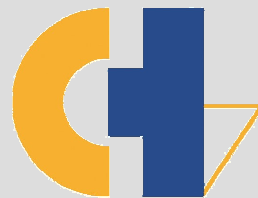


Luxembourg, 03. December 2011

# The groin area: a Bermuda triangle in sports medicine?



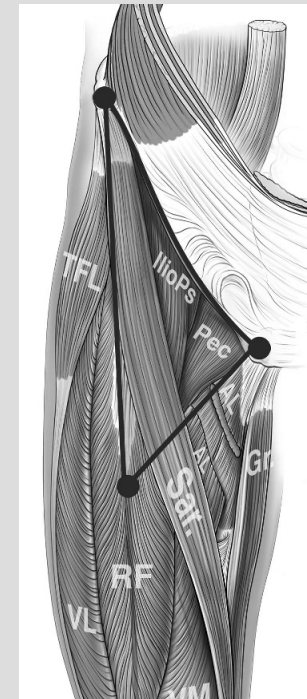
Christian Nührenbörger

Centre de l'Appareil Locomoteur, de Médecine du Sport et de Prévention  
Centre Hospitalier de Luxembourg – Clinique d'Eich

# The groin area: a Bermuda triangle in sports medicine?



Triangular area in the Atlantic ocean where ships, planes and people have mysteriously disappeared.



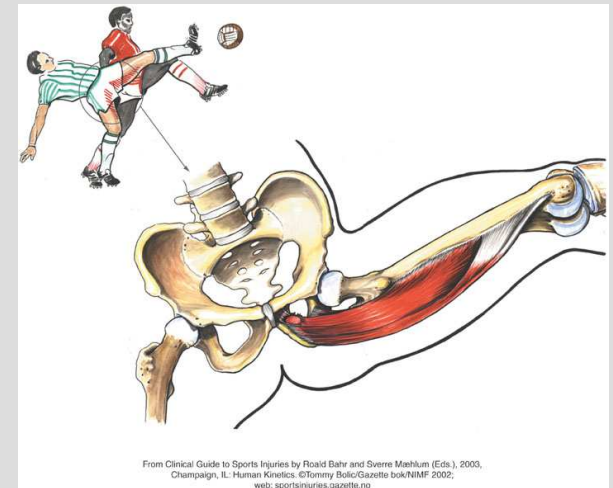
From:  
Falvey 2011

Groin an anatomical triangular region where diagnosis and symptoms are often confusing.

(Bizzini 2010)

# Groin pain in athletes

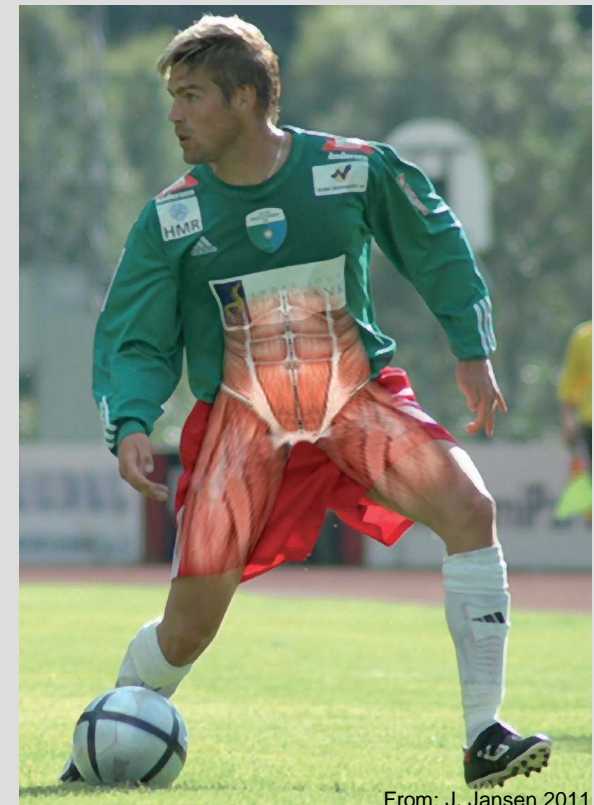
- **Most difficult „team management“ problem** (Verrall 2011)
- **Common in sports with movements of kicking, pivoting, side to side, sharp cutting or weaving (soccer, ice hockey, rugby, Australian rules football.... )**  
(Bradshaw et al. 1997; Meyers 2008)
- **High incidence**
  - Football 3,5 injuries / 1000 player hours (Werner 2009)
  - Football up to 10% of all injuries (Hawkins 2001; Paajanen 2011)
  - 11-14 groin injuries / 100 player / year  
(Hawkins & Fuller 1999; Hölmich 2005)
- **High recurrence rate**
  - Football 15% (Werner 2009)
  - Australian Football 21% (Orchard & Seward 2002)
  - Icehockey 23,5% (Emery, Meeuwisse & Powell 1999)
- **Strong correlation between athletes having groin strain / osteitis pubis and ACL tears** (Verrall 2011; Silvers 2011)



# Groin pain in athletes

## Risk factors for groin injuries

- Previous injury +
- Level of sports +
- Flexibility +/-
- Strength +
- Core stability +
- Age +/-
- Gender (M > F) +



From: J. Jansen 2011

(Tyler 2001; Arnason 2004; Verrall 2008; Hölmich 2008; Maffay & Emery 2009)

