ISSN 1391-5452

SRI LANKA JOURNAL OF CHILD HEALTH

Official Publication of the Sri Lanka College of Paediatricians

Volume 32 June 2003 No. 2

CONTENTS

Sri Lanka Journal of Child Health is the continuation of the Ceylon Journal of Child Health

ISSN 1391-5452

SRI LANKA JOURNAL OF CHILD HEALTH

Official Publication of the Sri Lanka College of Paediatricians

Volume 32 **June 2003** **No. 2**

CONTENTS *Page*

Sri Lanka Journal of Child Health is the continuation of the Ceylon Journal of Child Health

Printed by Ananda Press

Editorial Office

Sri Lanka College of Paediatricians, Wijerama House, No.6, Wijerama Mawatha, Colombo 7, Sri Lanka.

Tel:683178, Fax:00-94-1-683178, E-mail:slcp@sltnet.lk, Internet:www.medinet.lk

The electronic version of this issue of the journal is available on the World Wide Web of the Internet completely free of charge

Please access
http://www.medinet.lk/journals/childhealth.asp

Editorial

Vitamin K and the newborn

Sri Lanka Journal of Child Health, 2003; **32**: 31-34

Vitamin K comprises several molecular forms that have a common 2-methyl-1,4-naphthoquinone ring but differ in the structures of the side chain at the 3-position[1]. Vitamin K_1 or phylloquinone is the principal form in plants and vegetable oils[2]. Most commercial formulae contain >50 µg/L of vitamin K_1. In contrast, vitamin K content of human milk is generally <20 µg/L and often <5 µg/L[3]. Vitamin K_1 absorption occurs in small intestine and requires presence of bile acids[2]. The intestinal flora synthesizes vitamin K as vitamin K_2 or menaquinone[4]. Bacteria vary widely in this ability: *Bacteroides fragilis* and some strains of *Escherichia coli* are efficient producers of vitamin K_2 whereas some lactobacilli and pseudomonas organisms are incapable of its synthesis[4]. Absorption of vitamin K_2 from neonatal colon has been demonstrated[5], but the relative importance of intestinal flora in providing vitamin K to infant is unknown.

Vitamin K is required for modification and activation of a number of important proteins, best known of which are coagulation factors II, VII, IX and X[6]. Protein C, an inhibitor of coagulation, is also vitamin K dependent[7] as are other proteins with less understood specific functions[8]. The specific action of vitamin K is the posttranslational carboxylation of glutamic acid residues on vitamin K-dependent proteins[9]. This conversion of glutamic acid to γ-carboxyglutamic acid creates effective calcium binding sites on these proteins. Noncarboxylated proteins are functionally defective because they cannot bind calcium. In absence of vitamin K, synthesized coagulation factors circulate in their noncarboxylated, functionally defective form[1]. The vitamin K-dependent carboxylation of coagulation factors occurs in the endoplasmic reticulum of the hepatocyte[1].

Vitamin K_1 does not cross the placenta easily. Its concentration in cord blood is <10% of mean maternal values[10] and mean concentrations of vitamin K dependent clotting factors (II, VII, IX and X) are 30% to 60% of normal adult values[11]. These low levels gradually increase until they reach normal adult values by 6 weeks of age[1].

In the past, assessment of vitamin K status in infancy relied on functional assays of vitamin K-dependent factors or prothrombin time (PT) and comparison of these values with those of normal newborn infants. Unfortunately, levels seen in mild vitamin K deficiency may overlap normal physiologic values. An increase in these factor levels or decrease in the PT following administration of vitamin K has also been used to suggest a deficiency state. More specific tests measure the abnormal, noncarboxylated prothrombin that circulates in vitamin K-deficient patients. This abnormal prothrombin is antigenically intact but functionally defective[1]. One method compares level of prothrombin measured functionally (II coagulant) with that measured antigenically (II antigen)[12]. A low coagulant/antigen ratio indicates vitamin K deficiency. Other methods measure this abnormal prothrombin or PIVKA more directly[13]. In these assays carboxylated prothrombin is absorbed from plasma and any remaining noncarboxylated prothrombin is assayed immunologically.

Vitamin K deficiency bleeding (VKDB) in infancy (formerly known as haemorrhagic disease of the newborn) comprises early (0-24 hours), classical (1-7 days) and late (2-12 weeks) syndromes according to the time of presentation[14].

1. **Early VKDB** – These infants have severe and often life-threatening haemorrhage at time of delivery or during first 24 hours after birth. Although idiopathic case have been reported[15,16], it is typically seen in infants whose mothers have taken drugs that affect vitamin K metabolism. Warfarin taken during pregnancy may result in severe early VKDB[17]. Maternal anticonvulsants have also been linked to early VKDB[18,19]. Most cases have involved barbiturates, phenytoin or both. Infants born to women taking rifampicin and isoniazid during pregnancy may also be at risk for early VKDB[20]. The extent of bleeding varies from skin bruising or umbilical bleeding to widespread and fatal intracranial, intrathoracic, intra-abdominal and gastrointestinal haemorrhage[1].

2. **Classical VKDB** – This typically occurs at 2 to 5 days of age[21]. Affected infants are normal at birth but subsequently develop generalized ecchymoses or gastrointestinal bleeding. Nasal bleeding or bleeding following circumcision may also be the initial manifestation[1]. Intracranial haemorrhage is less common at this age. Breast feeding plays an important role in its pathogenesis. Breast milk is

relatively deficient in vitamin K. The incidence of moderate to severe bleeding among breast fed infants who do not receive vitamin K is 15 to 20 times greater than in infants who receive cow's milk, vitamin K or both[22].

3. **Late VKDB** – This was first described in Thailand in 1963[23]. The bleeding manifestations occur after first week of life. Of major concern is its sudden and unpredictable onset and the high (50-82%) frequency of intracranial haemorrhage as the presenting feature[24]. Another common initial feature is widespread deep ecchymoses or 'nodular purpura'[25]. Known risk factors include breast feeding and failure to give vitamin K prophylaxis at birth. An association between late VKDB and undiagnosed abnormalities of liver function has been reported in surveillance programmes from several countries[26,27,28]. Evidence for liver dysfunction in some cases has rested on transient, mildly abnormal biochemical indices[26,29], but several surveys have indicated that certain cholestatic liver diseases such as biliary atresia and α_1 antitrypsin deficiency may be responsible for the majority of cases of late VKDB[27,28,30].

The efficacy of newborn intramuscular (IM) vitamin K prophylaxis in prevention of classical and late VKDB has been well established[31]. In 1990 Golding et al reported a study of a 1970 birth cohort in Britain in which they noted an unexpected association between childhood cancer and pethidine given in labour and neonatal administration of vitamin K[32]. Subsequently, Golding and others conducted a case-control study designed to examine the risk of cancer associated with IM vitamin K administration among infants born in two hospitals in Avon between 1965 and 1987 and diagnosed with cancer between 1971 and 1989[33]. They reported a significant association between IM vitamin K and cancer when compared to no vitamin K or oral Vitamin K. They recommended exclusive use of oral vitamin K. A study from the United States of America found no association between neonatal IM vitamin K and an increased risk of any childhood cancer[34]. The American Academy of Paediatrics has thus recommended continued use of IM vitamin K for prophylaxis[35]. The British Paediatric Association, on the other hand, recommended routine use of oral vitamin K in all healthy neonates, reserving IM prophylaxis for those at greatest risk of VKDB[36]. 4 subsequent studies from Great Britain, whilst ruling out solid tumours, could not completely exclude a small risk of leukaemia[37,38,39,40].

The most efficacious oral vitamin K regimen for prevention of late VKDB remains to be established. Experience from small populations suggests that 0.025 mg given daily, as in Netherlands[40], or 1 mg doses given weekly, as in Denmark[41], may be almost as effective as 1 mg given IM at birth. Three oral doses of 2 mg vitamin K have been given to a substantial population of newborns in Europe under surveillance for late VKDB. The incidence of VKDB in these children was 0.56 (95% confidence interval 0.33-0.89)/ 100,000 live births, suggesting that this regimen is quite effective. Most of the infants who did not respond to prophylaxis had cholestatic disease[42].

Since 1994, the original Konakion, which contained the non-ionic detergent Cremophor EL as solubiliser, has been superseded by a mixed micellar formulation (Konakion MM) in which phylloquinone (vitamin K1) is solubilised in glycocholic acid and phosphatidylcholine. A paediatric Konakion MM formulation is now in wide use for oral vitamin K prophylaxis of VKDB and in healthy babies has been shown to give higher serum levels than the earlier preparation, suggesting a superior bioavailability[43]. It has also been claimed that Konakion MM is well absorbed in infants with severe cholestasis[44]. In a recent randomized controlled trial comparing breast fed infants given either 1 mg vitamin K_1 IM or 2 mg mixed micellar preparation orally at birth, on day 7 and day 30, good or even higher plasma vitamin K_1 concentrations up to the eighth week of life were observed in children on the oral regimen[45].

In Sri Lanka the paediatric Konakion MM formulation has been available from 1996. As this is supplied only in glass vials it is unsuitable for routine administration by mothers and so professional administration of each dose is specified in the data-sheet. However, most neonatal units continue to use IM vitamin K rather than the oral preparation because, in the normal newborn population, giving three doses of vitamin K_1 to breast feeding infants, two of which would be given after hospital discharge, is problematic. Poor compliance in administering the three doses has already been reported from elsewhere[46].

References

1. Lane PA, Hathaway WE. Vitamin K in infancy. *J.Pediatr* 1985; **106**: 351-359.

2. Corrigan JJ. The vitamin K-dependent proteins. *Adv Pediatr* 1981; **28**: 57.

3. Haroon Y, Shearer MJ, Rahim S. The content of phylloquinone (vitamin K_1) in human milk, cow's milk and infant formula foods determined by highperformance liquid chromatography. *J Nutr* 1982; **112**: 1105.

4. Bentley R, Meganathan R. Biosynthesis of vitamin K (menaquinone) in bacteria. *Microbiol Rev* 1982; **46**: 241.

5. Aballi AJ, Howard CE, Triplett RF. Absorption of vitamin K from colon in newborn infant. *J Pediatr* 1966; **68**: 305.

6. Liebman HA, Furie BC, Furie B. Hepatic vitamin K-dependent caboxylation of blood-clotting proteins. *Hepatology* 1982; **2**: 488.

7. Esmon CT. Protein C: Biochemistry, physiology and clinical implications. *Blood* 1983; **62**: 1155.

8. Gallop PM, Lian JB, Hauschka PV. Carboxylated calcium-binding proteins and vitamin K. *N Engl J Med* 1980; **302**: 1460.

