Rebalance MD

PAEDIATRIC ORTHOPAEDICS

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PAEDIATRIC ORTHOPAEDIC SURGEON

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a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

DISCLOSURES

- I HAVE NO INDUSTRY CONFLICTS TO DECLARE
- I AM AN ORTHOPAEDIC SURGEON TRAINED IN PAEDIATRICS, NOT A PAEDIATRICIAN TRAINED IN ORTHOPAEDICS
- I AM A PARENT

- ALL IMAGES IN THIS PRESENTATION ARE FROM THE ROYAL CHILDREN'S HOSPITAL MELBOURNE ORTHOPAEDIC FACT SHEETS

LEARNING OBJECTIVES

- DISCUSS NORMAL SO WE CAN IDENTIFY ABNORMAL
- COVER THE BASIC ORTHOPAEDIC CONCERNS IN YOUNG PATIENTS
  - DIAGNOSIS
  - BASIC TREATMENT
  - WHEN TO REFER
- LEAVE TIME FOR DISCUSSION

DEFINING "NORMAL"

- ONE OF THE BIGGEST PARTS OF MY JOB IS SEPARATING THE "NORMAL" FROM THE PATHOLOGIC
  - ALMOST ALL CHILDREN MAKE THEIR WAY TO BEING A "NORMAL" ADULT
  - WHAT IS "ABNORMAL" IN ADULTS CAN BE "NORMAL" IN A CHILD
- PARENTAL CONCERN IS ONE OF THE MAIN REASONS KIDS SEE ME
- PAIN AND FUNCTIONAL LIMITATION ARE PROBABLY THE BEST MARKERS OF TRUE PATHOLOGY IN A CHILD

FLAT FEET

- DEFINED AS LACKING THE LONGITUDINAL ARCH OF THE FOOT
- FLAT FEET ARE NORMAL IN ESSENTIALLY ALL INFANTS AND MANY YOUNG CHILDREN
  - IN INFANTS THE MEDIAL FAT PAD OBSCURES THE DEVELOPING ARCH
  - IN CHILDREN FLEXIBILITY CAN CREATE PHYSIOLOGIC FLEXIBLE FLAT FEET
  - MOST CHILDREN DEVELOP AN ARCH BY AROUND THE AGE OF 6
  - 1 IN 5 NEVER DEVELOP AN ARCH
    - VAST MAJORITY OF WHICH HAVE NO LONG TERM PROBLEMS

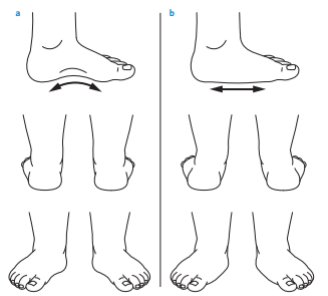


Figure 1. Children's feet may have an arch (a) Flat feet appear flat with no arch (b)

FLAT FEET

- FLEXIBILITY OF THE FOOT IS THE MOST IMPORTANT FEATURE
  - PAINLESS FLEXIBLE FLAT FEET DO NOT REQUIRE TREATMENT (AT ANY AGE)
- ORTHOTICS AND EXERCISES DO NOT LEAD TO DEVELOPMENT OF AN ARCH
  - COMFORTABLE SHOES WHICH ACCOMMODATE THE FOOT SHAPE ARE MOST IMPORTANT
- ORTHOPAEDICS CAN HELP IF:
  1) PAINFUL FLAT FOOT
  2) FUNCTIONAL LIMITATION
  3) UNILATERAL FLAT FOOT
  4) RIGID/STIFF FLAT FOOT
     - LIKELY A TARSAL COALITION

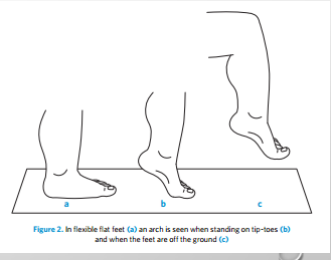


Figure 2. In flexible flat feet (a) an arch is seen when standing on tip-toes (b) and when the feet are off the ground (c)

GAIT

- THERE IS NO NORMAL
- WE CALL THEM TODDLERS FOR A REASON
  - WIDER STANCE
  - RAPID CADENCE
  - SHORT STEPS
- IT TAKES UNTIL AROUND AGE 3 FOR KIDS TO DISPLAY MATURE WALKING PATTERNS
  - BY AGE 7, GAIT SHOULD MIMIC ADULT GAIT
- DURING YOUR CHILD'S FIRST FEW YEARS WALKING, THEY MAY HAVE OBVIOUS GAIT ABNORMALITIES
  - THE MOST COMMON TYPES OF GAIT ABNORMALITIES ARE INTOEING, OUTTOEING, LIMPING AND TOE WALKING
- MANY GAIT DISTURBANCES ARE COMMON AND CORRECT THEMSELVES ON THEIR OWN
- GAIT DISTURBANCES RARELY REQUIRE MEDICAL ASSISTANCE
- STILL BE THINKING ABOUT NEUROMUSCULAR DISORDERS AND DISLOCATED HIPS (AMOUNG OTHERS)

GAIT CYCLE

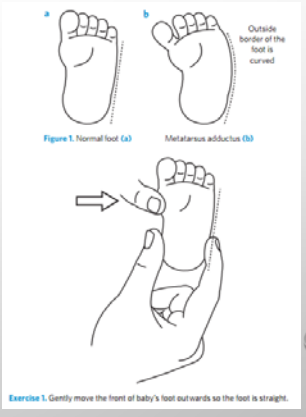
- STANCE PHASE (FOOT IS IN CONTACT WITH THE GROUND)
  - INITIAL DOUBLE-LIMB SUPPORT > SINGLE-LIMB STANCE > DOUBLE-LIMB SUPPORT
  - HEEL-STRIKE > FLAT FOOT > TOE OFF
- SWING PHASE (FOOT IS IN THE AIR)
- AGE CHANGES GAIT
  - WALKING VELOCITY, STEP LENGTH, AND THE DURATION OF THE SINGLE-LIMB STANCE INCREASE WITH AGE
  - NUMBER OF STEPS TAKEN PER MINUTE DECREASES
  - A MATURE GAIT PATTERN IS WELL ESTABLISHED BY THREE YEARS OF AGE, AND THE GAIT OF A SEVEN-YEAR-OLD CHILD CLOSELY APPROXIMATES THAT OF AN ADULT

