Biomecânica dos Complexos Articulares do MEMBRO INFERIOR

Isabel Sacco – FMUSP

1

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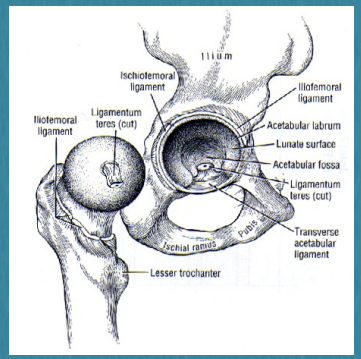
COMPONENTES DO QUADRIL



PELVE

(isquio, ilio, pubis)

FÊMUR

3

FUNÇÃO

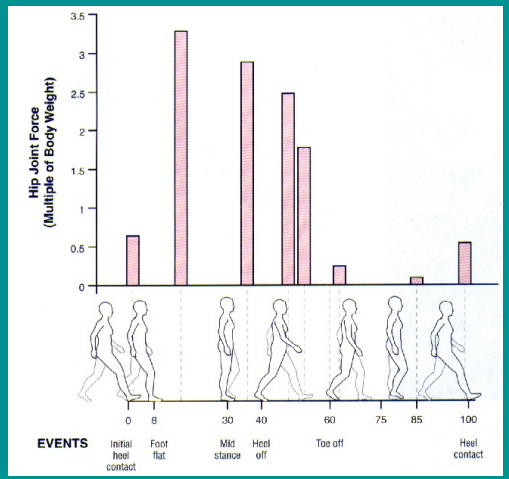
PRIMORDIALMENTE:

SUSTENTAÇÃO DO PESO

Em posturas estáticas e dinâmicas

TRANSMISSÃO DE FORÇAS

4



5

SALTO TRIPLO

Peso do atleta + velocidade =

grande sobrecarga da articulação do quadril

15 x PC

6

ADM X PATOLOGIA

7

COMPLEXO DO QUADRIL

ARTICULAÇÃO SINOVIAL, TIPO ESFERÓIDE

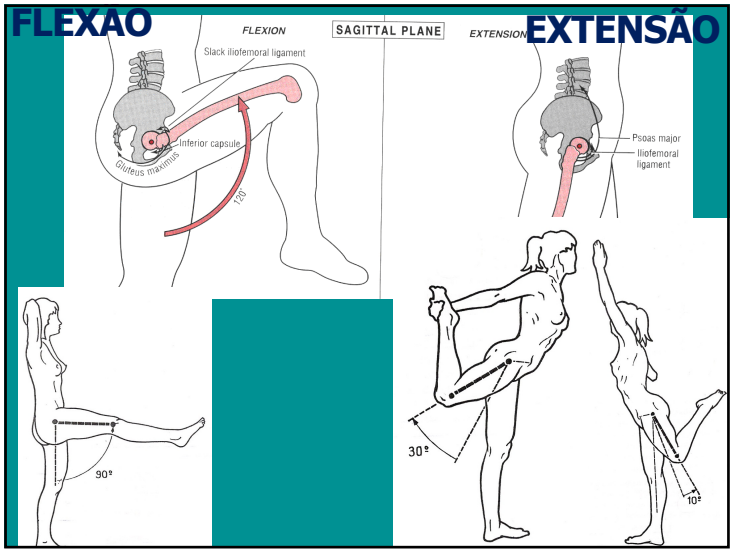
3 GRAUS DE LIBERDADE:

