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Overview and Prevention

Sports injuries in the young Football player

Steve Felsher

Sports and Olympic Soccer Physiotherapist

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Growth and Development

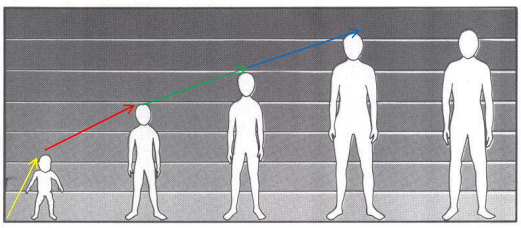
Pre-pubertal growth

❖Growth during childhood is a relatively stable process

❖Until about the age of 4 y, girls grow slightly faster than boys and both sexes then average a rate **of 5–6 cm/y** and 2.5 kg/y until the onset of puberty

❖A general rule of thumb is that a child grows:

➢25cm's in the first year of life
➢12–13 cm's in the second year
➢5–6 cm each year until puberty.



The increase in body size from birth to adult

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Adolescent growth spurt

✓ As puberty approaches, growth velocity slows "preadolescent dip"

✓Sudden acceleration during mid-puberty

✓Girls average a peak height velocity of **9 cm/y at age 12** and a total gain in height of **25 cm** during the pubertal growth period

✓Boys, on average, attain a peak height velocity of **10.3 cm/y, 2 y later than girls**, and gain **28 cm** in height

✓After a period of decelerating height velocity, growth virtually ceases because of epiphyseal fusion, typically at a skeletal age of 15 y in girls and 17 y in boys

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✓This growth spurt produces a rapid increase in both weight and height

✓Growth spurt occurs 12 ♀

✓Growth spurt occurs 14 ♂

✓During growth spurts most of the child's energy is used for growing.

✓Children will be easily tire & struggle with usual volume or intensity of training

✓Be aware of overload or overuse injuries!!!

✓Light training will stimulate growth if the child has enough energy.

Growth and pubertal development in children and adolescents: effects of diet and physical activity, Alan D Rogol, Pamela A Clark and James N Roemmich, From the University of Virginia Health Sciences Center Charlottesville. 1996

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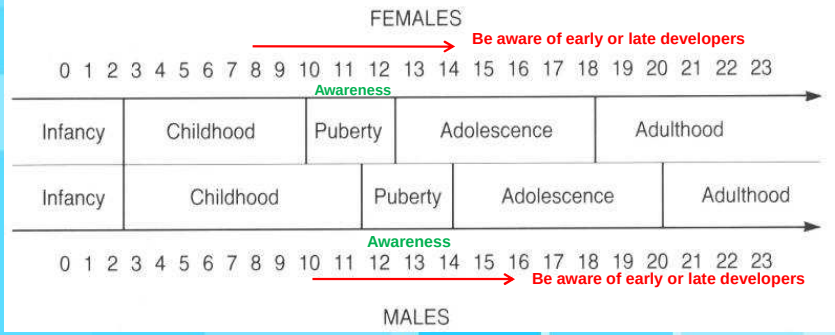
Growth and development

Stages in growth and development up to adulthood



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Some Football Statistics

- ✓Football the most popular sport in the world
- ✓FIFA recognising 265 million amateur players
- ✓Perceived to be a “safe sport”
- ✓Fastest growing team sport in the USA
- ✓Majority of injuries in football are minor
- ✓Less than 2% will need hospital admission
- ✓65-75%:Contusions and abrasions most commonly reported
- ✓Overuse injuries account for between 5 – 20%
- ✓Majority of soccer injuries are to lower limbs – 70%
- ✓Dominant limb more injured

- ✓ Knee injuries
- ✓ Ankle injuries

Soccer Injuries in Children, Anne Paterson, 2009

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Injury type

~ 85% of children's injuries a made up of –

- contusions, abrasions and blisters (23.5 – 53%)
- Muscle strains (19 – 35%)
- Ligament sprains (8 – 35.9%)

Major injuries make up ~ 15% of the total = greater financial resources

- Suspected fractures and dislocations, meniscal and ligament tears included (2.4 – 23.2%)

Soccer Injuries in Children, Anne Paterson, 2009

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Management of Musculoskeletal conditions in young footballers