INTOEING

- DEFINED AS AN INTERNAL FOOT PROGRESSION ANGLE ON NORMAL GAIT
- OFTEN PRESENT BECAUSE OF CONCERNS REGARDING COSMESIS OF THE GAIT OR CLUMSINESS WITH RUNNING OR SPORTS
- EXTREMELY COMMON AND ALMOST ALWAYS OUTGROWN BEFORE AGE 10
- USUALLY COMES FROM ONE OF THREE CAUSES
  1) FOOT (METATARSUS ADDUCTUS)
  2) TIBIA (INTERNAL TIBIAL TORSION)
  3) HIP (FEMORAL ANTEVERSION)

INTOEING

- METATARSUS ADDUCTUS
  - NORMAL LATERAL BORDER OF FOOT IS STRAIGHT
  - USUALLY PRESENT FROM BIRTH
  - OFTEN RESOLVES BY 2-3 YEARS OF AGE
  - OCCASIONALLY REQUIRES PT/STRETCHING
  - RARELY REQUIRES CASTING



INTOEING

- INTERNAL TIBIAL TORSION
  - VERY COMMON IN INFANCY
  - USUALLY CORRECTS BY AROUND AGE 8
  - BEST CHECKED BY MEASUREMENT OF "THIGH-FOOT ANGLE"
    - PATIENT PRONE LOOKING DOWN ON FOOT IN RELATION TO THIGH
  - NO BRACING, FOOTWEAR OR ORTHOTICS MAKE ANY DIFFERENCE

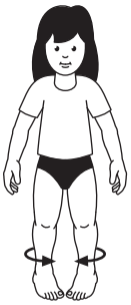


Figure 2. Internal tibial torsion — when the lower leg turns inwards between the knee and ankle

INTOEING

- FEMORAL ANTEVERSION
  - NORMAL IN YOUNG CHILDREN
  - USUALLY RESOLVES BY AROUND 10 YEARS OF AGE
  - "W-SITTERS"
    - CHILDREN SIT WITH KNEES FORWARD AND BOTTOMS BETWEEN THEIR FEET
    - NO EVIDENCE THIS IS HARMFUL, BUT OFTEN SUGGEST TO AVOID IT
  - NO BRACING, FOOTWEAR OR ORTHOTICS MAKE ANY DIFFERENCE

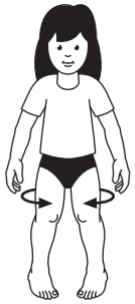


Figure 3. Internal femoral torsion — when the thigh bone turns inwards between the hip and the knee

INTOEING

- ORTHOPAEDICS CAN HELP IF:
  1) UNILATERAL INTOEING
  2) SEVERE INTOEING
  3) FAILURE TO IMPROVE ON EXPECTED TIME COURSE
  4) SCHOOL AGE CHILD WITH TRIPPING AND DECLINED PARTICIPATION AS A RESULT
  5) STIFF METATARSUS ADDUCTUS

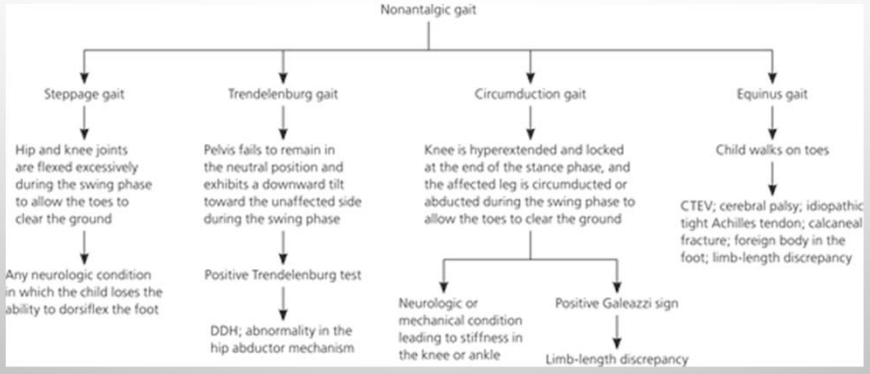
TOE WALKING

- MORE COMMON IN AUSTISM SPECTRUM
- DON'T WORRY AS MUCH THOSE WHO HAVE DONE IT FOREVER, DO WORRY ABOUT NEW ONSET TOE WALKERS
- STRETCHING, REMINDING AND HIGH-TOPS CAN HELP BREAK THE HABIT
- NEEDS EVALUATION IF:
  - PERSISTS BEYOND AGE 3
  - NEUROLOGIC FINDINGS
  - UNILATERAL
  - PAIN

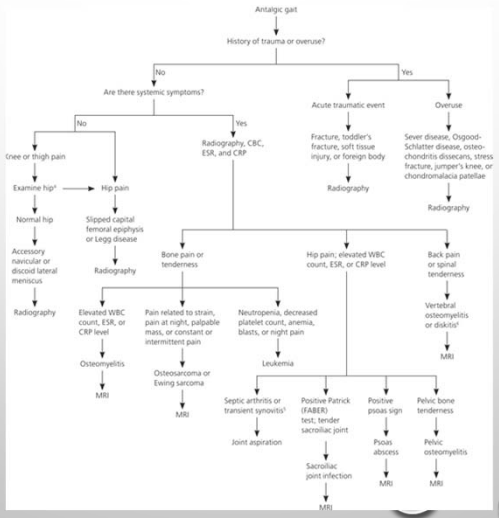
THE LIMPING CHILD

- HAVE A HIGH LEVEL OF SUSPICION, BUT APPRECIATE MOST DIAGNOSIS ARE BENIGN AND SELF-LIMITING
- THIS CAN BE A SIGN OF MSK OR NON-MSK RELATED DISEASE
  - GOOD PHYSICAL EXAM OF THE WHOLE CHILD IS REQUIRED
- HISTORY, PHYSICAL EXAM, LABS, IMAGING
  - JUST LIKE EVERY OTHER PROBLEM

THE LIMPING CHILD



THE LIMPING CHILD



BOW LEGS AND KNOCK KNEES

- GENU VARUM (BOW LEGS)
  - NORMAL FOR INFANTS AND TODDLERS
  - USUALLY CORRECTS BY AROUND AGE 3
  - MORE OBVIOUS IN STANDING/WALKING CHILD
- GENU VALGUM (KNOCK KNEES)
  - NORMAL BETWEEN AGES 3-6 YEARS
  - USUALLY CORRECTS BY AROUND AGE 8
  - MUST ASSESS WITH PATELLAE FACING FORWARD