9. Stenflo J, Fernlund P, Egan W. Vitamin K-dependent modifications of glutamic acid residues in prothrombin. *Proc Natl Acad Sci USA* 1974; **71**: 2730.

10. Shearer MJ, Rahim S, Barkhan P, Stimmler L. Plasma vitamin K_1 in mothers and their newborn babies. *Lancet* 1982; **ii**: 770.

11. Hathaway WE, Bonnar J. Perinatal coagulation. New York; Grune & Stratton, 1978; p 53.

12. Corrigan JJ, Krye JJ. Factor II (prothrombin) levels in cord blood: Correlation of coagulant activity with immunoreactive protein. *J Pediatr* 1980; **97**: 979.

13. Meguro M, Yamada K. A simple and rapid test for PIVKA-II in plasma. *Thromb Res* 1982; **25**: 109.

14. Sutor AH, von Kries R, Cornelissen EA. Vitamin K deficiency bleeding (VKDB) in infancy. ISTH Pediatric/Perinatal Subcommittee, International Society on Thrombosis and Haemostasis. *Thromb-Haemost* 1999; **81**: 456-461.

15. Leonard S, Anthony B. Giant cephalhaematoma of newborn with haemorrhagic disease and hyperbilirubinaemia. *Am J Dis Child* 1961; **101**: 170.

16. Hull MG, Wilson JA. Massive scalp haemorrhage after fetal blood sampling due to haemorrhagic disease. *BMJ* 1972; **4**: 321.

17. Stevenson RE, Burton OM, Ferlauto GJ, *et al*. Hazards of oral anticoagulants during pregnancy. *JAMA* 1980; **243**: 1549.

18. Mountain KR, Hirsh J, Gallus AS. Neonatal coagulation defect due to anticonvulsant drug treatment in pregnancy. *Lancet* 1970; **1**: 265.

19. Bleyer WA, Skinner AL. Fatal neonatal haemorrhage after maternal anticonvulsant therapy. *JAMA* 1976; **235**: 626.

20. Eggermont E, Logghe N, van de Casseye W. Haemorrhagic disease of the newborn in the offspring of rifampicin and isoniazid treated mothers. *Acta Paediatr Belg* 1976; **29**: 87.

21. Aballi AJ. Haemorrhagic disease of the newborn. *Pediat Ann* 1974; **3(2)**: 35.

22. Sutherland JM, Glueck HI, Gleser G. Haemorrhagic disease of the newborn: Breast feeding as a necessary factor in the pathogenesis. *Am J Dis Child* 1967; **113**: 524.

23. Bhanchet P, Tuchinda S, Hathirat P. A bleeding syndrome in infants due to acquired prothrombin complex deficiency; a survey of 93 affected infants. *Clin Pediatr* 1977; **16**: 992-998.

24. Chuansumrit A, Isarangkura P, Hathirat P. Vitamin K deficiency bleeding in Thailand; a 32-year history. *Southeast Asian J Trop Med Pub Health* 1998; **29**: 649-654.

25. Nagi NA, Al-Dubooni HM, Al-Shirkat SAR. Nodular purpura in infancy. *Post-grad Med J* 1982; **58**: 274.

26. Hanawa Y, Maki M, Murata B. The second nation-wide survey in Japan of vitamin K deficiency in infancy. *Eur J Pediatr* 1988; **147**: 472-477.

27. McNinch AW, Tripp JH. Haemorrhagic disease of the newborn in the British isles; two year prospective study. *BMJ* 1991; **303**: 1105-1109.

28. Ekelund H. Late haemorrhagic disease in Sweden 1987-89. *Acta Paediatr Scand* 1991; **80**: 966-968.

29. von Kries R, Reifenhauser A, Gobel U, *et al*. Late onset haemorrhagic disease of newborn with temporary malabsorption of vitamin K. *Lancet* 1985; **1**: 1035.

30. Loughnan PM, McDougall PN. Epidemiology of late onset haemorrhagic disease; a pooled data analysis. *J Paediatr Child Health* 1993; **29**: 177-181.

31. von Kries R, Hanawa Y. Neonatal vitamin K prophylaxis. Report of Scientific and Standardization Subcommittee on Perinatal Haemostasis. *Thromb Haemost* 1993; **69**: 293-295.

32. Golding J, Paterson M, Kinlen LJ. Factors associated with childhood cancer in a national cohort study. *Br J Cancer* 1990; **62**: 304-308.

33. Golding J, Greenwood R, Birmingham K, Mott M. Childhood cancer, intramuscular vitamin K and pethidine given during labour. *BMJ* 1992; **305**: 341-346.

34. Klebanoff MA, Read JS, Mills JL, Shiono PH. The risk of childhood cancer after neonatal exposure to vitamin K. *N Engl J Med* 1993; **329**: 905-908.

35. Vitamin K Ad Hoc Task Force. Controversies concerning vitamin K and the newborn. American Academy of Paediatrics. *Pediatrics* 1993; **91**: 1001-1003.

36. Expert Committee. Vitamin K prophylaxis in infancy. London: British Paediatric Association, 1992.

37. McKinney PA, Juszczak E, Findlay E, Smith K. Case-control study of childhood leukaemia and cancer in Scotland; findings for neonatal intramuscular vitamin K. *BMJ* 1998; **316**: 173-177.

38. Passmore SJ, Draper G, Brownbill P, Kroll M. Case-control

studies of relation between childhood cancer and neonatal vitamin K administration; retrospective case-control study. *BMJ* 1998; **316**: 178-184.

39. Passmore SJ, Draper G, Brownbill P, Kroll M. Ecological studies of relation between hospital policies on neonatal vitamin K administration and subsequent occurrence of childhood cancer. *BMJ* 1998; **316**: 184-189.

40. Parker L, Cole M, Craft AW, Hey EN. Neonatal vitamin K administration and childhood cancer in the north of England. *BMJ* 1998; **316**: 189-193.

41. Cornellisen M, von Kries R, Loughnan P, *et al*. Prevention of vitamin K deficiency bleeding; efficacy of different multiple oral dose schedules of vitamin K. *Eur J Pediatr* 1997; **156**: 126-130.

42. Norgaard-Hansen K, Ebbesen F. Neonatal vitamin K prophylaxis in Denmark; three years' experience with oral administration during the first three months of life compared with one oral administration at birth. *Acta Paediatr* 1996; **85**: 1137-1139.

43. von Kries R, Hachmeister A, Gobel U. Can 3 oral 2 mg doses of vitamin K effectively prevent vitamin K deficiency bleeding? *Eur J Pediatr* 1999; **158**: 183-186.

44. Schubiger G, Gruter J, Shearer MJ. Plasma vitamin K_1 and PIVKA-II after oral administration of mixed-micellar or cremophor EL solubilized preparations of vitamin K_1 to normal breast-fed new-borns. *J Pediatr Gastroenterol Nutr* 1997; **24**: 280-284.

45. Amedee-Manesme O, Lambert WE, Alagille D. Pharmacokinetics and safety of a new solution of vitamin K1(20) in children with cholestasis. *J Pediatr Gastroenterol Nutr* 1992; **14**: 160-165.

46. Greer FR, Marshall SP, Severson RR, *et al*. A new mixed micellar preparation for oral vitamin K prophylaxis; randomized controlled comparison with an IM formulation in breast fed infants. *Arch Dis Child* 1998; **79**: 300-305.

47. Croucher C, Azzopardi D. Compliance with recommendations for giving vitamin K to newborn infants. *BMJ* 1994; **308**: 894-895.

G N Lucas
Joint Editor

Leading Article

Nutrition, immunity and infections in children

Meharban Singh[1]

Sri Lanka Journal of Child Health, 2003; **32**: 35-39

Human health and well-being depends upon an interaction between genetic endowment or constitution on the one hand and environmental factors like nutrition, ecology (environmental sanitation, safe drinking water, pollutants, toxins etc) and life style (physical exercise, mental poise, peace, positive thinking, art of living, spirituality etc) on the other. Good nutrition and sound health go hand-in-hand. It has been known since the time of Hippocrates, that a person with good nutrition is able to ward off infections much more effectively than a person who is "fragile and weak". During most of the 20th century, the focus of research in nutrition was how to improve intake of total calories and protein in children. Therefore, the florid cases of kwashiorkor, severe protein-energy malnutrition and severe deficiencies of single micronutrients like scurvy, beriberi, pellagra and keratomalacia have significantly declined or disappeared. However, there is still widespread prevalence of diseases of public health relevance due to deficiencies of single micronutrients like iron deficiency anaemia, goitre and other iodine-deficiency disorders and milder forms of vitamin A deficiency[1]. But, of late, there has been an increasing awareness that subclinical or biochemical deficiency of certain micronutrients ("hidden hunger") is widely prevalent in developing countries which is adversely affecting the quality of human life and leading to frequent occurrence of common day-to-day gastrointestinal and respiratory infections[2]. It has been documented in developing countries that impaired immunocompetence due to nutritional deficiencies precedes overt infections and may even occur before growth failure is evident.

Nutritional status of children

Nutritional disorders are common in children due to their higher nutritional requirements to meet the demands of their physical and mental growth and because of their dependence on parents and caretakers to look after their needs. According to National Nutrition Bureau of India, 80-90% children take less than 30% RDA of green leafy vegetables. Therefore, iron consumption is inadequate in 90% of individuals in India[3]. The dietary surveys have shown that two-third of adolescents consume less than 70% RDA of vitamin A and riboflavin. Intake of calcium, vitamin B complex and vitamin C is also inadequate. Due to widespread inadequacy of dietary intakes, subclinical deficiencies of vitamin A, vitamins B_2, B_6, folate and vitamin C are seen in over 50% of apparently healthy children[4]. According to United Nations Subcommittee on Nutrition, it is difficult to meet 100% RDA of micronutrients in infants and children through home-based foods.

The immune system

A number of mechanisms protect the human host from entry of microorganisms and development of clinical infection. Host resistance can be divided into two main categories i.e. non-specific and antigen-specific (Table 1). The integrity of innate forces or frontline defences depends upon genetic or constitutional factors. They act as the first line of protection by preventing entry of microorganisms from skin and mucous membranes. The antigen-specific mechanisms of protection are adaptive or acquired by prior exposure to microorganisms or their antigenic determinants. The non-specific and antigen-specific defences support and complement each other to mount a concerted fight against invading pathogens.