PLANO SAGITAL: MOV. FLEXÃO / EXTENSÃO

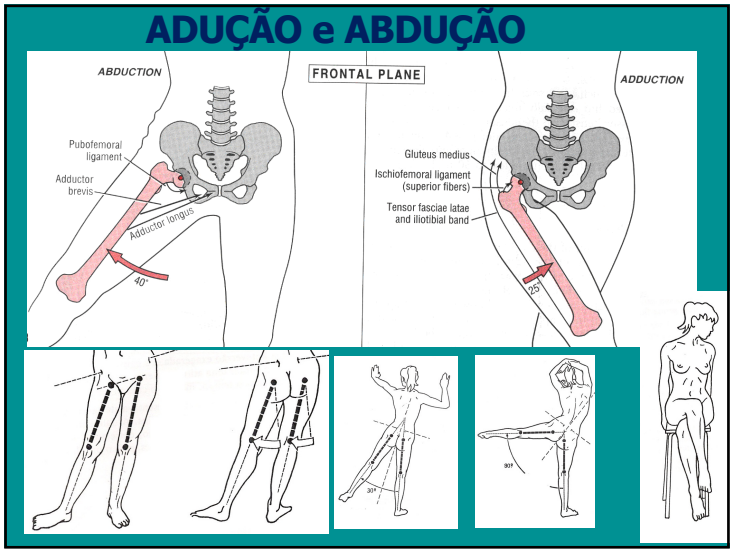
PLANO FRONTAL: MOV. ABDUÇÃO / ADUÇÃO

PLANO TRANSVERSO: ROT. MEDIAL / LATERAL

8

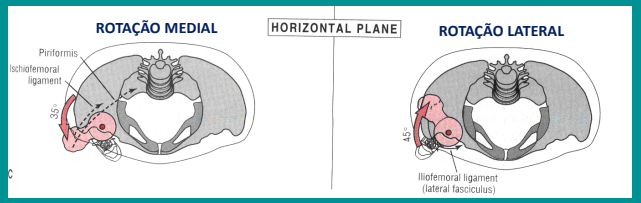

FLEXÃO
FLEXION
SAGITTAL PLANE
EXTENSION
EXTENSÃO
Slack iliofemoral ligament
Inferior capsule
Gluteus maximus
120
Psoas major
Iliofemoral ligament
90°
30°
10°

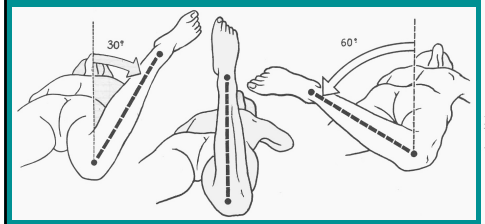
9

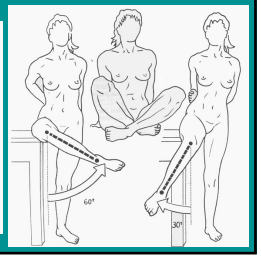

ADUÇÃO e ABDUÇÃO
ABDUCTION
FRONTAL PLANE
ADDUCTION
Pubofemoral ligament
Adductor brevis
Adductor longus
40°
Gluteus medius
Ischiofemoral ligament (superior fibers)
Tensor fasciae latae and iliotibial band
25°

10

ROTAÇÃO







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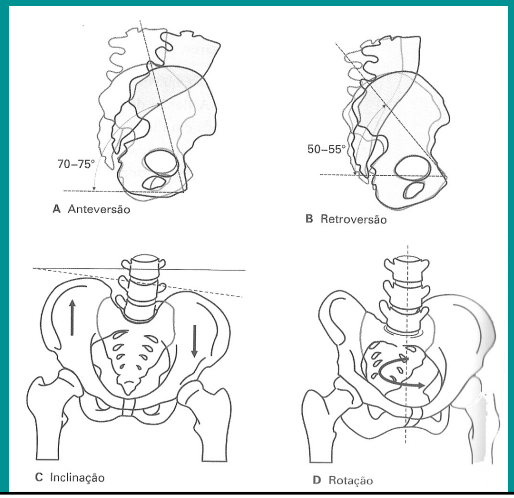
MOVIMENTOS DA CINTURA PÉLVICA



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MOV.	ADM	LIMITANTES
Flexão	90º (joelho.ext)	IQT e Grácil
	120º (Joelho flex)	Fibras inf. lig. Isquiofemoral e cápsula inferior
Extensão	20º (joelho ext)	Predomin. lig. Iliofemoral e cápsula inf; alguns componentes lig. pubofemural e isquiofemoral
	10º (joelho flex)	Reto femoral
Abdução	40º	Lig. pubofemoral, cápsula inf., adutores e IQT
Adução	25º	Fibras sup. Isquiofemoral, trato iliotibial, abdutores
Rot. medial	30º	Lig. isquiofemoral, rotad. laterais (piriforme)
Rot. lateral	60º	Feixe lat. lig. Iliofemoral, trato iliotibial, rot. mediais

