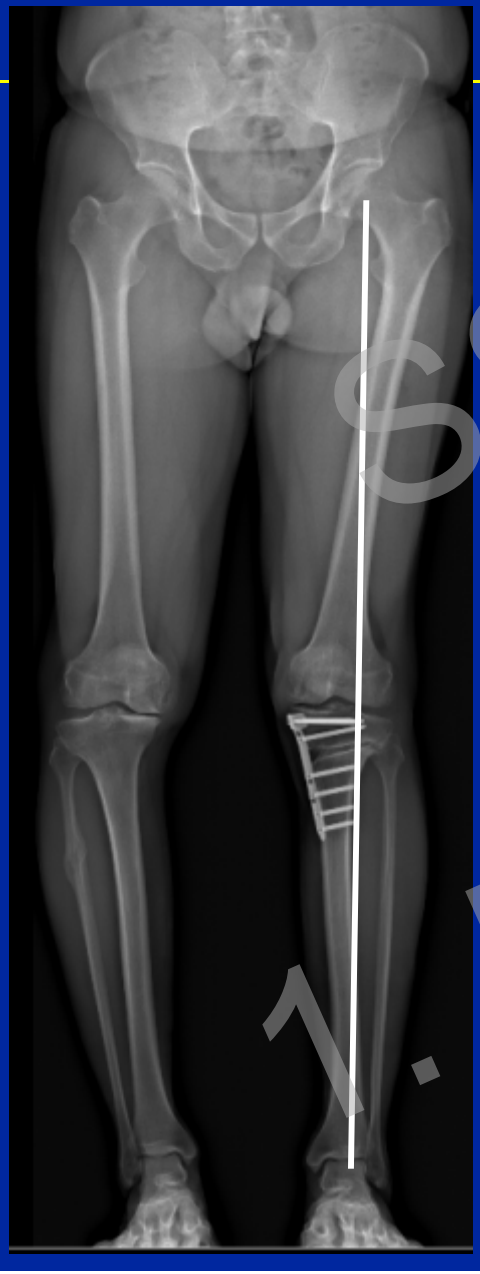
46 Y OLD MALE



Medial unicompartmental Osteoarthritis

Young and active, good lateral and patellofemoral compartment

- High tibial open wedge valgus osteotomy

Titanium

Locking Plate

(Tomofix)

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63 Y OLD MALE

Pain in the medial compartment both knees

- **Varus left: 9 ° right: 7 °**
- **Medial unicompartmental osteoarthritis**

63 Y OLD MALE

- Medial compartment Osteoarthritis
- Middle aged
- Good lateral

and patellofemoral compartment

- Intact anterior cruciate ligament

63 Y OLD MALE

Conservativ:
- **Lateral shoesole raise**
- **Corticosteroid Infiltration**

Operativ:
- **High tibial open wedge valgus osteotomy**
- **Unicompartmental knee prosthesis**

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63 Y OLD MALE

Unicompartmental medial knee prosthesis

Approach:
Standard
anteromedial

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UNICOMPARTMENTAL KNEE PROSTHESIS

Ideal Patient:* **

- Over 60 y
- Low demand
- Under 80 kg
- Full extension
- 90 degrees flexion
- < 10 ° varus and
- < 15 ° valgus

* Pearse AJ et al. JBJS Br 2009
** Berger RA et al. JBJS 2005

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UNICOMPARTMENTAL KNEE PROSTHESIS

TABLE 7. Published Series of Unicompartmental Knee Arthroplasties

Year	Authors	Compartment	Prosthesis	Number	10-Year Revision Rate (percent) (95% CI)	15-Year Revision Rate (percent) (95% CI)
1992	Capra & Fehring[7]	Medial/Lateral	Marmor	52	94 (?)	—
1993	Heck et al[15]	Medial/Lateral	Marmor	294	91 (86–97)	—
1996	Cartier et al[10]	Medial/Lateral	Marmor	207	93 (81–100)	—
1998	Tabor & Tabor[40]	Medial/Lateral	Marmor	67	84 (?)	79 (?)
1999	Squire et al[39]	Medial/Lateral	Marmor	140	89 (84–95)	87 (78–95)
1994	Knutson et al[17]	Medial	Marmor	2354	92 (89–94)	—
2002	Lidgren[24]	Medial	Marmor	1923	86 (76–88)	—
1991	Neider[29]	Medial	St. Georg	548	80 (?)	—
1994	Weale & Newman[44]	Medial	St. Georg	42	90 (?)	88 (?)
1997	Ansari et al[2]	Medial	St. Georg	461	87 (81–93)	—
1994	Knutson et al[17]	Medial	St. Georg	1345	89 (82–92)	—
2002	Lidgren[24]	Medial/Lateral	St. Georg	396	94 (84–97)*	—
1998	Murray et al[28]	Medial	Oxford	144	98 (93–100)	—
2000	Kumar & Fiddian[19]	Medial	Oxford	100	85 (?)	—
2002	Lidgren[24]	Medial	Oxford	749	86 (76–89)	—
1991	Scott et al[38]	Medial/Lateral	Brigham	100	85 (67–99)	—
2002	Lidgren[24]	Medial/Lateral	Brigham	978	90 (76–90)*	—
1998	Hasegawa et al[14]	Medial	PCA	77	88 (?)	—
2002	Lidgren[24]	Medial/Lateral	PCA	135	70 (55–78)	—
1998	Bert[5]	Medial	MBUKA	100	87 (?)	—
1999	Berger et al[4]	Medial/Lateral	Miller-Galante	62	98 (96–100)	—
2002	Argenson et al[3]	Medial	Miller-Galante	160	94 (91–97)	—
2002	Lidgren[24]	Medial/Lateral	Endo-Link	4784	91 (83–93)	—

*9-year survival

* Australian Orthopaedic Association National Joint Replacement Registry 2010 Annual Report. Table KP29. Page 102.
** Price AJ et al. CORR, 2005