Interactions between nutritional status and infections

Nutrient deficiencies have been demonstrated to have adverse effects on many immune functions[2,5,6,7]. Children with malnutrition and overt or covert deficiencies of micronutrients are more vulnerable to develop a variety of common day-to-day infections. Infective illnesses are recognised to aggravate nutritional deficiencies by causing anorexia, tissue catabolism, enhanced utilization and increased losses of micronutrients. Acute infections thus adversely affect nutritional status which makes an individual more vulnerable to contract infection, thus setting-up a vicious cycle of undernutrition and recurrent infections (Figure 1). During antigen-antibody fight, there is increased production of reactive oxygen-free radicals which may further adversely affect the integrity of immune cells by damaging their mitochondria.

[1] *Consultant Paediatrician, Child Care and Dental Health Centre, A-47, Sector-31, Noida-201301, India.*

Table 1
Defence mechanisms of the body

Frontline non-specific innate protection	*Antigen-specific acquired protection*
• Intact skin and mucous membranes • Phagocytic cells • Mucus • Cilia • Complement system • Lysozyme • Humoral factors	• Cell-mediated immunity (T-cell system) • Immunoglobulins (B-cell system) 1gA, 1gG, 1gM, 1gD, 1gE

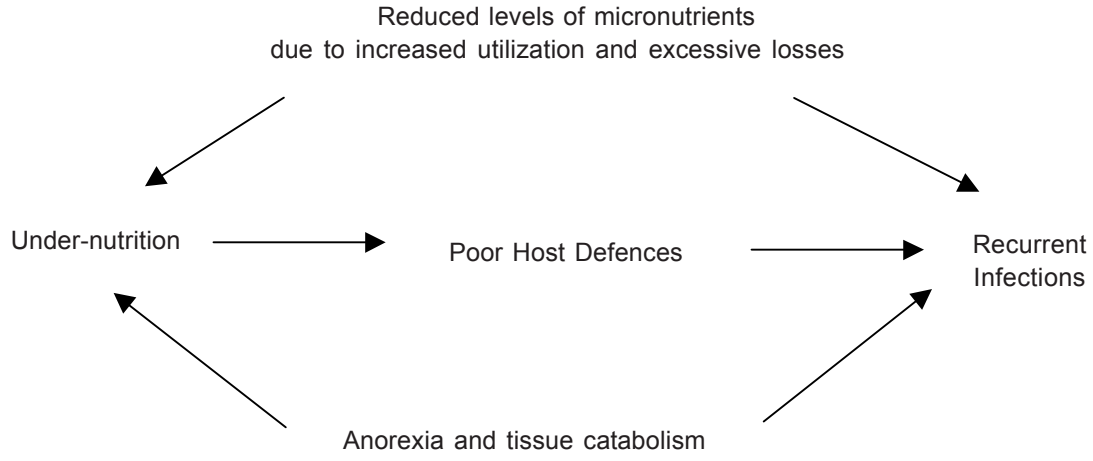

Figure 1. *Vicious cycle of undernutrition and recurrent infections*

Metabolic interactions between micronutrients

A number of metabolic interactions between various micronutrients have been identified which has great clinical relevance. Ascorbic acid is known to enhance the absorption of iron. Riboflavin has an important role in the absorption, metabolism and utilization of iron[8]. Vitamin A is required for utilization of iron for hemoglobin synthesis as it mobilizes the iron stores from liver and spleen. There is evidence to suggest that high intake of zinc may interfere with absorption of iron and copper. In fact, excessive intake of zinc (>50 mg/d) is recommended to reduce copper load in Wilson's disease. Zinc deficiency may aggravate hypovitaminosis A because zinc is required for transport of hepatic vitamin A to the target tissues[9]. Vitamin E has a sparing effect on vitamin A and ascorbic acid by protecting them from oxidation. Selenium deficiency may impair utilization of iodine because it is a key component of the enzyme which is required to convert thyroxine to triiodothyroxine. Molybdenum intake may aggravate copper deficiency because it promotes urinary excretion of copper. Magnesium helps in the absorption of calcium while calcium intake promotes absorption of vitamin B_{12} from the ileum. Therefore, these and several other metabolic interactions should be kept in mind while giving a "cocktail" of various micronutrients in clinical practice.

Nutrition and Host Defences

Research studies during the past two decades have demonstrated the importance of optimal nutrition for the functional integrity of the immune system. Both under-nutrition and over-nutrition as well as deficiencies and excess of single nutrients have been shown to have adverse effects on the immune system. Recently, studies have shown that immunological dysfunction is the earliest marker of deficiency of micronutrients.

Every few days our body replaces one-quarter of our immune cells. For example, neutrophils have a half-life of merely 36 hours! Therefore, the immune system needs continuous supply of vitamins and minerals for their regeneration.

Protein-calorie malnutrition

The immunologic manifestations of protein-calorie malnutrition are broad based and include atrophy of lymphoid tissue, decrease in number of lymphocytes with markedly reduced cellular and humoral immune responses[5]. It is well known that some viruses that cause only a mild illness in well-nourished children can be fatal in those with malnutrition. Arginine and glutamate are two key semi-essential amino acids which have been shown to have salutary effect on the immune system. Arginine sustains the integrity of thymus by enhancing production of thymic hormones and proliferation of thymocytes. It is credited to increase the cytotoxicity of macrophages, natural killer cells (NK cells), cytotoxic T-cells and neutrophils by releasing growth hormone, which has widespread receptors in the immune system. During arginine metabolism, nitric oxide (NO) is released which has tumoricidal and microbicidal activities, causes dilatation of blood vessels and promotes adhesion of leucocyte-endothelial cells. Glutamine is an essential nutrient for the growth and proliferation of lymphocytes and macrophages. Nucleotides, preformed purines and pyrimidines in the diet, potentiate a variety of cell-mediated immune responses.

Obesity

The immune system works most efficiently when nutritional status is optimal i.e. there is neither a deficiency nor excess of any nutrient. There is increasing incidence of obesity in children belonging to affluent societies because of unsatisfactory dietary life styles. Animal studies have shown that high energy intake impairs lymphocyte responsiveness while high fat intake suppresses T-cell functions and activity of NK cells. Fatty acids have an important role in the functioning of immune system because they are structural components of cell membranes[7]. In general, diets rich in n-3 poly-unsaturated fatty acids (PUFAs) tend to inhibit immune response, whereas those rich in n-6 PUFAs tend to promote immune response by increasing inflammation. Adequate intake of n-3 PUFAs (fish oil) has been shown to reduce the symptoms of autoimmune and inflammatory diseases. It is believed that the ratio of n-6 to n-3 PUFAs is more important than the absolute amount of these classes of fatty acids in the diet to ensure optimal nutrition and health.

Micronutrients

In the last decade, there has been a growing awareness that deficiencies of vitamins and minerals can cause reduced immune functions even when the calories and protein in the diet meet recommended intake levels[2]. Micronutrients are essential cofactors for various catalytic, structural and regulatory metabolic activities of cells. They are required for energy production, synthesis of RNA and DNA and for providing protection against reactive oxygen-free radicals. Table 2 summarizes the immuno-protective role of micronutrients on various components of immune system.

Clinical implications

There is enough clinical and research evidence that deficiency of micronutrients is associated with increased incidence and severity of common day-to-day gastro-intestinal and respiratory infections[6]. Nutritional supplements have been given to improve the immunologic status of children, reduce the incidence of infections and improve the outcome of those who get infected. There are conflicting reports regarding utility of large doses of vitamin A in preschool children in developing countries[10,11]. Some reports have documented reduction in mortality in children by 20-30% while others have not found any significant benefits. There is some evidence that supplements of vitamin A may reduce the incidence of recurrent or protracted diarrhea and respiratory infections. The intervention studies have shown that high doses of vitamin A are useful to improve the survival of children with post measles bronchopneumonia[12]. However, excessive intake of vitamin A has been shown to adversely affect the immune responses and there is potential risk of toxicity due to massive doses of vitamin A. There are conflicting reports that supplements of high-doses of vitamin C may reduce the incidence and severity of upper respiratory tract infections.

The studies have shown that zinc deficiency increases morbidity and mortality after challenge with various pathogenic bacteria in experimental animals. Zinc deficiency in children is associated with increased incidence and severity of acute diarrhea and lower respiratory tract infection (LRTI). A meta-analysis of clinical trials of zinc supplementation showed that both shorter and longer courses of zinc reduced incidence of pneumonia by 25-40% in various studies[14]. In most studies zinc has been given together with vitamin A, as co-deficiency is common and both nutrients are known to favourably affect immunity. In a recent study from India, zinc supplementation was associated with

reduced incidence of severe forms of LRTI in zinc-deficient children aged 6-30 months. *Osen-darp etal* showed that zinc supplementation during first 6 months of life is associated with reduced incidence of acute LRTI especially in those infants who were zinc-deficient[15]. However, administration of zinc to zinc-deficient children with post measles pneumonia did not offer any therapeutic benefit[16]. Excessive intake of zinc supplements should be avoided because it is known to depress immune functions and interfere with copper nutrition. Zinc supplementations have been shown to reduce the mortality of malaria due to *P.falciparum*.

There is evidence to suggest that selenium deficiency may be an important predictor of decreased survival of patients suffering from AIDS[17]. It has been shown that myocarditis due to Coxsackie virus (Keshan disease) is aggravated by dietary deficiency of selenium. However, direct benefits of selenium are difficult to evaluate due to potential interactions between selenium and vitamin E.

Table 2
Effects of various micronutrients on immune functions

Micronutrients	*"Frontline" mucosal defences*	*Cell-mediated Immunity*	*Antibody production*	*Cytokine patterns*
Vitamins				
Vitamin A	Improved integrity	↑ DTH* ↑ NK cell** activity	Increased	↑ IL-2***
Vitamin E	---	↑ DTH ↑ immune cell proliferation	Increased	↑ IL-2, ↓ PGE_2
Vitamin C	Improved integrity	↑ DTH	---	↑ IL-1
Vitamin B_6	---	↑ DTH	Increased	↑ IL-2
Folic acid	---	↑ DTH	---	---
Trace Minerals				
Iron	---	↑ DTH ↑NK cells	Increased	↑ Interferon
Zinc	---	↑ DTH ↑NK cells	Increased	↑ IL-1
Selenium	---	↑ DTH ↑NK cells	Increased	---
Copper	---	↑ DTH	Increased	---

* DTH: Delayed-type hypersensitivity response
** NK cells: Natural killer cells
*** IL: Interleukins

References

1. Trace Elements in Human Nutrition and Health. World Health Organization, Geneva 1996.

2. Kelly DS, Bendich A. Essential nutrients and immunologic functions. *Am J Cl Nutr* 1996; **63**: 994 S-996 S.

3. National Family Health Survey 1998-99. International Institute for Population Sciences, Mumbai, India 2000; 266-274.

4. Vijayaraghavan K, Balakrishna N, Antony GM. Report on Food and Nutrient Intakes of individuals. National Nutrition Monitoring Bureau, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India, 2000.

