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Conference on 'Malnutrition matters'

Symposium 6: Young people, artificial nutrition and transitional care Nutrition, growth and puberty in children and adolescents with Crohn's disease

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Of the individuals who present with Crohn's disease 25% are <18 years of age, mostly adolescent. Nutritional impairment and delayed growth are common at diagnosis and remain an issue during the disease course. Treatment has the primary aim to control symptoms, induce disease remission and achieve normal growth in the long term and includes nutritional support and early use of immunomodulation. Puberty may be discordant and is generally late and final adult height may not be achieved until the late teenage years. Chronic ill health and delayed growth may be accompanied by emotional and intellectual immaturity. These factors, including the varying rates of physical and emotional development, need to be considered during adolescence with multidisciplinary input to ensure that the young patient is appropriately supported. Transition to adult care requires close collaboration between paediatric and healthcare teams with careful attention to nutritional, emotional and educational issues, all of which are relevant in the progression from childhood, through adolescence and to adult life.

Crohn's disease: Children and adolescents: Nutrition and growth: Puberty: Management

Of the individuals who present with Crohn's disease 25% are <18 years of age[1]. The disease runs a chronic relapsing course with a high morbidity. Nutritional impairment with growth failure and delayed onset of puberty are common at diagnosis[2] and remain issues throughout the disease course. Key priorities in paediatric practice (in addition to keeping the child well) are therefore to facilitate through careful medical management normal growth and emotional and pubertal development. The transfer to the adult healthcare team generally occurs between ages 16 and 18 years when growth may not be complete and requires close collaboration between paediatric and adult healthcare teams to support the young individual through this transition.

Clinical features

The classical triad of presenting features are abdominal pain, diarrhoea and weight loss. The British Paediatric Surveillance Unit survey conducted in the UK from June 1998 for 13 months has reported that this triad is seen in only 25% of children. Abdominal pain is the commonest symptom, occurring in 75% of children, approximately 60% have weight loss preceding diagnosis, 56% have diarrhoea while only 45% report both diarrhoea and weight loss[1,3].

There should be a low threshold for investigation of children with chronic gut symptoms, particularly in the presence of weight loss, raised inflammatory markers and a family history of inflammatory bowel disease. Investigation is by gastroscopy, ileo-colonoscopy and small-bowel radiology[4].

Nutrition and growth

Nutritional impairment is common at diagnosis, occurring in ≤85% of children at diagnosis, and is manifest by failure to gain weight or weight loss[2]. This feature is associated with impaired linear growth and delayed onset of puberty in ≤50% of children[2] with the potential for reduced final adult height reported in up to one-third[5].

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Many factors potentially contribute to the poor nutritional status, with reduced intake as the principal cause secondary to anorexia (including self-imposed dietary restrictions secondary to symptoms with food), pain induced by food, nausea, abdominal discomfort and diarrhoea. The result is an energy deficiency and a nutrient and micronutrient deficiency. In addition, potential contributing factors include: malabsorption secondary to gut inflammation or resection, fistula or stoma; losses secondary to diarrhoea including potentially substantial blood and electrolyte loss; disease-induced hypermetabolism; toxicity from drug treatment[6].

Nutrition *per se* will impact on linear growth, particularly during adolescence when the energy cost of growth is high, and not only in children with bowel inflammation. In 2003 it was reported that for two boys with anorexia nervosa the period of weight loss was accompanied by reduced growth, as evidenced by a fall in height velocity, which improved in parallel with the improved nutritional status as the condition was treated and weight gain achieved[7].

In Crohn's disease there are additional factors that contribute to the impairment of growth and delayed onset of puberty including the systemic consequences of gut inflammation, disturbances of the growth hormone–insulin-like growth factor axis and the side effects of corticosteroids when used. Disease site (jejunal), early onset and disease severity are also risk factors[8]. It is of interest in this context that different clinical phenotypes are seen, including short underweight, short normal-weight and normal-height underweight. There are many factors that contribute to this feature, including timing of the onset of disease related to puberty, timing of puberty and expected height when parental heights are considered together with the contribution of nutritional intake, nutritional status, the inflammatory response, endocrine factors and the disease management[8].

The delay in growth is linear in that both growth and puberty and therefore physical maturity are delayed. The striking impact of this in a proportion of cases is that the child looks younger than their chronological age and therefore may be treated as such, with all the consequent psychological sequelae added to the impact of coping with a chronic disease during adolescence. The second important impact of this growth delay is that it is not uncommon for young patients with Crohn's disease to continue to grow into their late teens, when most adolescents have completed their growth, with continued improvement after age 16 years, as evidenced by continued improvement in height SD score in long-term follow-up data[8].

It is important in the young patient in the adult clinic to be aware of where there may still be potential for growth, particularly if puberty is not complete, and clinical assessment should include careful documentation of weight, height, height velocity and pubertal status.

It is generally accepted that growth is best when disease is in remission, as evidenced by the increased height velocity seen after therapeutic intervention. This outcome is most impressive after surgical resection of active disease[9] but also after the induction of disease remission using medical therapies including exclusive enteral nutrition[10], azathioprine and monoclonal antibody therapy[11].

Normal growth is a primary outcome best facilitated by keeping disease in remission. In the young patient in whom growth remains impaired despite maintenance therapy re-investigation should be considered particularly to exclude more extensive disease than is apparent clinically and stricture formation, and other potential causes such as psychosocial factors need to be considered[12].

Management strategy

The primary aim of management is to control disease symptoms, correct nutritional impairment, avoid disease complications, avoid treatment complications and promote normal growth and pubertal development.