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UNICOMPARTMENTAL KNEE PROSTHESIS

SUMMARY:

- Only medial or lateral compartment osteoarthritis
- Stable ligaments
- Shorter rehab than with total knee arthroplasty (TKA)
- Osteoarthritis can go on -> revision to TKA*
- Not for younger active patients (revisionrate 19% in patients under 55y after 7 years)
- Results of TKA after Uni worse **

Berger RA et al. JBJS 2005
** Pearse AJ et al. JBJS Br 2009

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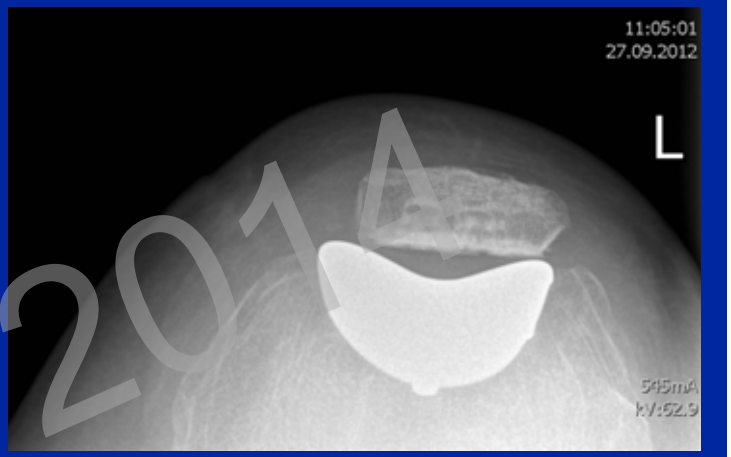
PATELLOFEMORAL JOINT PROSTHESIS

PATELLOFEMORAL JOINT PROSTHESIS

- High revision rate
- Rare indication
- Results lately better



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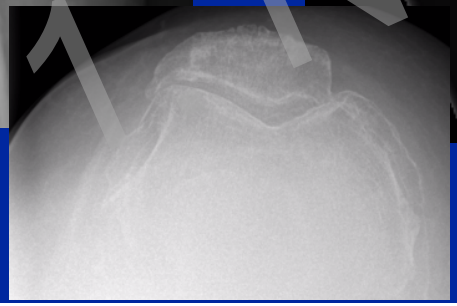
82 Y FEMALE



SURGICAL APPROACH FOR TOTAL KNEE ARTHROPLASTY (TKA)

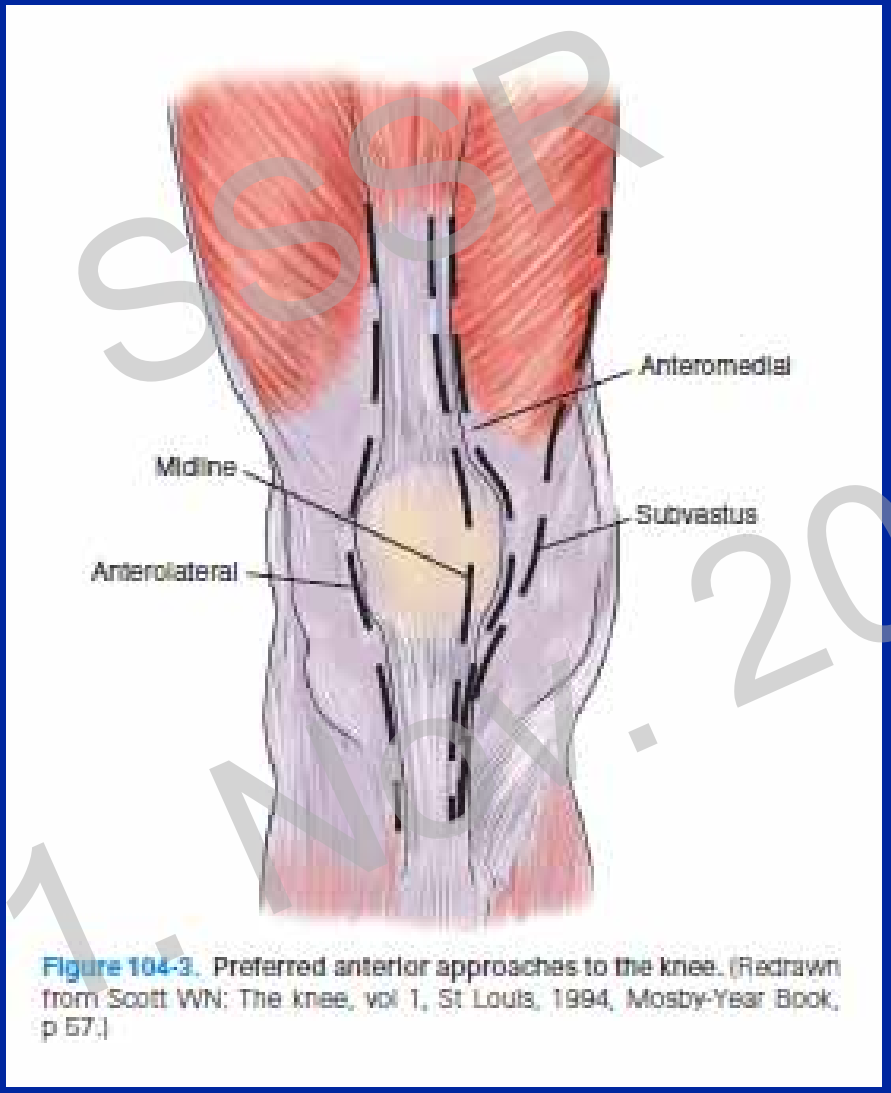


Figure 104-3. Preferred anterior approaches to the knee. (Redrawn from Scott WN: The knee, vol 1, St Louis, 1994, Mosby-Year Book, p 57.)