• Younger football players suffer similar injuries to adults

E.g. ACL, Achilles Tendon, Groin Strains

• Some significant difference → structure of growing bone

* Children, pre-puberty and post puberty

Important to remember that our children are not little adults

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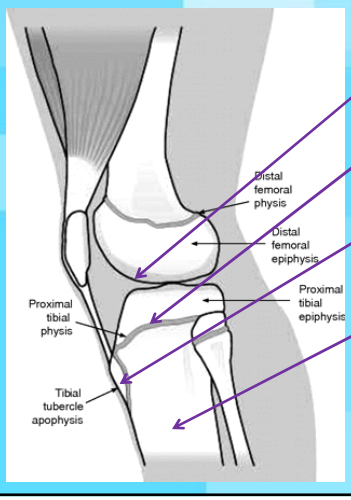
Anatomical differences between adult and growing bone



Articular cartilage of growing bone thicker and can remodel

Junction between epiphyseal plate and metaphysis vulnerable

Tendon attachment sites - cartilaginous plates, provide a relatively weak cartilaginous attachment – predisposing to avulsion injuries

Metaphysis of long bone in children more resilient and elastic – withstand greater deflection without fracture – children tend to suffer incomplete fractures of the greenstick type

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Injury to the junction between epiphyseal plate and metaphysis

Avulsion injuries at the apophyseal site

Greenstick fracture

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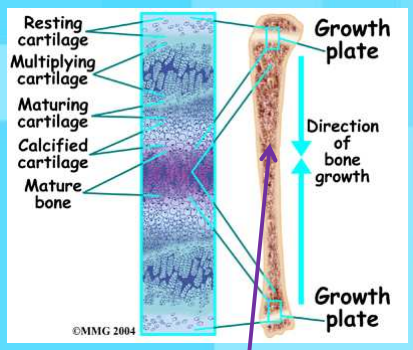
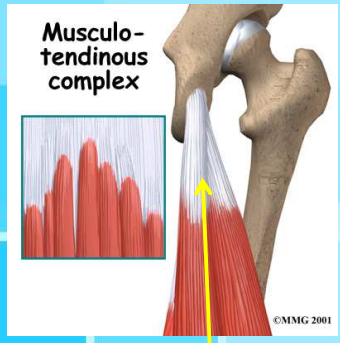
During rapid growth - long bone lengthens →
before muscles and tendons are able to stretch correspondingly →
and before musculotendinous complex develops necessary strength and coordination
to control newly lengthened bone → *this may lead to muscle and tendon injuries*



Faster



Slower

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Common Injuries in Youth Elite Football Players

Most common sites of injury

1. Knee injuries
2. Ankle and heel injuries
3. Hip injuries
4. Groin and thigh injuries
5. Back injuries

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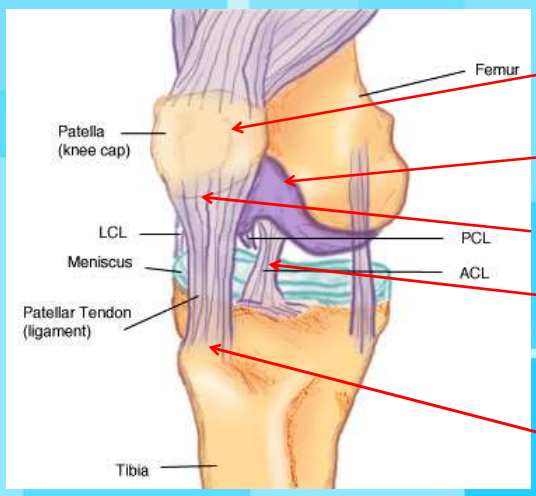
Common Knee Injuries



