BE CHILLY in PÆDIATRIC ORTHOPÆDICS

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OMISSION

- limping
- knee
  - acute
  - chronic
- foot
  - metatarsus adductus
  - flat
- torsion
  - knock knees
  - bow legs
- scoliosis
- back pain

LIMPING CHILD

frequency

transient synovitis 3x
pyarthrosis
osteomyelitis
trauma
Legg-Calvé-Perthes
rheumatoid arthritis
diskitis

WNB 1 < 10%
fever > 38.5°C 2 ~ 40%
WBC > 12K 3 > 75%
ESR > 40 mm/hr. 4 > 90 %
CRP > 10 mg/L 5 > 87% NPV
50% PPV
LIMPING CHILD

- transient synovitis
- pyarthrosis
- osteomyelitis
- trauma
- Legg-Calvé-Perthes
- rheumatoid arthritis
- diskitis

PERIPHERAL JOINT

arthrocentesis

frequency

3x

TORSION

- adult rotational profile established by 8 yrs.
- reassure, reassure, reassure:
  - nothing alters natural history except:
- in-toe ing spontaneously improves
- in-toeing may offer a functional advantage
- out-toeing does not improve, and may be disadvantageous

GENU VALGUM et VARUM

- generalised
- focal
- symptomatic
- ugly

STOP

maximum genu valgum @ 3 yr.
- initiate Rx of genu varum @ 3 yr.

= refer genu varum @ 3 yr.

maximum genu valgum @ 3 yr.
- spontaneous improvement till 8 yr.

= refer genu valgum @ 8 yr.

nothing alters natural history except

Jordan Elway Agassi
KNEE – acute

- History: mechanism
- Significant?
- Physical: effusion

Röntgenogrammes

- Fracture
- Yes
- Crutches + immobilizer
- Refer... within week
- No
- Crutches for comfort
- Immobilizer
- Refer... @ 6 wk

KNEE – chronic

- Patellofemoral ligament instability
- Meniscal disease
- OCD
- Effusion
- Tendinitis
- Apophysitis

LIMB LENGTH DISCREPANCY

- Evidence?
- Immature
- Mature
- Tendinitis
- Amputation

- LLD
  - @ maturity

FOOT – flat foot

- ≤ 20% United States’ population
- Not abnormal
FOOT – arch

FOOT – flat foot

FOOT – flat foot

FOOT – flat foot

arch / heel

flat foot

normal

cavus

1

0.5

0

7 yr.

not abnormal

90% flexible

rigid 10%

75% s tight heel cord

25% c tight heel cord

observation

orthotic

operation

<10%

hindfoot valgus

hindfoot varus

no medial longitudinal arch

arch restored standing on toes
SCOLIOSIS – types

ST RUC TUR AL

IDIOPATHIC

unknown aetiology?

CONGENITAL

vertebral anomaly

NEUROMUSCULAR

cerebral palsy
myelodysplasia

e.g. skeletal dysplasia

SYNDROMIC
e.g. skeletal dysplasia
**NATURAL HISTORY**

- progression: \( \alpha \) 1/maturity
- \( \alpha \) curve

\[ \begin{align*}
\text{fusio}n & \quad \text{> 30°} \\
\text{< 10 yr} & \quad \text{fusion}
\end{align*} \]

[di Méglio A. Spine 31:1933-42, 2006]

**NATURAL HISTORY**

- progression post maturity: \( > 45° \)
- \( \frac{3}{4} \)
- average 28°

- cardiopulmonary D:
  - thoracic \( > 90° \)

- sitting/other care issues:
  - lumbar

- appearance:
  - psychosocial impact

- back pain

**MANAGEMENT**

**SCREENING**

- test specific and sensitive, reproducible, easy to perform
- applied to @ risk population
- cost:benefit ratio acceptable
  - cost to patient = psychosocial effect of brace
  - cost to society = financial during childhood
    - employment and medical care in adulthood
- assumption that early intervention alters natural history
  - id est bracing effective

SCREENING

“schooliosis”

<table>
<thead>
<tr>
<th>observe</th>
<th>brace</th>
<th>fusion</th>
<th>degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>30</td>
<td>50</td>
<td></td>
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</tbody>
</table>

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SCREENING

normal variation

- rib hump ≤ 75%
- lumbar prominence ≤ 80%
- shoulder elevation ≤ 10 mm
- waist asymmetry ≤ 15 mm.
- lower limb length discrepancy ≤ 50%

[Vercauteren M. Spine 1982]

SCREENING

angle of trunk rotation

referred/missed students (N = 1000)

[Bunnel WP. JBJS-A 1984]

SCREENING

normal variation

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- lumbar prominence ≤ 80%
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- lower limb length discrepancy ≤ 50%

[Vercauteren M. Spine 1982]
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    = employment and medical care in adulthood


SCREENING

- began 1962 in U.S.A.