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PERSONALIZED CUTTING BLOCKS

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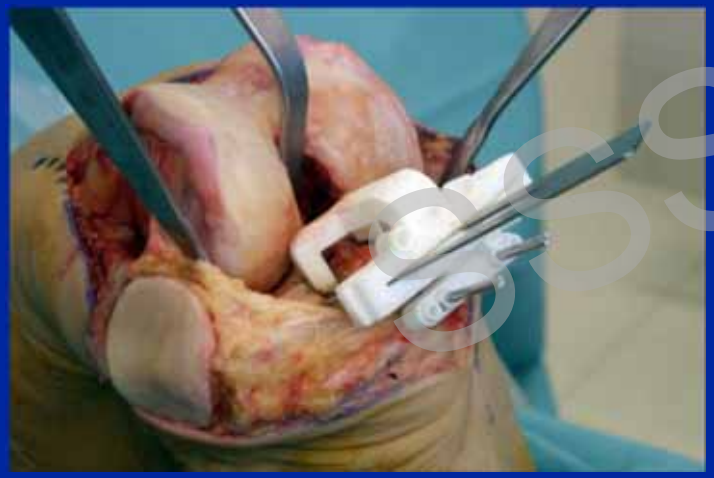
PERSONALIZED CUTTING BLOCKS



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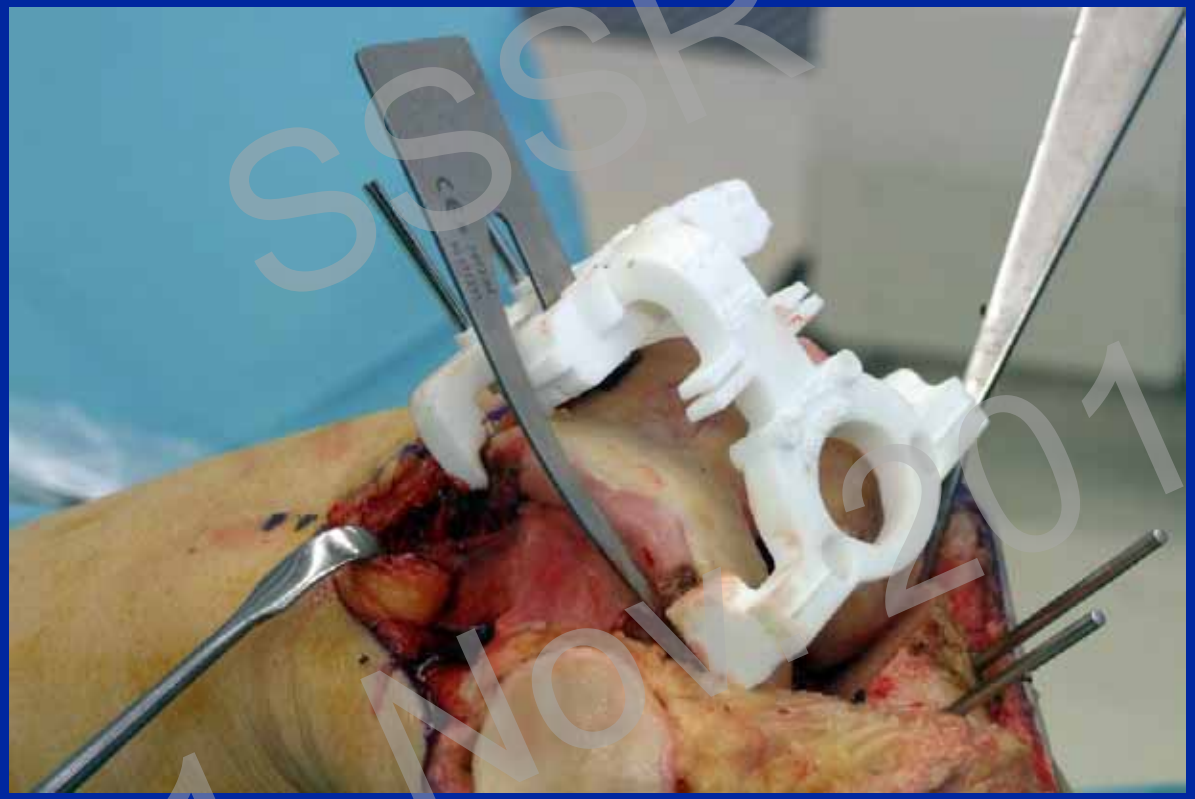
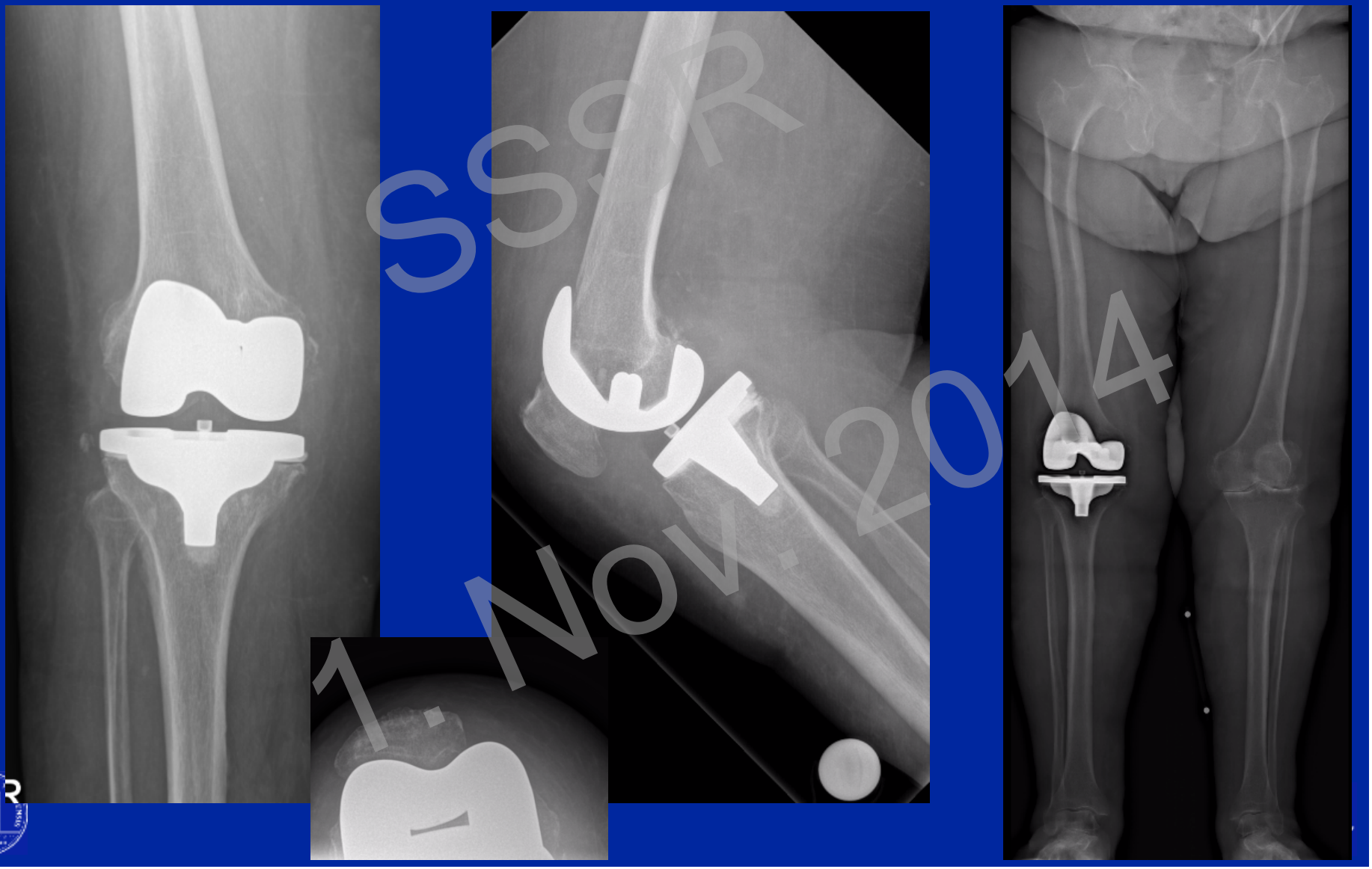


