The stiff knee after TKA

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EKA
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DEFINITION

One of the most common complications following TKR

The definition has changed over time:

- **1990 Nicholls and Dorr: FLEXION <45°**
- **2002 Christensen: FLEXION <75° and EXTENSION <20°**
- **2006 Yercan: FLEXION <95° and EXTENSION <10°**

BOTH SURGEONS AND PATIENTS HAVE GREATER EXPECTATIONS!

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A KNEE IS STIFF WHEN THE PATIENT IS DISAPPOINTED WITH THE ARC OF MOTION

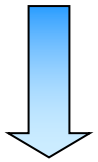
WESTERN COUNTRIES

EASTERN COUNTRIES

INCIDENCE

Pariente et al examined 5000 TKRs (1997-2003)

7% stiff TKRs



75% successful manipulation under anesthesia (MUA)

1% revision surgery

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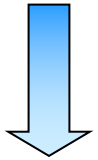
INCIDENCE

Yercan et al examined 1100 TKRs

5.3% stiff TKRs



1% revision surgery

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CAUSES

- **PRE-OPERATIVE**
- **INTRA-OPERATIVE**
- **POST-OPERATIVE**

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PREOPERATIVE CAUSES

- **OBESITY**
- **LIMITED RANGE OF MOVEMENT (ROM)**

PREOPERATIVE CAUSES

PREOPERATIVE ROM IS THE BEST PREDICTOR OF POSTOPERATIVE ROM

THE TREATMENT OF STIFFNESS BEGINS WITH THE MANAGEMENT OF PATIENT'S EXPECTATIONS!

Bauer et al., Knee (2010)
Nelson et al, JBJS (2005)

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CAUSES

- PRE-OPERATIVE
- **INTRA-OPERATIVE**
- POST-OPERATIVE

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INTRAOPERATIVE CAUSES

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- GAP IMBALANCE
- OVERSIZING
- INADEQUATE TIBIAL RESECTION
- JOINT LINE ELEVATION
- OVERSTUFFING OF THE PATELLOFEMORAL JOINT
- REMAINING POSTERIOR OSTEOPHYTES
- TOO TIGHT PCL IN CR DESIGN
- INVERSE TIBIAL SLOPE

INTRAOPERATIVE CAUSES

Other factors

- **SOFT-TISSUE BALANCING:**

check collateral ligaments tightness

- **ROTATIONAL MALALIGNMENT:**

Potential conflict with soft tissues, femoral and tibial implants, and patellar and femoral implants

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CAUSES

- PRE-OPERATIVE
- INTRA-OPERATIVE
- **POST-OPERATIVE**

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POSTOPERATIVE CAUSES

- HETEROTOPIC OSSIFICATIONS
- PAIN CONTROL
- MOTIVATION
- REHABILITATION PROGRAM
- COMPLEX REGIONAL PAIN SYNDROME (CRPS)
- INFECTION
- ARTHROFIBROSIS

Heterotopic ossification

Heterotopic ossification is the **abnormal growth of bone** in tissues where bone normally does not exist (muscle, tendons, other soft tissues)

Causes include: trauma, immobilization, severe bleeding, inflammation etc.

ALL FACTORS OCCURING AFTER TKR SURGERY

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CRPS

Complex regional pain syndrome (CRPS) is a chronic (>6 months) pain condition that most often affects one limb, after an injury or a surgery

Symptoms include: **pain**, swelling, limited range of motion and changes to the skin and bones

- Type I: no evidence of nerve damage **(90%)**
- Type II: evidence of nerve injury

In the past Type I CRPS has been given several different nomenclatures (algodystrophy syndrome, neuroalgodystrophy, Sudeck's atrophy etc.), still incorrectly used today