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AMPLITUDES FUNCIONAIS

- **Calçar sapatos com o pé no chão:**

- sagital = 124° frontal = 19° transversal = 15°

- **Calçar sapatos com o pé sobre a coxa do lado oposto:**

- sagital = 110° frontal = 23° transversal = 33°

- **Inclinar para pegar objetos:**

- sagital = 117° frontal = 21° transversal = 18°

- **Sentar e levantar de cadeiras:**

- sagital = 104° frontal = 24° transversal = 17°

- **Agachamento:**

- sagital = 122° frontal = 28° transversal = 26°

- **Subir escadas:**

- sagital = 67° frontal = 16° transversal = 18°

- **Descer escadas:**

- sagital = 36°

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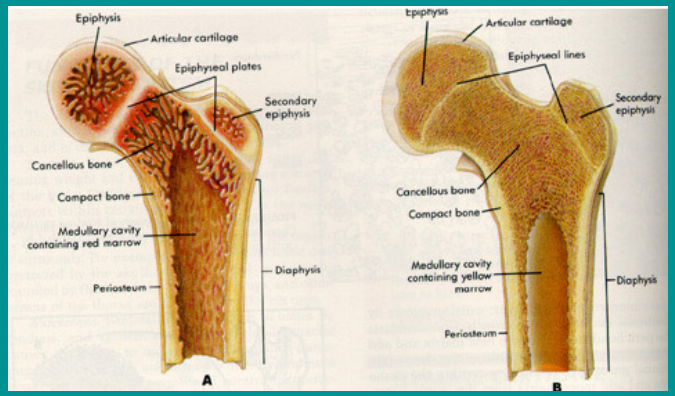
FÊMUR – OSSO LONGO



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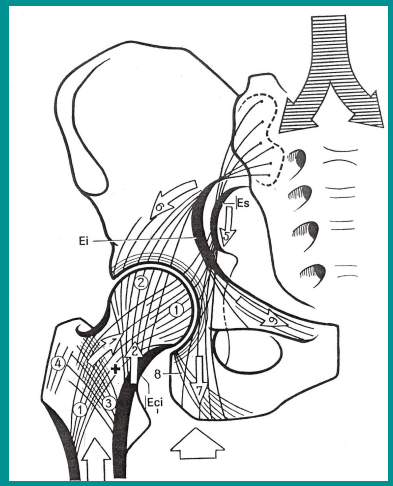

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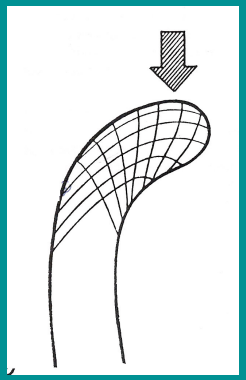
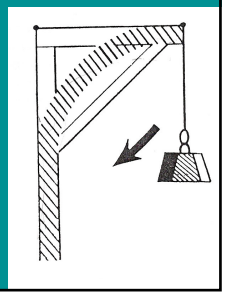
DISTRIBUIÇÃO DAS LINHAS DE FORÇAS

TRAÇÃO



COMPRESSÃO



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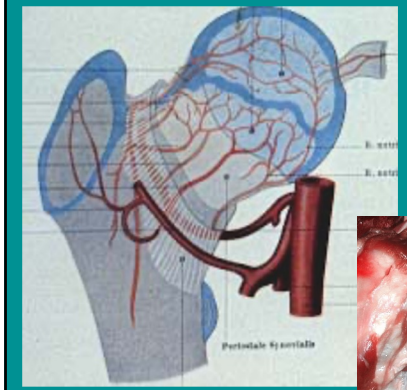
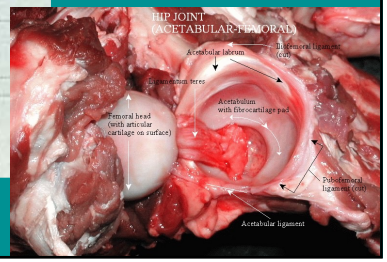
Vascularização





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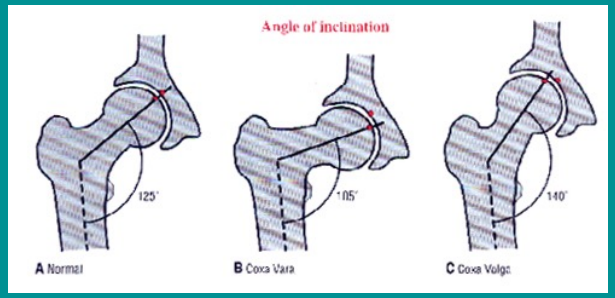
ÂNGULO DE INCLINAÇÃO

Crianças: 150º Adultos: 125º Idosos:120º



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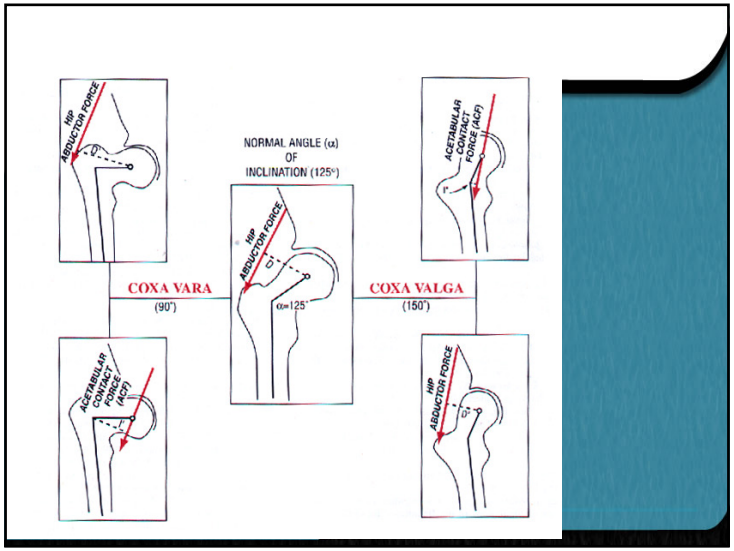

