plasty (with accurate apposition of flaps of vaginal and hymenal mucosa as described above) gives excellent cosmetic result than hymenotomy (simple incision only) or hymenectomy (excision of membrane). In an orthodox society of ours, it is recommended as the procedure of choice. However, adequate control of infection and enough experience in neonatal surgery are the pre-requisites.

REFERENCES

1. Graivier L. Hydrocolpos. J Pediatr Surg 1969, 4: 563-568.
2. Narasimharao KL, Mitra SK, Pathak IC. Hydrocolpos as a cause of urinary ascites. Indian Pediatr 1983, 20: 300-302.
3. Singhal GD, Gopal SC, Gangopadhyay AN. Pyometrocolpos with distal vaginal agenesis. JIMA 1985, 83: 59-60.

Serum Iron and Total Iron Binding Capacity in Anemias in Children

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Anemia results in significant morbidity and mortality in children and constitutes a public health problem of considerable importance. Majority of anemic children have some nutritional deficiency, the iron deficiency being the most common(1). Therefore, the present study was conducted to know the significance of serum iron, total iron binding capacity and transferrin saturation in differentiation of anemias in children.

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Material and Methods

The study was conducted in the Department of Pediatrics, Regional Institute of Maternal and Child Health, Dr. Sampurnanand Medical College, Jodhpur, from May to December, 1988. Forty anemic (28 males and 12 females) children were selected and lower normal values of hemoglobin were taken as the cut off point in different age groups, as suggested by Pearson(2), *i.e.,* upto 2 weeks 13.0, 2 weeks to 6 months 9.5, 6 months to 6 years 10.5, and 6 to 12 years 11 g/dl. Hematologic investigations like hemoglobin, total leucocyte count, differential leucocyte count, peripheral blood film, total red blood cell count, packed cell volume, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, serum iron(3) and total iron binding capacity (TIBC)(4) were done in all the cases, while bone marrow examination, fetal hemoglobin and reticulocyte count were carried out whenever indicated. Twenty five normal age matched healthy children (19 males and 6 females) served as controls.

Transferrin saturation below 16% formed the basis of diagnosis of iron deficiency anemia(5,6) while dimorphic anemia was diagnosed on the basis of red cell morphology in peripheral blood smear(2).

Results

The values of serum iron, TIBC and

TABLE I—*Serum Iron and TIBC in Control and Anemic Children*

Type of anemia	No. of cases	Serum iron (μg.dl) Mean±SD	TIBC (μg/dl) Mean±SD	Transferrin saturation (%)
1. Normal children (control)	25	102.3 ±13.1	311.2 ±26.8	32.8
2. Iron deficiency anemia	25	50.9 ±11.7**	416.7 ±26.3**	12.2**
3. Dimorphic anemia	7	65.5 ±25.0*	413.9 ±37.7**	15.8
4. Hemolytic anemia	5	197.6 ±23.2**	244.9 ±14.7	57.2**
5. Aplastic anemia	2	236.0	355.4	66.7
6. Leukemia	1	113.4	338.2	33.5

* $p<0.01$; ** $p<0.001$

transferrin saturation in controls and anemic children are shown in *Table I*. The serum iron was significantly elevated ($p<0.001$) and TIBC was significantly reduced ($p<0.001$) in hemolytic anemia as compared to iron deficiency or dimorphic anemia. Mean transferrin saturation was 12.2% in 25 cases of iron deficiency anemia and 15.8% in 7 cases of dimorphic anemia.

Discussion

The mean levels of serum iron, TIBC and transferrin saturation in healthy children were 102.3±13.1 μg/dl, 311.2±26.8 μg/dl and 32.8%, respectively and were within the range reported by other workers(7-9).

The mean serum iron in cases of iron deficiency anemia was 50.9 μg/dl in this study as observed by other workers(10-15). Similarly, mean TIBC was raised to 416.7 μg/dl in iron deficiency anemia, corresponding to the values obtained by other workers(13,15). Transferrin saturation in iron deficiency anemia was 12.2% in our study.