5. Lanseth L. Nutrition and Immunity in Man. Belgium, ILSI press, 1999.

6. Scrimshaw NS, San Givonni JP. Synergism of nutrition, infection and immunity. An overview. *Am J Cl Nutr* 1997; **66**: 464 S - 477 S.

7. Cunningham-Rundles S (Ed). Nutrient Modulation of Immune Response, New York: Marcel Dekker, 1993.

8. Lynch SR. Interaction of iron with other nutrients. *Nutrition Rev* 1997; **55 (4)**: 102-110.

9. Zinc. Trace Elements in Human Nutrition and Health. World Health Organization, Geneva 1996; 72-101.

10. Herrera MG, Nestel P, El Amin A. Vitamin A supplementation and child survival. *Lancet* 1992; **34**0: 267-270.

11. Hurssey GD, Klein M. A randomized controlled trial of vitamin A in children with severe measles. *N Engl J Med* 1990; **323**: 160-164.

12. West KP, Pokhrel RP,Katz J. Effect of vitamin A in reducing pre-school child mor-tality in Nepal. *Lancet* 1991; **338**: 67-71.

13. Sazawal S, Bentley M, Black RE, Dhingra P, Geroge S, Bhan MK. Effect of zinc supplementation on observed activity in low socioeconomic Indian preschool children. *Pediatrics* 1996; **98 (6)**: 1132-1137.

14. Bhutta ZA, Black RE, Brown KH, Gardner JM, Gore S, Hidayat A. Prevention of diarrhea and pneumonia by zinc supplementation in children in developing countries: pooled analysis of randomized controlled trials. Zinc Investigators' Collaborative Group. *J Pediatr* 1999; **135 (6)**: 689-97.

15. Osendarp SJ, Santosham M, Black RE, Wahed MA, van Raaij JM, Fuchs GJ. Effect of zinc supplementation between 1 and 6 months of life on growth and morbidity of Bangladeshi infants in urban slums. *Am J Clin Nutr* 2002; **76 (6)**: 1401-8.

16. Mahalanabis D, Chowdhury A, Jana S, Bhattacharya MK, Chakrabarti MK, Wahed MA, Khaled MA. Zinc supplementation as adjunct therapy in children with measles accompanied by pneumonia: a doubleblind, randomized controlled trial. *Am J Clin Nutr* 2002; **76 (3)**: 604-7.

17. Duggan C, Fawzi W. Micronutrients and child health: Studies in international nutrition and HIV infection. *Nutrition Rev* 2001; **59 (11)**: 358-369.

Original Articles

A study of children with Kawasaki disease

R Ajanthan[1], Sanath P Lamabadusuriya[2], W Withana[3]

Sri Lanka Journal of Child Health, 2003; **32**: 40-43

(Key words: Kawasaki disease, coronary arteritis, atypical or incomplete Kawasaki disease)

Abstract

Objectives To study demography, presentation, treatment, complications and prognosis of children with Kawasaki disease (KD).

Design A descriptive ongoing case study.

Method All children clinically suspected to have KD, following admission to professorial unit at Lady Ridgeway Hospital for Children or when seen in the private sector, from November 2001 to September 2002, were included in the study. The demographic details, presenting features, treatment and complications were recorded. Children with coronary arteritis were reviewed periodically to analyse long-term effects.

Results 19 children were suspected to have KD. Mean age was 3.9 years. 53% were males. Fever, conjunctivitis and mucocutaneous lesions were the commonest presenting features. 14(74%) had coronary artery changes. 5(26%) patients fulfilled the criteria for diagnosis. Intravenous immunoglobulin was used as treatment in 8(42%) cases.

Introduction

Kawasaki disease (KD), also called mucocutaneous lymph node syndrome, was first reported by Kawasaki in 1967[1]. Criteria for diagnosis of KD include fever of 5 days duration with 4 out of the 5 following features viz. conjunctivitis, lymphadenopathy, polymorphous rash, changes in mouth, and changes in extremities[1]. Presentation of KD can be atypical and in some instances this may be misleading in management. Successful resuscitation of a cardio-respiratory arrest in a child ready to go home, with subsequent investigations showing a dyskinetic myocardium due to myocardial infarction, prompted us to look at the presenting features of KD and the need to investigate early.

[1] *Senior Lecturer,*
[2] *Senior Professor,*
[3] *Senior Registrar, Professorial Paediatric Unit, Lady Ridgeway Hospital, Colombo.*

(Received on 12 May 2003)

Objectives

To study the demography, clinical presentation, treatment, complications and prognosis of children with KD.

Design

A descriptive ongoing case study.

Method

All children, clinically suspected to have KD following admission to professorial unit at Lady Ridgeway Hospital for Children and the private sector in Colombo, from November 2001 to September 2002 were included in the study. The demographic details, presenting features, treatment and complications were recorded. Children with coronary arteritis were reviewed periodically to analyse long-term effects.

Results

There were 19 cases in all. Ages ranged from 1-8 years with a mean of 3.9 years. 53% were males. The presenting features of these patients, in accordance with the diagnostic criteria of KD, are shown in Table 1. Whilst fever was present in all 19(100%) cases, conjunctivitis and mucocutaneous lesions were present in more than 50% of patients.

Table 1

Presenting features of Kawasaki disease

Diagnostic criterion	*No, of cases (%)*
Fever	19(100)
Mucocutaneous lesions	12(63)
Conjunctivitis-non purulent	10(53)
Peripheral lesions	09(47)
Rash	09(47)
Cervical lymphadenopathy	07(37)

Table 2

Patient profile

Case	*Age(Yrs)*	*Criteria*	*ESR*	*Platelet count (10^9/1)*	*2D Echo*	*IVIG*	*Persistence of dilated coronaries*
1	4.5	F + 2	121(4)	318(4)	**** (4)	No	Yes >1Yr
2	2.0	F + 3	104(2)	625(1)	* (2)	Yes	Resolved <1 mth
3	1.0	F + 3	130(2)	675(3)	*** (3)	No	Yes >1Yr
4	2.0	F + 1	77(1)	410(2)	* (1)	No	Resolved <1 mth
5	1.5	F + 4	126(1)	680(2)	Normal	No	
6	3.5	F + 4	110(1)	510(2)	* (2)	Yes	Resolved <4 mths
7	3.0	F + 3	23(1)	507(1)	Normal	No	
8	2.5	F + 1	110(2)	436(2)	* (2)	Yes	Resolved <3 mths
9	3.0	F + 2	130(2)	340(2)	*** (2)	No *	Resolved <3 mths
10	8.0	F + 3	100(1)	270(1)	** (2)	Yes	Yes >1Yr
11	5.0	F + 3	80(1)	310(1)	Normal	No	
12	3.5	F + 2	95(1)	1365(2)	* (2)	No	Resolved <1 mth
13	4.2	F + 4	127(1)	529(4)	Normal	Yes	
14	8.0	F + 4	120(1)	865(3)	Normal	No	
15	4.8	ND		ND	*** (2)	??	Yes >1 Yr
16	2.7	F + 2	110(1)	527(1)	* (1)	Yes	Resolved <4 mths
17	4.5	F + 4	125(2)	520(2)	* (1)	Yes	Resolved <3 mths
18	8.0	F + 2	105(2)	549(2)	** (2)	Yes	Yes >6 mths
19	1.8	F + 1	142(3)	625(3)	*(3)+Pul arteritis	Yes	Resolved <4 mths

Note:a) Numericals within brackets indicate the week of illness since onset of fever

b) Asterixs denote coronary artery dilatation

* = 2-3 mm, ** = 3-4 mm, *** = 4-8 mm, **** = >8 mm

Mean erythrocyte sedimentation rate was 107.5 mm (range 23-130 mm) in the first hour. Highest platelet count recorded from each patient varied from 270-1, 365 x 10^9/l. Coronary artery changes were evident in 14 (74%) patients. Intravenous immunoglobulin (IVIG) was used as treatment in 8 (42%) cases. The patient profile is shown in Table 2. Cases 1, 6 and 17 are further described to illustrate the varying presentations and complications.

Case1 A 4½ year old from Kurunegala was transferred with fever and a provisional diagnosis of leptospirosis. As the fever was not settling, he was investigated extensively. This included an ultrasound scan of abdomen and an explorative laparotomy. His fever subsided and he was about to be discharged from hospital when he had a cardiorespiratory arrest. He was resuscitated and managed in the intensive care unit for a day and was noted to have a triple rhythm. 2-dimensional echocardiogram (2D echo) revealed evidence of anteroseptal myocardial ischaemia with a dilated right coronary artery equal to root of aorta. The diagnosis was revised to KD and he was started on warfarin, dipyridamole, captopril and isosorbide dinitrate.

Case 6 This was a 3½ year old from Kurunegala with fever and 4 other features, which completed the diagnosis of KD, and a 2D echo showed a dilated left coronary artery. This child was treated with IVIG and aspirin and at present is well with normal coronary arteries.

Case 17 A 4½ year old girl was transferred from Negombo with fever of 7 days duration, rash, conjunctivitis with subconjunctival haemorrhage and cervical lymphadenopathy. She complained of headache, itchy palms and diarrhoea. 2D echo showed a dilated left

coronary with arteritis of right coronary artery. She was treated with IVIG and aspirin. Next day she developed papilloedema and the computed tomogram showed presence of cerebral oedema. She was given IV mannitol for 48 hours. One week after treatment she developed fever with red eyes and recrudescence was of concern.

Discussion

It has been shown that in KD there is 20-25% chance of developing coronary arteritis[2]. Over the years there have been many reports on incomplete and atypical KD in which some have progressed to show the full spectrum later on[3,4]. The main concerns for the paediatrician are twofold:

- Whether to investigate children with incomplete diagnostic criteria and
- When to do the first 2D echo and when to repeat it.

In our series only 5 patients (26%) fulfilled the criteria for diagnosis. 2(40%) of this group had coronary artery changes. IVIG therapy was given to the 2 children with coronary artery changes and 1 other child, who was managed in the private sector, and whose parents paid for the treatment. There were 14(74%) cases with incomplete diagnostic criteria and 12(86%) of them had coronary artery changes. Due to constraints in purchase of IVIG in the public sector, and late diagnosis, only 6(50%) of these 12 cases were treated with IVIG. Aspirin was commenced in all patients at onset. Aspirin (3-5 mg/kg/day) and/or dipyridamole were continued until coronary artery changes had returned to normal. Aspirin has never been subject to a randomised controlled trial alone but has been studied with or without IVIG. Advantages of IVIG therapy have been promising[5,6]. Meta-analysis has not shown significant advantage of IVIG with high dose aspirin (80-120mg/kg/day) over IVIG with moderate dose aspirin (30-50mg/kg/day) in preventing coronary aneurysms in acute phase of illness[5]. 2 patients developed elevated serum alanine aminotransferase (ALT) levels and were managed on dipyridamole only. One of them was drowsy, and resembled Reye syndrome[7].

