Paediatric Orthotics

Neuromuscular Disorders Study Day for AHPs
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Melville Dixon
Paediatric Orthotic Service Lead
RHSC Yorkhill Glasgow
What are Neuromuscular disorders?

- Neuromuscular disorders encompass many diseases and ailments that impair the functioning of the muscles, either directly, being pathologies of the muscle, or indirectly, being pathologies of nerves or neuromuscular junctions.
What are Neuromuscular disorders?

• Neuromuscular disease may be acquired: poliomyelitis, Guillain-Barré syndrome, myasthenia gravis, polymyositis

• The most common are genetic: spinal muscular atrophy, hereditary motor sensory neuropathy, congenital myasthenia gravis and Duchenne's muscular dystrophy

• Common symptoms of neuromuscular disease may include infantile floppiness or hypotonia, delay in motor milestones, feeding and respiratory difficulties, abnormal gait characteristics, frequent falls, difficulty with stairs or arising from the floor, and muscle cramps or stiffness
Selection of Neuromuscular disorders

- Adrenoleukodystrophy
- Arthrogryposis Multiplex Congenita
- Becker Muscular Dystrophy
- Bethlem Myopathy
- Charcot-Marie-Tooth Disease
- Hereditary Motor and Sensory Neuropathy
- Congenital Muscular Dystrophy
- Congenital Myopathy
- Spinal Muscular Atrophy
- Duchenne Muscular Dystrophy
- Emery-Dreifuss Muscular Dystrophy
- Facioscapulohumeral Muscular Dystrophy
- Friedreich’s Ataxia
- Pompe’s disease
- Guillain-Barré Syndrome
- Limb Girdle Muscular Dystrophy
- Muscular Dystrophy
- Myasthenia Gravis
- Peripheral Neuropathy and agenesis of the corpus callosum
Selection of Neuromuscular disorders

• Becker Muscular Dystrophy
• Bethlem Myopathy
• Charcot-Marie-Tooth Disease
• Limb Girdle Muscular Dystrophy
• Duchenne Muscular Dystrophy
• Congenital Muscular Dystrophy
• Spinal Muscular Atrophy
Specialist skills

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Orthotist Tool box

- Foot Orthosis
  - AFO
- Knee Orthosis
  - KAFO
  - HKAFO
  - RGO
  - TLSO
- Upper Limb
Phases of Orthotic intervention

Ambulatory

Non-ambulatory

Spine

Upper Limb
Ambulatory

- Becker Muscular Dystrophy
- Bethlem Myopathy
- Charcot-Marie-Tooth Disease
- Limb Girdle Muscular Dystrophy
- Duchenne Muscular Dystrophy
- Congenital Muscular Dystrophy
- Spinal Muscular Atrophy
Ambulatory

- Reduce discomfort
- Prevent deformity
- Maintain ROM
- Improve gait
  - Maximise energy efficiency
  - Reduce tiredness/Increase distance
  - Reduce stumbles/trips/falls
  - Improve pattern of gait (cosmetics)
Ambulatory
Ambulatory
Ambulatory

• CMT video
Ambulatory

- DMD video
Assistive/adaptive devices for function
AFOs are not indicated for use during ambulation because they typically limit compensatory movements needed for efficient ambulation, add weight that can compromise ambulation, and make it difficult to rise from the floor. During the late ambulatory stage, a KAFO with locked knee might prolong ambulation but is not essential.
Non-ambulatory

- Becker Muscular Dystrophy
- Bethlem Myopathy
- Charcot-Marie-Tooth Disease
- Limb Girdle Muscular Dystrophy
- Duchenne Muscular Dystrophy
- Congenital Muscular Dystrophy
- Spinal Muscular Atrophy
Non-ambulatory

- Reduce discomfort
- Prevent deformity
  - Comfort
  - Maintenance of shoe fitting
- Maintain ROM
- Enable standing where possible
Non-ambulatory
The number of hours per 24-hour period during which the soleus muscle was stretched above a minimal threshold length was calculated. The major finding was that there was no progressive contracture when the soleus was stretched for at least six hours a day (the same time as in non-handicapped children). On the other hand, there was progressive contracture when the stretching time was as short as two hours.
Assistive devices for musculoskeletal management

Orthoses

Prevention of contractures also relies on resting orthoses, joint positioning, and standing programmes. Resting ankle–foot orthoses (AFOs) used at night can help to prevent or minimise progressive equinus contractures and are appropriate throughout life.6,17–19,21,22 AFOs should be custom-moulded and fabricated for comfort and optimum foot and ankle alignment. Knee–ankle–foot orthoses (KAFOs; eg, long leg braces or callipers) for prevention of contracture and deformity can be of value in the late ambulatory and early non-ambulatory stages to allow standing and limited ambulation for therapeutic purposes,23 but might not be well tolerated at night.6 Use of AFOs during the daytime can be appropriate for full-time wheelchair users. Resting hand splints for patients with tight long finger flexors are appropriate.
Non Ambulatory
(Standing Shell)
Spine

- Becker Muscular Dystrophy
- Bethlem Myopathy
- Charcot-Marie-Tooth Disease
- Duchenne Muscular Dystrophy
- Limb Girdle Muscular Dystrophy
- Congenital Muscular Dystrophy
- Spinal Muscular Atrophy
Spine
Spine

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Spine
Upper Limb

- Becker Muscular Dystrophy
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Thank you!

Melville Dixon
Melville.dixon@ggc.scot.nhs.uk
@MelDixonAHP