Patella-femoral pain syndrome

Bone stress injuries

Sinding-Larsen-Johansson Lesion

ACL injuries

Osgood-Schlatter Lesion

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Osgood-Schlatter Lesion

Noticeable Swelling

Appearance of the lesion

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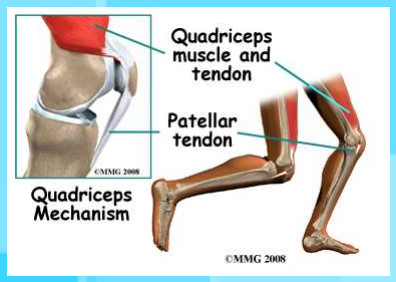
- most common knee injury
- repeated contraction of quadriceps
- growth spurts
- high level activity
- pain aggravated by exercise
- self-limiting settling with bony fusion
- symptoms may persist for up to 2 years
- activity modification – be guided by pain
- biomechanical assessment
- ice therapy
- foot wear – shoes – boots – orthotics?
- stretch program for quadriceps
- strengthening program when pain has reduced



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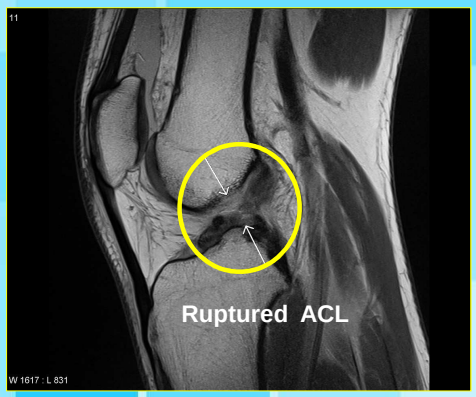
ACL Injuries



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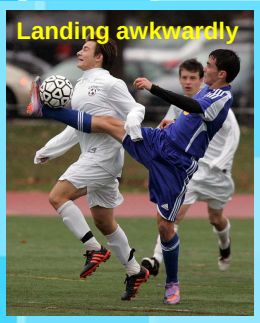

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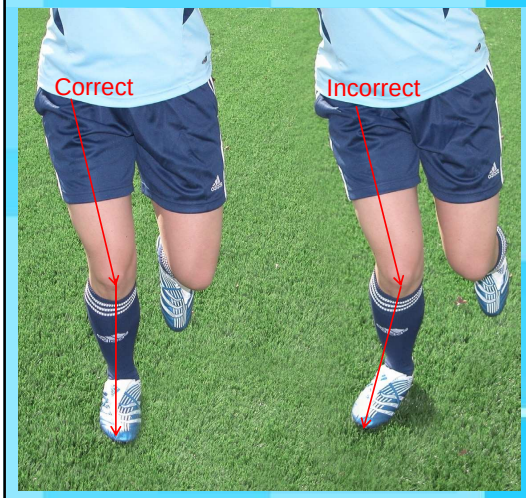

ACL injuries

- most severe injury in young soccer players (fractures withstanding)
- incidence increasing in young athletes
- Not sure why?
- more prevalent in female soccer players
- hip, knee and foot angle
- usually associated with a “pop”
- sometimes associated with meniscal injury
- clinical diagnosis important
- MRI scan
- management controversial – surgery?

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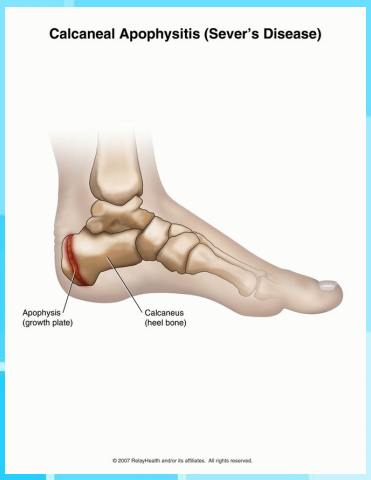
Heel Pain

Sever's Disease



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Sever's is the sister to Osgood-Schlatters

- site of insertion of Achilles tendon
- growth spurts
- between ages of 7 and 10 years
- activity related pain
- tight calf muscles?
- biomechanical assessment important
- activity modification
- usually settles between 6 – 12 months
- heel raises
- stretching
- orthotics?
- strengthening exercises

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Hip Injuries

Apophysitis – number of large musculotendinous units attach around the hip and groin

❑ Excessive activity can result in traction injuries : Hip flexors, quadriceps and adductors

❑Management involves reduction in activity and attention to predisposing factors which may include tight or weak muscles and poor lower limb biomechanics

Irritable Hip Syndrome

❑Common in very active children – other conditions must be excluded
❑Child presents with a limp
❑Pain not well localized
❑Examination reveals a painful restriction of motion
❑Symptoms usually settle after a period of bed rest and observation
❑X-rays, bone scans and blood tests normal