PERSONALIZED CUTTING BLOCKS

82 Y FEMALE



83 Y MALE

COMPUTER ASSISTED SURGERY

Intraoperative pictures of computer navigation.

An imageless computer navigation systemshowing the computer screen and infrared camera.

Pointer for anatomic registration points

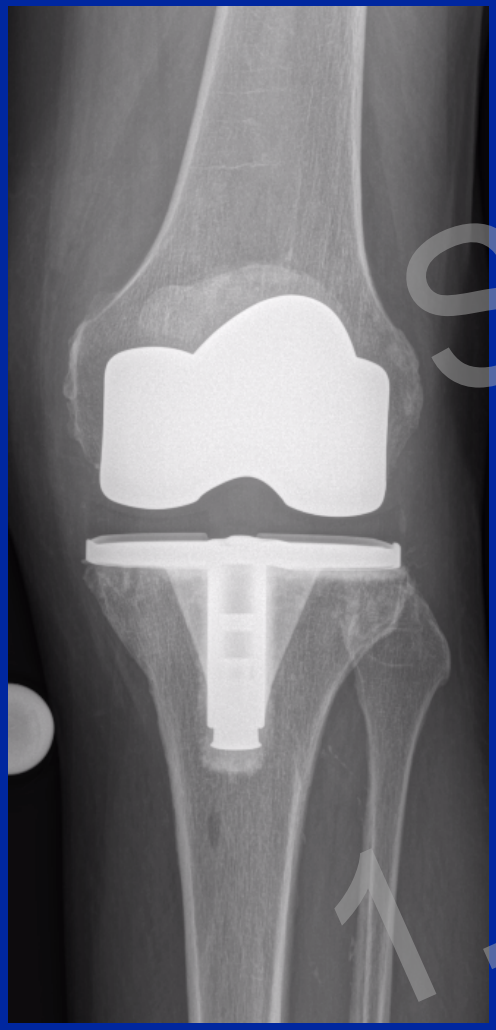
TOTAL KNEE ARTHROPLASTY

Intraoperative pictures of computer navigation using .....

Femoral cutting block with navigator

Validation of femoral cut with tracker

83 Y MALE



TOTAL KNEE ARTHROPLASTY

Conventionel Technique:	**standard**
Computer-navigation:	**preciser (less outliers)**
Individuel patient-specific technique:	**even preciser***

* MacDessi SJ et al. The Knee, 2014

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MATERIAL

Femur component (usually cemented)
(cobalt-chrome-molybdenum stainless steel)

Ultra highly crosslinked Polyethylen Inlay

Tibia component (always cemented)

(cobalt-chrome-molybdenum stainless steel)

TOTAL KNEE ARTHROPLASTY (TKA)

I. DESIGN CATEGORIES

A. Designs are categorized based upon an increasing level of mechanical constraint in knee system.

1. Least constrained
   - Cruciate-retaining TKA—keep PCL
   - Cruciate-sacrificing TKA
   - Both used for straightforward primary TKA
2. Constrained
   - Constrained nonhinge TKA
   - Used for complex primary or revision TKA
3. Highly constrained
   - Hinge TKA
   - Used for complex revision TKA

Miller MD et al. Review of Orthopaedics, 2012

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TYPES OF PRIMARY TOTAL KNEE ARTHROPLASTY