CRPS

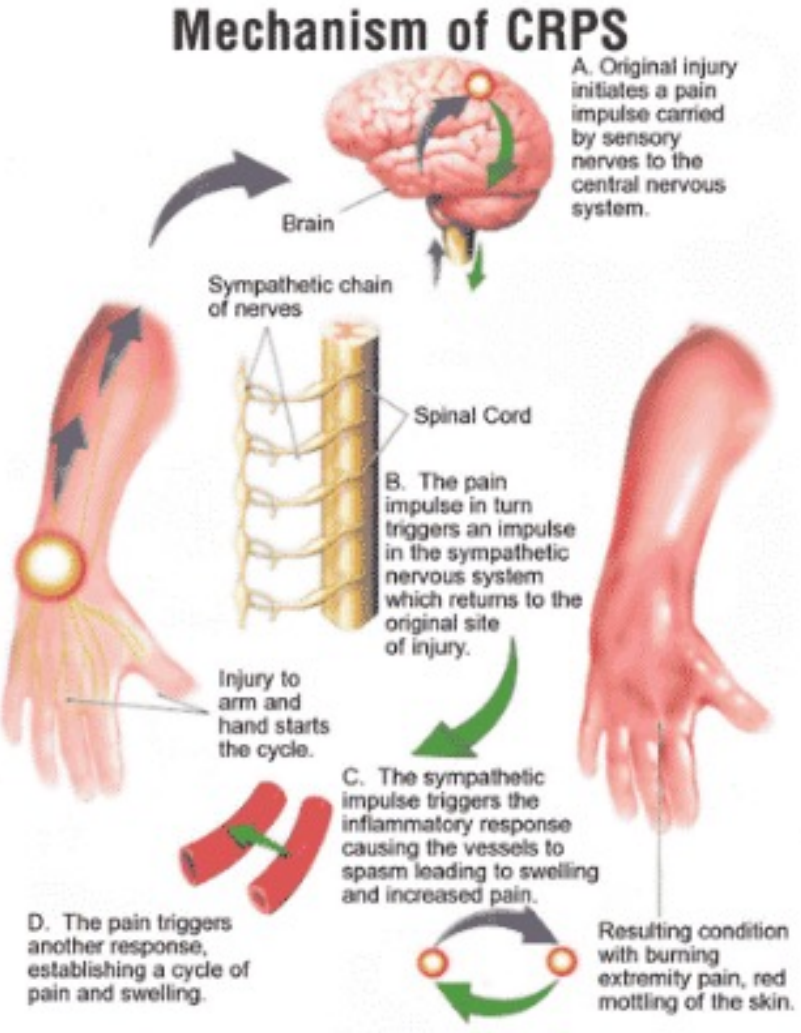
Malfunction of the peripheral and central nervous systems

Perception of non-painful stimuli as painful may be caused by inflammatory molecules and neuropeptides

It is **not a psychological illness**, yet it can cause several psychological problems and affect the quality of life.

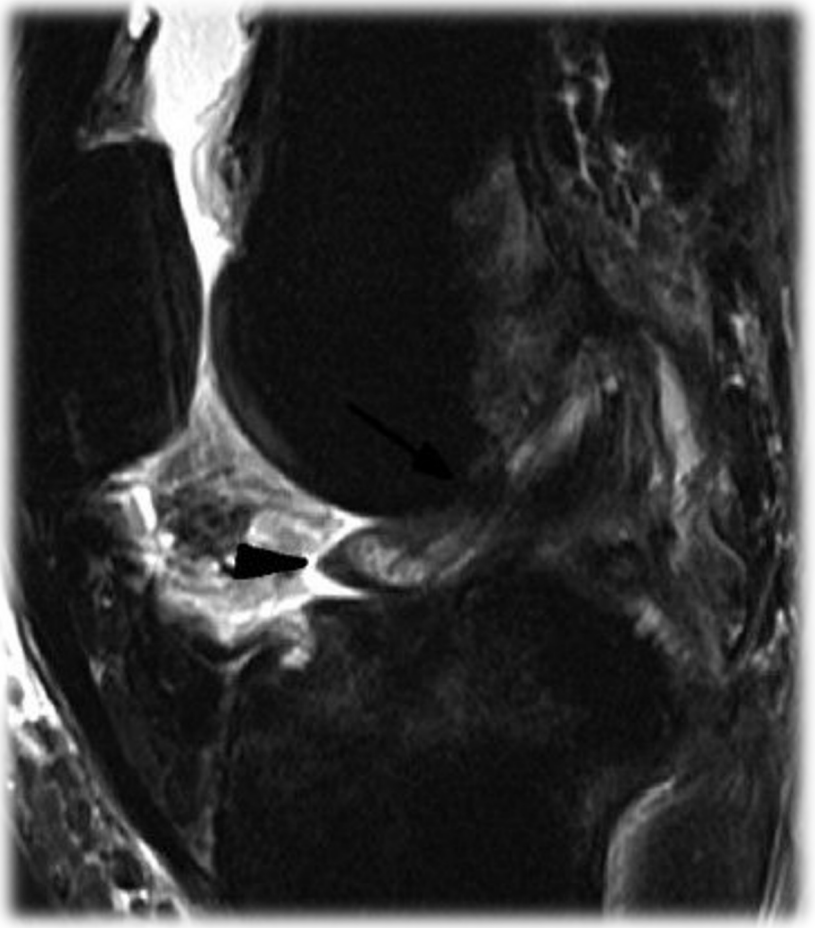
Treatment requires a **multidisciplinary approach** involving medications, physical and occupational therapy, psychological treatments, and neuromodulation.

