Open hip surgery for borderline hip dysplasia

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Objectives

1. Review hip dysplasia workup and natural history
   - Focus on "Mild" or "borderline"
2. Understand treatment options for mild dysplasia
   - Open vs. arthroscopic surgical indications
   - Physical therapy
     - nonop, preop, postop

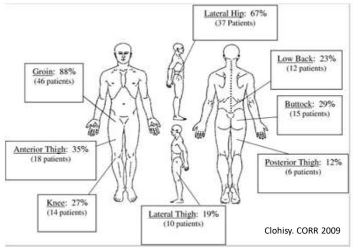
Hip dysplasia

- Underdeveloped acetabulum that leads to pain, chondrolabral problems and early onset arthritis
  - Size
  - Shape
  - Orientation
- Femur
  - Torsion
  - Sphericity
  - Offset or CAM lesion
- Ligamentous laxity

Presentation

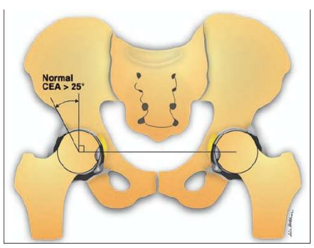
History
- Groin pain **
- Activity related abductor pain
- Sitting pain common due to iliopsoas discomfort

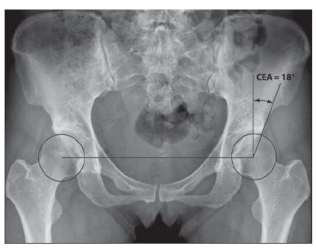
Exam
- Beighton index
- Increased hip flexion and IR
- Apprehension
- Anteversion
- Iliopsoas snapping
- Abductor weakness



Clohisy. CORR 2009

Lateral Center Edge Angle (LCEA)

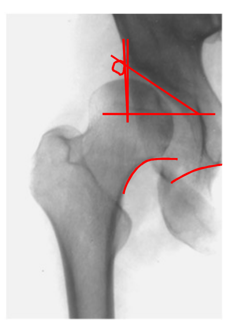




Wiberg 1939

AP Imaging Findings

- Arthrosis (Tonnis grade)
- Congruence
- Coverage deficit (LCEA)
- Rim impaction / fracture
- Joint obliquity (A. index or tonnis angle)
- Subluxation
  - Shenton's line
  - Ilioischial line to femoral head distance



Femoro-epiphyseal acetabular roof (FEAR) index > 2

LCEA 20
FEAR 0
stable

LCEA 20
FEAR 8
unstable

Wyatt and Beck. CORR 2017

Severity Grading

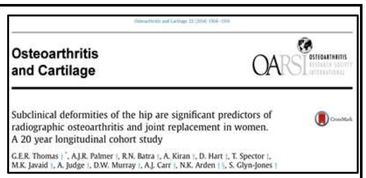
	Mild	Moderate	Severe
LCEA	15-25	5-15	<5
AI	10-20	21-30	>30

Prognostic value in long term follow-up studies

Matheney. JBJS 2016

Mild vs. borderline

- Confusing definitions:
  - Mild: 15-25
  - Borderline: 20-25
- Abandon term borderline
- LCEA < 28 deg increases risk of OA 13% per degree
- LCEA < 30 deg is risk factor for OA

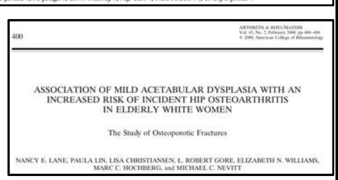


Osteoarthritis and Cartilage

OARSI

Subclinical deformities of the hip are significant predictors of radiographic osteoarthritis and joint replacement in women. A 20 year longitudinal cohort study

G.E.R. Thomas, A.J.R. Palmer, R.N. Batra, A. Kiran, D. Hart, T. Spector, M.K. Javaid, A. Judge, D.W. Murray, A.J. Carr, N.K. Arden, S. Glyn-Jones

