IC 14 - A MULTIDISCIPLINARY APPROACH TO IMPROVING GAIT IN CHILDREN WITH CEREBRAL PALSY WITH RHIZOTOMY: PATIENT SELECTION, AND OUTCOMES

Procedure

Conus method

Cauda Equina method

Spinal cord

Cauda equina

Sciatic nerve

History:
Charles Scott Sherrington
Fig. 1.  a. Position of animal after transaction at calamus scriptorius.
b. Position of animal after ablation of cerebral hemispheres when decerebrate rigidity has developed.
c. Position of animal after ablation of one cerebral hemisphere when decerebrate rigidity has developed.
d. Effect on decerebrate rigidity of severance of different spinal roots of left fore-limb.

History

- 1898 Sherrington showed relief of muscle spasticity in decerebrate cats by section of the dorsal root
- Won Noble prize in 1932 in medicine and physiology for "discoveries involving the function of neurons"
- Inhibition of function
- Coined the term synapse
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History

- 1913 Otto Foerster 150 cases of dorsal rhizotomy from L2-S2 (Foerster operation)
- Emphasized rehabilitation and orthopedic procedures in the post-op period.
- Was Lenin's personal physician and performed his autopsy

History

- 1967 Gros in Montpellier France modified the operation to cut 4/5 of dorsal roots from L1-S1.
- Gros reported 62 cases with 18 year follow up. (25 cases of CP)
- Noted improved speech and upper limb function in the CP sub-category
1978 Fasano et al in Italy reported using intra-operative EMG to select which dorsal rootlets should be cut.

109 cases done starting in 1971 (CP population)

Peacock 1982
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- Pub Med search- Selective dorsal rhizotomy 340 results
- Pub Med search- Selective dorsal rhizotomy and controlled trial 12
  - 5 are anesthesia and analgesia papers and two are a meta-analyses

That was the science

- The rest of this talk is art
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Technique

- Cauda Equina
  - Larger opening
  - Anatomic Localization
  - Most used
  - Long term spinal instability?
  - Longer operative time?
  - More blood loss?
  - Longer recover time?

- Conus
  - Smaller opening
  - Venous drainage
  - Less Bone Removal
  - Localization less precise
  - More urologic complications?
  - Less blood loss?
  - Less painful?

Technique: Cauda Equina

- Prone under general anesthesia
- EMG
- L1- L5 Laminotomy
Technique: Cauda Equina

- Anatomic and EMG identification of each rootlet L1-S1 (S2 included if < 50% of S1 sectioned)
- Dura closed

Technique: Cauda Equina

- Lamina replaced
- Flat for 48-72 hours
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 Technique: Conus method

- Prone under general anesthesia
- EMG
- Laminectomy/Laminotomy guided by pre-op MRI and intra-operative ultrasound
- Laminectomy one or two segments (L1, L2)
- L2 root can be anatomically identified
- L3-S2 are isolated base on appearance and EMG recordings

- Lamina may or may not be replaced
Spinal deformity

- Several studies have been done to answer this question in this population
- Answer still unclear

Spinal deformity: the work of JC Peter

- 2009 "Incidence of spinal abnormalities in patients with spastic diplegia 17 to 26 years after selective dorsal rhizotomy."
- 1990 "Incidence of spinal deformity in children after multiple level laminectomy for selective posterior rhizotomy."
Spinal deformity: the work of JC Peter

- "Except for spondylolisthesis, spinal deformities did appear to progress with time. However, this increase was not marked, and the development of relatively mild scoliosis was the only statistically significant increase." 2009
- "Spondylolysis/spondylolisthesis is the only abnormality that appeared to be more common in this group than in children with CP" (9%) 1990
- Spondylolisthesis rates for general population is 4-6%

Conclusion

- Both methods are acceptable
- No good evidence exists at this time to suggest one should be done over the other