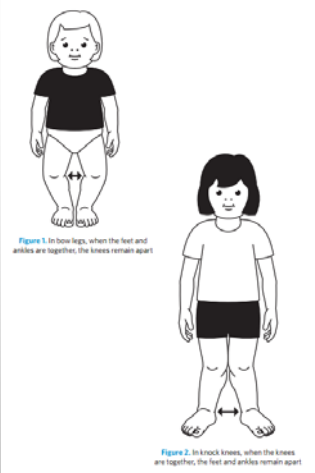


Figure 1. In bow legs, when the feet and ankles are together, the knees remain apart

Figure 2. In knock knees, when the knees are together, the feet and ankles remain apart

BOW LEGS AND KNOCK KNEES

- ORTHOPAEDICS CAN HELP IF:
  1) DEFORMITY IS SEVERE
  2) DEFORMITY TYPE IS OUTSIDE THE NORMAL GROWTH TRAJECTORY AND AGE RANGE
  3) UNILATERAL DEFORMITY
  4) ASSOCIATED WITH PAIN OR LIMP
  5) SHORT STATURE

GROWTH

- GROWTH IS NOT A BENIGN PROCESS
- I DESCRIBE TO PARENTS AS "THE SKELETON GROWS AND EVERYTHING ELSE JUST HAS TO STRETCH TO FIT"
  - PRE-EXISTING TIGHTNESS GETS WORSE
    - CEREBRAL PALSY
    - LOW BACK PAIN IN ADOLESCENTS
  - NEW TIGHTNESS DEVELOPS
    - ENTHESOPATHIES
    - SCOLIOSIS
- ALIGNMENT CHANGES DRASTICALLY THROUGH GROWTH

GROWING PAINS

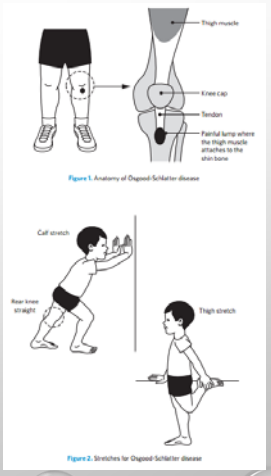
- DIAGNOSIS OF EXCLUSION
- OCCUR IN 15-30% OF CHILDREN
- PAIN IS CHARACTERISTIC
  - GENERALLY ACHE IN LARGE MUSCLE GROUPS (QUADS, CALF, HAMS)
  - TENDS TO BE EVENING OR NIGHT PAIN (CAN WAKE KIDS FROM SLEEP)
  - TENDS TO BE WORSE AFTER AN ACTIVE DAY
- TREATMENT IS SYMPTOMATIC RELIEF
  - MASSAGE
  - HEAT
  - TYLENOL/IBUPROFEN PRN
- STRETCHING IS PREVENTATIVE
- CONCERNS = ANY SIGN OF ANY OTHER DIAGNOSIS
  - SWELLING, HEAT, ATYPICAL PAIN

ENTHESOPATHIES

- INFLAMMATION WHERE A TENDON INSERTS ON BONE
- MANY COMMON DISORDERS ARE ENTHESOPATHIES
  - IN CHILDREN THEY TEND TO BE APOPHYSITIS
    - TENDON INSERTING ADJACENT TO OR ON A GROWTH PLATE
  - THEY ALL HAVE NAMES, BUT NO ONE CAN REMEMBER MOST OF THEM
- ANOTHER GROWTH RELATED PHENOMENOM

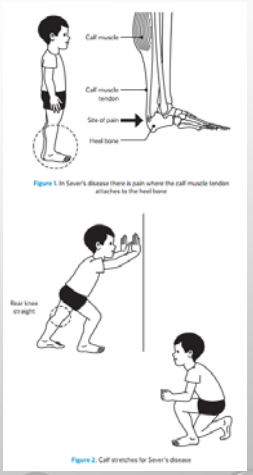
OSGOOD-SCHLATTER DISEASE

- TIBIAL TUBERCLE APOPHYSITIS
- MORE COMMON IN BOYS
  - PATELLOFEMORAL SYNDROME MORE COMMON IN GIRLS
- TENDS TO BE IN ACTIVE, RUNNING/JUMPING ATHLETES
- PAIN TENDS TO BE PRESENT DURING OR IMMEDIATELY AFTER ACTIVITY
- TENDER DIRECTLY OVER THE LUMP OF TIBIAL TUBERCLE
  - OFTEN SWELLING/ENLARGEMENT OF TUBERCLE
- SYMPTOM MANAGEMENT
  - REST, ICE, ANALGESIA
  - STRECTCHING!!
  - TAPING/BRACING
- PAIN GOES AWAY BUT LUMP OFTEN STAYS



SEVER'S DISEASE

- CALCANEAL APOPHYSITIS
- RESPONSIBLE FOR ALMOST ALL HEEL PAIN IN CHILDREN
- SAME RISK FACTORS AND PAIN PROFILE AS OSGOOD-SCHLATTER
- CONTINUING SPORT IN THESE CONDITIONS IS NOT HARMFUL BUT MAY EXACERBATE THE PAIN
- SYMPTOM MANAGEMENT
  - REST, ICE, ANALGESIA
  - STRECTCHING!!
  - GEL HEEL CUPS IN ALL SHOES
- USUALLY GOES AWAY WITHIN 6-12 MONTHS OF ONSET WITH STRETCHING



CURLY TOES

- YES - THAT IS ACTUALLY ITS MEDICAL NAME
- THE OFFENDING TOES ARE THE ONES CURLED UNDER THE NEIGHBOUR
  - OVERRIDING SECOND TOE IS AN ENTITY
- MANY CORRECT ON THEIR OWN
  - I SAY WAIT UNTIL AT LEAST 3 YEARS OLD IN MOST CASES
- SURGICAL INDICATIONS
  - PAIN
  - BLISTERS OR SKIN CHANGES
  - NAIL PROBLEMS