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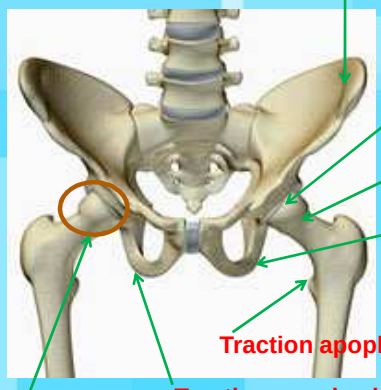

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Lower Back Pain and Postural Abnormalities

Common causes of LBP in the younger athlete similar to mature adult;

- ✓ minor soft tissue injuries
- ✓ minor apophyseal joint injuries and associated ligaments
- ✓ paravertebral muscle strains
- ✓ minor disc injuries
- ✓ stress injuries (hard surfaces & hyperextension)

Postural abnormalities usually associated with;

- ✓excessive kyphosis of the thoracic spine or thoracolumbar junction
- ✓Scheuermann's Disease - vertebral growth plates are affected
- ✓children can present with acute pain
- ✓usually presents in later years
- ✓rounded thoracic spine and a compensatory excessive sway lower back

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Management should include the following;

- ✓Rest or reduction from activities
- ✓Symptomatic treatment – physiotherapy/ no manipulation
- ✓Biomechanical assessment – gait, leg length, foot mechanics and pelvic instability
- ✓Stretching and strengthening of tight and weak areas
- ✓X-rays or scans
- ✓Sometimes bracing

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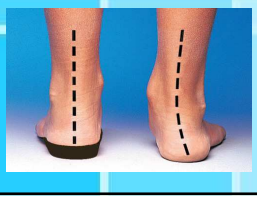
Painless Abnormalities of gait

- Common to see kids with an awkward gait
- Usually a worried parent
- Sometimes the child may complain of pain
- Often the abnormal gait is painless
- Not sufficient to say the child will "grow out of it"
- Thorough biomechanical assessment should be carried out
- May reveal structural abnormalities
- Most common are rotational abnormalities
- Originating from hip and the tibia causing either a toe-in or toe-out gait
- If child painless and biomechanical abnormalities not marked – best left alone
- If abnormalities marked or child is symptomatic – may need braces, splints or orthoses



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Research on soccer injuries

Biological maturity and injury in elite youth football; F. Le Gall1, C. Carling2, T. Reilly3, 2006

This study on elite French youth players indicates an overall injury rate of acquisition ranging from 4.6 to 5.7/1000 hours playing exposure for the three maturity groups concerned.

Conclusion: The most significant observations in this first study on biological maturity and injury in elite youth football were the higher incidence of tendinopathies, groin strains and re-injuries sustained in **early-maturing players**, the higher incidence of tendinopathies and osteochrondal disorders in **normal-maturing players** and the higher incidence of osteochrondal disorders and major injuries in **late-maturing players**

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Prevention of injuries

- Pre-participation assessment?
- Prevent Injury and Enhance Performance Programs (PEP) reduce incidence of knee injuries by 70%
- FIFA 11+ injury prevention program – reduce lower limb injuries by 30-50%
- Both programs involve a functional and dynamic warm-up involving stretching, strengthening, plyometrics, and sport specific agility training
- No shooting before warm-up
- Make sure your child wears all the appropriate safety gear
- Never allow your child to play through pain

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- If your child is injured or in pain, see your doctor or physiotherapist
- Cool-down after all sessions
- Flexibility - Stretching as an exercise outside of football
- Strength/Weight training – skill, technique and supervision very important
- Be aware overloading your child – *total volume* and other sports
- Adequate rest
- Hydration and nutrition
- Watch for signs of overuse or overload symptoms

Weight training - Pre-adolescent strength training -Just do it!, *Narelle Sibte – Strength & Conditioning Coach, AIS*

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Signs of Overtraining

- ✓Deterioration in execution of skills
- ✓Sluggish and slow to react at times
- ✓Decreased ability to achieve training goals
- ✓Lack of motivation to practice
- ✓Disinterested
- ✓Getting tired easily
- ✓Irritability and unwillingness to co-operate with teammates, family and friends
- ✓Loss of appetite

Physiological – Psychological - Emotional

- ✓Keep your eyes and ears OPEN
- ✓Be careful not to miss signs and push kids during these phases

Limited available evidence seems to point to an occurrence of overtraining in young athletes around 30%

Trainability of young athletes and overtraining, Nuno Matos and Richard J. Winsley,
Children's Health and Exercise Research Centre, School of Sport and Health Sciences, University of Exeter, UK

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How much is too much??