Cruciate retai **acrificing**

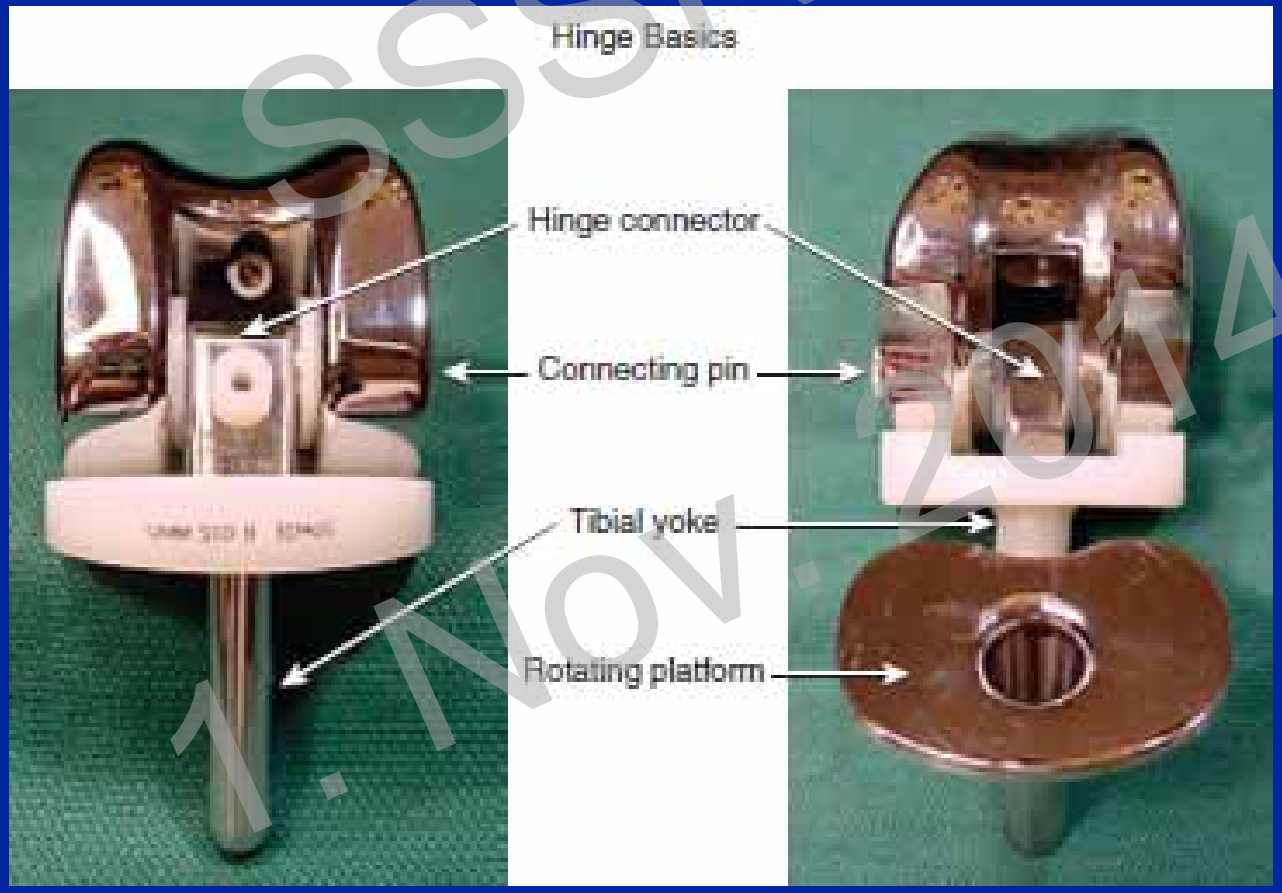
Anterior stabilized

TYPES OF PRIMARY TOTAL KNEE ARTHROPLASTY

Semiconstrained TKA

TYPES OF PRIMARY TOTAL KNEE ARTHROPLASTY

Highly constrained TKA



TOTAL KNEE ARTHROPLASTY

Patella resurfacing ?

TOTAL KNEE ARTHROPLASTY

- Less range of motion

- Limited activity

- Pain

- Survivalship

10-20%!!!

Unknown reason !

TOTAL KNEE ARTHROPLASTY COMPLICATIONS

Survival of the prosthesis:

after 5 y	95%!!!
after 10 y	91%
after 15 y	84%
after 20 y	78%

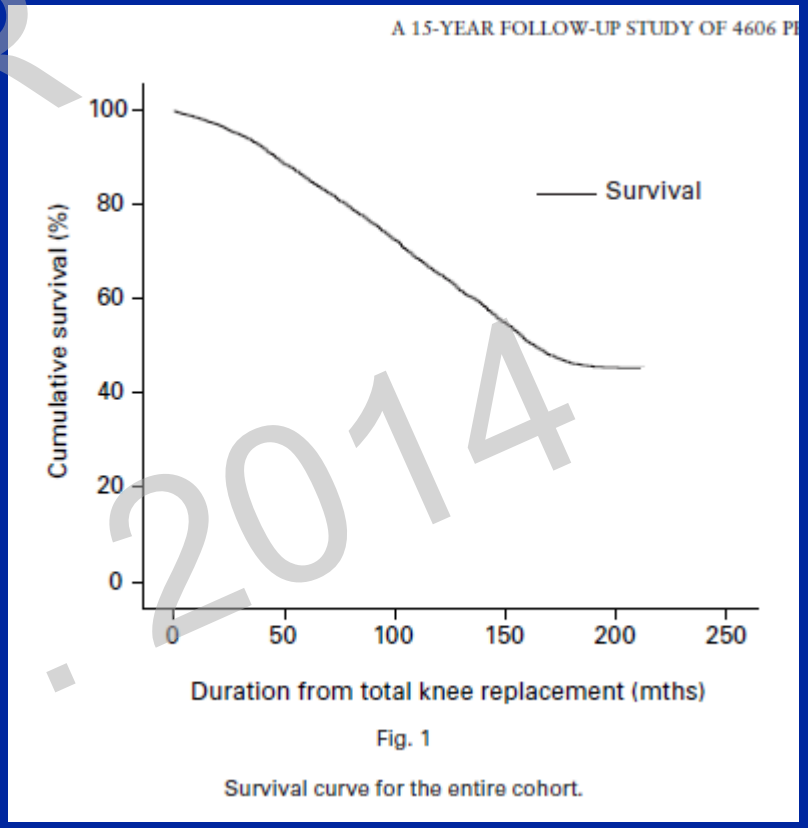


Fig. 1

Survival curve for the entire cohort.