All patients have been followed up for 6 months to a year and our first patient is still on warfarin, dipyridamole, isosorbide dinitrate and captopril. There were insufficient cases to look for statistical significance in resolution of coronary artery dilatation between the IVIG treated and untreated group. Cases with incomplete criteria (74%) outnumbered cases with complete criteria (26%). Coronary artery dilatation > 4mm was seen in the 'incomplete criteria' group during or after second week due to delay in suspecting KD and the dilatation is still persisting, except in one case. Cases diagnosed late were not given IVIG as fever had settled, indicating that the acute inflammatory process was settling. This reinforces the need to investigate 'incomplete criteria' cases during the first week on suspicion and if the coronary arteries are normal, a repeat assessment becomes mandatory within 3-5 days.

In view of these findings revised criteria for diagnosis of KD becomes essential. The KD research group (KDRG) in United Kingdom have redesigned inclusion criteria for diagnosis by reducing one criterion in the presence of coronary arteritis i.e. fever, presence of 3 criteria and evidence of coronary arteritis[8].

In conclusion, we emphasize that KD is the commonest cause of acquired coronary artery disease in children. A high degree of suspicion is needed to diagnose 'incomplete criteria' cases. Revised criteria would help to make the diagnosis early. This, in turn, would help in early resolution of arterial changes because IVIG therapy and aspirin would be started early.

Assessment of coronary arteries is the mainstay of diagnosis in atypical cases and an experienced cardiologist is a prerequisite in this situation. Availability and pricing of IVIG is equally important to arrest progression of coronary arteritis on which atypical cases are diagnosed. The need for life long follow up in children with KD, who have coronary artery involvement, is being debated[9].

Acknowledgements

We acknowledge Dr S. Narenthiran, Consultant Cardiologist, Lady Ridgeway Hospital, Colombo for his invaluable help in identifying the coronary artery lesions.

References

1. Kawasaki T. Paediatric acute mucocutaneous lymph node syndrome: clinical observation of 50 cases. *Japanese Journal of Allergy* 1967; **16**: 178-222.
2. Suzuki A, Kamiya T, Kuwahara N. Coronary arterial lesions of Kawasaki disease: cardiac catheterization findings of 1,100 cases. *Paediatric Cardiology* 1986; **7**: 3-9.
3. Hsieh YC, Wu MH, Wang JK, Lee PI, *et al*. Clinical features of atypical Kawasaki disease. *Journal of Microbiological and Immunological Infections* 2002; **35(1)**: 57-60.
4. Rowley AH. Incomplete (atypical) Kawasaki disease. *Paediatric Infectious Disease Journal* 2002; **21(6)**: 563-565.

5. Terai M, Shulman ST. Prevalence of coronary artery abnormalities in Kawasaki disease is highly dependent on gamma globulin dose but independent of salicylate dose. *Journal of Paediatrics* 1997; **131**: 888-893.

6. Durongpisitkul K, Gururaj VJ, Park JM, Martin CF. The prevention of coronary artery aneurysm in Kawasaki disease: a meta-analysis on the efficacy of aspirin and immunoglobin treatment. *Paediatrics* 1995; **96**: 1057-1061.

7. Lee JH, Hung HY, Huang FY. Kawasaki disease with Reye syndrome: report of one case. Zhonghua Min Guo Xiao Er Ke Yi Xue Hui Za Zhi 1992; **33(1)**: 67-71.

8. P A Brogan, A Bose, D Burgner, D Shingadia, et al. Kawasaki disease: an evidence based approach to diagnosis, treatment, and proposals for future research. *Archives of Disease in Childhood* 2002; **86**: 286-290.

9. SJ Murugan, J Thomson and JM Parsons. Is life long follow up for patients with Kawasaki disease indicated? *Heart* 2002; **88**: 644.

An appreciation of grandmothers

A grandmother is a woman who has no children of her own, so she loves the boys and girls of other people.

Grandmothers have nothing to do, they only have to be there. If they take you for a walk, they go slowly past beautiful things like leaves and caterpillars.

They never say, “Come on quickly” or “Hurry up for goodness sake”. They are usually fat, but not too fat to tie up shoelaces.

They wear spectacles and sometimes take out their teeth. They can answer every question, for instance why dogs hate cats and why God isn't married. When they read to us they don't leave out anything. They do not mind if it’s always the same story.

Everyone should have a grandmother, especially those who have no television. Grandmothers are the only grown-ups who always have time.

(*Provided by* Professor Manouri Senanayake)

Original Articles

A survey of transfer forms at the Lady Ridgeway Hospital for Children

L L Sudewa[1], N P U B P Nelundeniya[2], B J C Perera[3], I Weerasinghe[3]

Sri Lanka Journal of Child Health, 2003; **32**: 44-47

Abstract

Objective To assess type and adequacy of information provided by transfer forms (TFs) at two units of Lady Ridgeway Hospital for Children (LRHC), Colombo.

Design Prospective observational study.

Setting Wards 8 and 9 of LRHC.

Subjects All children transferred from other medical institutions.

Method Study was carried out over 3 months from 15th March, 2002 on all patients transferred to wards 8 and 9 from another hospital. Type of information provided in TFs were assessed and details taken into a pre-tested questionnaire. The information was analysed using Epi Info Version 6.04b.

Results A total of 172 TFs, accounting for 3% admissions, were analysed. 74% transfers were under 5 years of age. Full name was not provided in 60%. Race and religion were not given in 35% and 43% respectively. Incomplete addresses were given in 10% and no addresses in 27%. Most transfers were from teaching, provincial and base hospitals. In 54% consultants had not signed TF and in 26% designation of transferring officer was not provided. Results of investigations were provided only in 57%. In 74% there was neither a diagnosis card nor a referral letter.

Main complaints and clinical signs were given in 74% but details of patient's condition at time of transfer was given in only 42%. Date of admission to transferring institution was provided in only 18%. Treatment was instituted at transferring station in 74% but only 15% mentioned the date of starting treatment. In 30% duration of treatment was provided and in only 13% was date and time of last dose of drugs documented.

Conclusions There were significant inadequacies in information provided in many TFs. A revised format of printed TF should be adopted to minimize these deficiencies.

[1] *Paediatric Senior Registrar,*

[2] *Paediatric Registrar,*

[3] *Consultant Paediatrician, Lady Ridgeway Hospital, Colombo.*

(Received on 8 May 2003)

Introduction

Lady Ridgeway Hospital for Children (LRHC) is the only tertiary care institution for children in Sri Lanka. Patients are transferred to it for multiple reasons from all parts of the country. Many have been initially managed in local institutions and transferred. Each is accompanied by a standard TF in which demographic and clinical details are provided. There are no previous publications on nature of information provided by TFs. This study was undertaken to provide some information on this aspect.

Objective

To evaluate nature and adequacy of demographic and clinical information provided by TFs.

Method

The study was carried out over 3 months from 15th March 2002 in wards 8 and 9 of LRHC. All children transferred to the wards were included. All TFs were perused and a pretested purpose-designed questionnaire was used to collect information provided by TFs. Some information was crosschecked with mother or bystander. Questionnaire was designed to evaluate information provided on headings of TFs as well as further details that should have been given by the doctor transferring the patient. The details were fed into a specifically designed computer database in Epi Info Version 6.04b and analysed using its inherent analytical mode.

Results

A total of 172 TFs were analysed accounting for 3% admissions during period of study. 74% transfers were under 5 years of age. Correct age was given in all TFs. Full name was not provided in 104(60%). In 9(5%) gender was not mentioned. Race and religion were not given in 61(35%) and 75(43%) respectively. Incomplete addresses were given in 17(10%) and no addresses were provided in 47(27%) TFs.

There were 32(18%) transferred from National Hospital, 49(29%) from other teaching hospitals, 47(27%) from base hospitals, 14(8%) from provincial hospitals, 12(7%) from district hospitals and 15(9%)

Figure 1. *The current standard transfer form.*

TRANSFER OF PATIENTS FROM ONE INSTITUTION TO ANOTHER

From : .....

To :.....

(If pre-arranged, please indicate the Ward/Unit/Department)

Full Name :	Parent/Guardian's Name : .....
Sex :	.....
Age :	Address : .....
Nationality :	.....
Religion :	.....
BHT No. :	Telephone No. : .....

Time & Date of Transfer : .....

Diagnosis/Clinical Problem : .....

Reason for Transfer: .....

Date & time of admission to the transferring institution : .....

Clinical state on admission to the transferring institution :-

Details of management in the transferring institution :-

Results of investigations :-

Current drug therapy with the time of the last dose :-

Suggested investigations & management :-

Clinical state at the time of transfer :-

....

Date Signature & designation of the transferring offcer

Figure 2. *The proposed new transfer form*

from peripheral units. In 2(1%) transferring station was not provided in TF.

There were 142(83%) from stations where consultants were available but consultants had signed TFs in only 79(46%). In 45(26%) designation of transferring officer was not provided. In 164(95%) reason for transfer was mentioned but transferring time and date were provided in only 89(52%). Results of investigations performed were provided in 98(57%).

In 127(74%) TF was not accompanied by either a referral letter or diagnosis card. Main complaints and clinical signs were given in 127(74%) but details of patient's condition at time of transfer was given in only 72(42%). Date of admission to transferring institution was provided in only 31(18%). In 162(94%) child was accompanied by mother but relationship of accompanying person was given in TF in only 12(7%).

Treatment was instituted at transferring station in 127(74%) but only 19(15%) had noted day of commencement of therapy. In 52(30%) duration of treatment was provided and in only 22(13%) was date and time of administering last dose of drugs documented.

Discussion

In Sri Lanka, standardized printed TFs are used to transfer patients from one medical institution to another (Figure 1). The document itself is of a general design to cater to needs of any transferred patient and is not specific for paediatric age group. It is a valuable document that should provide important information regarding patient. Many details, for which specific spaces are provided in TF, are helpful for future management.

The present study highlights major deficiencies in filling up TFs. Some important pieces of information were not provided in a significant proportion of documents perused in this study. In a Ministry of Health Circular[1] dated 29th April 2002, specific instructions are given on filling of current TF. The study revealed that these instructions have not been adhered to in some patients transferred to LRHC.

The inadequacy of information provided in TFs hampers optimal management of cases transferred. Many transferred patients are either seriously ill or responding poorly to treatment. Some are diagnostic problems that need further evaluation and investigation. In all of them it is imperative that all relevant clinical information be available to institution to which they are transferred.