# Groin pain in athletes

## Lack of consensus regarding:

- Terminology
- Definitions
- Diagnostic criteria
- Therapy

## Geographical and sports-specific variation:

Adductor dysfunction (Scandinavia)  
Weiche Leiste (Germany)  
Athletic Pubalgia (USA)

Sports hernia (Great Britain)  
Osteitis pubis (Australia)  
Pubalgies (France)

(Schilders et al. 2007)



# Groin pain in athletes

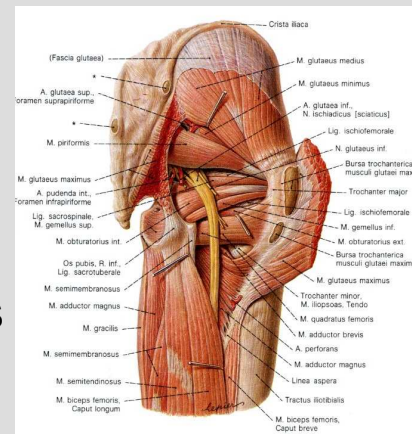
## Possible causes of groin pain in athletes (Robertson et al. 2009)

Abdominal aortic aneurysm	Hydrocoele/varicocoele	Postpartum symphysis separation
Acetabular disorders	Inflammatory bowel disease	Prostatitis
Adductor strain	Inguinal or femoral hernia	Pubic instability
Adductor tendinitis	Intra-abdominal abscess	Sacroiliac joint problems
Apophysitis	Legg-Calve´-Perthes disease	Seronegative spondyloarthropathy
Appendicitis	Lumbar spine pathology	Slipped capital femoral epiphysis
Avascular necrosis of femoral head	Lymphadenopathy	Snapping hip syndrome
Avulsion fracture	Muscle strain	Sports hernia
Bursitis	Myositis ossificans	Stress fractures
Conjoined tendon dehiscence	Nerve entrapment	Synovitis
Crohn's disease	Obturator nerve entrapment	Testicular neoplasm
Diverticular disease	Osteitis pubis	Testicular torsion
Epididymitis	Osteoarthritis	Urethritis
Femoroacetabular impingement	Ovarian cyst	Urinary tract infection
Herniated nucleus pulposus	Pelvic inflammatory disease	.....
Hockey player's syndrome	Pelvic stress fracture	

# Groin pain in athletes

## Groin and hip related muscles and tendons:

- Abdominal muscles rectus / obliques / transversus
- Adductor longus / brevis
- Adductor magnus
- Pectineus
- Gracilis
- Iliopsoas
- Satorius
- Rectus femoris
- Tensor fascia latae
- Gluteus medius, minimus, maximus
- Piriformis, Obturatoris + other ext. rotators
- Hamstrings

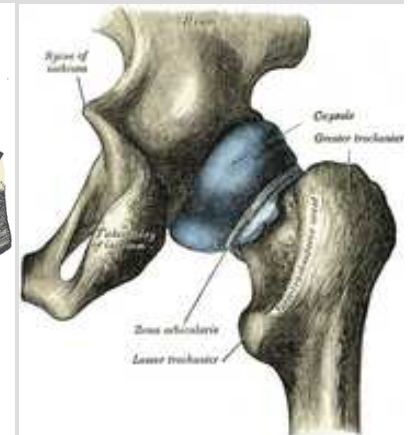
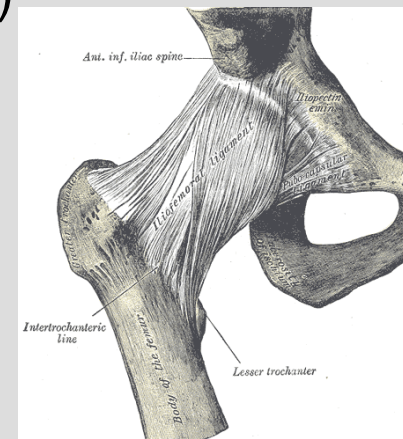
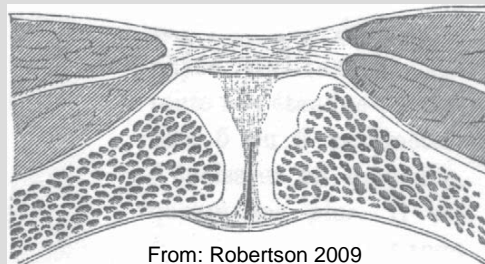
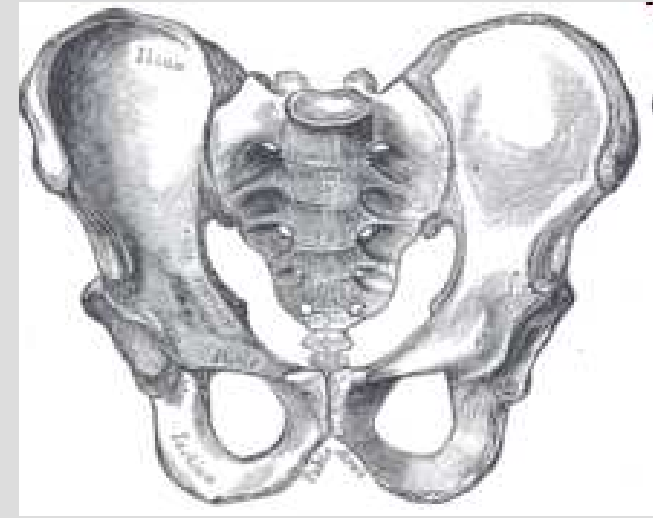




