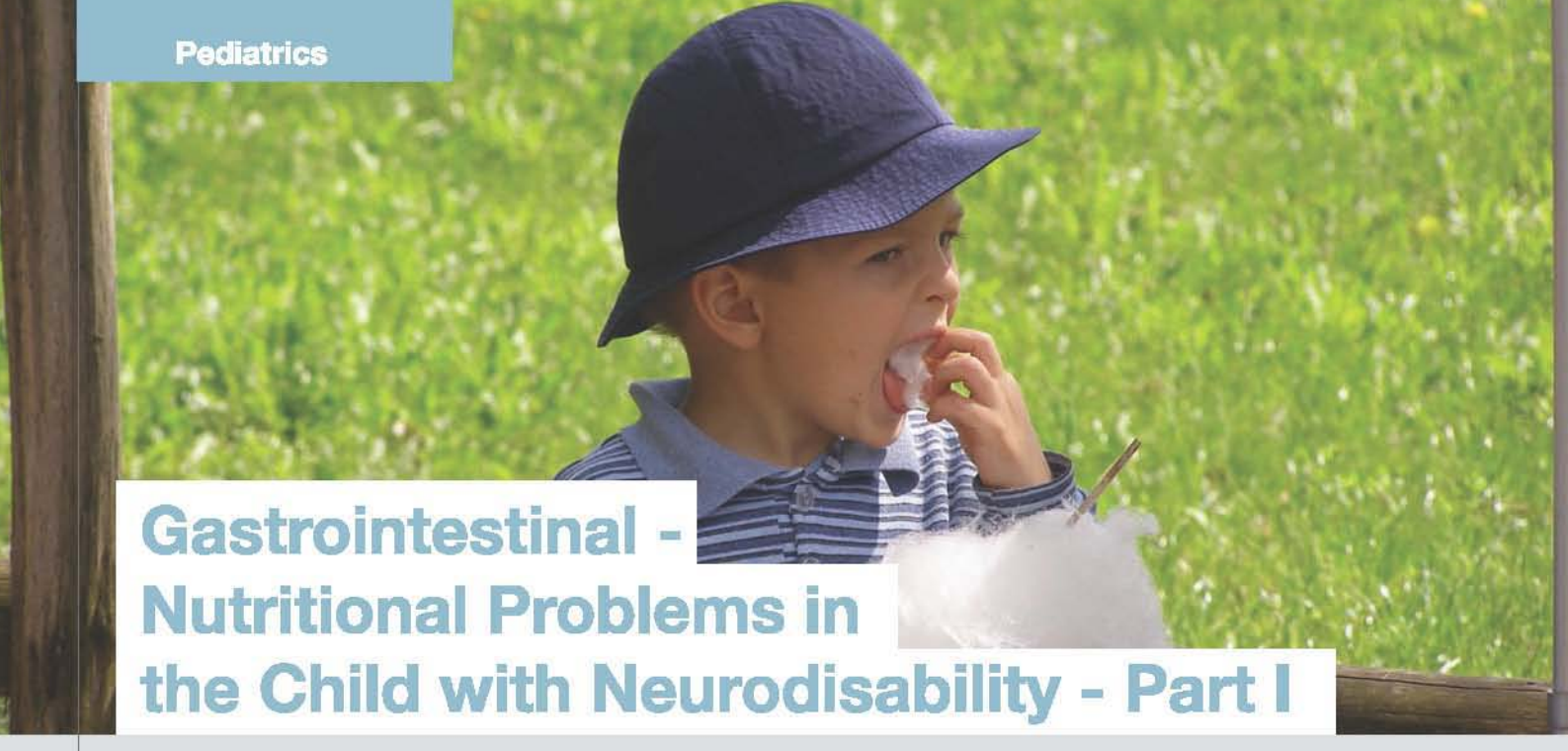

Gastrointestinal - Nutritional Problems in the Child with Neurodisability - Part I

by Thomas Attard

Neurodisability is increasingly being recognized as an important niche within pediatrics, more so since being recognized as a distinct subspeciality within the UK-STA in 2003. The spectrum of disorders encompassed in neurodisability includes learning disability, epilepsy, cerebral palsy, autistic spectrum disorders, head injury rehabilitation and neurometabolic disorders.

The child with neurodisability (ND) can be a challenge on several levels of care and it is incumbent upon the primary care physician, or pediatrician, to recognize the ramifications of the neurodisability to other systems including nutritional and gastrointestinal disorders.

This article will address the nutritional complications of ND in childhood, feeding strategies, and the impact and management of disordered motility resulting in gastroesophageal disease and constipation in these patients. The second installment of this series will address dietary modification in ND syndromes including autism.

Assessment of the nutritional status in the child with cerebral palsy can be difficult. Routine height, weight and head circumference are the basis of longitudinal growth monitoring but can be riddled with clinical and practical difficulties (Table 1). In fact, even well recorded weight-for-height percentiles will miss a significant proportion of malnourished children with cerebral palsy rendering triceps skinfold measurement preferable in this population.[1]

Foremost amongst the nutritional risks inherent to moderate and severe cerebral palsy is disordered calcium metabolism resulting in osteopenia and increased fracture risk.[2] The diagnosis of osteopenia rests upon Bone Mineral Densitometry which in children however can be problematic because of the lack of population specific norms, and more so in a contracted population as is the child with cerebral palsy. Decreased mobility, difficulty with feeds and overall malnutrition and the use of anticonvulsants tend to exacerbate the risk.

