Knee stiffness

Objectives

1. Definition
2. Pathogenesis
3. Types of surgical methods
4. Indications

Definition

Knee stiffness: a limitation in range of motion, is a potential complication after any intra-articular or extra-articular injury. It can be caused by a flexion contracture, an extension contracture or a combined contracture

Causes of a Stiff Knee

- Arthritis: Gouty arthritis, Post-traumatic arthritis
- Injury: ligament, muscle, fracture
- Infection
- Autoimmune: Rheumatoid arthritis, systemic lupus erythematosus

Pathogenesis

- Post-traumatic stiffness: presence of dense intra-articular adhesions and/or fibrotic transformation of peri-articular structures
- Flexion contracture: posterior adhesions and/or anterior impingement
- Extension contractures: anterior adhesions and/or posterior impingement

Pathogenesis

- Stiffness has two components
  - Intra-articular:
    - Tissue remodeling leading to intra-articular adhesions
    - Excessive proliferation of fibrous scar tissue, retraction of peri-articular soft tissues
    - Bone impingement due to intra-articular malunion
  - Extra-articular:
    - Quadriceps adhesions to a femoral callus
    - Femoral aponeurosis and intermuscular septum, retraction of the muscle due to scar tissue and skin adhesions in the deeper layers

Treament

Treatment consists of analyzing the condition and then surgically releasing certain anatomical structures as needed

Loss of flexion

- Posterior impingement (femoral malunion)
- Anterior adhesions or retractions (joint capsule, quadriceps bursa, patellar retinaculum, quadriceps), and patella baja/infera.
- MRI can help determine the capsule volume, and the presence of meniscus, cartilage and ligament injuries.

Loss of extension

- Anterior impingement (e.g. malunion of the intercondylar eminence)
- Contracture of the posterior joint capsule over the condyles
- Contracture of the gastrocnemius muscles

Manipulation under anaesthesia

- Gentle manipulations can be an option before 3 months
- It is fraught with many potential problems: fracture, failure of fixation construct, tendon rupture, cartilage damage, etc

Arthroscopic arthrolysis

- This is now a standard technique that can be considered starting 3 months after the injury event, and sometimes earlier. In fact, it should be suggested early on if the joint range of motion is no longer improving and there are no signs of active CRPS. Any fractures must have healed

Open release

- Arthrolysis
- Open quadriceps release
- Posterior arthrolysis for loss of extension

Definition

- Quadriceps contracture is a condition quadriceps is contracted due to various causes. The contracture may occur in one or more components of the muscle.
- The quadriceps femoris is the main active extensor of the knee

Indication

Surgery is usually indicated in established cases of quadriceps contracture where conservative treatment is not beneficial