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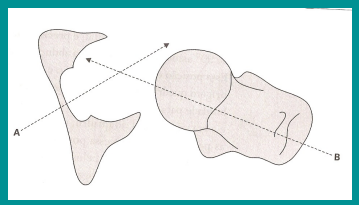
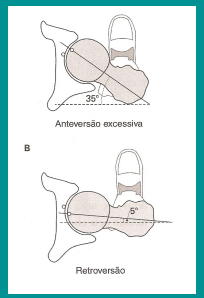
ORIENTAÇÃO DO ACETÁBULO

Voltado pouco lateralmente, inferiormente e anteriormente

ÂNGULO DE ANTEVERSÃO





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Posição de fechamento da articulação:

Por definição: é a posição de maior estabilidade articular

ABDUÇÃO – ROTAÇÃO LATERAL – FLEXÃO (<90°)

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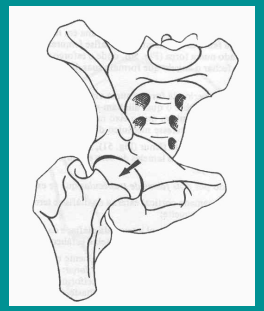
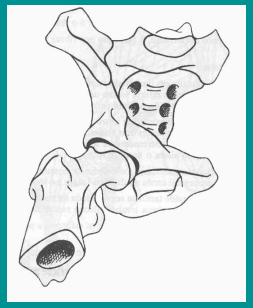
COAPTAÇÃO ARTICULAR



POSIÇÃO ANATÔMICA



FLEXÃO +ABDUÇÃO + ROT. LATERAL

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ESTABILIDADE

- ÓSSEA
  - SUPERFÍCIES ARTICULARES
  - ÂNGULO DE INCLINAÇÃO
  - ÂNGULO DE ANTEVERSÃO
- PESO / GRAVIDADE
- PRESSÃO NEGATIVA INTRA-ARTICULAR
- LIGAMENTOS
- MÚSCULOS

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Estruturas de estabilidade da articulação do quadril

CARTILAGEM ARTICULAR

CÁPSULA ARTICULAR

Mais reforçada anteriormente

LÁBIO ACETABULAR: Anel fibrocartilaginoso, aumentar congruência articular , Formato triangular, Insere-se na borda do acetábulo, Também se fixa com a cápsula articular para o lado de fora

LIGAMENTOS

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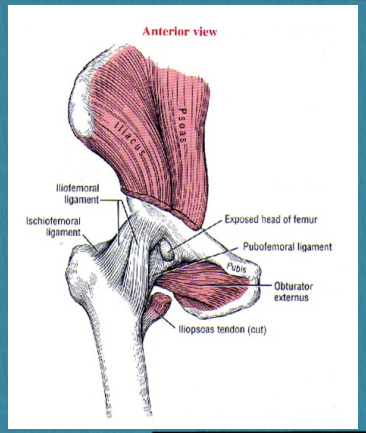
LIGAMENTOS DO QUADRIL



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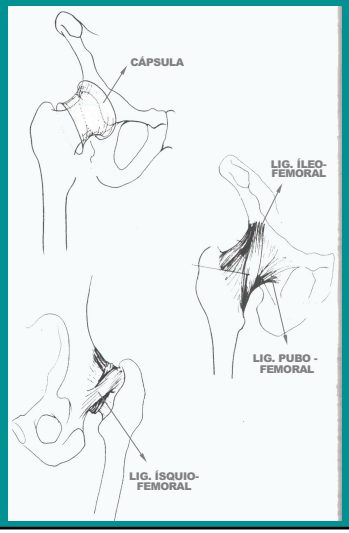
ESTABILIDADE ESTÁTICA