In hemolytic anemia mean serum iron was 197.6 μg/dl, TIBC was 244.9 μg/dl and transferrin saturation was 57.2%. The increase in serum iron in hemolytic anemia is due to excessive destruction of red cells and increased absorption of iron from the gut.

On examination of peripheral blood film, out of these 40 anemic children, 29 had microcytic hypochromic picture. Amongst these, 25 had transferrin saturation of less than 16% and were diagnosed as iron deficiency anemia. The rest 4 patients had transferrin saturation of more than 50% and were confirmed to be hemolytic anemia by other appropriate tests. Transferrin saturation was less than 16% in 4 (57.1%) and more than 16% in 3 (42.9%) cases of dimorphic anemia. Among four patients who showed normocytic normochromic picture, transferrin saturation was raised in all except one case of leukemia in which it was normal.

Thus, it can be concluded that transferrin saturation is not only a diagnostic criterion for iron deficiency anemia but it also helps in differentiation of various types of microcytic hypochromic anemias.

REFERENCES

1. World Health Organization. Control of nutritional anemia with special reference to iron deficiency. WHO Tech Rep Ser No. 570, Geneva, 1975.

2. Pearson HA. The anemias. *In:* Nelson Texbook of Pediatrics, 13th edn. Eds Nelson WE, Philadelphia, WB Saunders Co, 1987, pp 1035-1036.

3. International Committee for standardization in Hematology. Recommendation for measurement of serum iron in human blood. Br J Hematol 1978, 38: 291-294.

4. International Committee for Standardization in hematology. Measurement of total and unsaturated iron binding capacity in serum. Br J Hematol 1978, 38: 281-290.

5. Bainton DF, Finch, CA. The diagnosis of iron deficiency anemia. Am J Med 1964, 37: 62-70.

6. Koerper MA, Dallman PR. Serum iron concentration and transferrin saturation in the diagnosis of iron deficiency anemia in children. J Pediatr 1977, 91: 870-874.

7. Smith CH, Schulman I, Morgenthlaw JE. Iron metabolism in infants and children. Adv Pediatr 1952, 5: 195-218.

8. Khanduja PC, Agarwal KN. Serum iron and hematological value in school children. Indian Pediatr 1970, 7: 383-387.

9. Duggal N, Joshi KC, Sangal BC. Etiological study of anemia in infancy and childhood with special reference to hemoglobinopathies in and around Jaipur. Indian J Pediatr 1977, 44: 309-314.

10. Patel BD, Parekh JG, Jhala HJ, Saraiya OC. Anemias in infants and children. Indian J Child Health 1958, 7: 639-646.

11. Jadhav M, Baker SJ. Study of etiology of severe anemia in childhood. Indian J Child Health 1961, 10: 235-242.

12. Manchanda SS, Khanna HL. Severe anemia, an analysis of 105 cases. Indian J Child Health 1962, 11: 643-648.

13. Bettkerur UN, Shah DS, Billur PK, Shah SH. Pattern of anemia in childhood. Indian Pediatr 1971, 8: 350-354.

14. Magotra ML, Phandke MV. Anemias in infancy and childhood. Indian Pediatr 1975, 12: 493-498.

15. Mehta NB, Modi UJ, Vaishnav VP. Anemias of infancy and childhood. Pediatr Clin India 1975, 10: 138-140.

Dermal Organophosphorus Poisoning in a Girl with a Hip Spica

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Organophosphorus compounds available as pesticides and insecticides are a common cause of poisoning in India. Ignorance amongst the public of the lethal potential of these chemicals absorbed through the dermal route led to serious intoxication in a young girl. The peculiar mode of poisoning prompted us to share this unique experience.

Case Report

A 3-year-old girl presented with a two day history of vomiting and loose stools. In the 24 hours preceding admission, child had altered sensorium, excessive frothing from mouth and twitching movements of the facial muscles. She had fractured her right femur a fortnight ago and had a hip

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