Glycogen Storage Disease

A.K. Sarkar
A.K. Ghosh
K. Biswas
B.S. Roy
K. Sarkar

The glycogen storage diseases (GSD) or glycogenoses are a heterogenous group of inborn errors of carbohydrate metabolism that lead to abnormal concentrations or structure of glycogen. Several well defined disorders of glycogen metabolism, have been described based on the identified enzymatic defects or sometimes the distinctive features(l). We wish to report our experience with one such case of Type-IX GSD.

A 3-year-old boy of non-consanguinous parents was brought with progressive distension of abdomen since 2 years of age. There was no history of jaundice, convulsion or similar disorder in the family. Clinical examination revealed an alert, well-nourished child with distended abdomen. The liver was enlarged 12 cm below the right costal margin, firm in consistency with well defined margin and smooth surface. Spleen and kidneys were not palpable. The rest of the systemic examination was non-contributory.

From the Departments of Pediatrics and Pathology, Institute of Post Graduate Medical Education and Research and S.S.K.M. Hospital, Calcutta.

Investigations showed a normal hemogram, platelet count and ADP aggregation test. Liver function tests revealed total bilirubin 0.4 mg/dl, total protein of 7.1 g/dl with albumin 4.8 g/dl, alkaline phosphates 70 IU/L, SGOT 75 IU/L, SGPT 65 IU/L and prothrombin time 13 sec against the control time of 12.5 sec. Random blood sugar was 62 mg/dl, serum triglycerides 92 mg/dl, cholesterol 140 mg/dl, lactic acid 12.8 mg/dl and uric acid 2.6 mg/dl. Fasting blood sugar was 60 mg/dl and following IV glucagon, its values were 80 mg/dl, 90 mg/dl, 78 mg/dl and 70 mg/dl when examined after + h, 1 + h and 2 h. After meals, blood glucose was 65 mg/dl and 2 h after glucagon administration it rose to 105 mg/dl.

ECG and X-ray chest revealed no abnormality. Ultrasonography of the abdomen showed grossly enlarged liver with uniform echotexture. Spleen and kidneys were of normal size and shape. Liver biopsy showed marked enlargement of hepatocytes with obliteration of the sinusoids. Special stains revealed hepatocytes containing large amount of diastase sensitive PAS positive material, *i.e.,* glycogen *(Fig. 1).*

Gradual abdominal protuberance from early childhood and huge hepatomegaly pointed to a metabolic disorder. Tt needs to be emphasized that most cases of GSD are characterized by huge hepatomegaly without splenomegaly unless portal hypertension supervenes due to cirrhosis(2). There have been only isolated case reports of GSD from India(2,4) but the disorder should be borne in mind especially where there is family history of a similar disorder or where parental consanguinity exists. Among the GSD, Type-I is the commonest and a number of cases have been reported from India(2).

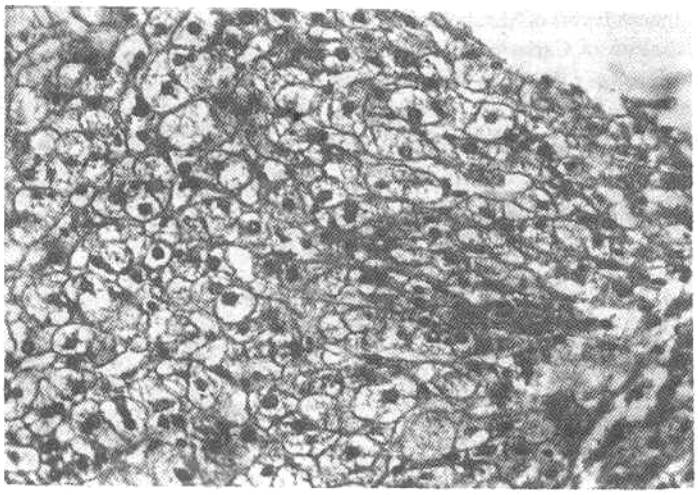

Fig. 1. Histopathological appearance of liver biopsy showed typical balooning of hepatocytes with obliteration of sinusoids. Special stains revealed large amount of diastase sensitive PAS positive material in hepatocytes (HEX 80).

Due to lack of facilities for enzymatic studies it is rather difficult to precisely categorize our patient but an effort has been made to classify the case on the basis of clinical and biochemical features particularly glucagon stimulation test. Marked hepatomegaly without splenomegaly commonly occur in Types I, III, VI, VIII, IX, X and XI GSD. Absence of hypoglycemia, hyperlipidemia, lactic acidosis bleeding, diathesis, renal enlargement and presence of normal platelet adhesiveness may be the important pointers against diagnosis of Type I GSD. Moreover, normal hyperglycemic reaction following IV glucagon both after overnight fasting and 2 hours after a meal goes conclusively against this condition. Increase of blood glucose concentration when glucagon is administered after fasting, normal cholesterol and triglyceride levels exclude Type III GSD. Presence of normal hyperglycemic response to IV glucagon as has been observed in the present case favors the possibility of Type IS GSD as opposed to Type VI where glucose tolerance curve remains fiat. As the patient in question did not exhibit any neurological features in the form of ataxia, nystagmus, 'dancing eyes', hypertonia or spasticity; Type VIII GSD was not taken into consideration. In type X GSD apart from persistent hepatomegaly possible muscle weakness, only reported, there is no rise in blood glucose after IV glucagon. Type XI is characterized by rickets and growth failure secondary to renal Fanconi syndrome. Judging the above mentioned features, a diagnosis of Type IX GSD was made. Further characterization to sub types IX a, b, c, requires specific enzyme assay of leukocytes, cultured skin fibroblasts or liver. The patients with Type IX GSD run a benign course and hepatomegaly gradually recedes as the children grow older(l).

REFERENCES

1. Hug G. Inborn Errors of Metabolism: Defects in Metabolism of Carbohydrates. *In:* Nel son Text Book of Pediatrics, 13th edn. Eds. Behrman RE, Vaughan VC, Nelson WE, Phi'adelphia, W.B. Saunders Co, 1987, pp 277-357.
2. Singh M, Fazal MI, Tana I, Arya LS, Goel RG. Glycogen storage disease. Indian Pediatr 1983, 20: 208-213.
3. Sarkar AK, Ghosh T, Chowdhury T, Saha G, Sanda R. Glycogen storage disease (Type III). Indian Pediatr 1991, 28: 1058-1061.
4. Kalta V, Arya LS, Nayak NC. Glycogen storage disease (Type IV): A familial cirrhosis diagnosed by electron microscopy. Indian Pediatr 1980, 17: 625-627.