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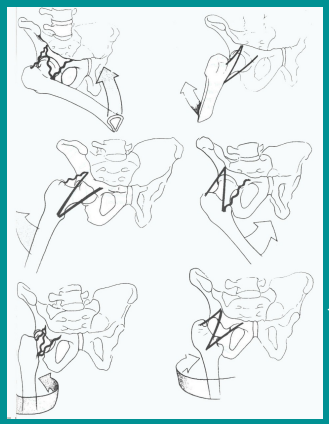
LIGAMENTOS

FLEXÃO →

ABDUÇÃO →

ROT. MEDIAL →



← EXTENSÃO

← ADUÇÃO

← ROT. LATERAL

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MÚSCULOS ANTERIORES

Adutores:

- adutor longo
- adutor curto
- adutor magno
- pectíneo
- grácil

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MÚSCULOS FLEXORES

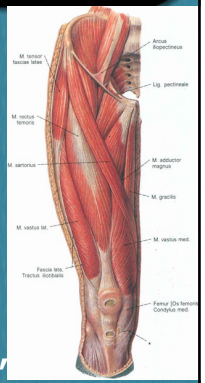
Flexores Primários:

-iliopsoas

- reto femoral
- tensor da fáscia lata
- sartório

Flexores Secundários:

Pectíneo, adutor longo e magno, grácil (40 e 50 º de flex)



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MÚSCULOS POSTERIORES

Extensores:

-glúteo máximo

-IQT : bíceps femoral
semitendinoso
semimembranoso

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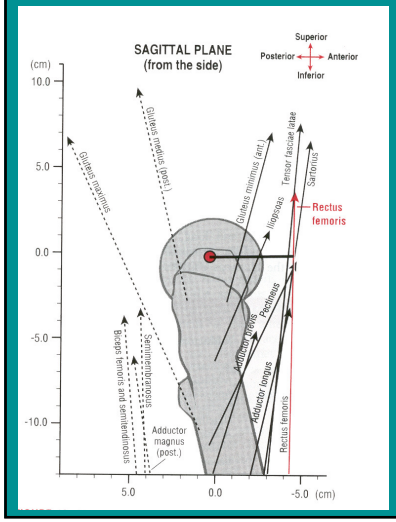

MM. FLEXORES / EXTENSORES

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MÚSCULOS VISTA LATERAL

Abdutores

-glúteos médio, mínimo

Função: abdução CCA e CCF; estabilizar pelve unilateral

-Tensor da fáscia lata

manter tensão da banda iliotibial

-

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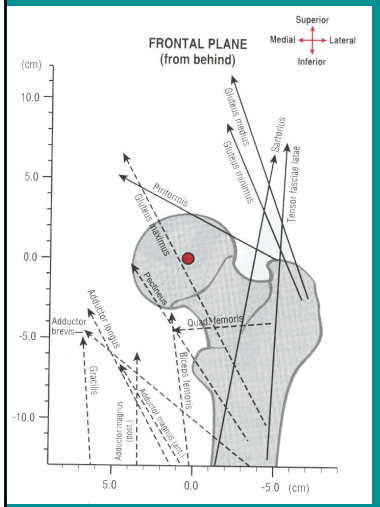

MM. ADUTORES / ABDUTORES

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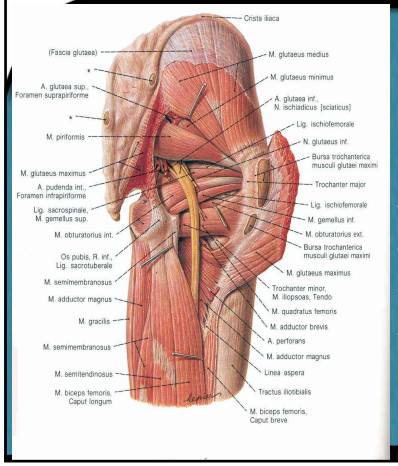
MÚSCULOS POSTERIORES



ROTADORES LATERAIS

-obturadores externo e interno

-quadrado femoral

- piriforme

- gêmeo inferior e superior

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ADM QUADRIL X LOMBAR

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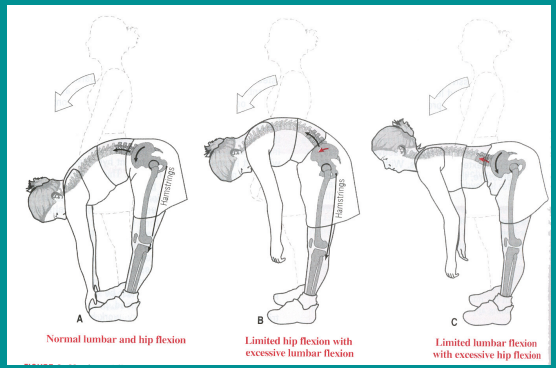
RITMO LOMBO – PÉLVICO