Results are often **unsatisfactory**



Arthofibrosis

- Lack of effective interventions
- There is likely a genetic component of scar tissue formation
- Possible linkage to certain human leukocyte antigene (HLA) subtypes
- Histopathology of removed scar tissue demonstrates fibrosis with chronic inflammation, synovial hyperplasia and unregulated proliferation of collagen



PAINFUL STIFF TKR

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

The 2018 Definition of Periprosthetic Hip and Knee Infection: An Evidence-Based and Validated Criteria

Javad Parvizi, MD [a,*], Timothy L. Tan, MD [a], Karan Goswami, MD [a], Carlos Higuera, MD [b], Craig Della Valle, MD [c], Antonia F. Chen, MD, MBA [a], Noam Shohat, MD [a,d]

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…always think to INFECTION

Major criteria (at least one of the following)	Decision
Two positive cultures of the same organism	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

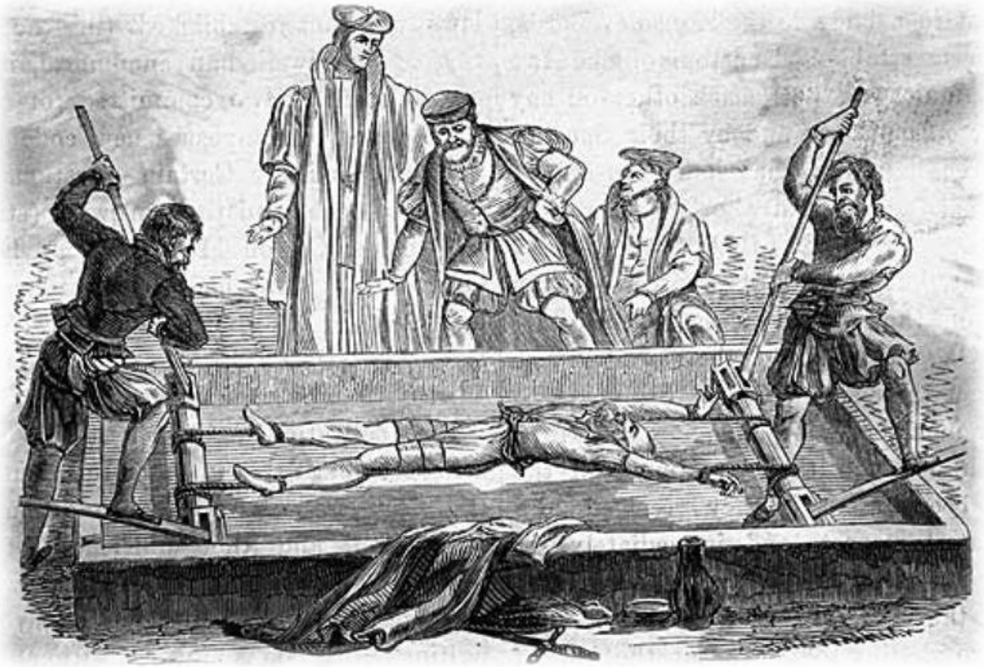
Preoperative Diagnosis	Minor Criteria	Score	Decision
Serum	Elevated CRP *or* D-Dimer	2	≥6 Infected
Serum	Elevated ESR	1	
Synovial	Elevated synovial *WBC count or LE*	3	2-5 Possibly Infected [a]
Synovial	Positive alpha-defensin	3	
Synovial	Elevated synovial PMN (%)	2	0-1 Not Infected
Synovial	Elevated synovial CRP	1	