# Groin pain in athletes

## Bones and articulations:

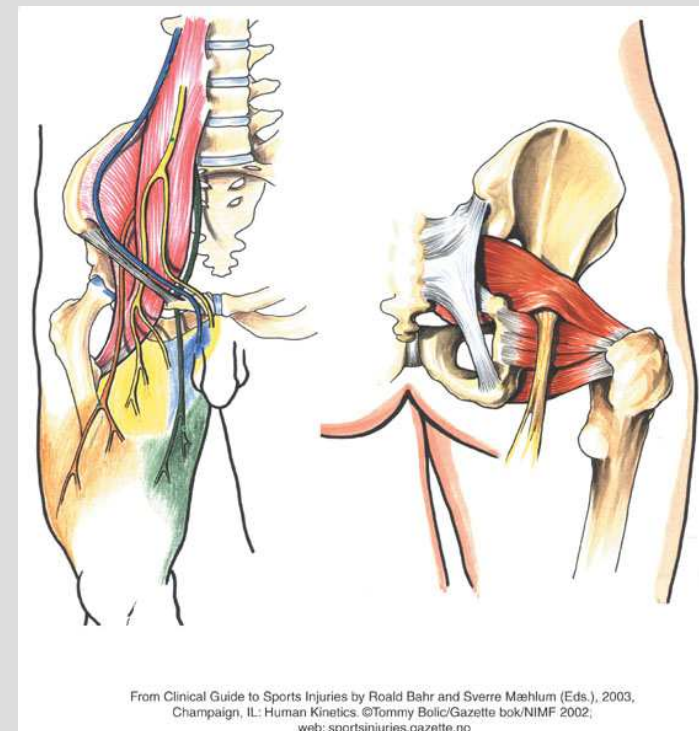
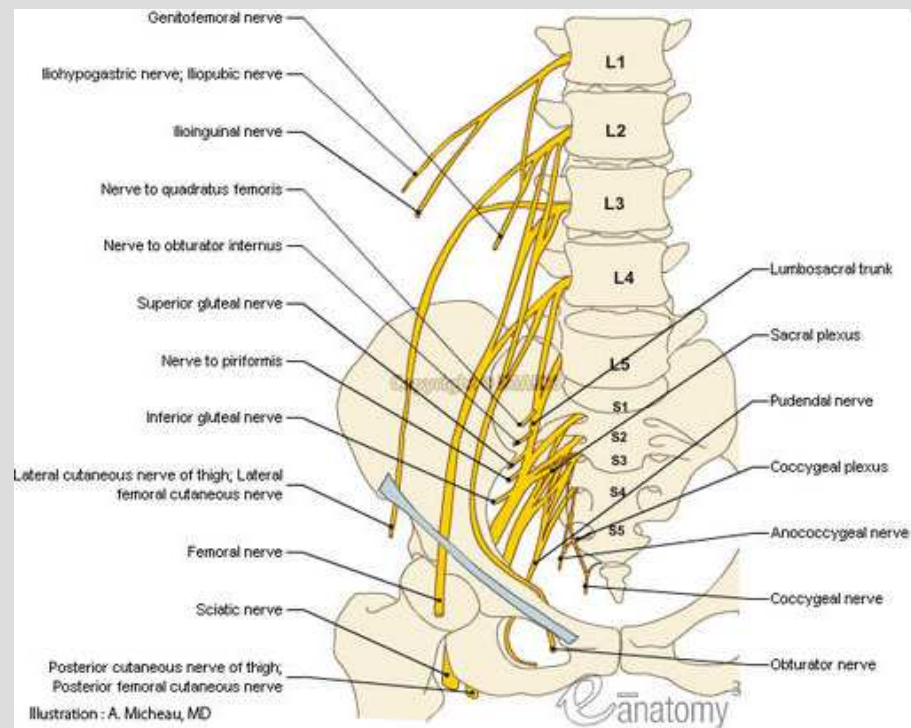
- Pelvic girdle: Ilium, Pubis, Ischium
- Sacrum
- Femur
- Symphysis joint (fibrocartilaginous disc)
- Hip joint (Labrum)
- Sacroiliac joint





# Groin pain in athletes

## Nerves:

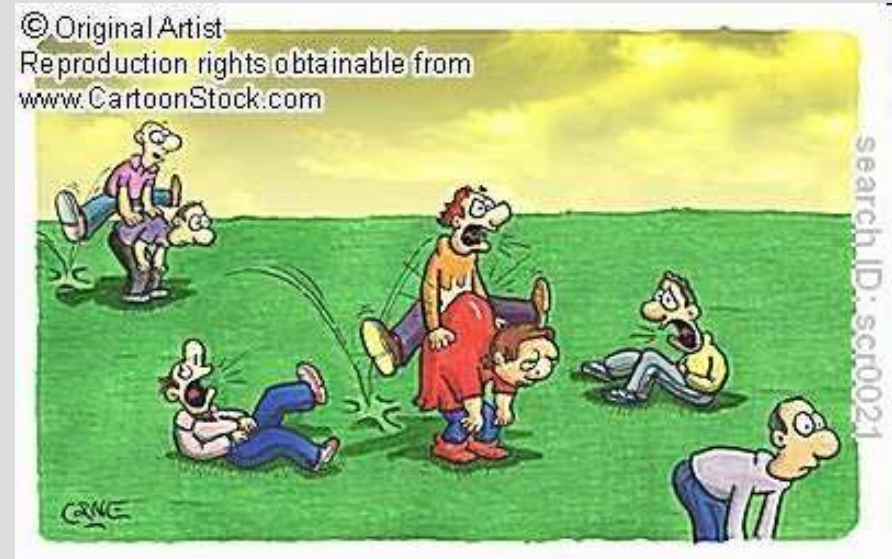


# Groin pain in athletes

## What is a groin injury???

A bone fracture or Achilles tendon rupture -  
That's clear!