Quadriceps plasty

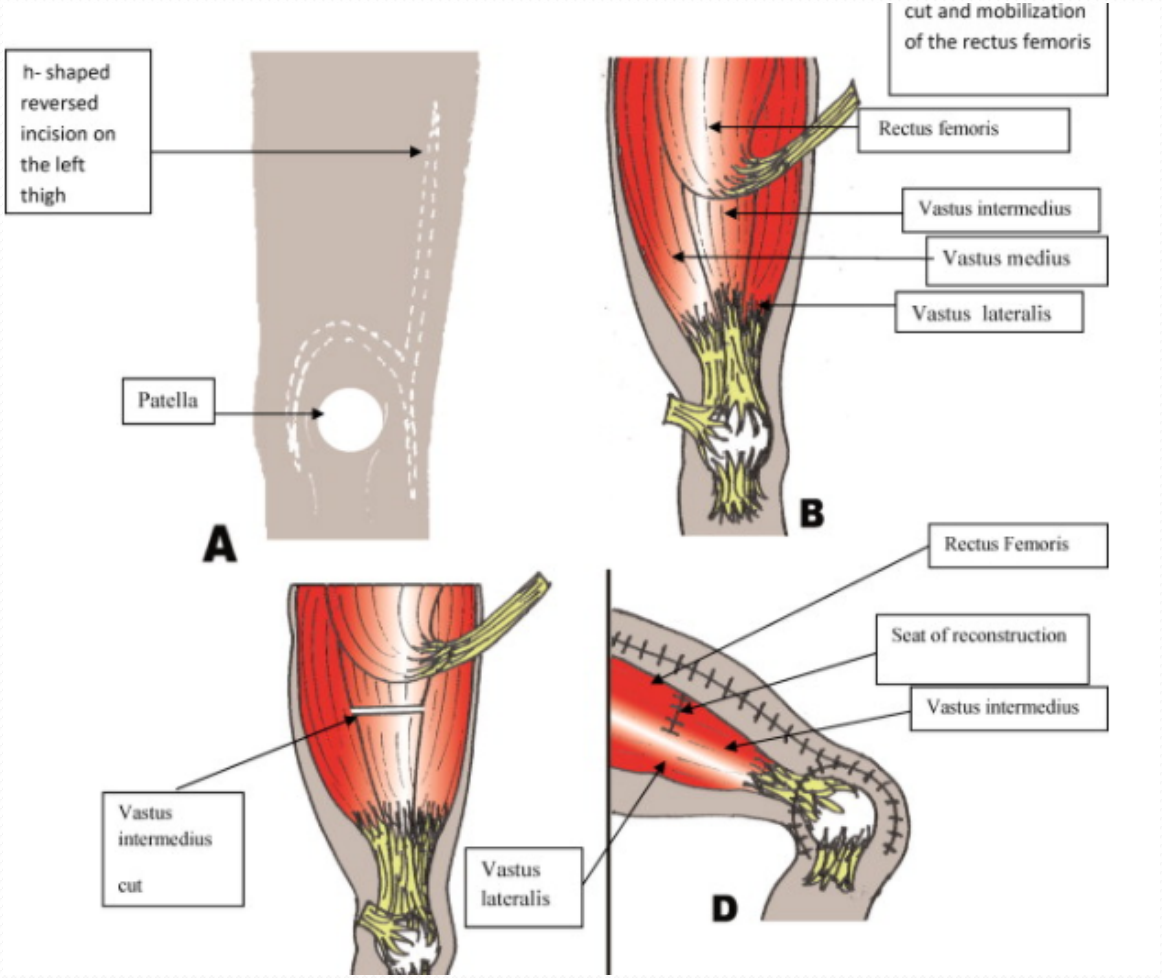
- Distal
  - Bennett‟s V-Y Plasty
  - Thompson‟s Quadriceps Plasty
- Proximal
  - Judet‟s Proximal Release
  - Sengupta‟s Proximal Release
  - Lenart and Kullmann‟s proximal release

Bennett's V-Y Plasty

- An inverted "V" incision is made at the musculotendinous junction of the rectus femoris
- Tendon is sutured back in the position of full flexion. Thus converting a "V" to "Y" of the incision

Thompson's Quadriceps Plasty

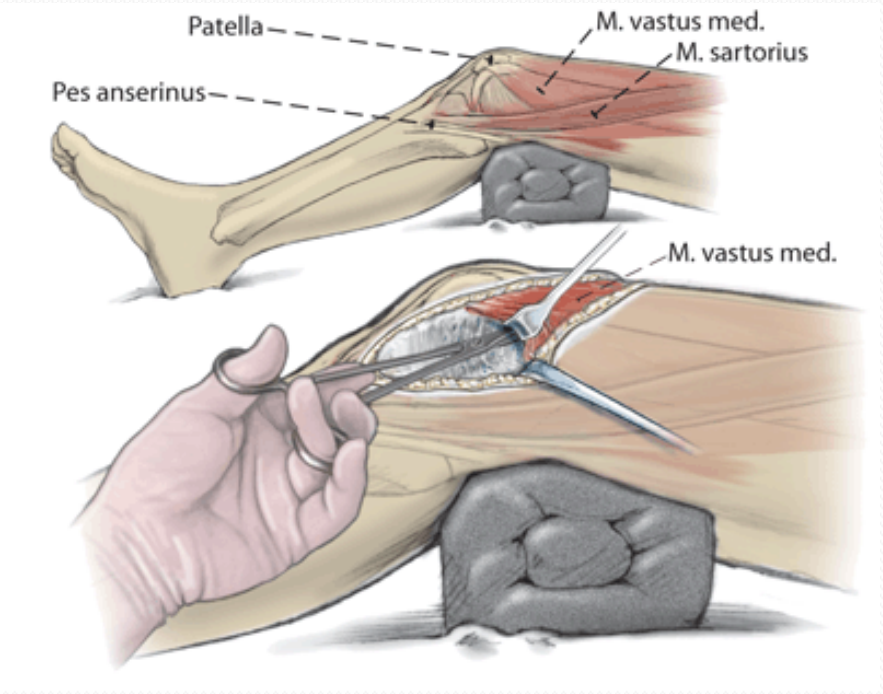
- Anterior part of the capsule of the knee joint including the lateral expansion of the vasti on both sides is divided far enough to overcome the contracture
- The vastus intermedius is excised completely
- If the flexion is still not obtained after correcting the first three cause then it must be due to shortening of the rectus femoris itself