Intraoperative Diagnosis	Inconclusive pre-op score *or* dry tap [a]	Score	Decision
	Preoperative score	-	≥6 Infected
	Positive histology	3	4-5 Inconclusive [b]
	Positive purulence	3	
	Single positive culture	2	≤3 Not Infected

TREATMENT ALTERNATIVE TO REVISION

- **Manipulation under anesthesia (MUA)**

- **Arthrolysis**



… to strip fibrous bands

- **Other treatments for special cases (heterotopic ossifications, reflex sympathetic dystrophy, hip or spine disorders)**

Manipulation under anesthesia

- ✓ **Aim** Breakage of intra-articular adhesions: the manipulation is carried out until there is no further breakage palpated or heard.
- ✓ **Timing** The earlier it is performed the more satisfactory is the result

It is the first tool, but when it has to be pulled out…?

3 weeks

Soft tissue and skin damage

3 months

Periprosthetic fracture
Extensor mechanism disruption

Risk of complications

Manipulation under anesthesia

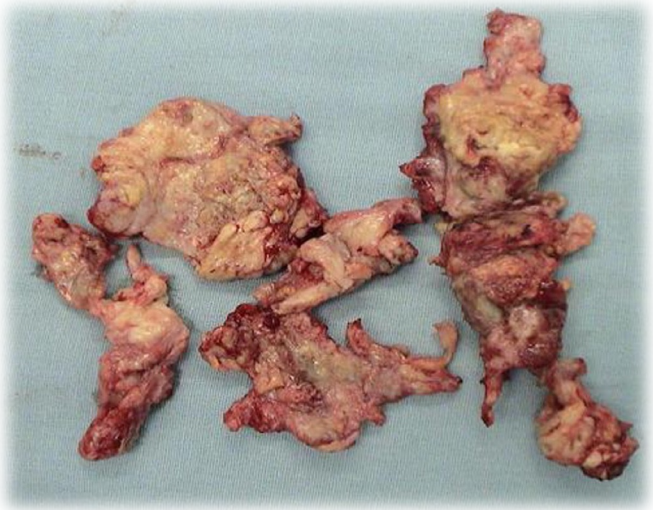
- ✓ **Results: successful in 80% of cases**
  - **67° → 117° (Yercan 2006)**
  - **71° → 102° (Pariente 2006)**

For extension deficit:
- ➢ **Less successful**
- ➢ **More complications**

- ✓ **Postoperative management**
  - **Pain control (epidural catheter)**
  - **Intensive physical therapy to lock in the gains of the MUA (CPM set to the max flex-ext obtained)**

Arthroscopic arthrolysis

- ✓ **Indication:** Painless, stiff knee that has not improved after 3-6 months of conservative treatment
- ✓ **Aim:** Debulk the amount of intra-articular adhesions to better perform MUA. Jerosch described a standard technique in 2007
- ✓ **Same postoperative management as MUA**



Arthroscopic arthrolysis

- ✓ **Results are rather controversial in literature…**
  - **Best results in cases of isolated PF fibrosis or tight PCL in CR TKA**
  - **Less effective in extension lag and severe ROM limitation (<60°)**

In clinical practice, it has limited indications…

Williams et al.