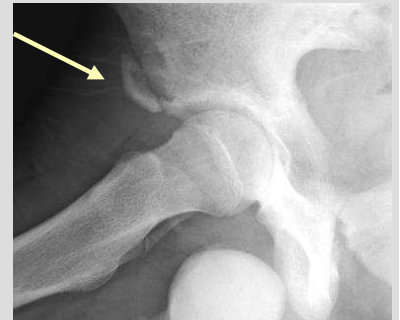
But a **groin injury**?



# Groin pain in athletes

## Possible injured anatomical structures and tissues:

- **Muscle:** tear, strain, myositis ossificans ....
- **Tendon:** tendinosis, tendinitis, tendinopathy, enthesopathy ....
- **Bone:** stress, oedema, osteitis, necrosis, fracture, apophysitis, avulsion ....
- **Articulation:** arthritis, arthropathy, instability, cartilage, synovitis, labrum ....
- **Nerve:** entrapment, neuritis, neuropathy ....
- **Soft tissues:** hernia, weakness, bursitis .....

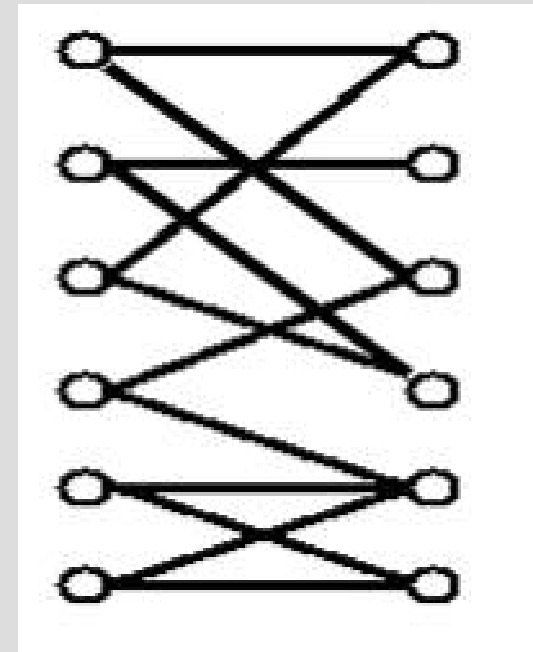


# Groin pain in athletes

## Clinical entities

- Adductor related groin pain
- Rectus abdominis related groin pain
- Inguinal related groin pain
- Psoas related groin pain
- Pubic symphysis related groin pain
- Hip related groin pain

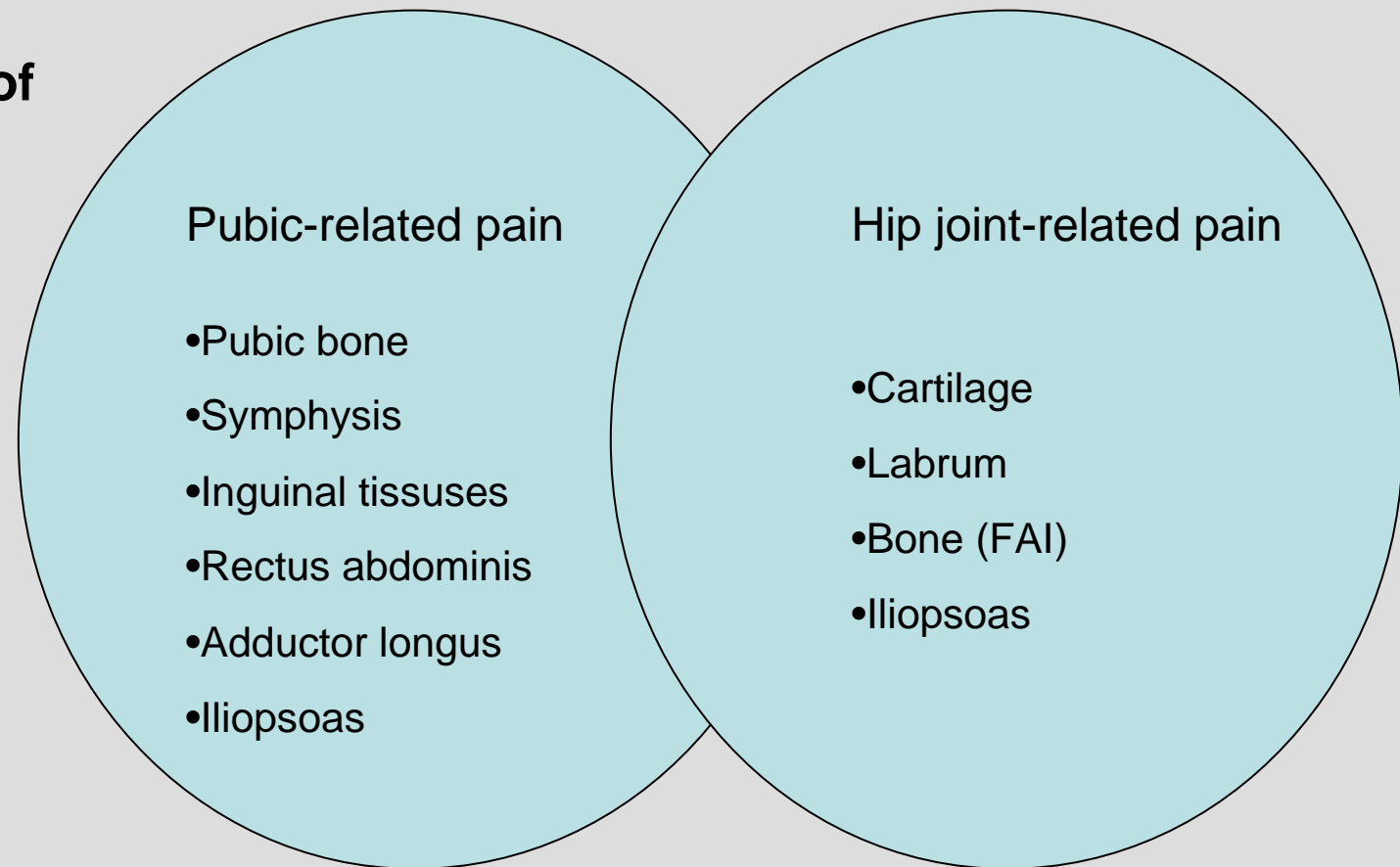
**But:** - 2 clinical entities in 33% of patients  
- 3 clinical entities in 8% of patients