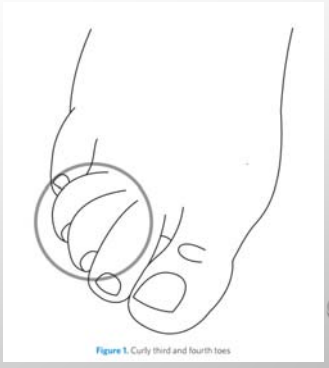
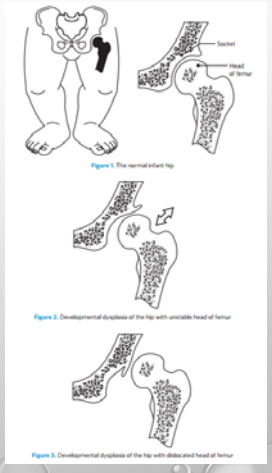


Figure 1. Curly third and fourth toes

DEVELOPMENTAL DYSPLASIA OF HIP

- THE HIP IS A BALL-IN-SOCKET JOINT
- NORMAL INFANT HIP IS NOT MATURE AT BIRTH, BUT DEVELOPS INTO A STABLE JOINT WITH TIME
  - FAILURE OF THIS PROCESS IS DDH
- DDH IS A SPECTRUM OF DISEASE
  - ACETABULAR DYSPLASIA (SHALLOW SOCKET)
  - UNSTABLE HIP (BARLOW POSITIVE)
  - DISLOCATED HIP (ORTOLANI POSITIVE)

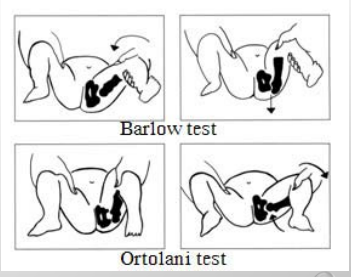


DEVELOPMENTAL DYSPLASIA OF HIP

- OCCURS IN 1/1000 LIVE BIRTHS
- RISK FACTORS
  - FIRST BORN
  - FEMALE
  - FAMILY HISTORY
  - FRANK BREECH
  - CULTURAL (FINNISH, FIRST NATIONS)
  - TWINS (FRATERNITY)
  - HIGH BIRTH WEIGHT (FAT)

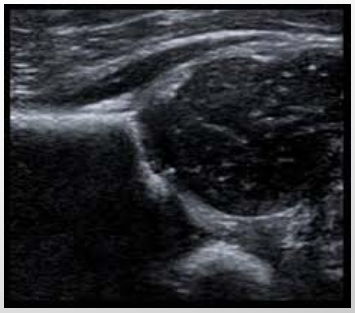
DEVELOPMENTAL DYSPLASIA OF HIP

- DDH IS OFTEN PICKED UP AT BIRTH BUT CAN DEVELOP IN THE WEEKS OR MONTHS AFTER BIRTH
  - ROUTINE EXAM ON BABY CHECKS IS IMPORTANT
- DDH IS NOT PAINFUL – PAIN IS NOT A SIGN OF DDH
- ORTOLANI/BARLOW SIGNS USEFUL EARLY, BUT MORE DIFFICULT AS CHILD AGES
- LACK OF ABDUCTION IS MOST USEFUL SIGN
- ASYMMETRIC THIGH CREASES ONLY USEFUL IN NEWBORN PERIOD
- CLICKS ARE ALMOST ALWAYS BENIGN



DEVELOPMENTAL DYSPLASIA OF HIP

- ULTRASOUND SCREENING
  - 2 OR MORE RISK FACTORS
    - FIRST BORN, FEMALE, BREECH, FAMILY HISTORY
  - ANY ABNORMAL EXAM
  - IF YOU ARE UNSURE FOR ANY REASON



DEVELOPMENTAL DYSPLASIA OF HIP

- EARLY DETECTION AND TREATMENT IS CRITICAL
- IT IS A RELATIVELY EASY PROBLEM UNDER THE AGE OF 6 MONTHS AND GETS EXPONENTIALLY MORE DIFFICULT TO TREAT THEREAFTER
- LATE DIAGNOSIS OFTEN RESULTS IN LARGE SURGICAL TREATMENT WITH INFERIOR OUTCOMES

DEVELOPMENTAL DYSPLASIA OF HIP

- HEALTHY HIP POSITIONING
  - "THE FROG POSITION"
  - KNEES UP AND OUT
  - SAFE SWADDLING
  - CARRIERS

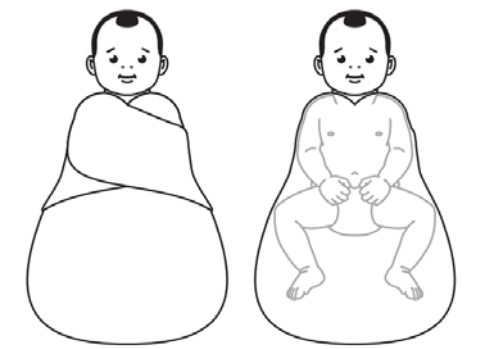
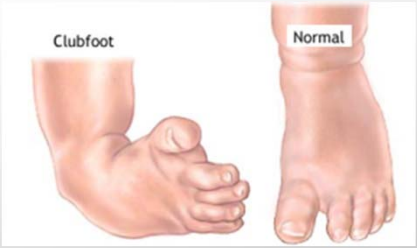


Figure 3. Safe wrapping with the hips bent and knees apart

CLUBFOOT

- TALIPES EQUINOVARUS
  - FOOT TURNED IN AND DOWN
- POSITIONAL VS. CONGENITAL
  - FLEXIBLE VS RIGID
- AFFECTS 1/1000 LIVE BIRTHS
  - WITH ONE AFFECTED CHILD, RISK IS 1/30 OF SUBSEQUENT CHILD BEING AFFECTED



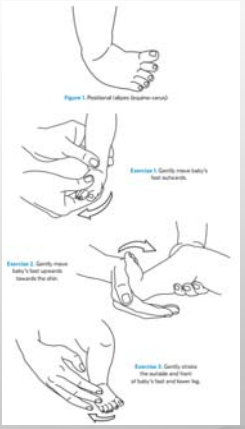
CLUBFOOT

- TREATED WITH SERIAL CASTING
  - PONSETI TECHNIQUE
    - WEEKLY CAST CHANGES
    - LONG LEG CASTS
  - OFTEN ACCOMPANIED WITH ACHILLES TENOTOMY AT END OF TREATMENT
  - DENNIS-BROWNE BOOTS AND BARS FOLLOW CASTING
    - FULL TIME FOR 3 MONTHS
    - NIGHT WEAR UNTIL AGE 3-4 YEARS

