Evaluation and Management of Spinal Deformity in Cerebral Palsy

Clinical evaluation
- Incidence correlates with disease severity: approx. 50% of GMFCS IV or V patients will have a moderate to severe curve by age 18\(^1\)
- Change in activity or spasticity
- Pain and positioning problems
- Develops in 75% of CP patients with hip subluxation/dislocation, but no correlation between unilateral or bilateral dislocations (marker of disease severity rather than a cause) \(^2\)
- Scoliosis develops more rapidly or simultaneously with hip subluxation in most cases, but hip subluxation can be more rapid in some cases (16%) \(^3\)
- Physical exam: evaluate sagittal and coronal balance, hip ROM, UE contractures, how much purposeful movement in LE, able to follow commands, weight, skin issues

Nonoperative treatment
- Bracing
  - main objective to improve seating/positioning and maintain function
  - conflicting evidence as to whether bracing slows progression\(^4\)\(^-\)\(^6\)
  - no study with brace monitors to evaluate compliance
  - our preference: custom molded TLSO (soft or hard- depending on skin issues and patient/parent tolerance)
- Wheelchair Modification
- Baclofen pump and dorsal rhizotomy may help with spasticity but do not improve scoliosis (some studies suggest worsening of scoliosis with those treatments- but many confounders) \(^7\)

Operative treatment
Indications and Timing of Surgery
- higher rate of complications with larger curve magnitude\(^8\)
- flexibility may be the most important factor
- prior to development of severe restrictive lung disease or pulmonary HTN
- important to sit upright for quality of life?

Preoperative Protocols
- optimize nutrition
- pulmonology evaluation
- cardiology evaluation if >70 degrees
- CHG wipes
Intraoperative Protocols
- antibiotic prophylaxis (important to cover for gram negative organisms)\(^9\)
- Best Practice Guidelines for SSI prevention in high risk patients protocol\(^{10}\)
- tranexemic acid (TXA)
- neuromonitoring (checklist)
- discussion of MAP goals for phases of procedure with anesthesia
- Intraoperative wound irrigation prior to closure
- Topical vancomycin in bone graft/on fascia

Surgical techniques

Fixation
- Sacral-Alar-Iliac screws (SAI)-> fewer implant complications than Iliac Bolts
  (SAI screws fail 75% less than Iliac Bolts)\(^{11}\)
- Pedicle screws preferred over wires
- Sublaminar band

Correction
- Halofemoral traction (keep blood pressure up while weight is on)
- Temporary rod (provides stability if staging)
- Occasionally Halogravity traction for a few weeks
- Anterior releases (rarely used- patients with severe enough curve to benefit often have poor pulmonary status and cannot safely tolerate it)
- Ponte osteotomy
- Serial reducers for load sharing during reduction
- T square of Tolo to evaluate correction\(^{12}\)

Postoperative Care
- impervious dressing (ioban)
- continue antibiotics for 24 hrs
- optimize nutrition
- mobilize early and often

Complications
- Respiratory (PICU postoperative management)
- Wound Infection (high risk)
- Pseudarthrosis

High Satisfaction rate (92%) despite high complication rate (27%)\(^{13}\)
References