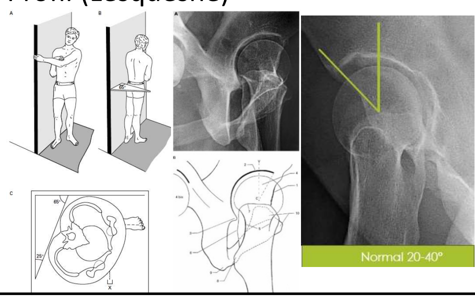


ASSOCIATION OF MILD ACETABULAR DYSPLASIA WITH AN INCREASED RISK OF INCIDENT HIP OSTEOARTHRITIS IN ELDERLY WHITE WOMEN

The Study of Osteoporotic Fractures

NANCY E. LANE, PAULA LIN, LISA CHRISTIANSEN, L. ROBERT GORE, ELIZABETH N. WILLIAMS, MARC C. HOCHBERG, and MICHAEL C. NEVITT

Anterior Coverage-ACEA
Faux Profil (Lesquesne)



Lateral XR (Dunn, cross table, frog, etc.)

- Offset or CAM
- Aspherical femoral head
  - Capsule and gluteus minimus remodeling of femoral head

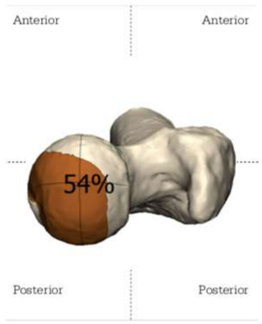
Steppacher. CORR 2008
Beck. Acta Orthop 2001

MRI

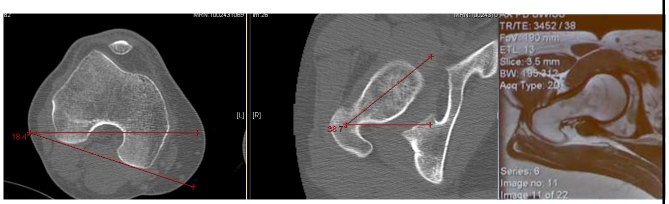
- Iliocapsularis and iliopsoas hypertrophy
- Labrum hypertrophy and/or tear
  - Sagittal and radial or axial oblique sequences
  - Tension failure?
- Cartilage
  - Chondral defects
  - Rim signal change
- Femur
  - Offset
  - Fovea position
  - Torsion

CT

- Acetabular version
- Femur
  - Offset
  - High fovea position
  - Torsion
- 3D
  - % femoral head coverage
  - Location of deficiency



Femoral torsion



Pathomechanics

- Decide whether instability vs. impingement is the primary issue

Table 1. Overview of various parameters used to assess hip instability

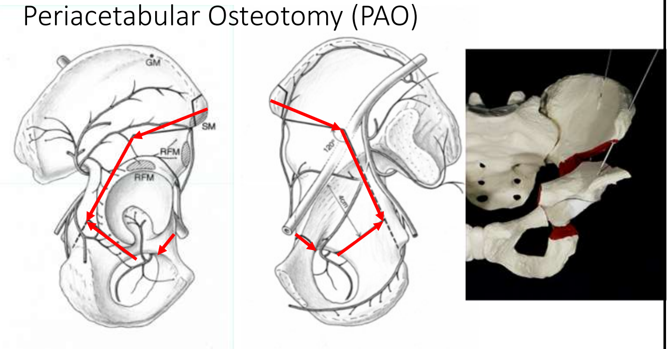
	Parameters	*Estimated predictive value in %*
Parameters proving hip instability	Break of Shenton's line	100
	Increased distance from the ilioischial line	100
	Recentering of the femoral head on abduction view	100
	Posterior crescent sign on MR-arthrography	90
	FEAR index >2°	92
Parameters highly indicative for hip instability	LCEA <20°	70
	AI >10°	70
	NSA >135°	55
	Femoral antetorsion >25°	70
Parameters often present in hip instability	Hypertrophy of labrum	50
	Increased volume of M. iliocapsularis	50
	Lig. Teres tear	70

