ORTHOPEDICS

Primary Outcomes

- Maintenance of a stable and balanced spine.
- Optimize pulmonary function. Avoid restrictive pulmonary disease.
- Optimize spinal growth.
- Avoid or facilitate healing of sacral/ischial decubiti

Secondary Outcomes

Maintenance of plantigrade feet
Prevent pressure sores

Tertiary Outcomes

Preserve or improve gait efficiency
Early identification and stabilization or correction of lower extremity deformities

INFANCY (THROUGH AGE 1 YEAR)

Clinical Questions

- What are the challenges of early onset scoliosis, kyphosis and pulmonary insufficiency syndrome?
- Which foot deformities merit correction in infancy and what is appropriate treatment?

Guidelines

- Obtain baseline AP and Lateral scoliosis x-rays
- Orthopedic evaluations Q 3-6 months in first year of life.
- Perform Ponseti casting or release for clubfoot or congenital vertical talus deformities,
- Perform neonatal kyphectomy if required to facilitate skin closure
- Perform spinal fusion for congenital scoliosis with documented progression

TODDLER (1-3 YEARS)

Clinical Questions

- What is the proper timing for correction of rotational deformities of the femur and/or tibia
- Are twister cables useful for rotational deformities?
- What is the role of bracing or Mehta casting for early onset non-congenital scoliosis?
- Should gibbous deformity be treated surgically?
- Is Rib to Pelvic distraction vs kyphectomy the optimum treatment for gibbous?

Guidelines
• Monitor the spine for development or progression of deformity with AP and Lat Scoliosis radiographs q 1 -2 years or more frequently in patients with concerns for progression.
• Initiate treatment for progressive early onset scoliosis that may involve casting, bracing or growing rod placement
• Perform tendon release/transfers for unbalanced foot deformities such as the calcaneus foot, or equinovarus foot.
• Surgically correct rotational deformities of the tibia or femur only if they are limiting further motor development. Otherwise, temporize due to concerns of recurrence if derotational osteotomies are performed too early.
• Perform fusion in situ for progressive congenital scoliosis

PRE-SCHOOL (3-5 YEARS)

Clinical questions:

Is bracing effective for early onset, non-congenital scoliosis?
Is rib-pelvis distraction vs spine based growing rod construct the optimal treatment for progressive scoliosis?

Guidelines

• Evaluate gait with careful attention to Orthopedic deformities that render gait inefficient
• Perform derotational osteotomy when rotational abnormality adversely impacts ambulation, particularly for tibial torsion
• Treat foot deformities with stretching, casting, bracing, soft tissue release or tendon transfers.
• Obtain Scoliosis xrays Q 1-2 years or more frequently in patients with progression
• Work with neurosurgery to identify, if present, neurogenic cause of scoliosis progression
• Consider bracing for progressive non-congenital scoliosis in the 25 – 50 degree range
• Perform fusion in situ for progressive congenital scoliosis

SCHOOL AGE (6-11 YEARS)

Clinical Questions

• As per previous age group

Guidelines

• Monitor gait, rotational deformities and foot position.
• Scoliosis, pelvic obliquity, and hip flexion contractures cause worsening of mobility.
• Correct foot deformities with soft tissue release, tendon transfer and osteotomy if necessary. Avoid fusion if possible.
• Correct tibial and femoral rotational deformities when interfering with gait
• Consider computerized gait analysis if available in low lumbar or sacral level patients with atypical gait abnormalities for decision making regarding surgery or bracing
• Monitor for the development of scoliosis/kyphosis.
• Obtain AP and Lat Scoliosis radiographs Q 1-2 years or more frequently in patients with
progressive spinal deformity. Early surgical treatment of scoliosis will not assure continuation of mobility.

- Teach child about fractures and related precaution.

**TEEN AGE (12-17 YEARS)**

**Clinical Questions**

- What is the impact of scoliosis/kyphosis on gait, sitting balance, upper extremity function?
- What is the relationship between spinal deformity and decubitus ulcer?
- Which patients benefit from spinal deformity surgery?
- How can spinal deformity surgery be safely accomplished?
- In lumbar scoliosis, how high must the fusion extend?

**Guidelines**

- Monitor for the development or progression of scoliosis. If the curve has progressed to an operative magnitude, (50 degrees) discuss with the family the risks/benefits of surgical treatment. If family decides against surgical treatment, then future spine radiographs are not necessary.
- Monitor for deterioration of gait and consider treatment of Orthopedic deformities leading to deterioration such as hip/knee contracture or rotational deformities. Computerized gait analysis may be useful for decision making in low lumbar and sacral level patients.
- Annual evaluation, unless more frequency indicated.
- Address bone density issues by recommending calcium and vitamin D supplementation. Osteoporosis: occurs more commonly in the lower extremities and may lead to fractures. Bone densitometry is a critical tool. This is particularly important to non-ambulatory patients, and when hormonal supplementation or replacement (HRT) is used.

**ADULT (18+ YEARS)**

**Clinical Questions**

- What is the optimal Orthopedic transition plan?
- What degenerative issues can be expected for specific levels of function (eg knee arthrosis for midlumbar with valgus thrust gait pattern) and what treatments can mitigate against these problems (eg. KAFO’s or crutches in the above example)

**Guidelines**

- Develop an Orthopedic transition plan
- Counsel the patient about potential orthopedic degenerative problems.
RESEARCH GAPS (all age groups)

- Is bracing effective in treating developmental (non-congenital) scoliosis in patients with Myelomeningocele?
- Is Mehta casting effective in non-congenital early onset scoliosis in MMC?
- What is the impact of Scoliosis/Kyphosis on gait, sitting balance or upper extremity function?
- The optimal age for repairing congenital kyphosis is unclear.
- It is also unclear which patients with scoliosis will benefit from sacral-pelvic instrumentation, or one-stage vs. two-stage operation.
- What is the relationship between specific foot deformities and the development of pressure sores? Does foot deformity surgery alter the risk of pressure sores?
- What is the role of guided growth surgery for rotational deformities?
- Is there a specific Orthopedic transition plan that is ideal?

REFERENCES