(Hölmich 2007)

# Groin pain in athletes

**Overlapping of symptoms:**



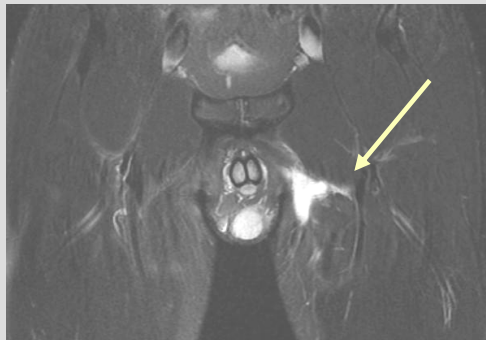
(Holzheimer & Gresser 2007; Schilders et al. 2007; Meyer et al. 2008; Tibor 2008; Weir et al. 2011; McSweeney 2011)

# Groin pain in athletes

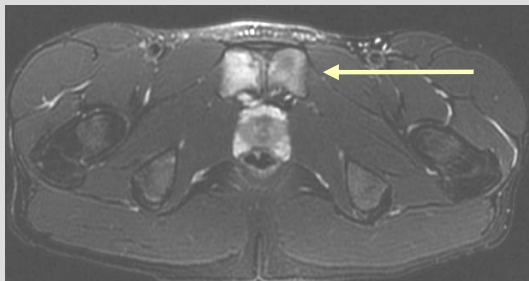
## 4 broad categories

(Schilders et al. 2007; Hölmich 2007; Jansen et al. 2008; Minnich et al. 2011)

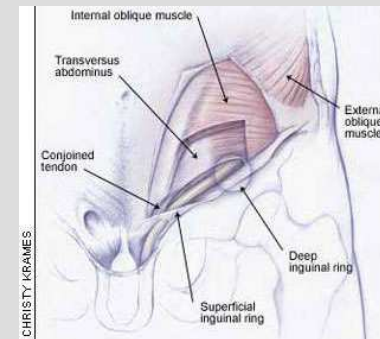
### Adductor dysfunction



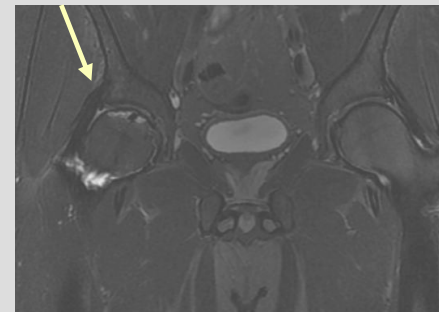
### Osteitis pubis



### Sports hernias



### Hip joint injury



# Groin pain in athletes

## What is the cause of chronic groin pain? Pathophysiology?

„Weakness or instability to stabilize the pelvis and the lumbosacral connection or false movement patterns are often the beginning of a negative story.“ (Biedert et al. 2003)

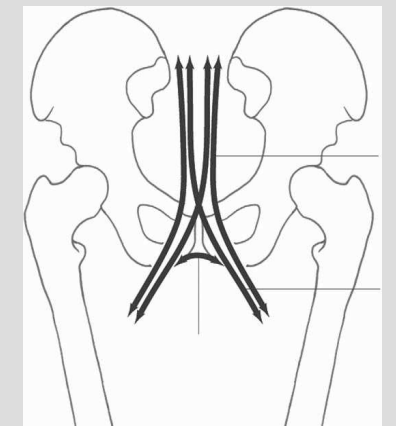
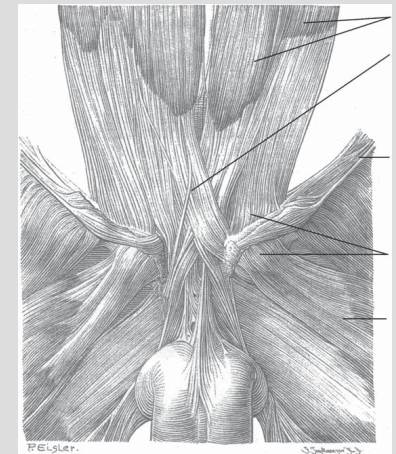
- What is the role of the adductors and the rectus abdominis?