Roberts VI et al. JBJS Br, 2007

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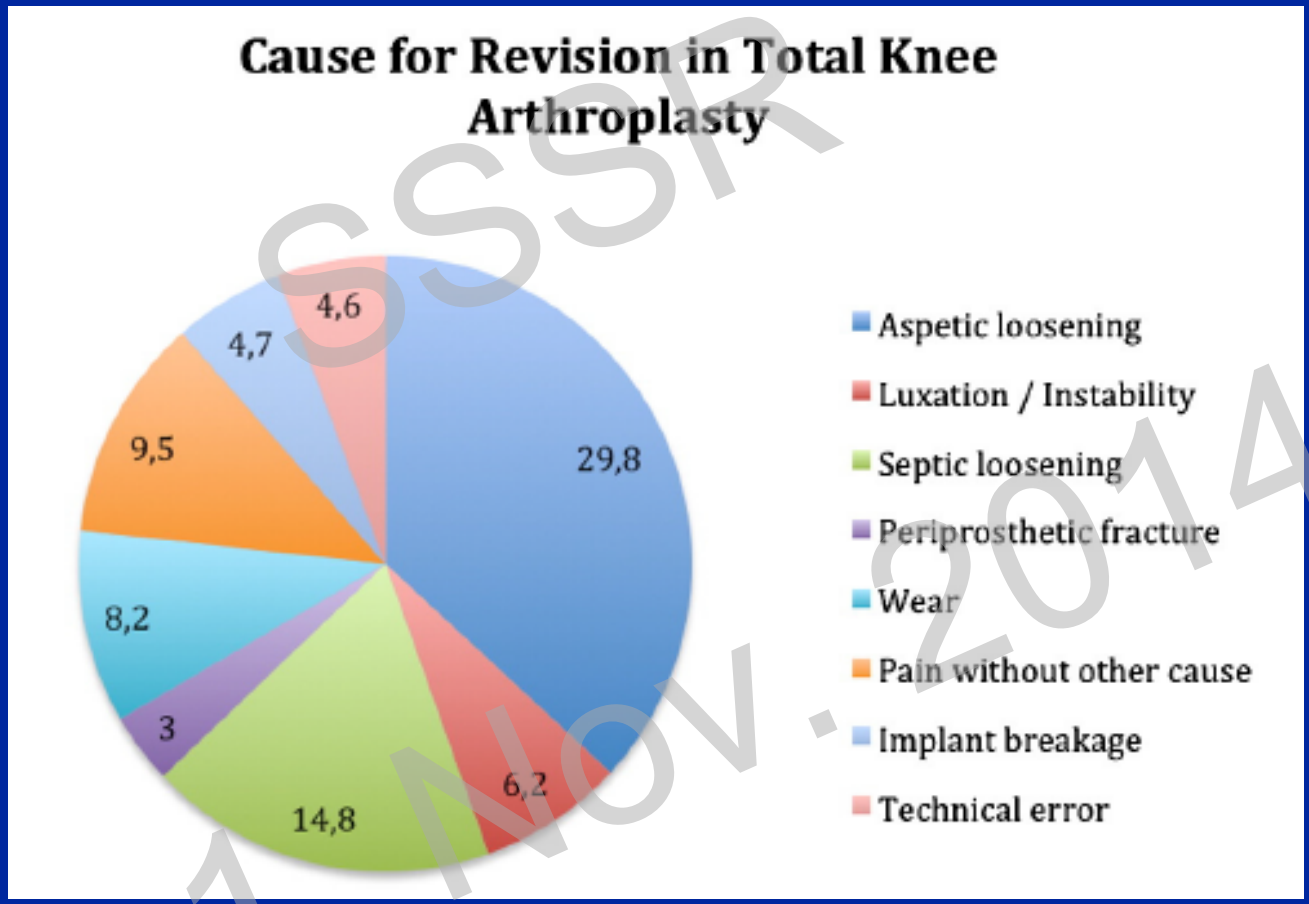
TOTAL KNEE ARTHROPLASTY COMPLICATIONS



Sadoghi P et al. Journal of Arthroplasty, 2013

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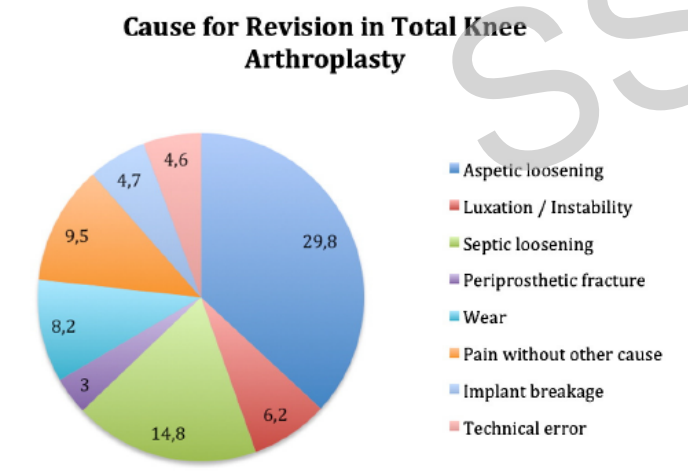
TOTAL KNEE ARTHROPLASTY COMPLICATIONS



Painful TKA: Rule out….