The present format of TF (Figure 1) does not provide spaces for important details like current drug therapy, timing of last dose, clinical condition at time of transfer, likely diagnosis or clinical problem. It is time that the standard printed TF is modified to correct some of these deficiencies. A new format for TF is suggested and given in Figure 2.

Conclusions

Many inadequacies in information provided by TFs were detected in this study. The general use of a revised format of the standard printed form is recommended.

References

1. Beligaswatta AML. Transfer of patients from one institution to another. Department of Health Services, Ministry of Health. General Circular No.01-09/2002. Issued on 29-04-2002.

Current Practice

Pain control in the neonate

Priyanthi Molligoda[1]

Sri Lanka Journal of Child Health, 2003; **32**: 48-49

Introduction

Despite the fact that neonates and infants are not capable of expressing their subjective sensations, it has become clear that they do perceive pain, and pain correlates with hormonal, metabolic and cardiovascular changes. New findings support the notion that repetitive painful stimuli result in both short-term and long-term psychophysiological effects like decreased attentiveness, poor regulation of behavioural state and motor processes, increase in irritability, as well as an altered pattern of feeding and sleeping[1]. Especially preterm neonates are frequently exposed to multiple painful procedures. Thus, sufficient analgesia during all kinds of painful procedures in the neonate becomes extremely important.

Pharmacological agents in intensive care

Occurrence of early intraventricular haemorrhage within 24-72 hours after birth of a preterm suggests a role for pain and stress in the multifactorial causation of severe intraventricular haemorrhage and periventricular leucomalacia. There is evidence that such neurological outcomes in the preterms who receive ventilatory support can be reduced by morphine analgesia and/or midazolam sedation[2].

Morphine can be used as a bolus of 50-100 µg/kg initially over 30 minutes, followed by an IV infusion of 10 µg/kg/hr increasing to 20-30 µg/kg/hr if required. Slow bolus of 200 µg/kg over four hours followed by an infusion of 25 µg/kg/hr can also be used[3].

It is important to have naloxone immediately available and of course the ability to continue respiratory support. Caution and immediate access to resuscitation facilities are required for opiates used in non-ventilated babies and the lower end of the infusion range may be necessary. When opiate analgesia is prescribed for prolonged periods, there is a need for planned withdrawal of the drug. This has even more practical relevance with new ventilatory techniques where spontaneous breathing (PTV or CPAP) is encouraged. During surgery opioids are the drugs of choice aside from local anaesthetics.

However, the use of opioids in neonates and especially preterm infants must be considered in the light of certain pharmacokinetic and pharmacodynamic differences when compared to adults. There is a longer elimination rate resulting in increased duration of action and accumulation of drug. The blood brain barrier is not fully developed in the preterm resulting in more access of opioids to binding sites in the CNS. Differentiation of opioid binding sites has not reached the peak. Thus, higher doses relative to body weight are needed to establish sufficient analgesia. Despite such potential drawbacks, opioids are still the best choice when compared with other drugs, since they show the least cardiovascular changes[1].

Local analgesia

It should be considered when appropriate e.g. lignocaine infiltration before chest drain insertion. Transdermal analgesia like EMLA cream (lidocaine-prilocaine cream) or topical 4% Amethocaine gel (Ametop)[4], both of which are available in Sri Lanka, are useful for procedures like venepuncture, IV cannulation and arterial puncture, provided that the stated dose is not exceeded. There are some concerns related to the use of EMLA cream which has been associated with methaemoglobinaemia when used with another MetHb-inducing agent.

Non-pharmacological interventions to reduce pain and stress

They should be the first choice in painful procedures especially when past the phase of initial intensive care.

Breast feeding during the procedure

The analgesic effect of breast feeding in term neonates was demonstrated by a randomised controlled trial very recently[5]. As breast feeding is the most potent pleasant stimulation a newborn can experience, this is not surprising. During venepuncture, infants (180 term newborns) were either breast fed, held in their mother's arms without breast feeding, given 1 ml of sterile water as placebo or given 1 ml of

[1] *Consultant Paediatrician and Neonatologist, Apollo Hospital, Colombo.*

30% glucose followed by a pacifier to suck. There were significant reductions in pain scores used for the breast feeding group and glucose plus pacifier groups when compared with the other two groups. Meta-analysis of studies using oral sucrose administration before painful procedures demonstrate its analgesic effect[6].

Other non-pharmacological methods

It was demonstrated in a controlled trial that reducing inappropriate sensory stimuli during intensive care of neonates was associated with improved clinical and developmental outcome[7]. Gentle massage significantly decreases cortisol levels in preterm infants[8]. Skin to skin contact significantly reduces cry and circulating beta endorphin levels[9,10].

Overall comprehensive nursing care with awareness of pain and distress is likely to be the key answer for the chronic management of pain.

Conclusions

- Use of opiate infusion in the acute phase, and awareness of pain and kindness to the babies, in the chronic phase are the two main strategies.
- Giving a breast feed or glucose solution followed by a pacifier (for non-nutritive sucking) during a painful procedure is simple but effective.
- Proper analgesia may reduce the incidence of poor neurological outcome in ventilated pre-term neonates.

References

1. Latasch L, Freye E. Pain and opioids in pre-term and newborns, *Anaesthetist* 2002; **51 (4**): 272-84.
2. Anand KJ, Barton BA. Analgesia and sedation in preterm neonates who require ventilator support: results from the NOPAIN trial. Neonatal outcome and prolonged analgesia in neonates. *Arch Pediatr Adolesc Med* 1999; 1**53 (4)**: 331-8.
3. Quinn MW. Randomised double blind controlled trial of effect of morphine on catecholamine concentration in ventilated preterm babies. *Lancet* 1993; **342**: 324-27.
4. Jain A, Rutler N. Does topical amethocaine gel reduce the pain of venepuncture in new-born infants? A randomised double blind controlled trial. *Arch Dis Child Fetal Neonatal Ed* 2000; **83 (3)**: 207-10.
5. Carbajal R. Analgesic effect of breast feeding in term neonates: randomised controlled trial. *BMJ* 2003; **326**: 13-15.
6. Stevens B. The efficacy of sucrose for relieving procedural pain in neonates – a systematic review and meta-analysis. *Acta Paediatrics* 1997; **86**: 837-42.
7. Als A. Individualised developmental care for the VLBW preterm infant. *JAMA* 1994; **272**: 853-58.
8. Acolet D. Changes in plasma cortisol and catecholamine concentrations in response to massage in preterm infants. *Arch Dis Child* 1993; **68**: 28-31.
9. Acolet D. Skin to skin contact for very low birth weight infants and their mothers. *Arch Dis Child* 1988; **63**: 1377-1381.
10. Acolet D. The effect of mother-infant skin-to-skin contact on plasma cortisol and beta endorphin concentration in preterm newborns. *Infant behaviour & Development* 1997; **20**: 553-57.

Snippets from the world wide web

Sri Lanka Journal of Child Health, 2003; **32**: 50

Azithromycin Improves Lung Function in Bronchiolitis Obliterans Syndrome

Findings of this small study may warrant a randomized trial of this promising, inexpensive, and low-risk treatment.

http://mp.medscape.com/cgi-bin1/DM/y/ebiX0EIZ1O0D2x0FZTN0Ac

Human Genome Project Completed

Scientists announced on Monday the final completion of the Human Genome Project, more than two years ahead of schedule.

http://mp.medscape.com/cgi-bin1/DM/y/ebiX0EIZ1O0D2x0FZSr0AD

Managing a Common Disorder in Children: Atopic Dermatitis

This non-contagious, chronic inflammatory disease is common, and thus it is important for healthcare clinicians to be familiar with the disease and its therapeutic management.

http://mp.medscape.com/cgi-bin1/DM/y/ebif0EIZ1O0DzQ0FZRE0AE

Genetic Defect Responsible for Rare Premature Ageing Disorder Identified

Scientists from the U.S. and France simultaneously announced on Wednesday the discovery of the genetic mutation that causes Hutchinson-Gilford progeria syndrome, an extremely rare form of premature ageing.

http://mp.medscape.com/cgi-bin1/DM/y/ebif0EIZ1O0DzQ0FZRI0AI

Neonates Need Eye Exam to Rule out Cataracts

Nearly 40% of otherwise healthy infants with infantile cataracts, a birth defect that requires surgery before age of 6 weeks, are not diagnosed with the condition until after they have passed that age, a new study conducted in Georgia found.

http://mp.medscape.com/cgi-bin1/DM/y/ebif0EIZ1O0DzQ0FZRJ0AJ

Metapneumovirus Infection Does Not Exacerbate Childhood Asthma

Childhood asthma exacerbations are associated with rhinovirus infection, but not with meta-pneumovirus infection, according to a report in April 15th issue of The Journal of Infectious Diseases.

http://mp.medscape.com/cgi-bin1/DM/y/ebif0EIZ1O0DzQ0FZRK0AK

Gender-Assigning Surgery May Impair Sexual Function

Girls who undergo clitoral surgery as a result of being born with ambiguous genitalia show a high rate of sexual difficulties later in life, researchers report in the April 12th issue of The Lancet.

http://mp.medscape.com/cgi-bin1/DM/y/ebif0EIZ1O0DzQ0FZRM0AM

Throat Clearing Can Be First Sign of Paediatric Asthma

New findings suggest that the first sign of asthma in a child may be simple throat-clearing.

http://mp.medscape.com/cgi-bin1/DM/y/ebif0EIZ1O0DzQ0FZRN0AN

B J C Perera
Joint Editor

Case Reports

A case of toxic shock syndrome in an eight year old girl

E A N Fonseka[1], T E Malcolm[2]

Sri Lanka Journal of Child Health, 2003; **32**: 51-53

Introduction

Toxic shock syndrome (TSS) is an acute febrile illness with mucocutaneous manifestations and multi-system involvement, often associated with focal staphylococcal infection[1]. Many cases occur in menstruating women who are 15-25 years of age and use tampons or other vaginal devices in the presence of vaginal colonisation or infection with toxin-producing strains of *Staphylococcus aureus*[2]. TSS, however, also occurs in children, non-menstruating women and men associated with wound infection, nasal packing, sinusitis, tracheitis, pneumonia, empyema, abscesses, burns, osteomyelitis and primary bacteraemia[3]. Several cases have been reported in children[1,4].

Staphylococcus aureus produces several super-antigenic exotoxins such as toxic shock syndrome toxin-1 (TSST-1) and staphylococcal enterotoxins[5]. Overactivation of T cells by these exotoxins and resultant overproduction of cytokines are the primary causes of TSS[6].