Figure 3. Foot abduction brace

CLUBFOOT

- POSITIONAL TALIPES
  - ANY FOOT THAT CAN BE PUT IN NORMAL POSITION IS NOT A TRUE CLUBFOOT
  - HIGH CORRELATION TO DDH
  - TREATED WITH STRETCHING
  - CASTING RARELY REQUIRED



THANK YOU

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Perinatal Orthopaedics

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Outline

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- **Neonatal fractures**
- **Positional foot deformities**
- **Hip pathology**
- **Discussion**

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Neonatal Fractures

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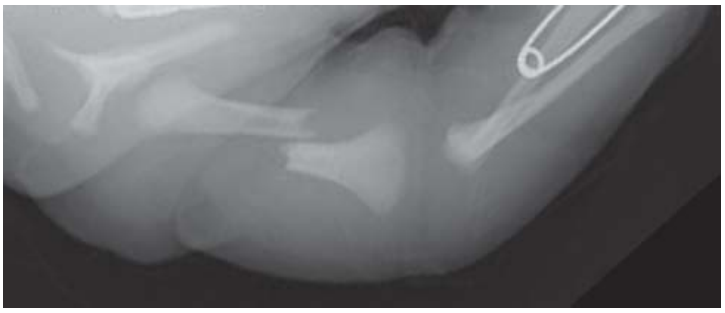
- **6-8/1000 Live births**
- **Perinatal trauma**
- **Brittle bone diseases**



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Neonatal Fractures

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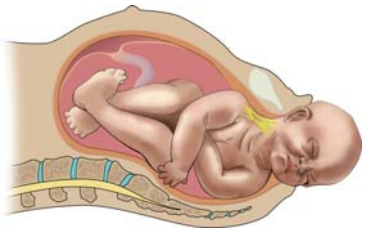
- **Causes**
  - –Shoulder dystocia
  - –Instrument deliveries
  - –Versions and extractions



- **Risk Factors**
  - –Macrosomia (>4500g)
  - –Maternal obesity
  - –Abnormal presentation
  - –Prima gravida
  - –Cephalopelvic disproportion, small maternal stature, maternal pelvic anomalies
  - –Prolonged or rapid labor
  - –Oligohydramnios

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Neonatal Fractures

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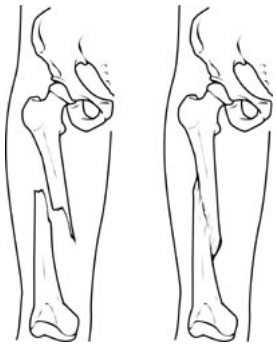
- **Common injuries**
  - –Clavicle Fracture (most common)
  - –Humerus fracture
  - –Femoral fracture
  - –Brachial plexus injury
- **Findings**
  - –Loss of spontaneous movement of limb
  - –Swelling
  - –Pain on passive movement



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Neonatal Fractures

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- **Management**
  - –Upper limb
    - Immobilize by pinning arm to body
    - Vietnam splint
  - –Lower limb
    - Pavlik harness

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Neonatal Fractures

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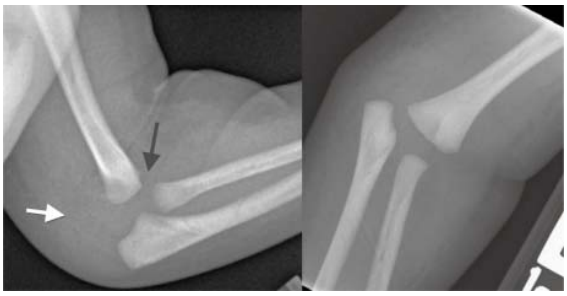
- **Special cases**
  - –Epiphyseal dissociation
    - No fracture on XR
    - Something just isn't right to you



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Brittle Bone Diseases

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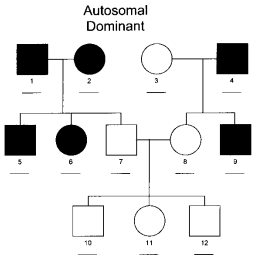
- **Suspicious Findings**
  - –Translucent skin
  - –Bowing deformities
  - –Blue sclera
    - Can be normal – persistence is not
  - –Family history



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Brittle Bone Diseases

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- **Metabolic bone disease of prematurity**
- **Osteogeneis imperfecta**
- **Rickets**
- **Bruck Syndrome**
- **Cole-Carpenter Syndrome**
- **Familial Osteoporosis**
- **Fibrous Dysplasia/Mc-Cune Albright Syndrome**
- **Hypophosphatasia**
- **Congenital insensitivity to pain**

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Brittle Bone Diseases

Rebalance MD

- **Metabolic bone disease of prematurity**
- **Osteogeneis imperfecta**
- **Rickets**
- **Bruck Syndrome**
- **Cole-Carpenter Syndrome**
- **Familial Osteoporosis**
- **Fibrous Dysplasia/Mc-Cune Albright Syndrome**
- **Hypophosphatasia**
- **Congenital insensitivity to pain**

10

Brittle Bone Diseases

Rebalance MD

- **Metabolic bone disease of prematurity**
  - –< 28 weeks
  - –Late establishment of enteral feeds
  - –Chronic lung disease
  - –Jaundice (conjugated hyperbilirubinemia)
  - –Furosemide diuresis (> 2 weeks)
    - Urinary loss of Ca -> Bone remodelling
  - –Self-limiting disease (2 years)

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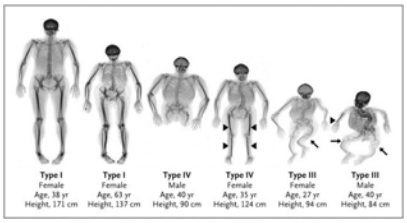
Brittle Bone Diseases

Rebalance MD

- **Osteogeneis imperfecta**
  - –1 in 15,000
  - –Type I collagen deficiency
  - –4 types
    - I = mild
    - II = “lethal”
    - III = severe
    - IV = moderate
  - –Family history



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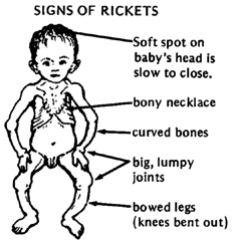
Brittle Bone Diseases