Adductor longus attachment communicates with:

- Rectus abdominis sheath
- Pubic symphysis capsule
- Inguinal ligament
- Contralateral Adductor longus tendon

Transfers large forces during athletic activity to pubic region!

(Robertson et al. 2009; Best 2010; Norlon-Old et al. 2011)





# Groin pain in athletes

## What is the cause of chronic groin pain? Pathophysiology?

- What is the role of hip ROM?
  - Loss of hip ROM can lead to increased pelvic rim and hip bony configuration stresses and further down the limb (Delajaye et al. 2003; Verrall 2005 + 2007)
- Increased pelvic rim stresses can have many possible „victims“:
  - Hip joint
  - Parasymphyseal region (Symphysis, Pubic bones)
  - Soft tissues (abdominal and adductor muscles)



# Groin pain in athletes

## A Hypothesis of groin injury:

Imbalance of the pelvis - muscular, ligamentous or otherwise because of ROM, strength, previous injury etc. – plus increased activity



Overuse and consequent weakness of tissue

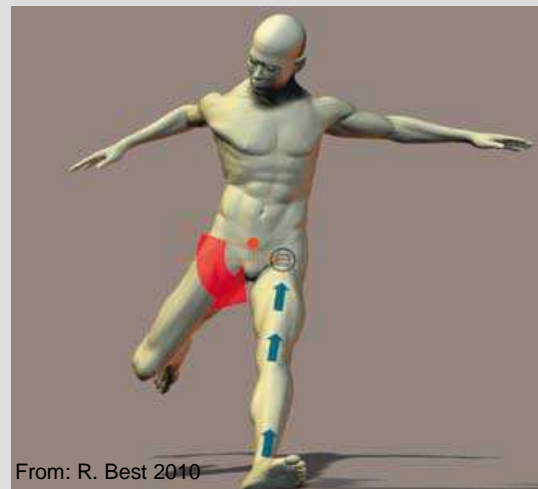


The tissue is damaged



Pain is generated

(Hölmich 2011)



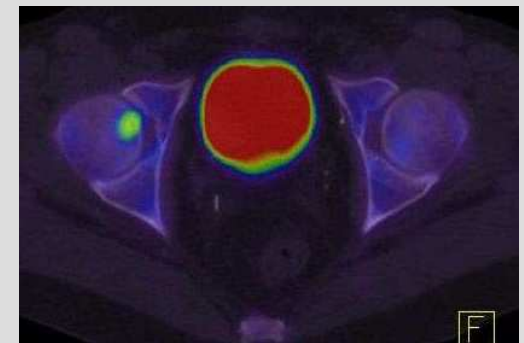
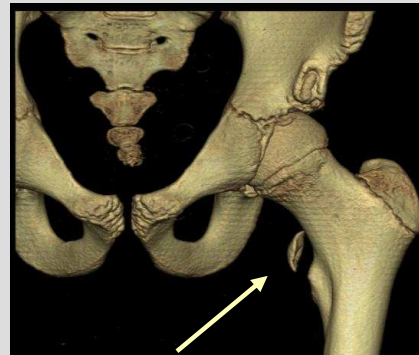
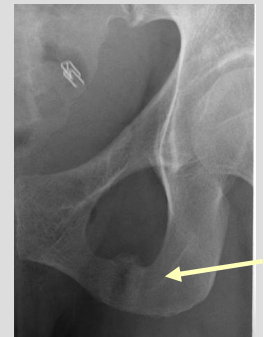
From: R. Best 2010



# Groin pain in athletes

**What is the diagnostic pathway and what are the findings on?**

- Clinical examination?
- Dynamic Ultrasound?
- X-ray?
- MRI? Dynamic?
- CT-scan? PET-Scan?
- Scintigraphy?
- Herniography?



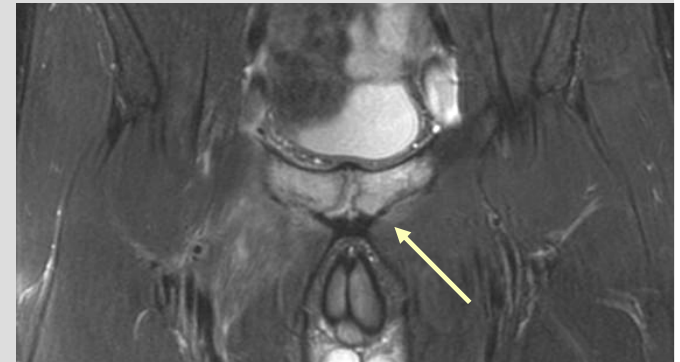
# Groin pain in athletes

## Osteitis pubis

- Is the bone marrow oedema a **real diagnosis**?
- Stress response?
  - So every player should have some stress response changes.
  - MRI is also positive in asymptomatic athletes.
- Correlation between signal intensity and groin symptoms?

More stress = more pain?