h- shaped reversed incision on the left thigh
Patella
A
cut and mobilization of the rectus femoris
Rectus femoris
Vastus intermedius
Vastus medius
Vastus lateralis
B
Vastus intermedius cut
Vastus lateralis
Rectus Femoris
Seat of reconstruction
Vastus intermedius
D

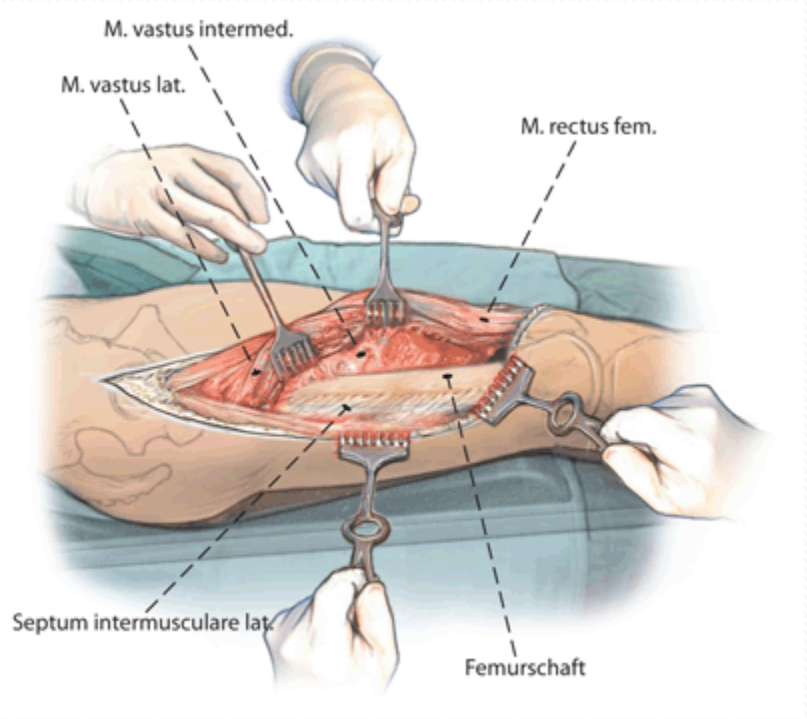
Judet‘‘s Proximal Release

- Judet devised a muscle slide operation which avoids lengthening of the rectus femoris.
- The vastus lateralis and vastus intermedius are released from their origin proximally.
- This eliminates chances of extension lag and haemoarthrosis of the knee

