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Ultrasonography in Children with Sickle-cell Anaemia

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Summary

Adekile AD and Makanjuola D. Ultrasonography in Children with Sickle-cell Anaemia. *Nigerian Journal of Paediatrics* **1983; 10: 35.** Gallbladder studies, using plain abdominal radiography and oral cholecystography were carried out on 45 children with sickle-cell anaemia (SCA) in an attempt to ascertain the prevalence of cholelithiasis among these sicklers. Gallstones were demonstrated in only two patients, giving a prevalence rate of 4.4%. The low prevalence of gallbladder disease in Africans as reported by others and confirmed in the present series, may be due to low consumption of refined fibre-depleted foods and cholesterol. However, it is likely that its prevalence will increase with improved diet of patients with SCA and their survival into adulthood.

Introduction

SICKLE-CELL anaemia (SCA), like other chronic haemolytic states, predisposes to cholelithiasis.[1–6] The prevalence rates as reported by these workers vary between 9 and 55% depending on the population studied. Several reports, mostly from North America, have emphasised the need for routine screening for gallstones in these patients. However, one previous study from Nigeria reported the rarity of cholelithiasis in patients with SCA.[7] The study involved mostly adolescents and adults and the diagnosis was based on plain abdominal radiography and oral cholecystography. The present study was undertaken in order to establish the prevalence of cholelithiasis in children with SCA, using plain abdominal radiography, ultrasonography and oral cholecystography. To our knowledge, there have been no previous reports of ultrasonography of the gallbladder in Africans with sickle-cell anaemia.

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Patients and Methods

Forty-five asymptomatic consecutive patients, aged between three and 16 years (25 females and 20 males) attending the Sickle-cell clinic, Ife University Teaching Hospital, Ile Ife , were studied. Their haemoglobin genotype was SS as determined on cellulose acetate electrophoresis at pH 8.6. The patients' haematocrit values at the time of study ranged from 18 to 26% and the total serum bilirubin ranged from 1.0 to 10.5mg/100ml (17–178.5umol/L). Informed consent was obtained from all the patients and /or their parents.

All the patients had plain abdominal radiographs of the gallbladder area and realtime ultrasonography of the gallbladder. The ultrasonographic examination (using Roche Abdoscan 5 KONTRON with a 2.8 MHz transducer) was performed in the morning before the patients had breakfast, to prevent gallbladder contraction. Longitudinal, transverse and oblique scans of the right hypochondrium were made. Oral cholecystograms were performed on patients whose gallbladders were not satisfactorily visualised or had acoustic shadowing on sonography and/or who had calcific densities on plain abdominal radiography.

Results

The plain abdominal radiography of the gallbladder area showed calcific densities (Fig. 1) in two patients (one male, aged 13 years and one female, aged 16 years). In 41 of the 45 patients, the gallbladder was easily visualised on ultrasonography, with no dense intravesicular echoes or acoustic shadowing to suggest calculous formations and there was no evidence of sludging (Fig. 2). In the remaining four patients, three (including the two who had calcific densities on plain abdominal radiography) had poorly-defined gallbladders with dense acoustic shadows (Fig.3), while the gallbladder was not satisfactorily visualised in one. All four had oral cholecystograms which confirmed gallstones in the two suspected cases; the other patient who had acoustic shadows on sonography turned out to be a case of 'comma or elbow-shaped' gallbladder, while the fourth patient had a radiologically normal gallbladder. Therefore, the prevalence rate of cholelithiasis in the present study was 4.4%.

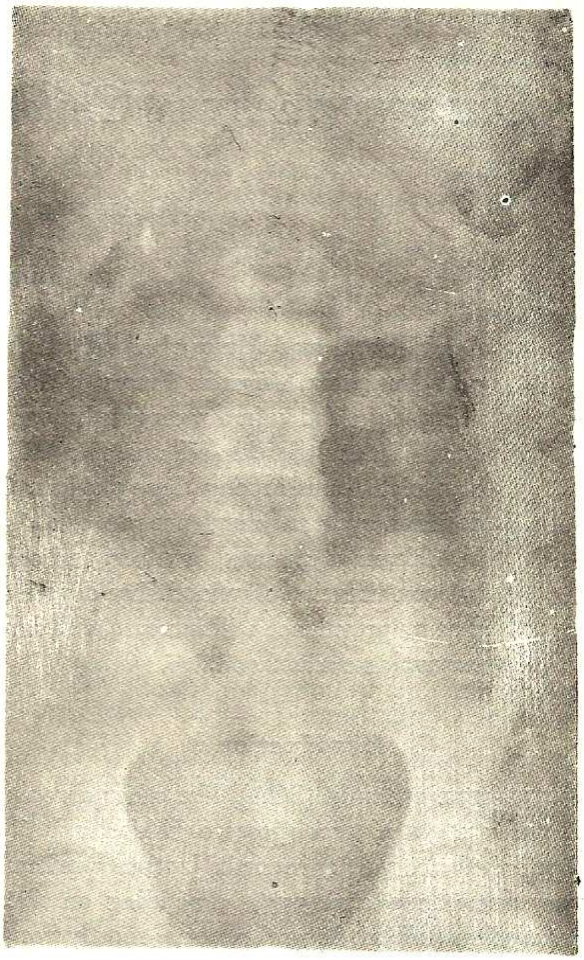

Fig. 1. A plain abdominal radiograph showing a round opacity in the right hypochondrium. Oral cholecystography confirmed the opacity to be a gallstone.