(Lovell et al. 2006; Paajanen et al. 2010; Verrall 2001 + 2011)

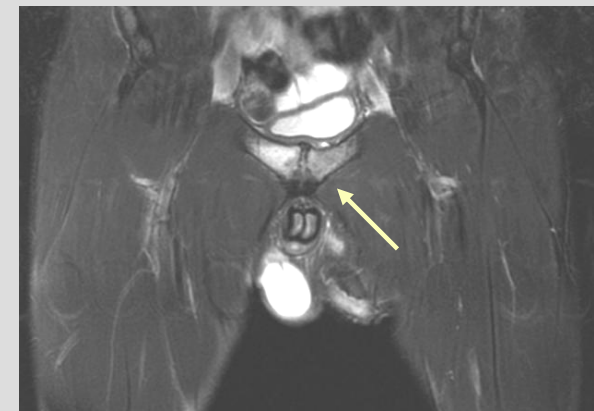
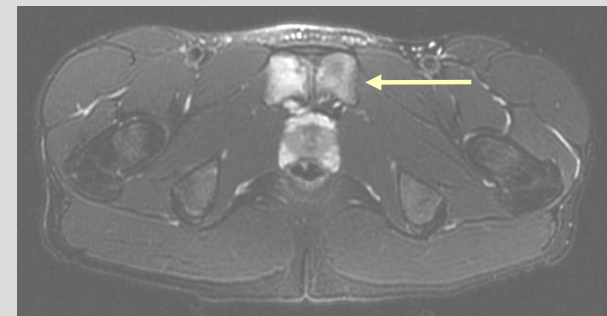


# Groin pain in athletes

## Osteitis pubis

**Better: Pubic bone stress injury = PBSI?  
Pubic related groin pain?**

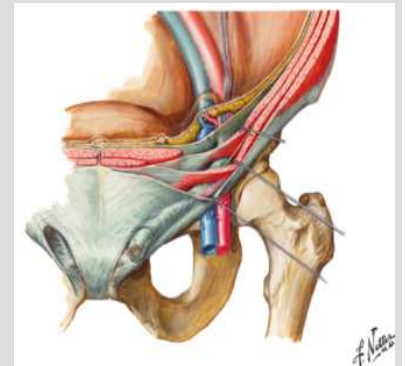
- What is the conservative treatment?  
Rest? Injections? Medicaments?
- What is the role of surgery?
- Is prevention possible?



# Groin pain in athletes

## „Sports Hernia“

- What is it?
  - „Hernia“ is a misnomer because there is not a classic herniation of soft tissues.
  - It is a weakness of the posterior wall of the inguinal canal that results in nerve irritation and insertional tendon pain on bone. (Muschaweck & Berger 2010)
- „Operation seems to work.“ (Paajanen 2004; Kluin 2004; Caudill 2008; Minnich 2011)
- But there is no consensus regarding the preferred surgical techniques:
  - Primary pelvic floor repair without mesh? With or without Adductor longus release?
  - Minimal repair with decompression of the genitofemoral nerve branch?
  - Open anterior mesh repair?
  - Laparoscopic mesh repair?
- What are the diagnostic tools?
- Who has to be operated and when?





# Groin pain in athletes

## Hip pathologies

- What are the pathologies of the hip joint?
- FAI and hip arthroscopy are „en vogue“!  
But right diagnosis is difficult:
  - Multiple tests are unreliable and false positives
  - FAI changes on x-ray are observed in 94% of patients with LSARGP
  - No correlation between positive impingement test, reduced hip ROM and the number of radiological signs of FAI (Martin 2008; Weir et al. 2011)
- What are the indications for hip arthroscopies?
- Can we identify athletes with „hips at risk“?  
(Clinical examination, X-ray, MRI)
- Prophylactic treatment of an asymptomatic „hip at risk“?  
(Ellis et al. 2011)



From Clinical Guide to Sports Injuries by Roald Bahr and Sverre Mathum (Eds.), 2002  
Champaign, IL: Human Kinetics. ©Tommy Bahr-Gazette bok/NMIF 2002,  
web: sportsinjuries.gazette.no





# Groin pain in athletes

**Surgery in groin pain – what is done and effective?**

**Is it more than giving the athlete rest?**

- Hernia repairs
- Adductor releases
- Nerve decompression
- Drilling of pubic bone
- Debridement of symphysis
- Hip arthroscopy

(Verrall 2011)



# Groin pain in athletes

## A Hypothesis of groin injury:

Imbalance of the pelvis- muscular, ligamentous or otherwise because of ROM, strength, previous injury etc. – plus increased activity



Overuse and consequent weakness of tissue



The tissue is damaged



Pain is generated

## A treatment strategy:

- Correction of prediposing pelvic imbalance
- Specific strength training

(Hölmich 2011)



# Groin pain in athletes

## Prevention of chronic groin pain

Is prevention the key?

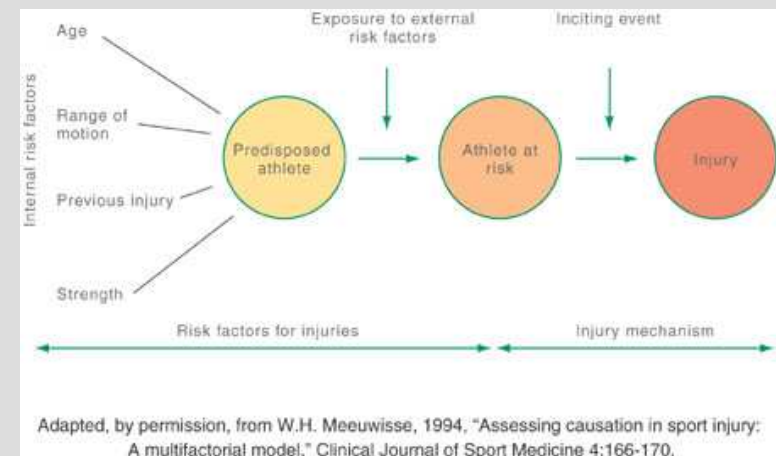
If yes, how to do it??