As a general rule the following principles should apply for 8 -14 year olds;

- ➢ 3 x sessions of no longer than 1.5 hours in duration
- ➢This should include 15 min warm-up and 5 min cool down
- ➢Sessions should be broken up into 15-20 minute segments
- ➢Regular water breaks – more frequent in the heat
- ➢Mainly skill and technique based
- ➢Game time no longer than 60 minutes 1 x p/week
- ➢Carefully planned training sessions very important
- ➢No extra running as kids will gain fitness from high intensity sessions
- ➢Be careful of other sports
- ➢Watch for signs of overtraining

Peter Brukner and Karim Khan, Clinical Sports medicine, 2007

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Football and Nutrition

❖At no time is nutrition more important
❖Time of rapid growth = high levels of activity
❖Eating and drinking practices established = foundation of dietary habits
❖Also time of nutritional risk, especially with adolescents:
➡ skip meals
➡ snack frequently
➡ rely heavily on fast foods

❖Children and adolescents involved in sport have high energy requirements
❖**Protein** intake of 2.0g/kg of body weight per day is recommended (12% of total energy)
➡ Good sources of protein; lean meat, chicken without skin, milk, low fat cheese, legumes, rice, eggs, nuts and seeds

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Carbohydrate intake well documented
❖6 – 9g/kg per day = 50 to 75% total energy
❖Young athletes may have difficulty eating enough to fulfil requirements
❖Often necessary to incorporate refined carbohydrates like sugar to help meet energy requirements
❖Very high carbohydrate diet not recommended at the expense of protein
❖Detrimental to growth and development
❖Good sources of Carbohydrates; rice, pasta, breads, cereals, fruit, starchy vegetables and legumes
❖Low GI – slow release carbohydrates, wholemeal bread/rice/pasta

Fat – all kids should be encouraged to reduce their fat intake to 30% of total energy intake

Thomas K, Morris P, Stevenson E (2009) Improved endurance capacity following 2% chocolate milk consumption compared with 2 commercially available sports drinks. *Applied Physiology Nutrition and Metabolism, 34: 78-82.*

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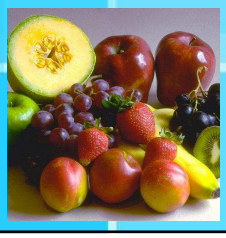
Vitamins and minerals

- Vitamin deficiencies will adversely affect athletic performance
- Certain diets may not provide enough vitamins
- Diets high in simple sugars may result low energy ⟶ Vitamin B deficiencies
- B group of vitamins are essential to convert sugar to energy
- Generally vitamin supplementation should discouraged
- Sometimes appropriate in vulnerable groups of young athletes
- Low-energy diets or excessive tiredness
- Two minerals very important ⟶ calcium and iron
- If and when vitamins necessary, important to get the correct dosages
- Remember that some supplements are not made for children
- Seek advice of a Sports Nutritionist



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Hydration

- ✓Attention to adequate hydration is essential
- ✓Children often do not ingest sufficient fluids
- ✓Lack of urge before and after exercise
- ✓Children gain heat faster from the environment
- ✓Greater surface area-to-body mass ratio than adults
- ✓Children produce more heat per mass unit than adults
- ✓Sweating capacity of children lower than adults
- ✓Reduces ability to dissipate body heat by evaporation

Age(years)	Time(min)	Volume(ml)
~15	45(before exercise) 20(during exercise) As soon after exercise	300-400ml 150 – 200ml Liberal until urination
~10	45(before exercise) 20(during exercise) As soon after exercise	150 – 200ml 75-100ml Liberal until urination

Sports Medicine Australia guidelines for fluid replacement(water)for children and adolescents

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Questions

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