Rebalance MD

- **Rickets**
  - –Multiple types
    - Hypophosphatemic
    - Vitamin D deficiency
  - –Rising incidence in NA
  - –Breast fed without supplementation



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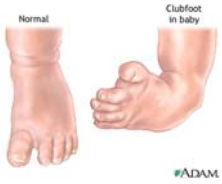
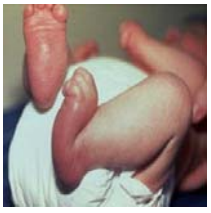
Positional Foot Deformities

Rebalance MD

- **Clubfoot**
  - –Congenital Talipes Equinovarus
  - –Positional clubfoot
- **Calcaneovalgus**
  - –Congential vertical/oblique talus
- **Metatarsus adductus**





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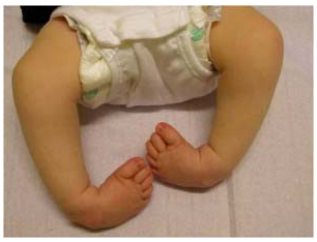
Congenital Clubfoot

Rebalance MD

- **1/1000 live births**
  - –50% bilateral
- **Very Specific Deformity**
  - –CAVE
    - Cavus (plantar flexed 1st ray)
    - Adductus (Metatarsal)
    - Varus (Hindfoot)
    - Equinus
- **Spectrum of severity**
  - –Pirani score



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Congenital Clubfoot

Rebalance MD

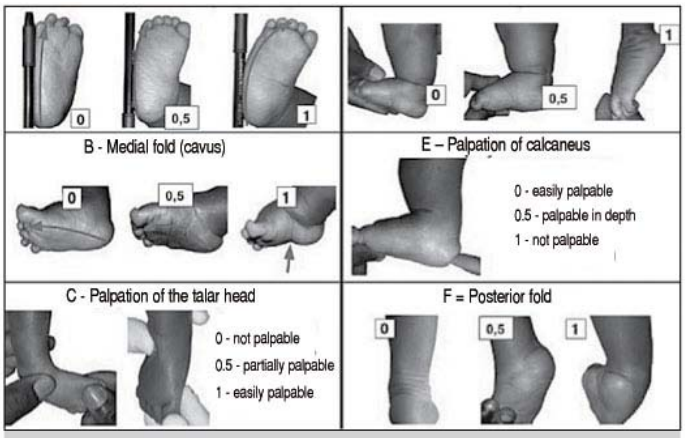

Figure 3. *Pirani's Classification for CC. Source: Pirani and Naddumba*[110].

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Congenital Clubfoot

Rebalance MD

- **Treatment is by Ponseti serial casting**
  - –Start within first 2 weeks of life
  - –Serial casting to correct deformity
  - –Weekly cast changes (usually 5-8 casts)
  - –Achilles tenotomy
- **Boots and bars**
  - –3 months full time
  - –Sleep time wear until at least 3rd birthday

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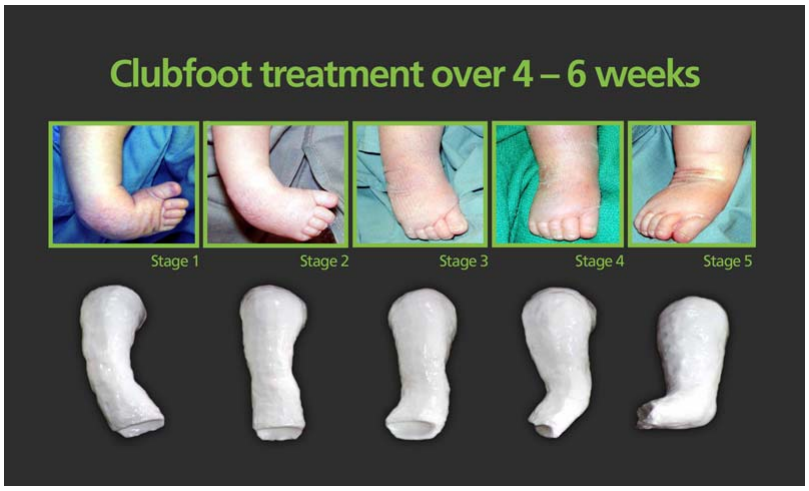
Congenital Clubfoot

Rebalance MD



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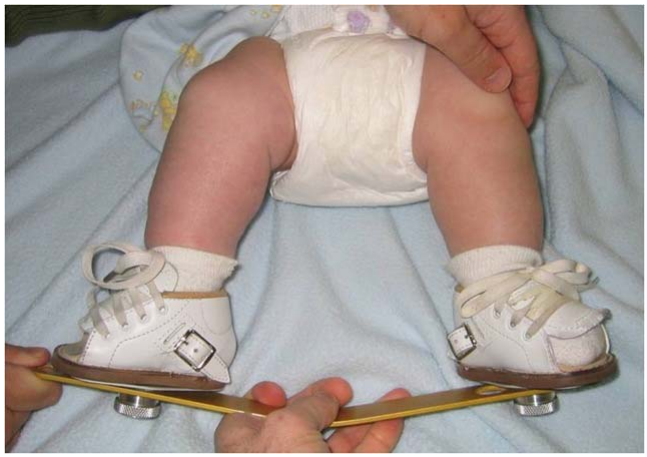
Congenital Clubfoot

Rebalance MD



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Positional Clubfoot

Rebalance MD

- **Flexible deformity**
  - –Foot held in same position as congenital clubfoot
- **Treatment is physiotherapy**
  - –Occasionally do 1-2 casts to speed it up
  - –No boots and bars or maintenance

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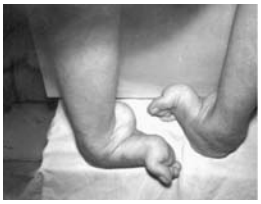
Atypical Clubfoot

Rebalance MD

- **Also known as syndromic clubfoot**
  - –Arthrogryposis
  - –Tibial Hemimelia
  - –Mobius Syndrome
  - –Larsen Syndrome
  - –Pierre Robin Sequence



- **Resistant to usual casting techniques**
- **Usually severe appearing**
  - –May be associated with other MSK deformities