Wyatt and Beck. J Hip Pres 2018

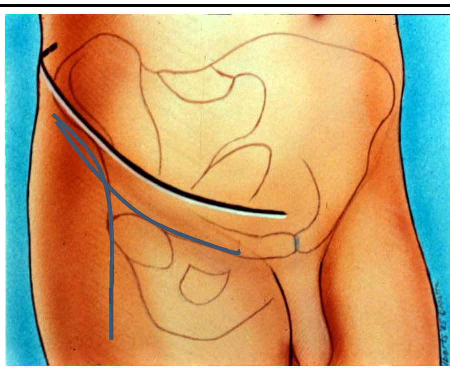
Non-operative treatment

- Physical therapy
  - Abductor strengthening
  - Hip Flexor strengthening
- Activity modification
- Annual surveillance radiographs

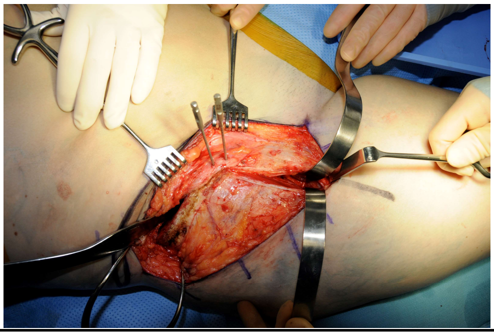
Periacetabular Osteotomy (PAO)



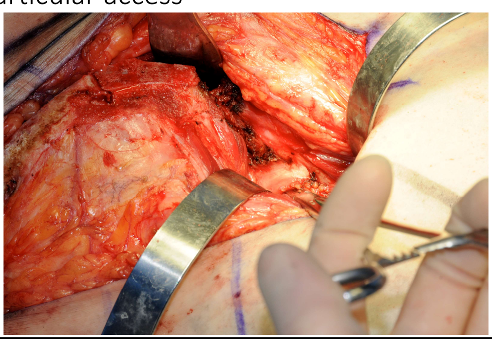
Approach



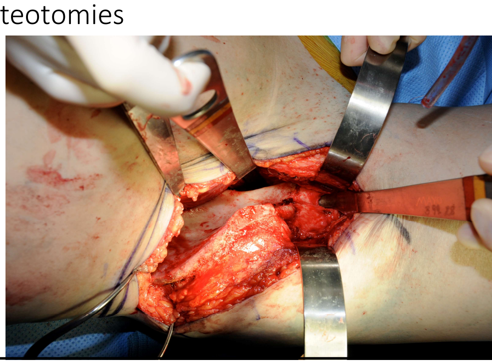
Approach



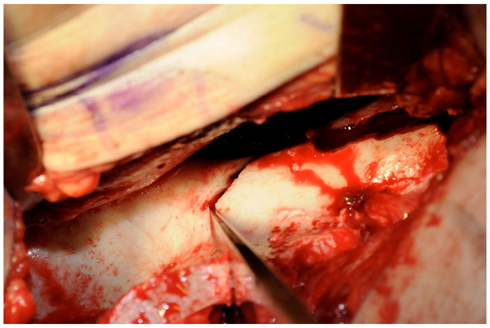
Intra-articular access



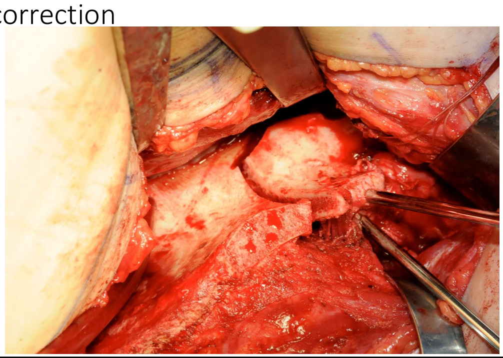
Pre-osteotomies



Post-osteotomies



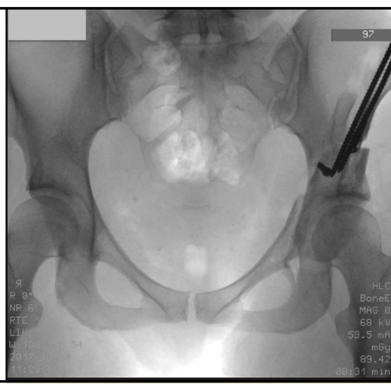
Post-correction



Case 1

37yo female s/p failed scope

- Left groin pain 10 years
- No mechanical sxs
- PE
  - Global hyperlaxity
  - Hip 105 flex
  - 50/45 IR/ER
  - 60 IR prone
  - 50 abd
- LCEA 17
- AI 5
- ACEA 19
- Torsion 18
- MRI
  - Hypertrophic tension labral tear