Paediatric management is generally coordinated through a regional centre in conjunction with local hospital and primary care delivered by the multidisciplinary team in collaboration with patients and their families. The multidisciplinary team includes as its key members dietitians and the specialist nurse.

There are many practical issues other than medical treatment. Like any other chronic disease Crohn's disease can result in substantial amounts of time absent from school, difficulty with examinations, over-dependence on parents and difficulty with friendships. The embarrassing nature of the disease, particularly if there is an urgency to pass stools, can be a major source of stress to the child in the school setting.

Compliance can be a real problem and high rates of non-adherence have been reported[13]. The treatment is by evidence-based algorithms of care. In the UK there are consensus-based guidelines for adult[14,15] and paediatric[16] care that are widely used. The differences between paediatric and adult practice relate to the emphasis on growth, with the avoidance of corticosteroids where possible and the earlier use of immunosuppressive agents, but also to the specific healthcare needs of the different age-groups.

Nutritional therapy

Exclusive enteral nutrition is widely used as primary therapy in children and adolescents. This therapy involves enteral feeding with the exclusion of other foods for 8 weeks followed by controlled food re-introduction, which reduces local and systemic inflammation and promotes weight gain[17]. The effect can be dramatic, with improvement in clinical symptoms, weight gain and inflammatory markers in only a few days[18]. It is non-toxic and probably as effective as steroids[19,20].

A recent Cochrane review of growth failure in childhood Crohn's disease has examined the impact of different treatments on growth[21] and has concluded that there is some evidence that exclusive enteral nutrition has additional benefits on growth when compared with steroids. The evidence for effectiveness is supported by the clinical experience of advocates of enteral nutrition who see it as

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well tolerated, non-toxic and acceptable to patients. A 6–8-week course of a polymeric feed is generally used. The amount required is gradually increased to approximately 120% of the recommended nutritional intake over 3 d[22]. The feed is most palatable when chilled and can be flavoured. Compliance as a consequence of multidisciplinary and family support is good and most children do not require a naso-gastric tube. Gradual food introduction is supervised by dietitians at the end of treatment while weaning enteral nutrition to allow identification of potential food triggers.

It is important to recognise that once the child is well activity levels will increase and so the energy needs are likely to be higher and that the amount of feed given may need to be increased particularly if the child is hungry. There may also be a need for increased energy intake to achieve catch-up growth.

The role of enteral nutrition as maintenance therapy is still unclear. It has been shown that while partial enteral nutrition may result in some symptomatic improvements, it does not alter the inflammatory process and thus has no long-term role in maintaining disease remission[23]. However, a retrospective study has shown improvements in both growth velocity and time to relapse in children who continue supplementary nocturnal enteral nutrition compared with those who do not[24].

Nutritional therapy in Crohn's disease should be considered as two different treatment arms: first, as a primary therapeutic option modulating disease activity as an immunomodulator inducing disease remission; second, as an (essential) adjunct to other therapies impacting on symptom control, control of inflammation and growth and likely to improve the efficacy of immunomodulatory and biological therapies. An improvement in the efficacy of Infliximab has been reported in adults treated concurrently with an elemental diet[25].

Drug therapy

This therapy is for the induction and maintenance of disease remission and includes corticosteroids, thiopurines and biological therapy. The use of these agents is well described elsewhere[26,27], with detailed algorithms for use described in the paediatric and national guidelines[14–16].

The greatest challenge in Crohn's disease is to maintain remission once disease remission is achieved and 2nd-line immunosuppressive agents including azathioprine are generally introduced early in children with good efficacy[28]. There needs to be careful consideration of psychological factors and a low threshold for re-investigation if there are persistent symptoms (acute or chronic) or impaired growth. The risk–benefit of different treatment strategies need to be discussed with consideration of biological therapies or surgical resection in disease refractory to other therapies.

Monoclonal antibody therapy

This therapy has been a major advance in the treatment of paediatric Crohn's disease, with impressive clinical efficacy for both the induction and maintenance of remission, although there is marked potential toxicity including an increased risk of T-cell lymphoma[29,30]. Monoclonal antibody therapy should be considered in active disease unresponsive to immunosuppressant therapy and not amenable to surgery (i.e. localised resection). Growth failure is a potential additional indication in childhood. Infliximab is the most widely used. In children on long-term cyclical therapy both dependency and progressive failure of response are common. Alternative biological therapies can be considered[26,27]. Surgery should be considered for disease unresponsive to medical management, particularly in the setting of chronic severe symptoms and/or growth failure, and although the risk of recurrence is high, it can result in a prolonged period of well-being and a marked growth spurt providing the timing in relation to the pubertal growth spurt is right.

Transition to adult care

In young patients with chronic disease transition from paediatric to adult healthcare generally occurs at some time during adolescence and makes a presumption of confidence and maturity that enables the individual to transfer from a family-based to self-led healthcare system. Many factors can impact on this process including disease type, severity and ongoing healthcare needs. Family, educational and social factors are of obvious relevance. In conditions like Crohn's disease that are associated with nutritional impairment delayed growth and delayed puberty are of particular importance.

Successful transition is a purposeful planned process that addresses the medical, psychosocial and educational and/or vocational needs of adolescents and young adults with chronic physical and medical conditions as they move from child-centred to adult-oriented healthcare systems.

There are different models of delivery, including direct transfer, handover clinics and transition clinics, whereby children are seen in this setting more than once by adult and paediatric teams together and a tailored approach according to the needs of the individual are part of a clinical network of care that recognises that the needs of all 16 year olds are not the same and, for example, that many will still value support from either the parent, a friend or their partner at the outpatient consultation.

There is guidance available through the documentation produced by the National Association of Colitis and Crohn's Disease in collaboration with healthcare professionals and other patient groups available on their website[31].

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