- **Infection**
- **Instability**
- **Loosening**
- **Implant malposition**

Sadoghi P et al. Journal of Arthroplasty, 2013

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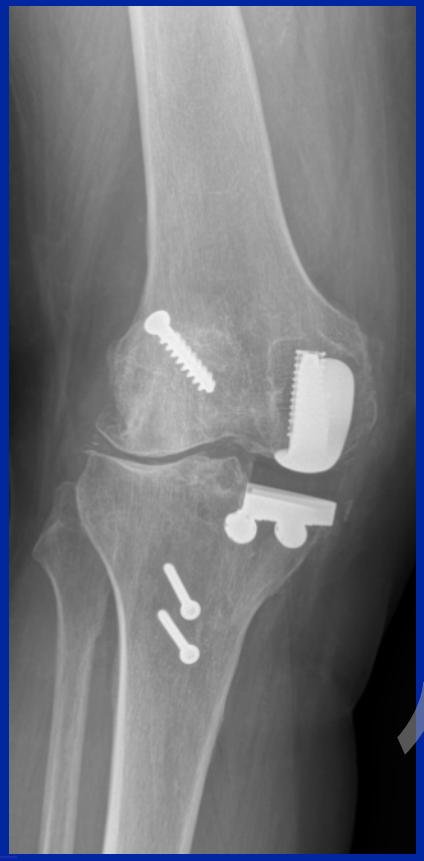
REVISION PROSTHESIS

Revision prosthesis

Resultats worse than primary total knee arthroplasty

UNICOMPARTMENTAL KNEE PROSTHESIS

66 y old female: status post acl reconstruction, tuberositas osteotomy and unicompartmental medial kneeprosthesis 16 years ago with aseptic loosening



REVISION

Revision with RT plus Solution knee prosthesis (highly constrained = rotating hinge)

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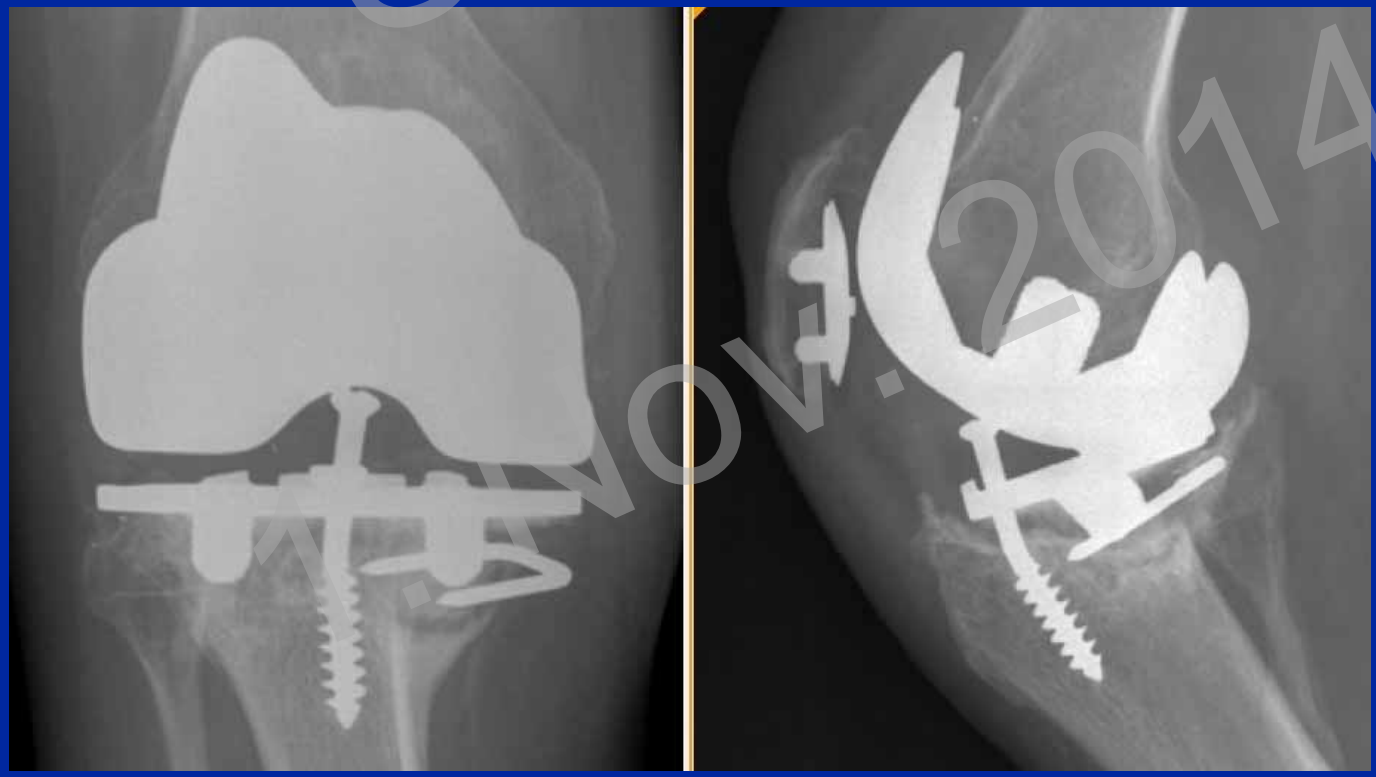
77 Y MALE

Aseptic loosening of a primary knee prosthesis 12 years ago
Loosened screw causing massive …..