- Scoliosis Research Society guidelines [ SRS 1999 ]:
  - @ 10 + 12 yr.
  - @ 13 or 14 yr.

- abandoned in Great Britain
- abandoned in Canada

SCREENING

- "schooliosis" observe brace fusion degree
  - 10 30 50

- 4% referred (92/2242)
- 0.2% treated (5/2242)
  (3 TLSO, 2 fusion)

if you don’t believe in bracing, then <0.1% need treatment

[Yawn BP. JAMA 1999]

SCREENING

- "schooliosis" observe brace fusion degree
  - 10 30 50

- 5% @ risk

- 4% referred (92/2242)
- 0.2% treated (5/2242)
  (3 TLSO, 2 fusion)

**SCREENING**

- **4,800 fusions**
  - **$168,000,000**
  - **3% referred**
  - **10% (0.3%) brace**
  - **10% (0.03%) fusion**
  - **$221,000,000**

[Bunnel WP. *Spine* 1993]

**SCREENING**

- "schooliosis" test specific and sensitive, reproducible, easy to perform
- applied to @ risk population
- cost:benefit ratio acceptable
  - cost to patient = psychosocial effect of brace
  - cost to society = financial during childhood
  = employment and medical care in adulthood
- assumption that early intervention alters natural history *id est* bracing effective


**BRACING**

- "schooliosis" observe brace fusion
  - 10
  - 30
  - 50
  - 5% @ risk

Milwaukee
- introduced as postoperative brace
- poorly tolerated: compliance ≤ 66%

[Blount WP. *JBJS-A* 1958]

Boston
- advantage: no collar
- disadvantage: ≤ T6

[Hall JB. *Prosthet Orthot Int* 1975]
BRACING

contraindication
- curve > 40º
- apex > T6
- thoracic lordosis
- obesity
- non-idiopathic
- too mature (e.g. post-menarche)

failure
- < 10 yr.
- correction in brace < 50%

“brace signature”
- worse outcomes if operation

BRACING

10 30 50

“schooliosis” observe brace fusion degree

- 5º @ risk

compliance 60-75%

[Diraimondo CV. JPO 1988
Bowen RJ. Spine 2004]

BRACING

10 30 50

“schooliosis” observe brace fusion degree

- 5º @ risk

? efficacy
no brace = surgery 26% (43/153)
brace = surgery 23.5%

[Weinstein S. Spine 2007; Goldberg CJ. Spine 2001; Dickson RA. JBJA 1999]
**MANAGEMENT**

- “Schoolosis”
- Observe
- Fusion

- 10
- 30
- 50

- **5° @ risk**

**AIS – refer**

- Curve > 25°
- Associated sign on PE: neural change
- Cutaneous stigma
- Significant pain: nocturnal
- Constant
- Focal
- Increasing
- Short duration (< 3 mo)

**BACK PAIN**

**the problem in adults**

- ≤ 80% of adults experience back pain
- Most common cause of back pain is “idiopathic”
- The most common identifiable problem is degenerative disc disease

**Hensinger RM. In The Pediatric Spine. New York, Thieme, 41-60, 1985**

**BACK PAIN**

**the problem in children, per tradition**

- Back pain in children is rare
- In ≤ 85%, there is an identifiable and treatable cause

**King HA. Pediatr Clin N Am 33:1489-1493, 1986**
BACK PAIN

the problem in children, *per* tradition

- back pain in children is rare
- 11–33% of children complain of back pain
  (Olsen TL. *Am J Public Health* 82:606-608, 1992)

child ≠ small adult

BACK PAIN

back pain in children is a diagnostic “black box”

child ≠ small adult

“overuse” “syndrome”
BACK PAIN

the problem in children, per tradition

• in ≤ 85%, there is an identifiable and treatable cause

• most common identifiable cause of back pain is spondylolysis

5% by 5 yr.

BACK PAIN

transverse process
vertebral body
superior articular process
tumor

BP: stress fracture of pars interarticularis

inferior articular process
sacrum

anterior

posterior

BACK PAIN

"idiopathic"

78%

7%
spondylolysis

identifiable cause 22%

6%
tumor

other 11%

infection arthritis neuropathy deformity

N = 217 age 2-17 yr. f/u 1-7 yr.

BACK PAIN

"idiopathic"

78%

7%
spondylolysis

identifiable cause 22%

6%
tumor

other 11%

infection arthritis neuropathy deformity

N = 217 age 2-17 yr. f/u 1-7 yr.

≈ 6%

≈ 10%
≥ 90% non-emergent & non-threatening

**BACK PAIN**

- Constant associated sx/s nocturnal ≤ 10% worrisome
- < 3 mo. increasing focal

**CANDIF**

- More common and less troublesome than once believed
- H & P C.A.N.D.I.F.
- Follow-up
- Judicious use of tests

**FIN**