Open arthrolysis

- ✓ **Indication:** severe ROM limitation after TKA with no component malposition and after a proper conservative treatment for 6 months
- ✓ **Aim:** greater access to remove fibrotic, intra-articular car tissue. Downsize the PE insert to a thinner one. Access to the posterior portion of knee joint.
- ✓ **Results:** few articles are available in the literature

Letenneur, Hutchinson, Pretzsch

Revision surgery

✓**Indication**

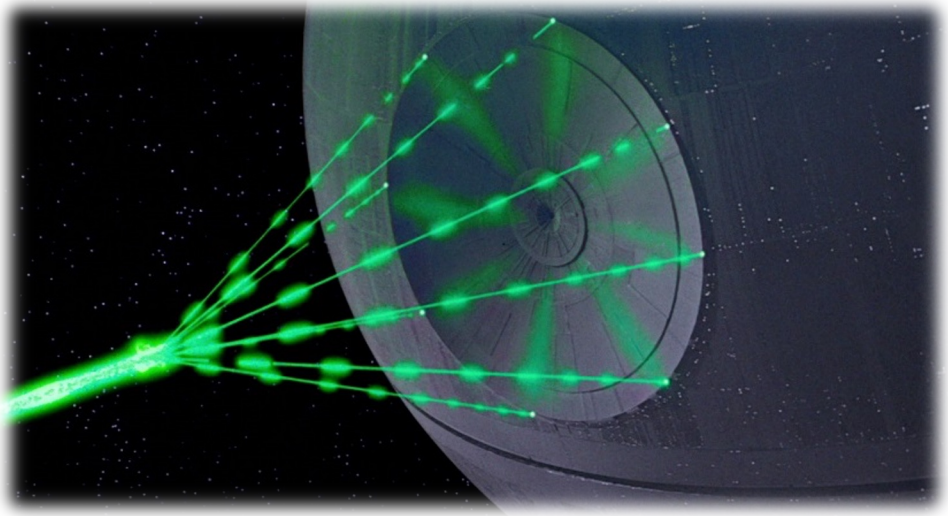
Documented surgical errors:

- **Patellar thickness, height and tracking**
- **Component malposition or oversizing**
- **Joint line variations**
- **Soft tissue balance…**

Plan the revision!

Revision surgery

- ✓ **Aim: scar tissue removal. Examine and correct component position and stability.**



- ✓ **Tips and tricks**
  - **A minimal symmetrical laxity in extension should be preferred**
  - **Restore a proper joint line level: epicondyle are not always detectable…**

It is an aggressive and technically demanding procedure

Revision surgery

✓ **Results are sometimes unsatisfactory…**

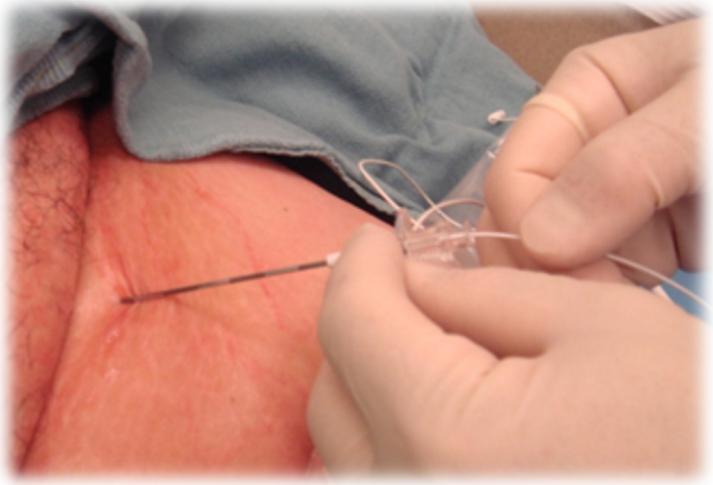
Su et al examined 150 Revision TKR

32,7% of failure

Patient should be informed

Alternative to revision: conservative treatments

- ✓ **Time** — do not revise before 1 year post-op
- ✓ **Rehab** — ↑ frequency and ↓ intensity of exercises
- ✓ **Pain control**
- ✓ **Medication: NSAIDs**
- ✓ **Lumbar sympathetic blockade + CPM**



DISCUSSION

- ✓ **Stiffness is one of the most frequent complications of TKA**
- ✓ **It is multifactorial with some elements out of surgeon's control**
- ✓ **Prevention is crucial:**
  - **Careful patient selection**
  - **Preoperative counseling**
  - **Meticulous surgical technique**
  - **Pain management after surgery**
  - **Early rehabilitation: restore FULL EXTENSION!!**

Thank you