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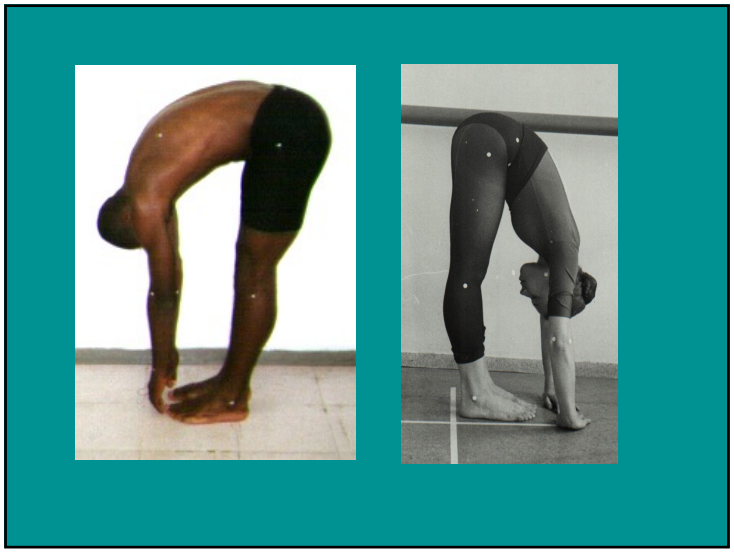

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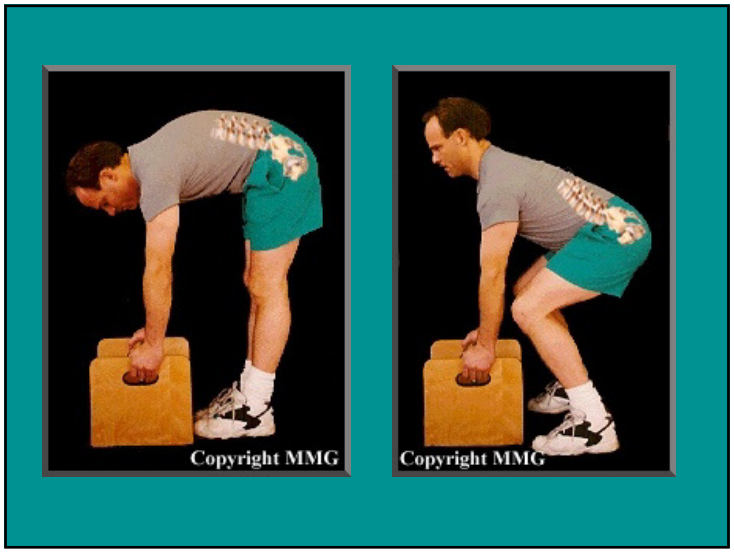

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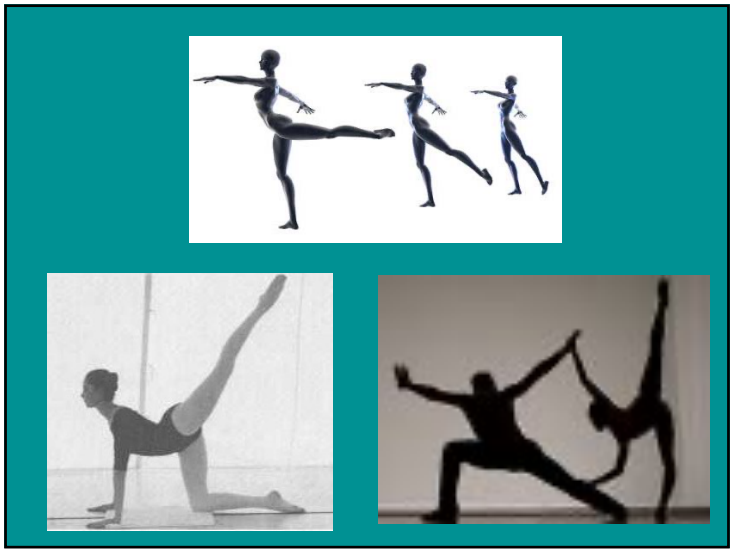

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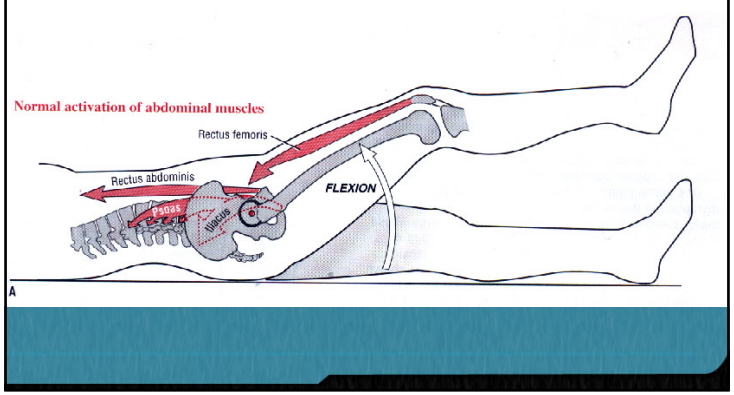
Flexão Quadril musculatura abdominal