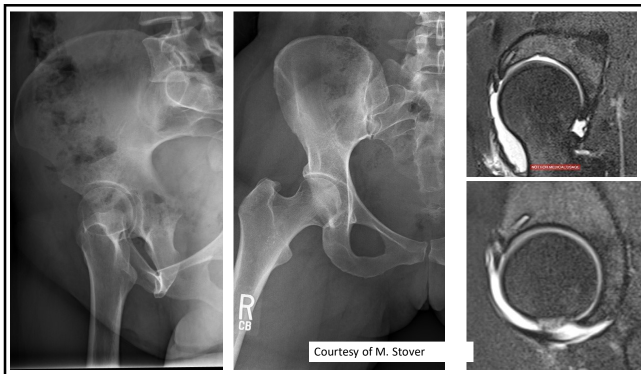


Case 2

40yo female s/p failed scope X2

- Right groin pain 4 years
- No mechanical sxs
- Better with injection
- PE
  - Global hyperlaxity
  - Hip 110 flex
  - 45/50 IR/ER
  - 70 IR prone
  - 55 abd

Courtesy of M. Stover



Courtesy of M. Stover

Mild dysplasia with anterior instability

- Mild dysplasia
  - LCEA 24
  - ACEA 25
  - AI = 11
- Femoral torsion 26
- CCD 140
- Acetabulum version 26
- Alpha 50
- MR –repair appearance
- DGEMRIC > 400 in samples

Courtesy of M. Stover

Courtesy of M. Stover

Arthroscopy in dysplasia

- Short term benefit in some arthroscopic publications
  - Limited PROs
  - Limited long-term follow up
  - Limited information on long-term sequela and subsequent operations
- Arthroscopy alone does not address osseus pathomorphology
  - Mechanical overload that led to the labral injury is unchanged
  - May accelerate arthrosis
- Failed arthroscopy prior to PAO results in inferior outcome compared to PAO as the primary procedure
- Valuable adjunct to open hip surgery to address intra-articular pathology
- May be indicated in cases when impingement > instability is main problem

Jo. J Hip Pres 2016
Parvizi. J Arthroplasty 2009
Clohisy. J Arthroplasty 2014
Kelly. AJSM 2017

Postop PT

PHASE 1 (starting postop day 1)

- CPM - start at 40 degrees advance as tolerated to 90°
- No SLR or active abduction
- Quadriceps, hamstring and gluteal isometrics
- Approx. 20kg WB with walker and/or crutches
- Prone position BID for 30 minutes
- When cpm returned → seated active hip flexion with spine extension.

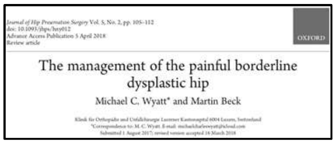
PHASE 2 (typically 6-8 weeks postop)

- Transition to full WBAT – wean from aids as gait normalizes.
- Abductor focused LE strengthening (standing preferred).
- Recumbent bike → water jogging → elliptical.
- Proprioceptive training, modalities.
- No lunges, squats, stairmaster.
- Leg press <70° hip flexion – preferably low weight and high reps.

Summary

1. Patients with mild hip dysplasia require detailed workup
   - Decide impingement vs. instability as primary problem

2. Treatment options for mild dysplasia include
   - Physical therapy
   - Open hip surgery
   - Arthroscopic hip surgery



Journal of Hip Preservation Surgery Vol. 5, No. 2, pp. 105–112
doi: 10.1093/jhps/hny012
Advance Access Publication 5 April 2018
Review article

OXFORD

The management of the painful borderline dysplastic hip

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Submitted 1 August 2017; revised version accepted 18 March 2018