How can we find specific groups of athletes at risk?

How to strengthen the muscles?

With concentric or eccentric or isometric exercises?

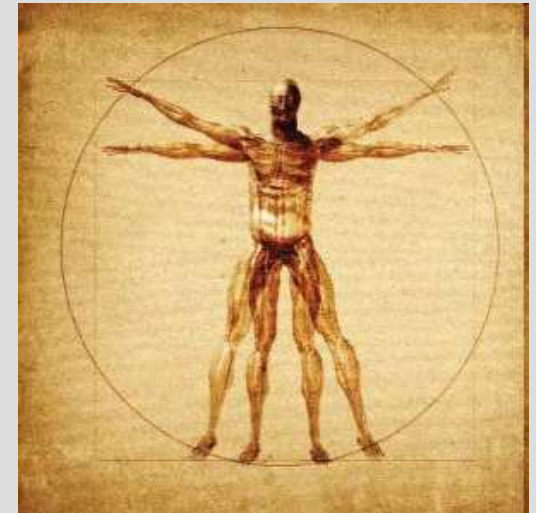
What are the right core stability principles?



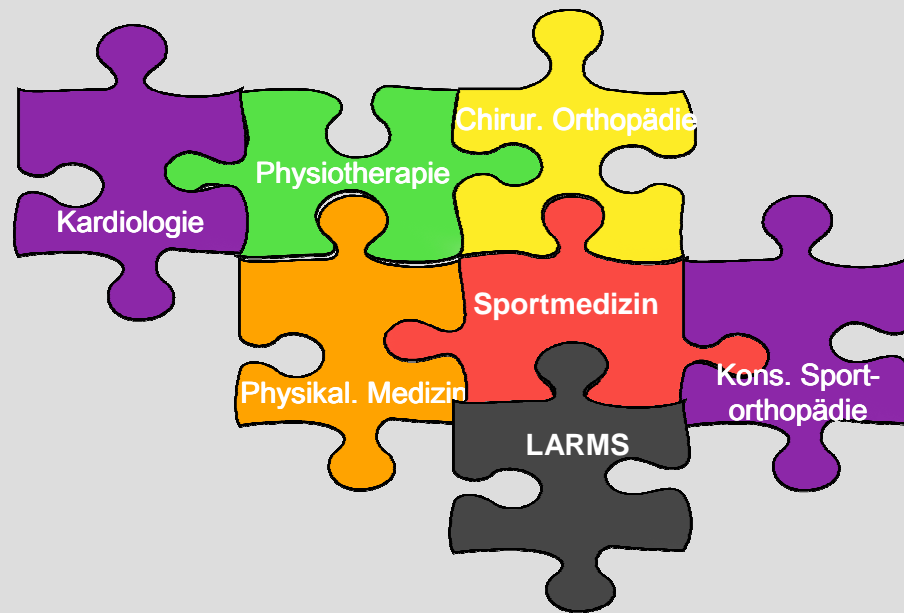
# Groin pain in athletes

## Rehabilitation and return-to-play

- How much **time** do we need?
  - 3-5 months rest (Verrall); 9,6 months in men and 7 months in female (Fricker)
  - 18,5 weeks (Hölmich); 12,8 - 20 weeks (Weir)
  - 6 – 8 weeks (Krüger); 4 – 12 weeks (Lutz) after groin surgery
  - 4 - 6 months after arthroscopic FAI treatment (Seil, Pape)
- What are the **limitations**?
  - **Patience** of athlete, trainer, physiotherapist, physician.....
  - Good short-term results, moderate mid-term. Long-Term?
- Do we have **return-to-play criterias**?
  - Pain? Full training?
  - Functional tests?
  - Strength tests?
  - MRI findings?



**Villmols merci fir aer Opmierksamkeet!**



**[www.sportmedizin-chl.lu](http://www.sportmedizin-chl.lu)**



**Sports Trauma and Overuse Prevention**  
[www.STOPsportsInjuries.org](http://www.STOPsportsInjuries.org)

 Société Luxembourgeoise de Recherche en Orthopédie et en Médecine du Sport asbl.

**6. SPORTMEDIZINISCHER WORKSHOP**  
**6<sup>e</sup> WORKSHOP MEDICO-SPORTIF**

für Ärzte, Physiotherapeuten und Trainer  
pour médecins, kinésithérapeutes et entraîneurs

**"LEISTENSCHMERZEN IM SPORT-  
PUBALGIES DU SPORTIF"**

**Samstag / Samedi, 03.12.2011**  
**08.45 - 14.00 h**



 Centre de l'Appareil Locomoteur,  
de Médecine du Sport et de Prévention

 LE GOUVERNEMENT  
DU GRAND-DUCHÉ DE LUXEMBOURG  
Département ministériel des Sports

 **crpt** Centre de Recherche en Prévention et en Traumatologie