Lower Extremity Orthopedic Surgery in Cerebral Palsy

Hank Chambers, MD
Rady Children’s Hospital - San Diego
Indications

• Fixed contracture
• Joint dislocations
• Shoe wear problems
• Pain
• Perineal hygiene problems
What can Orthopedic Surgery Offer?

• Lengthen tendons
• Transfer tendons
• Relocate joints
• Rotate bones
• Fuse joints
Principles of Orthopedic Surgery in Cerebral Palsy

• Single event, multilevel surgery
• Delay surgery as long as possible (> 6 years)
• Use spasticity management as adjunct to surgery
The Diving Syndrome

A  B  C  D

Mercer Rang
Timing of Surgery

• Soft tissue contractures
• Bony abnormalities
  – Morphology
  – Rotation
Spine Problems

- Scoliosis
- Spondylolisthesis
Hip Adduction Deformity

- Open vs percutaneous lengthening of adductors
- ? Obturator neurectomy

Canale and Beaty *Operative Pediatric Orthopedics* 1991
Adductor Lengthening

Obturator Neurectomy

Canale and Beaty
Operative Pediatric Orthopedics
Hip Flexion Deformity

• Usually caused by contracture of the iliopsoas muscle
• Sartorius, rectus femoris and tensor fascia femoris muscle can also contribute
Treatment of Hip Flexion Contractures

Canale and Beaty *Operative Pediatric Orthopedics* 1991
Psoas lengthening at the Pelvic Brim
Hip Subluxation & Dislocation

Acetabular Dysplasia

Hip Subluxation
Hip Subluxation & Dislocation

Indications for Treatment:

• Hip subluxation in any condition
• Pain
• Loss of sitting ability
Proximal Femoral Varus Derotational Osteotomies

Indications for surgery:

↑‘d valgus

↑‘d femoral anteversion
Acetabular Dysplasia

- Usually posterior dysplasia
Treatment of Acetabular Dysplasia
Periacetabular Osteotomy, Open Reduction and VDRO
San Diego Approach to Hip Dislocation
Salvage Procedure for Hip Dysplasia

- Interposition arthroplasty
Problems at the Knee

• Crouch gait
• Jump gait
• Stiff knee gait
• Recurvatum gait
Crouch Gait

- Increased hip flexion
- Increased knee flexion
- Increased ankle dorsiflexion (calcaneous)
- Usually iatrogenic
Patella Alta
Jump Gait

- In di or hemiplegia
- Increased hip flexion
- Increased knee flexion
- Increased ankle plantar flexion
Hamstring Lengthening
Stiff Knee Gait

- Manifest by swing phase knee stiffness
- Leads to problems of foot clearance
- Compensatory mechanisms include
  - Hip Circumduction
  - External Rotation
  - Contralateral vaulting
Rectus Femoris Transfer
Recurvatum Gait

• Usually iatrogenic
• Difficult to treat surgically
• Often need long leg braces (KAFO with the ankle in dorsiflexion)
KNEE PROBLEMS IN ADULTS WITH CEREBRAL PALSY

• Patellofemoral arthritis
• Patellar malalignment syndrome
• Meniscal tear
• Cruciate ligament tears
Rotational Abnormalities

• “Lever Arm Syndrome”
  – Increased Femoral Anteversion
  – Increased internal or external tibial torsion
  – “malignant malalignment” syndrome
  – Patellar subluxation/dislocation
  – Foot valgus
Treatment

- Femoral osteotomies
  - Proximal
  - Distal
- Gluteus medius transfer
- Tibial derotational osteotomies
- Correction of valgus in foot
Problems at the Foot & Ankle

- Equinus
- Calcaneous
- Varus
- Valgus
- Bunion
Treatment Options for Equinus

• Lengthening of the fascia (recession)
  – Strayer
  – Baker
  – Vulpius
  – Baumann

• Lengthening of the Tendoachilles
Equinus

Gastrocnemius Recession
Strayer or Vulpius

Open Tendoachilles Lengthening
Calcaneous

- Usually iatrogenic
Treatment Options for Calcaneous

Surgical:

- Muscle transfer to heel
  TA, TP, PL, PB, FDL, FHL
- Heel cord tenodesis
- Osteotomy of calcaneus
  (can combine with muscle transfer)
  Oblique
  Crescentic
The Varus Foot
Varus Foot Deformity

• Usually in hemiplegia

• Surgical Options include
  – Frost Lengthening of the Posterior Tibialis Muscle
  – Split Posterior Tibialis Tendon Transfer (SPOTT)
  – Split Anterior Tibialis Tendon Transfer (SPLATT)
Frost Tibialis Posterior Tendon Lengthening

A

B

C

Tibialis Posterior
Split Posterior Tibialis Tendon Transfer (SPOTT)
Split Anterior Tibialis Tendon Transfer (SPLATT)
Valgus Foot

• Common in diplegia & quadriplegia
Treatment Options for the Valgus Foot

• Peroneus Brevis Tendon Lengthening
• Calcaneal Lengthening
• Calcaneal Sliding Osteotomy
• Subtalar Arthrodesis
• Triple Arthrodesis
Peroneus Brevis Lengthening
Subtalar Arthrodesis
Subtalar Stapling
Evan’s Calcaneal Lengthening
Sliding Calcaneal Osteotomy
Triple Arthrodesis
Look for Ankle Valgus
Bunion Deformities

• Dorsal bunion
• Hallux valgus
Treatment

- Standard bunion procedure
- Arthrodesis
Thank You