Group A streptococcus can cause a similar TSS-like illness termed *streptococcal TSS*[7]. Kawasaki disease closely resembles TSS clinically. However, diffuse myalgia, vomiting, abdominal pain, diarrhoea, azotaemia, hypotension and shock are rare in Kawasaki disease[8].

The diagnostic criteria of staphylococcal toxic shock syndrome are shown in Table 1. All 3 major criteria together with any 3 minor criteria establishes the diagnosis.

There is no specific laboratory test. Selective tests reveal involvement of multiple organ systems including hepatic, renal, muscular, gastrointestinal, cardiopulmonary and central nervous systems[8]. Bacterial cultures of associated focus (e.g. vagina, abscess) before administration of antibiotics usually yield *S. aureus*, although this is not a required element of the definition[8].

Table 1

Diagnostic criteria of staphylococcal toxic shock syndrome

Major criteria (All required)

Acute fever >38.8°C
Hypotension (orthostatic or shock)
Rash (erythroderma with late desquamation)

Minor criteria (Any 3)

Mucous membrane inflammation
Vomiting, diarrhoea
Liver abnormalities
Renal abnormalities
Muscle abnormalities
CNS abnormalities
Low platelets

Exclusionary criteria

Absence of another explanation
Negative blood cultures (except for S aureus)

Case report

An 8 year old girl was admitted to Lady Ridgeway Hospital in April 2000 with a history of high fever with chills and rigors and headache of 5 days duration and a watery diarrhoea of one day duration following an abscess in left buttock.

On admission, she was febrile (38.9°C), toxic and restless but conscious. Her lips were red and cracked. There was a diffuse erythematous macular rash on anterior aspect of shoulder. An abscess was found in left buttock, 5 cm infero-lateral to anus. Her pulse rate was 150/min and blood pressure 70/40 mm Hg. Her respiratory rate was 24/min and there were no added sounds. The abdomen was soft; there was a tender hepatomegaly.

Her white cell count (WBC) was 17 x 10^9/L with a neutrophil leucocytosis. Her haemoglobin (Hb) was 10.8 g/dl. The platelet count was 205 x 10^9/L. Peripheral blood picture showed normochromic normocytic red cells with predominant neutrophils showing toxic granulation. The blood urea was 9.3 mmol/L, serum

[1] *Consultant Paediatrician,*

[2] *Paediatric Registrar, Lady Ridgeway Hospital, Colombo.*

(Received on 20 Dec. 2002)

sodium 123 mmol/L, ESR 60 mm, random blood sugar 3 mmol/L, SGPT 139 IU/L, SGOT 124 IU/L. The prothrombin time was normal.

She was resuscitated with normal saline, given initially as an IV bolus of 20 ml/kg over 15 minutes and then at the rate of 5 ml/kg/hr. After 2 hours her pulse rate was 100/min and BP 100/70 mm Hg. She was treated with IV penicillin, cloxacillin and hydrocortisone. Her vital parameters were checked hourly and a fluid balance chart maintained. She was haemodynamically stable for next 48 hours. However, fever persisted and she continued to appear toxic. Incision and drainage of abscess was done and pus was sent for culture and ABST on 6th day of illness.

2 days later her condition deteriorated. The pulse rate was 160/min and BP 90/70 mm Hg. A 2D ECHO revealed myocarditis with left ventricular dysfunction and an ejection fraction (EF) of 34%. She was treated with captopril 6.25 mg bd for 8 weeks. Cardiac function gradually improved over next 3 days. A 2D ECHO done after 3 days showed remarkable improvement of cardiac function with an EF of 61%. However, high spiking fever persisted and was intermittent. Desquamation of skin occurred on 11th day of illness, initially from trunk and later from hands and feet. Blood transfusion was given to counter anaemia on day 11.

Subsequent investigations confirmed improvement in her condition. WBC was 12.2 x 10^9/L, Hb 12.8 g/dl, platelet count 240 x 10^9/L, SGPT 22 IU/L and SGOT 26 IU/L. Blood culture was sterile but pus culture revealed a mixed growth of *S. aureus* and coliforms. As both organisms were sensitive to co-amoxyclav, this was added to the regime.

On the 13th day of illness fever settled. Urine output gradually declined from 12th day of illness with rising blood urea. On 14th day, her blood urea was 64.9 mmol/L with a serum sodium of 133 mmol/L and a serum potassium of 2.1 mmol/L. Peritoneal dialysis was started on 15th day and continued till 19th day of illness. During initial phase of dialysis, 3 mmol of potassium chloride was added to each litre of Peri-solution till serum potassium reached 3 mmol/L. Her serum creatinine was 4.45 mg/dl. Dialysis was discontinued when the urine output was 300 ml. At this stage an ultrasound scan (USS) of abdomen showed enlarged kidneys with increased cortical echogenicity and loss of corticomedullary demarcation with a radiological diagnosis of acute cortical necrosis.

After one month, renal function returned to normal. Her blood urea was 6.3 mmol/L, serum creatinine 1.1 mg/dl and creatinine clearance 104 ml/min. Subsequent USS of abdomen showed normal sized kidney with loss of corticomedullary demarcation. Third 2D ECHO, done after one month, showed an EF of 66%.

Antibiotics were given for 14 days. Treatment was supplemented with vitamins and high calorie diet. She was discharged after 2 months without any residual effects and followed up in the clinic and remains well.

Discussion

All 3 major criteria were present in this 8 year old girl viz. high fever, hypotension and rash. In addition, several minor criteria were present viz. mucous membrane inflammation, diarrhoea, liver abnormalities and renal abnormalities. She also had myocardial dysfunction which is not listed among the minor criteria. Finally, *S. aureus* was cultured from the pus. Thus the diagnosis of TSS is established. This is the first case of TSS reported in children in Sri Lanka.

As TSS is a medical emergency, a high index of suspicion is essential for early recognition of the disease. Parenteral administration of anti-staphylococcal antibiotics together with drainage of focus of infection are the mainstay of treatment[8]. Fluid replacement should be aggressive to prevent or treat hypotension, renal failure and cardiovascular collapse. Inotropic agents may be needed to treat shock[8]. There is recent evidence that steroids diminish toxicity of strains of staphylococcus associated with TSS resulting in more rapid clinical improvement[9].

Whenever a child presents with an acute febrile illness accompanied by hypotension, the possibility of TSS should be considered and investigations carried out to detect multiorgan dysfunction.

References

1. Buchdahl R, Levin M, Wilkins B, Gould J *et al*. Toxic shock syndrome. *Archives of Disease in Childhood* 1985; **60**: 563-567.

2. Shands KN, Schmid GP, Dan BB *et al*. Toxic shock syndrome in menstruating women. *New England Journal of Medicine* 1980; **303**: 1436-1442.

3. Reingold AL, Shands KN, Dan BB, Broome CV. Toxic shock syndrome not associated with menstruation. A review of 54 cases. *Lancet* 1982; **1**: 1-4.

4. Wiesenthal AM, Todd JK. Toxic shock syndrome in children aged 10 years or less. *Pediatrics* 1984; **74**: 112-117.

5. Kotzin B, Leung DYM, Kappler J, Marrack P. Superantigens and their potential role in human disease. *Adv Immunol* 1993; **54**: 99-166.

6. Akatsuka H, Imanishi K, Inada K, Yamashita H, *et al*. Production of tumour necrosis factors by human T cells stimulated by a superantigen, toxic shock syndrome toxin-1. *Clin Exp Immunol* 1994; **96**: 422-426.

7. Stevens DL, Tanner MH, Winship J, *et al*. Severe group A streptococcal infections associated with a toxic shock like syndrome and scarlet fever toxin A. *New England Journal of Medicine* 1989; **321**: 1-7.

8. Behrman RE, Kliegman RM, Jenson HB. Editors, Nelson Textbook of Paediatrics. 16th ed. Philadelphia: Saunders, 2000; 797-798.

9. Todd TK, Rossman M, Castor SA, *et al*. Corticosteroid therapy for patients with the toxic shock syndrome. *JAMA* 1984; **252**: 3399-3402.

UN Questionnaire

Last month, a survey was conducted. The only question asked was:

"Would you please give your honest opinion about solutions to the food shortage in the rest of the world?"

The survey was a HUGE failure because:

In Africa they didn't know what "food" meant.

In Eastern Europe they didn't know what "honest" meant.

In Western Europe they didn't know what "shortage" meant.

In China they didn't know what "opinion" meant.

In the Middle East they didn't know what "solution" meant.

In South America they didn't know what "please" meant.

And in the USA they didn't know what "the rest of the world" meant.

(*Provided by* **Dr Shanthamali de Silva**)

A case of type 1 Gaucher disease

G N Lucas[1], S. Sriranganathan[2]

Sri Lanka Journal of Child Health, 2003; **32**: 54-55

Introduction

Gaucher disease is the commonest glycolipid storage disease, characterized by abnormal accumulation of glucocerebroside in cells of the reticuloendothelial system. It is caused by inherited deficiency of lysosomal enzyme glucocerebrosidase. The birth incidence of this autosomal recessive disease is high (0.2%) among the Ashekenazi Jewish population[1]. There are 3 major types based mainly on presence or absence and severity of neurological manifestations. Type 1, the commonest, is characterized by absence of neurological involvement. Even though type 1 has been termed "Adult type", it usually presents in childhood[2].

Case report

A seven year old girl was admitted to Lady Ridgeway Hospital (LRH) in June 1998 with a history of progressive enlargement of abdomen and growth retardation since the age of 1 year. She was born normally and the mother noted that her growth was not in keeping with other children of similar age. She has taken the child to several institutions where different investigations were done with no definite diagnosis. By that time, mother noted that the child's abdomen was also enlarging progressively. When she was brought to LRH, in addition to these cardinal symptoms, there was a history of repeated infections, lethargy and easy bruisability.

She was the product of a non-consanguineous marriage and there was no family history of similar illness.

She was wasted; both height (90cm) and weight (11.5kg) were less than 3rd centile. She was pale and examination of abdomen revealed gross splenomegaly (15-17 cm below left costal margin) and moderate hepatomegaly. There were no neurological signs. Her development was age appropriate and she was noted to have a good drawing skill.

Initial investigations showed normal blood counts except for mild thrombocytopenia; x-rays, acid phosphatase and echocardiogram were normal. An ultrasound scan of abdomen confirmed the clinical findings. Bone marrow biopsy showed numerous Gaucher cells. Definitive enzymatic diagnosis could not be performed. A diagnosis of Gaucher disease was made based on clinical presentation and presence of Gaucher cells in bone marrow. Since there were no neurological abnormalities until presentation, diagnosis was narrowed to Gaucher disease type 1.