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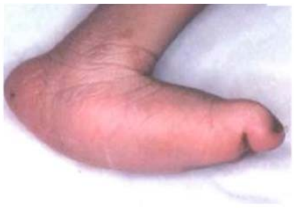
Calcaneovalgus Foot

Rebalance MD

- **Vast majority are normal**
  - –Intrauterine positioning
  - –Most resolve without treatment
  - –If no improvement by 3 months, need further assessment
- **Congenital vertical talus**
  - –Rocker bottom foot
  - –Often associated with neuromuscular abnormality

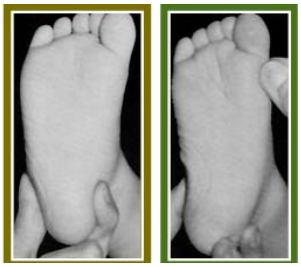


22

Metatarsus Adductus

Rebalance MD

- **Most common foot deformity of infancy**
  - –Incidence as high as 12%
  - –Flexibile require no treatment
  - –Resolve spontaneously
  - –Passive stretching recommended
  - –Casting may be appropriate if not resolved by 6-12 months



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Hip Dysplasia

Rebalance MD

- **Name changed from Congenital Dislocation of the Hip to Developmental Dysplasia of the Hip**
  - –Spectrum of disease
  - –Acetabular dysplasia
  - –Instability
  - –Dislocation
- **It is a failure of the normal development of the hip**
  - –Acetabulum and femoral head come from a single block of cartilage
  - –Acetabulum responds to pressure of femoral head on it to form a socket

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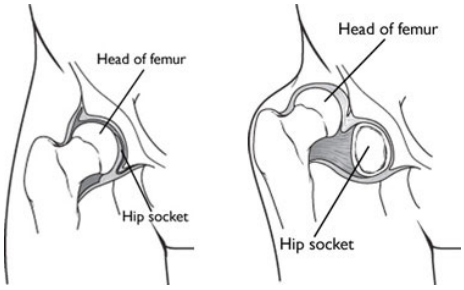
Hip Dysplasia

Rebalance MD

- **Incidence 1-2%**
- **Cause**
  - –We have no idea…
  - –Genetic?
    - Family history
    - Ethnic variations
  - –"Packaging Syndrome"
    - First born
    - Oligohydramnios
    - Associated abnormalities (metatarsus adductus, torticollis…)
    - Left hip (forced adducted against spine in left occiput anterior)



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Hip Dysplasia

Rebalance MD

- **Risk Factors**
  - –First Born
  - –Females
  - –Frank breech
  - –First Nations/Finnish
  - –Family history
  - –Foot deformity
  - –Facing one direction (torticollis)

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Hip Dysplasia

Rebalance MD

- **Physical exam**
  - –Leg length difference
    - Galleazzi Sign

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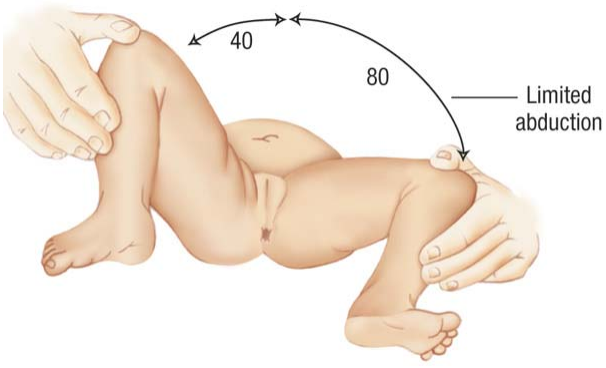
Hip Dysplasia

Rebalance MD

- **Physical exam**
  - –Leg length difference
    - Galleazzi Sign
  - –Limitation in abduction



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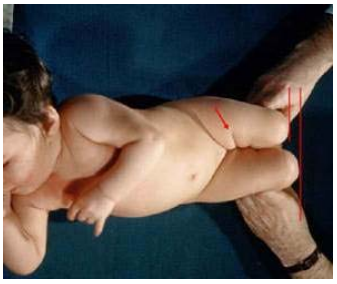
Hip Dysplasia

Rebalance MD

- **Physical exam**
  - –Leg length difference
    - Galleazzi Sign
  - –Limitation in abduction
  - –Asymmetric thigh folds
    - Only helpful in the NEWBORN period



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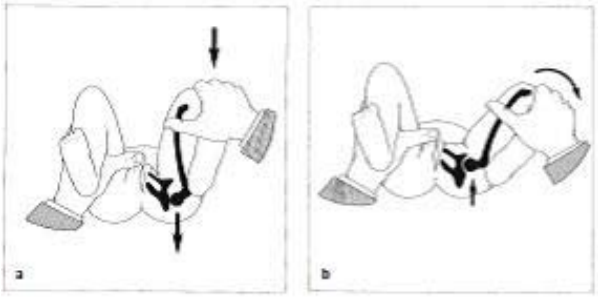
Hip Dysplasia

Rebalance MD

- **Physical exam**
  - –Ortolani
    - Reducing a dislocated hip
    - Hip must be OUT to be ORTOLANI
  - –Barlow
    - Dislocating an unstable hip



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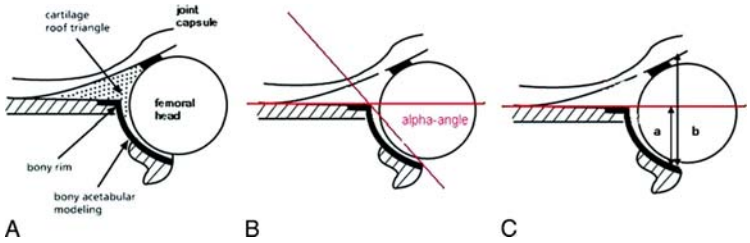
Hip Dysplasia

Rebalance MD

- **Ultrasound**
  - –We screen patients with risk factors
  - –We are the only screening program in Canada
  - –Literature does not support cost effectiveness of screening programs in DDH
  - –Early intervention is BETTER treatment