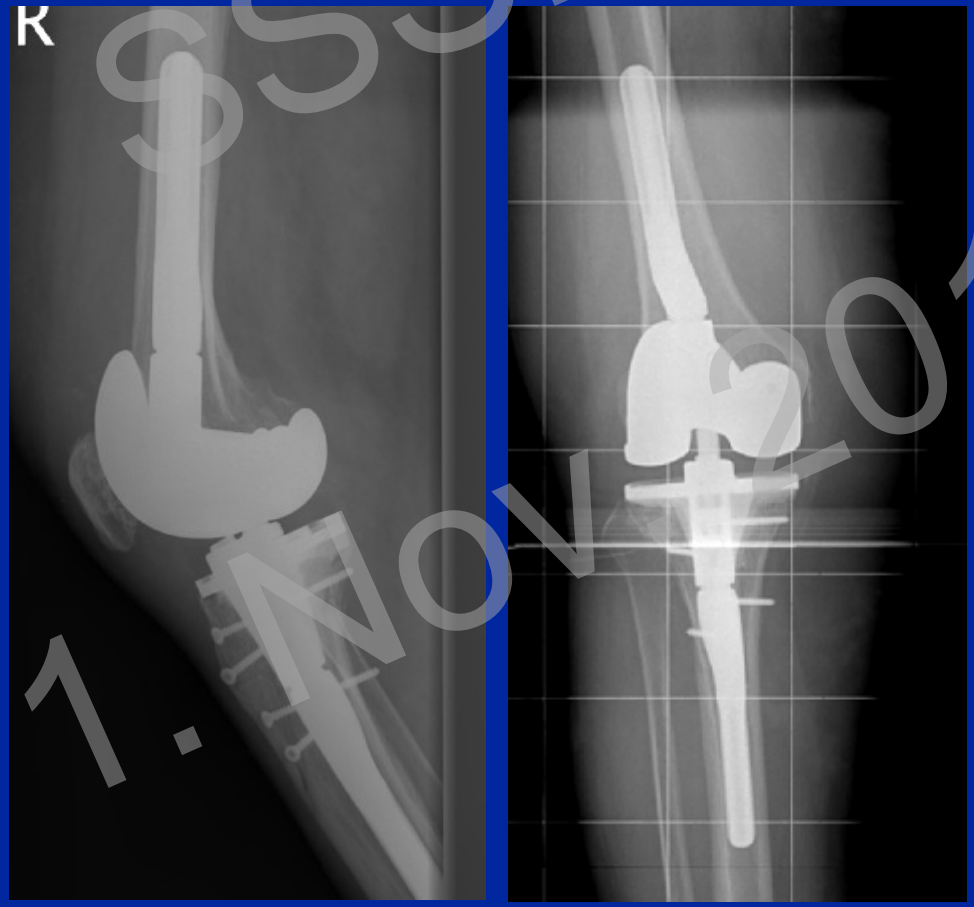


77 Y MALE

Metallosis

77 Y MALE

Revision with a highly constrained (rotating hinge) LINK knee prosthesis



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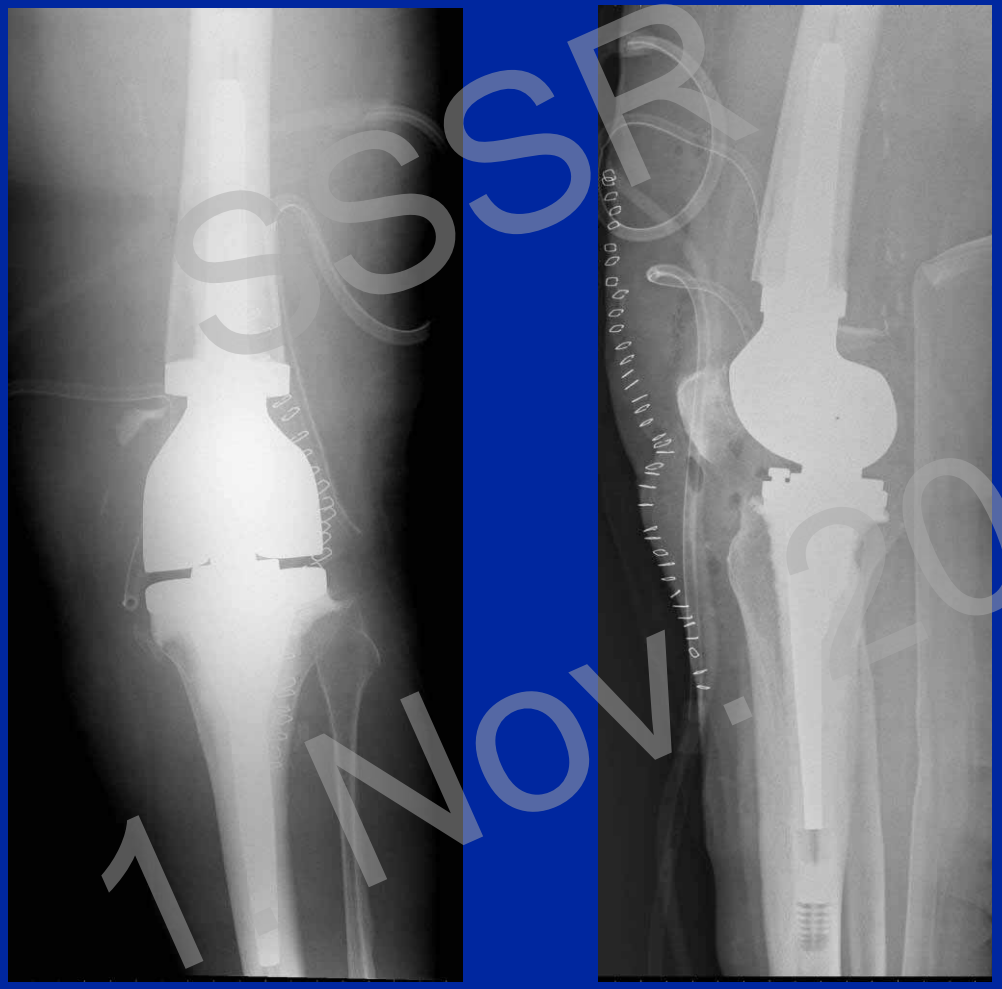
81 Y FEMALE

81 Y FEMALE

76 Y MALE

76 Y MALE



74 Y FEMALE

74 Y FEMALE
REVISION BECAUSE OF INSTABILITY

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REVISION - ARTHRODESIS

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THANK YOU

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