Medial retinacula is freed, any intra-articular adhesions are released



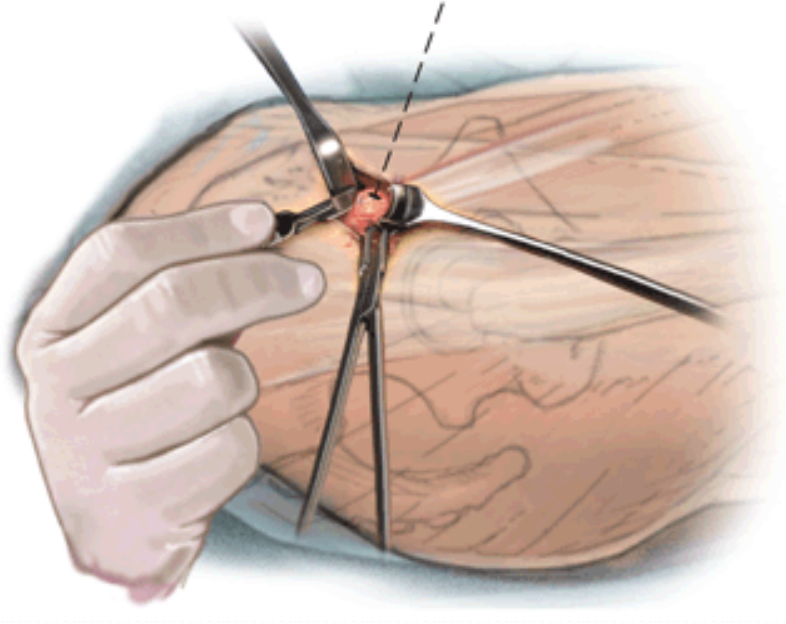
- The vastus lateralis is completely freed from the linea aspera and from the greater trochanter
- The vastus intermedius is lifted extraperiosteally from the lateral and anterior surface of the femur.
- The vastus medialis is not disturbed.
- The rectus femoris is untouched



Lenart and Kullmann's proximal release

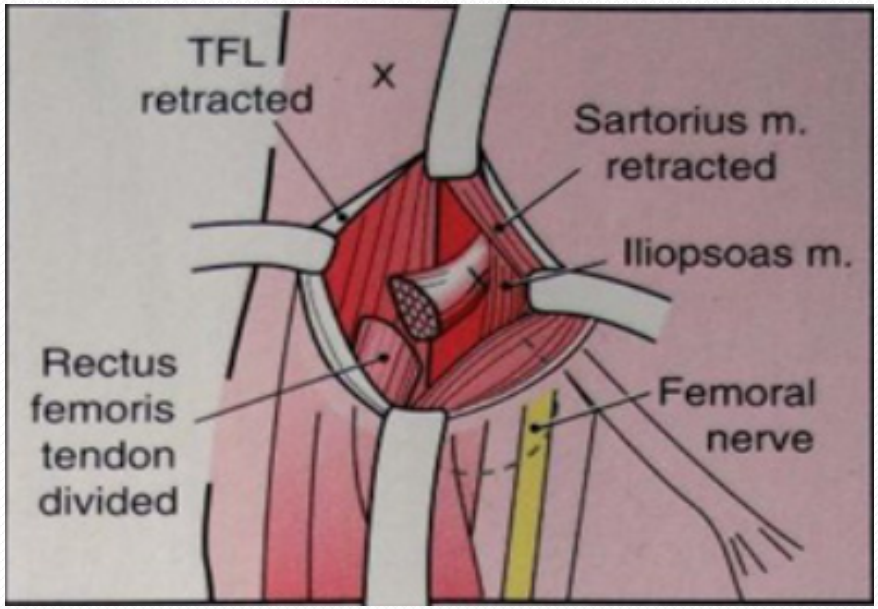
Lenart and Kullman described an operation to treat isolated contractures of rectus femoris

- The incision begins below the anterior superior iliac spine
- The origin of the muscle is detached from the anterior inferior iliac spine .
- The knee is flexed to 900 with the hip extended, the wound is closed in layers



Sengupta's Proximal Release

- Sengupta modified Judet's proximal release.
- Vastus lateralis release, the rectus femoris is also released from its origin, if it is contracted.



Complications

- Bleeding
- Fractures
- Ligament tears
- Recurrent stiffness

Take home messages

- Post-traumatic knee stiffness is a common condition. It requires an accurate assessment of the injuries
- The final decision is made on a case-by-case basis according to the clinical and imaging findings

THANKS FOR YOUR ATTENTION