She was started on "Cerezyme" in April 1999, initially on a low dose for first 3 months and later on the standard regime. She was monitored by quality of life, episodes of infection, growth parameters, blood counts, skeletal survey and visceral volume. After about 4 months of treatment, her weight was gradually picking up, blood counts improved (platelets rose from 150 x 10^9/L to 205 x 10^9/L) and there were no episodes of infections. The treatment is being continued.

Discussion

In a series of 34 children with adult type Gaucher disease, majority presented before the age of 10 years and growth retardation with hepatosplenomegaly were prominent features. 90% of children in this series had radiological features of skeletal involvement[2].

Common laboratory findings in type 1 Gaucher disease are anaemia, thrombocytopenia and elevated levels of serum acid phosphatase. Diagnosis of Gaucher disease should be considered in any patient with unexplained splenomegaly and is strongly supported by elevated levels of serum acid phosphatase and presence of typical Gaucher cells in bone marrow[3]. It is confirmed with results of an assay of glucocerebrosidase in white blood cells, fibroblast culture[4] or urine[5].

The child described here had the classical presentation of growth retardation and progressive abdominal distension; she did not show any neurological deficits and did not have skeletal abnormalities. Together with presence of Gaucher cells in bone marrow, the diagnosis of Type 1 Gaucher disease was made.

[1] *Consultant Paediatrician,*

[2] *Senior Registrar, Lady Ridgeway Hospital, Colombo.*

(Received on 13 March 2003)

Treatment of type 1 Gaucher disease was entirely symptomatic until recently. Splenectomy is effective in correcting thrombocytopenia and anaemia and eliminates the distress caused by the massively enlarged spleen[2]. Hydration, analgesics, narcotics for pain in bone crisis and orthopaedic interventions for fractures help to maintain the quality of life. Bone marrow transplantation is an effective form of therapy but the risk of mortality and morbidity makes this mode of treatment less desirable[6].

For type 1 disease, there is good evidence that enzyme replacement therapy (ERT) with mannose terminated placental, or recombinant glucocerebrosidase is beneficial in reducing hepatosplenomegaly, improving haematological parameters, and to a lesser extent alleviating bone disease[6]. Over 1500 patients are now on ERT. Marked organomegaly, severe/moderate cytopenias and extensive skeletal involvement are common indications to initiate ERT. Major disadvantages are cost of therapy, determination of effective initial and maintenance doses and difficulties in administration. Even in USA, cost of therapy for each patient ranges from $100,000 to $400,000 annually. For developing countries like Sri Lanka, cost of treating a single patient with ERT from annual drug budget is impossible.

References

1. Beutler E, Nguyen NJ, Henneberger HW, *et al*. Gaucher disease: Gene frequencies in the Ashekenazi Jewish population. *Am J Hum Genet* 1993; **5**2: 85-88.

2. Zevin S, Abrahamov A, Hadas – Halpern I, *et al*. Adult-type Gaucher disease in children: genetics, clinical features and enzyme replacement therapy. *Quarterly Journal of Medicine* 1993; **86**: 565-573.

3. Martin BM, Sidransky E, Ginns EL. Gaucher's disease: advances and challenges. In: Barness LA, ed. *Advances in Paediatrics*. St. Louis, Mosby - Year book; 1989; **36**: 277-306.

4. Daniels LB, Glew RH. Beta-glucosidase assays in the diagnosis of Gaucher's disease. *Clin Chem*. 1982; **28**: 569-577.

5. Aerts JMFG, Donker- Koopman WE, Koot M, Barranger JA, Tager JM, Schram AW. Deficient activity of glucocerebrosidase in urine from patients with type 1 Gaucher disease. *Clin Chem Acta*. 1986; **158**: 155-163.

6. NIH Technology Assessment Conference. Gaucher Disease. Current Issues in Diagnosis and Treatment. *JAMA* 1996; **275(7**): 548-553.

Picture Story

A mediastinal tumour that disappeared and reappeared

Manouri P Senanayake[1], R Ajanthan[2], S P Sumanasena[3], Sanath P Lamabadusuriya[4]

Sri Lanka Journal of Child Health, 2003; **32**: 56-57

An 11 year old boy developed breathlessness over 12 days and was admitted to the local hospital with facial oedema and engorged neck veins. He had been "less active" and "feeling unwell" for one month. His father had been diagnosed and treated for pulmonary tuberculosis in the past year. Chest x ray showed a superior mediastinal mass (Figure 1). To relieve increasing respiratory difficulty he had been administered intravenous hydrocortisone 100 mg six hourly for 2 days followed by oral dexamethasone 4 mg six hourly for 6 days eight days prior to transfer to Colombo.

On arrival at the Lady Ridgeway Children's Hospital he appeared well with no evidence of superiour vena-caval obstruction clinically or radiologically (Figure 2). The erythrocyte sedimentation rate was 22 mm 1st hour. The Mantoux test was positive (20 mm). White cell count and platelets were present in normal numbers in the peripheral blood. The haemoglobin was 10 g/dl. Bone marrow showed hypoplastic granulopoesis with all stages of maturation, normal erythropoesis and thrombopoesis and no infiltration by lymphoma or tumour cells. Macrophages were increased in number and activity, indicating chronic infection or inflammation.

Figure 1. *Prior to transfer – widened superior mediastinum*

[1] *Professor,*

[2] *Senior Lecturer,*

[3] *Registrar*

[4] *Senior Professor, Department of Paediatrics, Faculty of Medicine, Colombo.*

(Received on 24 April 2003)

Figure 2. *On admission – normal chest x-ray*

Steroid induced remission was the most probable reason for the disappearance of the superior mediastinal mass lesion. The possibility of tuberculous

disease resolving so quickly was considered unlikely despite the strongly positive Mantoux test. Lymphoma was a possible diagnosis. He remained in apparent good health with weekly chest x rays showing no abnormality over two weeks and no therapy was given. The mass recurred during the third week (Figure 3). A CAT scan showed a mass lesion in the superior mediastinum.

The child deteriorated rapidly with progressive x-ray changes of mediastinal enlargement and massive right sided pleural effusion (Figure 4) which was haemorrhagic on aspiration. He developed cervical lymphadenopathy, elevated blood pressure and bilateral loin masses in addition to respiratory symptoms.

A provisional diagnosis of Non Hodgkins Lymphoma with secondary infiltration of kidneys was made at the Cancer Institute Maharagama and he is awaiting the results of tissue biopsy.

Figure 3. *3rd week – minimal widening of superior mediastinum*

Figure 4. *4th week – Right pleural effusion and widened mediastinum*

Instructions to Authors

Sri Lanka Journal of Child Health, 2003; **32**: 58-59

All papers for publication should be sent to the editors, Sri Lanka Journal of Child Health, Sri Lanka College of Paediatricians, Wijerama House, No. 6, Wijerama Mawatha, Colombo 7.

General

Authors must submit 3 copies of the original manuscript on double space typescript. Text should be printed on one side of A4 sheets, which should be numbered. Avoid repetitions between tables and texts and between different sections of the paper. A separate title page should be provided including the title (which should be concise but informative), author/s name/s with their highest medical and scientific degrees and their current appointments. This page should include the full postal address for correspondence along with telephone number, fax number and e-mail address. The number of authors should be kept to a minimum.

Original Articles

Papers should contain original work not presented for publication or published elsewhere. The editors retain the right to shorten the article or make changes to conform to the style of the journal and to improve clarity. A structured format is preferred with the following headings: Introduction, Design, Method, Results, Discussion and Conclusions.

The abstract should not be more than 200 words, structured wherever possible and should include the main purpose of the study, the essential elements of the design, the most important results illustrated by numerical data and implications and relevance of the results as conclusions.

Authors should provide up to four key words or phrases for the index.

All measurements must be in SI units apart from blood pressure measurements, which should be in mm Hg, and drugs in metric units.

Abbreviations should be used rarely and should be in parenthesis preceded by the words in full before the first appearance.

Generic names should be used for drugs and if necessary, brand name may follow in brackets.

Short reports

Length must not exceed 900 words, including an abstract of less than 50 words, one or two small tables of illustration and up to six references. If more illustrations are required, the text must be reduced accordingly.

The title should be no longer than seven words.

Annotations

The annotations are commissioned by the editors who welcome suggestions for topics or authors.

Tables and illustrations

Table should be presented separately in double line spacing without rule lines. Illustrations should be used only when data cannot be expressed clearly in other ways. When graphs are submitted the numerical data on which they are based should be supplied. Illustration should be trimmed to remove all redundant areas and the top should be marked on the back.

Ultrasound scans, radiographs, etc, should be arrowed on an overlay to indicate areas of interest or should be accompanied by explanatory line drawings.

If photographs of patients are used, either the subjects should not be identifiable or their pictures must be accompanied by written permission to use the figure. Permission forms are available from the Editor.

Legends for illustrations should be triple-spaced on a separate sheet and should not appear on the illustrations.

Colour illustrations are encouraged. Send both transparencies and prints for this purpose.

Please note that the cost of reproducing any colour figures will be charged to the authors (please contact the editorial office for costs).

References

References should appear in the text as superscript in parenthesis, or within square brackets numbered in order of appearance. They should be listed at the end of the article. They should have the names of up to five authors, followed by initials. If there are more than five authors, the first four only should be given followed by et al. The title of the article should be followed by the title of the journal (abbreviated to the style of index Medicus), year of publication, volume number and first and last pages. Reference to books should give the names of authors (and/or editors) title, place of publication and publisher, followed by the year of publication. ACCURACY OF REFERENCES IS THE RESPONSIBILITY OF THE AUTHOR.

Some examples of references:

Journal articles

With author

de Alencar F E C, Cerutti C Jr, Durlacher R R, Boulos M, Alves F P, Milhous W, et al. Atovaquone and proguanil for the treatment of malaria in Brazil. *Journal of Infectious Diseases* 1997; **175**: 1544-1547.

Without author

Coffee drinking and cancer of pancreas [editorial] *British Medical Journal* 1981; **283**: 628.

Book references

Personal author/s

Colson J H, Armour W J, Sports injuries and their treatment. 2nd ed. Lond; S Paul, 1986.

Editor/s Compiler/s as author/s

Diener H C, Wilkinson M. editors, drug-induced headache. New York Springer-Verlag, 1988.

Chapter in a book

Weinstein L, Swartz M N. Pathologic properties of invading microorganisms. In: Sodeman WA Jr, Sodeman WA, editors. Pathologic physiology: of disease. Philadelphia: Saunders, 1974; 457-72.

N.B. **The editors insist on the submission of a computer 3.5 inch floppy diskette with the article in double column format done in the soft-ware program MICROSOFT WORD.**