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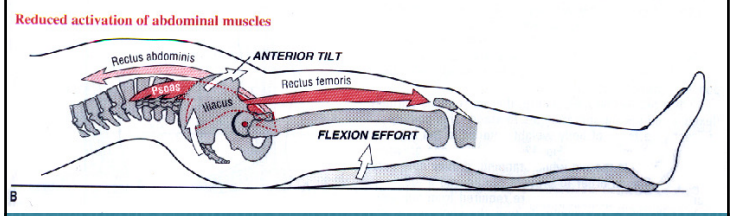
Flexão Quadril – musculatura abdominal



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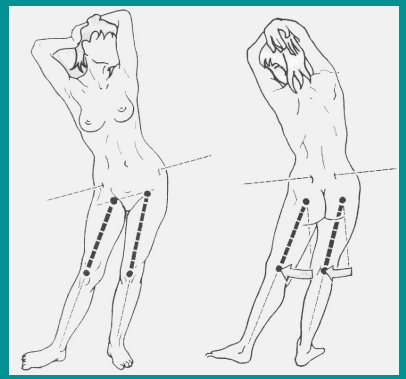
EQUILÍBRIO LÁTERO-LATERAL DA PELVE



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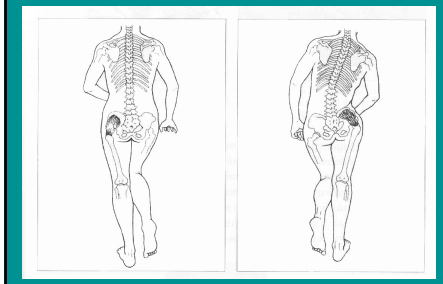
SINAL DE TRENDELEMBURG



- **marcha**: a partir da fase de médio apoio, até o contato inicial do membro há importante ação do glúteo médio oposto para manter nivelamento da pelve

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Modificações andar para reduzir contact forces Q

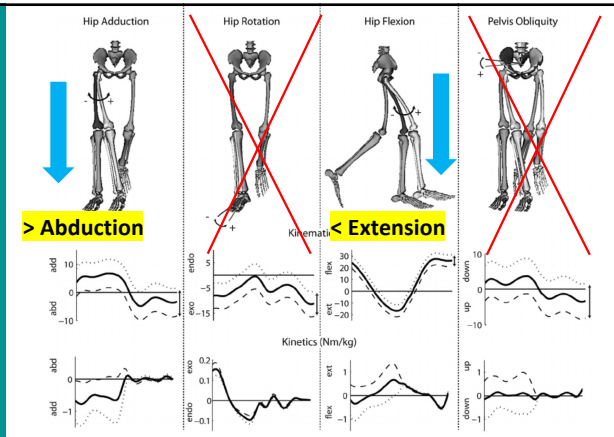

Figure 1. The different perturbations by ±5° in hip and pelvis kinematics. Specifically, the hip adduction, rotation, and flexion angles as well as pelvis obliquity were perturbed. The kinematic graphs show the average nominal joint angles (solid line) and the perturbations by +5° (dotted line) and − Screenshot). The kinetic graphs show the average nominal joint moments (solid line) and the moments when perturbing the kinematics by +5° (dotted line) and −5° (dashed line).

Wesseling et al. Journal of Orthopaedic Research, 2015

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Gait Alterations to Effectively Reduce Hip Contact Forces

Mariska Wesseling,[1] Friedl de Groote,[2] Christophe Meyer,[3] Kristoff Corten,[4] Jean-Pierre Simon,[5] Kaat Desloovere,[3] Ilse Jonkers[1]

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ABSTRACT: Patients with hip pathology present alterations in gait which have an effect on joint moments and loading. In knee osteoarthritic patients, the relation between medial knee contact forces and the knee adduction moment are currently being exploited to define gait retraining strategies to effectively reduce pain and disease progression. However, the relation between hip contact forces and joint moments has not been clearly established. Therefore, this study aims to investigate the effect of changes in hip and pelvis kinematics during gait on internal hip moments and contact forces which is calculated using muscle driven simulations. The results showed that frontal plane kinetics have the largest effect on hip contact forces. Given the high correlation between the change in hip adduction moment and contact force at initial stance ($R^2 = 0.87$), this parameter can be used to alter kinematics and predict changes in contact force. At terminal stance the hip adduction and flexion moment can be used to predict changes in contact force ($R^2 = 0.76$). Therefore, gait training that focuses on decreasing hip adduction moments, a wide base gait pattern, has the largest potential to reduce hip contact forces. J Orthop Res 33:1094–1102, 2015.