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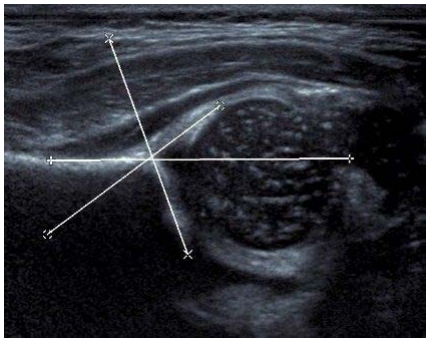
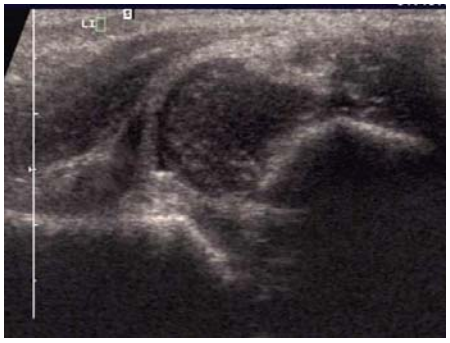
Hip Dysplasia

Rebalance MD

- **Ultrasound**





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Hip Dysplasia

Rebalance MD

- **Treatment**
  - –The whole krux of treatment is get the ball in to the socket as soon as possible to encourage the normal development of the hip
  - –Essentially replicating the Ortolani maneuvre
    - Flexion (100`)
    - Abduction

33

Hip Dysplasia

Rebalance MD

- **Treatment**
  - –The whole krux of treatment is get the ball in to the socket as soon as possible to encourage the normal development of the hip
  - –Essentially replicating the Ortolani maneuvre
    - Flexion (100`)
    - Abduction

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Hip Dysplasia

Rebalance MD

- **Treatment of reduced but dysplastic hip**
  - –Hip development just needs to be encouraged
  - –Hold in abduction and flexion until normal parameter
  - –Usually 6 weeks full time wear + 6 weeks night time wear
  - –Older the patient starts, longer bracing goes on

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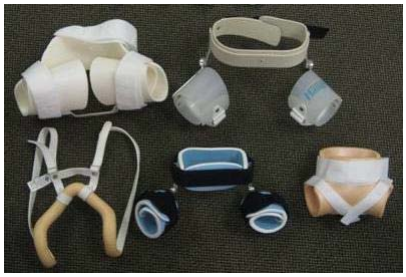
Hip Dysplasia

Rebalance MD

- **Treatment of dislocated hip**
  - –Need to get reduced (Ortolani)
  - –Brace with ultrasounds every week to check progress
    - Surprising number actually reduce!
  - –Failure at 3 weeks = abandon bracing
  - –Surgical care



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Hip Dysplasia

Rebalance MD

- **Treatment of dislocated hip (Surgical)**
  - –Attempt closed reduction and spica casting in OR
  - –Can release adductor tendons to improve ``zone of safety``
  - –Cast change at 6 weeks
    - 2 casts = total 12 weeks in cast
    - +/- bracing post casting
  - –Failed closed reduction = open reduction
    - Clear blockages to reduction
    - Cappsulorapphy
  - –Older children (~18 months) require corrective osteotomies in conjunction

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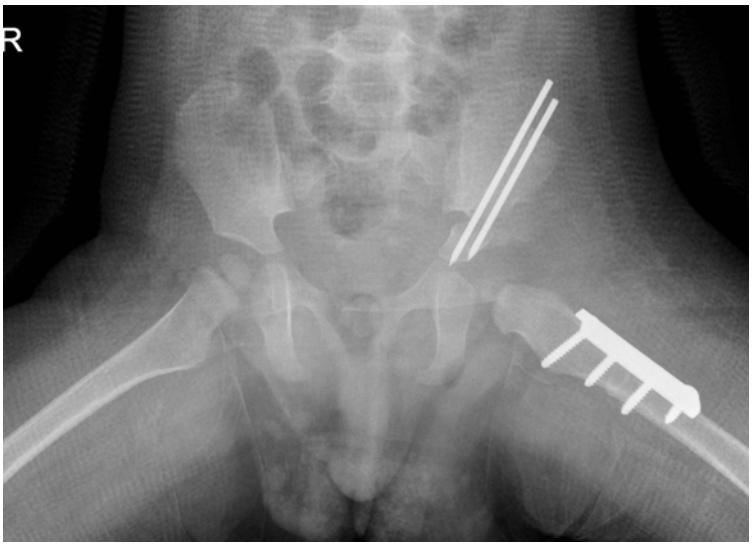
Hip Dysplasia

Rebalance MD



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Congenital Dislocation of Knee

Rebalance MD

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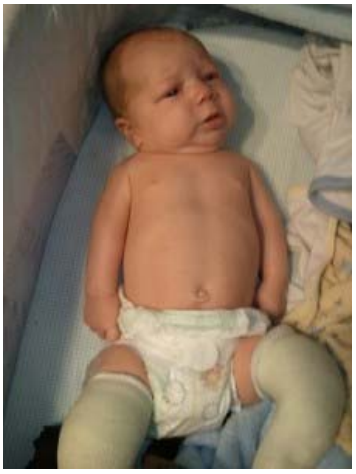
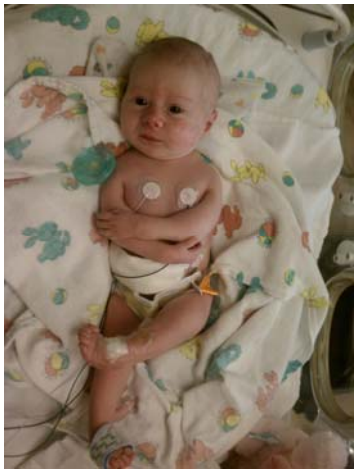
Arthrogryposis

Rebalance MD





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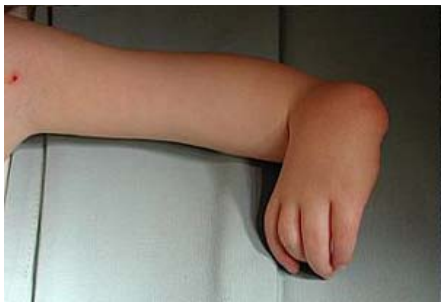
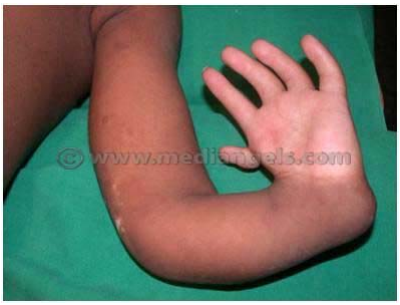
Radial Club Hand

Rebalance MD





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Thank You

Rebalance MD

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