Hydrocephaly
Ischemic / Metabolic Brain Atrophy – Microcephaly
Syndromic microcephaly
Syndromic Short Stature (Example Osteogenesis)
Tendon Contractures (hips)
Scoliosis / Lordosis
Endocrine Co-morbidity (hypothyroidism)
Medications (Example steroids)
Scoliosis brace, prostheses etc.
Accessibility to hoist – weight measurement

Table 1: Difficulties and Limitations in Nutritional - Longitudinal Growth Monitoring by means of Standardized Head circumference, Weight and Height Measurement.

Management includes addressing the global nutritional status but may require calcium supplementation and modification of anticonvulsant cover.

Other trace element and vitamin deficiencies have been reported with ND including cerebral palsy, and include iron deficiency[3] and vitamin C deficiency[4]; management should focus on improving intake of fluids, proteins and vitamins. There is no consensus on the usefulness of routine multivitamin supplementation in children with ND.

Management of nutritional deficiencies in children with ND includes enteral supplementation with high-calorie drinks and modifying food preparations towards a higher calorie and more nutritious diet. Liaison with a qualified dietician is invaluable at this stage. Children with ND, notably with autism spectrum disorder can be particularly picky eaters with extreme limitation in the variety of food and in some cases limited intake overall, including fluids.[5]

In cases where oral supplementation fails it is important to identify the potential contributing factors (Table 2) in order to map out further management. Children with ND are at higher risk for swallowing dysfunction.[6]

It is important to recognize and refer children at risk to a dedicated speech therapist; in many cases a video-fluoroscopic swallow study (VFSS) may be needed

to define the risk of aspiration. In some patients assessment may result in recommendations to modify the consistency or quantity of food per feeding session; this in itself may improve the adequacy of feeding especially fluid intake.

Dysphagia and pain upon swallowing will limit oral intake and children with ND are at increased risk of gastroesophageal reflux disease[7] (GERD) and eoisinophilic esophagitis. Significant reflux will result in loss of food through emesis but, more importantly pain and food refusal. GERD in children with ND is often complex with contributing dysmotility in the foregut[8] rendering traditional medical and surgical management less likely to succeed. Proton pump inhibitors are safe

Dysfunctional swallow – slow, uncoordinated / ineffective feeds, risk of aspiration
Dental abnormalities, poor dental hygiene - caries
Dysphagia –esophagitis
Gastroesophageal Reflux Disease
Eosinophilic Esophagitis / Allergic Enteropathy
Dysmotility – delayed gastric emptying
Medication associated
Celiac Disease
Small Bowel Bacterial Overgrowth
Fecal impaction – abdominal discomfort

Table 2: Failure of oral nutritional intervention (dietary modification and caloric supplementation) in the Child with Neurodisability.

and effective in this age range but their long term safety profile may be debatable especially in view of the risk of osteopenia in the growing child with ND. Surgical intervention (fundoplication) may be required to protect the airway if severe GER complicates dysfunctional swallow, but it is imperative in this scenario to educate the parents that the risk of adverse surgical outcomes are frequent including the continued need for aggressive pharmacologic management. Specifically in children with ND, it is important to consider the possibility of Rumination Syndrome as a cause of refractory reflux symptoms.

The child with ND may have failure to thrive through malabsorptive processes or other, most notably endocrine, comorbidity. It is important therefore to carefully assess dietary intake and in select cases perform stool testing. Both Celiac Disease and Small Bowel Bacterial Overgrowth are two malabsorptive processes that appear to be more prevalent in children with ND including CP[9] and may warrant diagnostic testing including endoscopy with biopsy or aspirate.

In those children with ND who appear to be failing to thrive or who are irreversibly malnourished despite oral supplementation alone, discussion of tube feeds is the obvious next step. These are usually emotionally charged subjects even though the parents may already have clear indications that this is necessary.[10] It is important to stress that a period of supplemental feeds via nasogastric tube should prove that a more definitive procedure, i.e. gastrostomy is indicated and will achieve the desired improved nutritional status: it is not unusual for supplemental NG feeds to exacerbate previously unrecognized reflux. It is equally important to stress that neither nasogastric nor eventually gastrostomy feeds, will preclude continued oral feeds. In practice, families tend to achieve more harmonious or at least, less stressful interactions around mealtimes as both the onus of delivering adequate calories, often from non-preferred foods is removed from the parents.[11]

Another manifestation of the complex dysmotility processes in children with ND especially CP is the high prevalence of constipation in this subpopulation. There are multiple additional potential factors, some reversible, that contribute towards constipation in this population (Table 3).

Dysautonomia - dysmotility
Immobility
Fluid deprivation
Medications
Low fiber diet
Special diets (Example ketogenic diet)

Table 3: Potential Factors Contributing Towards the Development of Constipation in the Child with Cerebral Palsy.

Functional constipation, and if untreated, retentive fecal incontinence (encopresis) is also more common in children with autism[12] and other milder neurologic and behavioral abnormalities like Attention Deficit Hyperactivity Disorder. In these individuals it is important to recognize that although the constipation – overflow diarrhea is rooted in the child's behavioral disorder, its natural history is such that it evolves into a disorder that requires long-term aggressive medical management along with behavioral modification in order to be definitively treated. The reader is referred to our earlier article on the subject.

In summary we have herein reviewed some of the gastrointestinal-nutritional sequelae of neurodisability in children. In this more vulnerable subpopulation of patients, optimized nutrition cannot be over-emphasized and a multidisciplinary coordinated effort can resolve some of the difficulties that prevent our patients from achieving their full potential.

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