Wesseling et al. Journal of Orthopaedic Research, 2015

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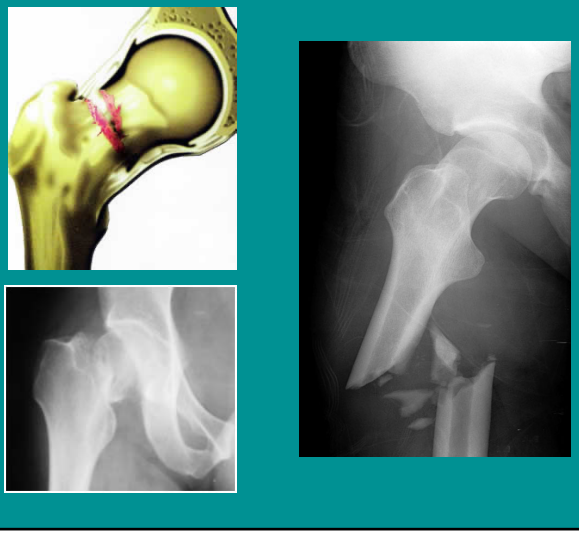

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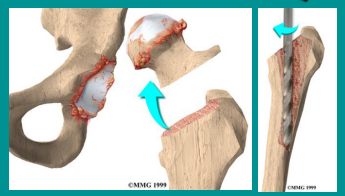
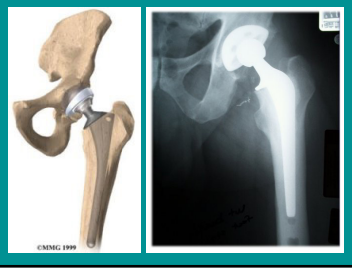
ARTROPLASTIA TOTAL DE QUADRIL –





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ARTROPLASTIA TOTAL DO QUADRIL

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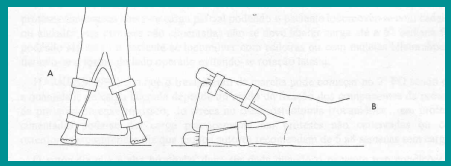
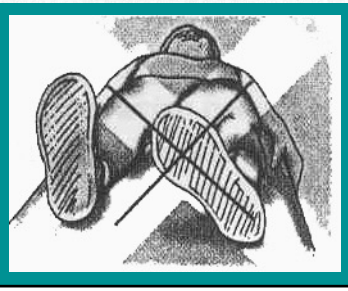
POR QUE ?





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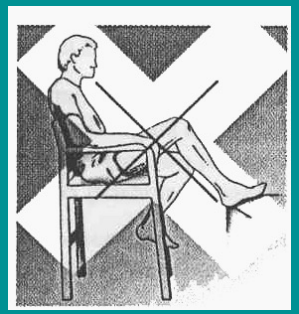

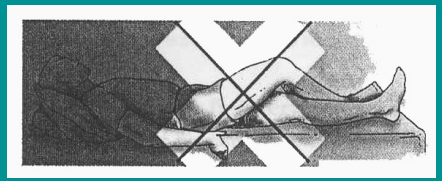

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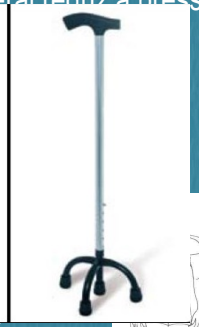
BENGALA

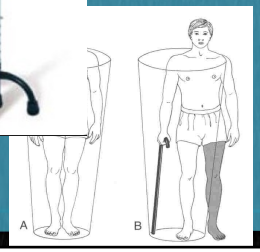
⇒ Bengala contra-lateral reduz a pressão sobre o quadril



⇒ Melho

do pacien

os limites de estabilidade



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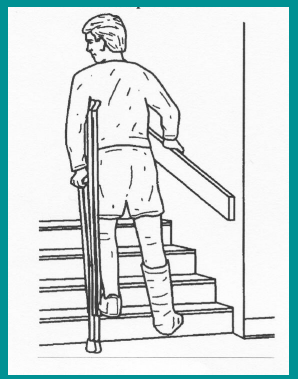

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