Role of Hip Adductor Lengthening in Children with Ambulatory Cerebral Palsy

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**Role of the Adductor muscles in Gait:** (Arnold et al. 2005; Arnold, Asakawa, and Delp 2000; Chong et al. 1978)

- **Stance phase** – hip flexors and adductors; minimal hip internal rotators
- **Swing phase** – Hip adductors and flexors, knee flexors; minimal hip internal rotators

**Indications for Adductor Lengthening:** (Miller et al. 1997; Shore et al. 2012; Scott, Chambers, and Cain 1996)

**Prevention treatment for Hip subluxation:**

- **Natural history** is for lower risk for progression in GMFCS II & III compare to IV/V
- **Indication** - GMFCS II/III with extended hip/knee abduction <30 & <8 years old
  - MP 30-40% - Observe – x-rays every 6 months, if >5% increase – adductor leng
  - MP >40 – Proceed to Adductor Lengthening
- **Surgical Procedure** – complete open release of adductor longus and gracilus
  - Add partial Add brevis release until 40-45 degrees extended hip/knee abduction
  - Protect and do not injury, resect or inject the Anterior branch Obturator Nerve
  - Fascial lengthening of the Psoas DO NOT Release the whole iliopsoas tendon
  - Distal Hamstring Lengthening if Popliteal angle more then 60 deg

**Post-operative Management** – Immediate movement, night time knee extensors

**Outcome** GMFCS II/III when MP < 60%

- is 80 to 90% good longterm outcome – normalized hips
- (Compared to 10 to 60% good outcome for GMFCS IV/V)
- No data on the effect of GMFCS I/II Hemiplegia type IV hip subluxation

**Complications**- Wide based gait, weak hip flexion – it will slowly resolve in young children

**Improvement in Gait Function (A)** – No published studies showing the impact of adductor lengthening, one study shows some functional improvement of posterior adductor transfers but with significant long term complications of pelvic obliquity(Scott, Chambers, and Cain 1996)

- **Natural History** – Significant early hip spasticity at walking begin, tends to slowly reduce
  - Most “adduction” is actually hip internal rotation and flexion NOT
  - Primarily caused by hip adductor spasticity
- **Indications** – Release impending developmental milestones (Sussman & Drescher)
  - Child who is struggling to start walking and seems blocked by spastic adductors
  - Do adductor and Hamstring lengthening and they start walking (Sussman)
  - OR Inject BOTOX and the child starts walking (Drescher-Charite, Berlin)
- **Post-operative Management** – Continue immediate active therapy
- **Outcome** – It makes parents very happy to see progress, no evidence - longterm impact
- **Complications** – May have wide based gait temporarily, will resolve
Improvement in Gait Function (B) – When there is asymmetric hip abduction

**Natural History** – This asymmetry is often a combination of rotation/flexion/adduction
It typically does not resolve but may get worse during growth

**Indications** – Always part of SEMLS with good assessment of all the components
Asymmetric abduction of 15 to 20 degrees not accounted for otherwise
Based on PE extended hip/knee ABD and kinematics

**Procedure** – Usually do percutaneous Longus only, unless previous adductor release

**Outcome** – Should develop more symmetric gait, especially in stance phase

**Complications** – Over lengthening is to be avoided, causes wide based gait

Improve Custodial or Self care:

**Natural History** – Spasticity tends to become more severe till approximately age 4 then
It slowly moderates till puberty around age 12 (Hagglund and Wagner 2008)
Therefore in GMFCS I-III adductor spasticity is seldom a problem prior to puberty
At puberty increased weight, especially obesity and interest in self care
Makes adductor spasticity and contractures more of a problem

**Indications** – Complaints by patient or care givers of difficult toileting, dressing, self care
Make sure it is not also internal rotation – adductor release will not help this

**Surgical Procedure** – Usually release only adductor longus, if no previous surgery
And not obese may be able to do percutaneous
If obese or previous surgery do open adductor longus and gracilus

**Post-operative Management** – Do immediate active and passive stretching

**Outcome** – for the correct patient, both the patient and care givers like the result
No published outcomes I am aware of

**Complications** – Often these are in obese adolescents who may develop wound healing
Although wound infections are rare they are annoying skin issues
Be very careful not to over lengthening and produce a wide based gait
GMFCS III maybe using the Adductor to brace knees together to come to stand
Warn patient that they may feel weak for sometime to come to stand

References