Discussion

Ultrasonography is now widely used in the primary evaluation of gallbladder diseases. Calculous formations within the gallbladder are easily recognised by their acoustic shadowing. Many reports of the efficacy of ultrasonography *in the diagnosis of cholelithiasis in SCA* have appeared in the literature.[2 4 8] Transducers of high frequencies tend to give better resolution on ultrasonic scanning, but we were quite satisfied with the image obtained with the 2.8 MHz transducer used in the present study. In four patients in whom the sonographic image was unsatisfactory, oral cholecystograms confirmed the presence of stones in two, revealed a 'comma or elbow-shaped' gallbladder in one and a radiologically normal gallbladder in the other.

The pathogenesis of cholelithiasis in SCA, like in other chronic haemolytic states, is related to the resultant hyperbilirubinaemia. The other

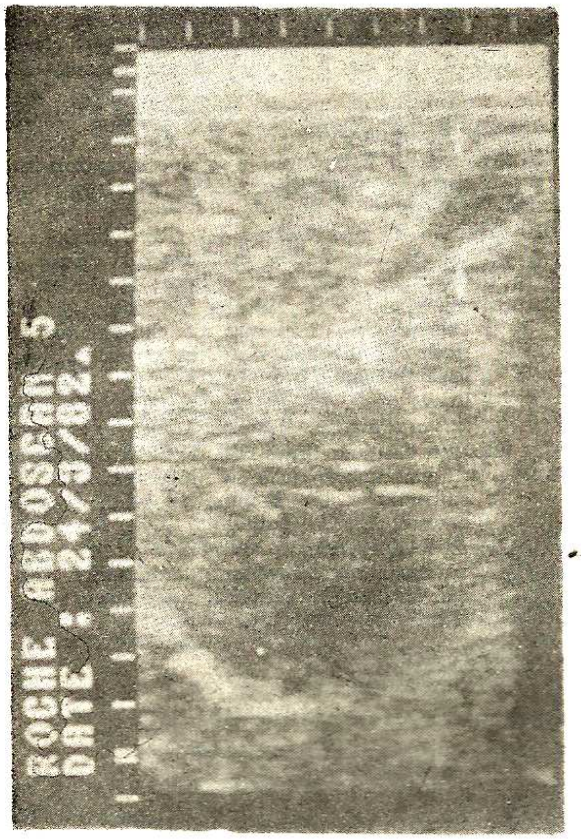

Fig. 2. Sonographic image of a normal gallbladder (in between the arrows)

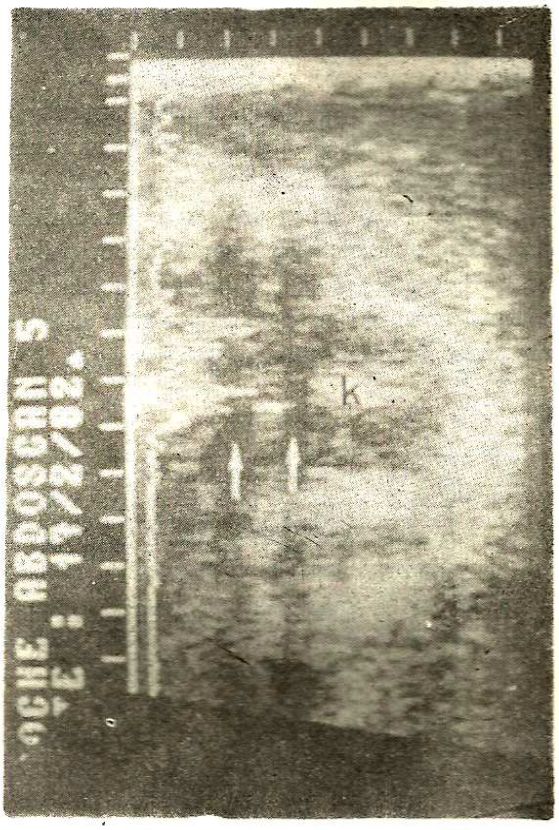

Fig. 3. Acoustic shadows (arrows) caused by stones in the gallbladder. Note the normal kidney image, marked K on the right.

components of these pigment stones include cholesterol and calcium. Most of the previous studies undertaken in order to establish the prevalence rates of cholelithiasis among sicklers concerned adults. However, studies carried out in the United States of America on paediatric patients have reported rates between 10 and 55%.[2-4 8] The study by Akinyanju and Ladapo[7] on African children and adults reported a prevalence of 9%.

The current concensus of opinion is that the incidence of cholelithiasis in SCA increases with age and is particularly common in patients with high serum total bilirubin levels. Sarnaik *et al*[8] have reported a statistically significant increase in the proportion of adolescent females with positive findings on gallbladder sonography, suggesting a possible role of puberty and oestrogens in the pathogenesis of cholelithiasis in patients with SCA.

In the present study, only two cases of cholelithiasis were found, thus confirming earlier impressions that gallbladder disease is uncommon in Africans.[9 10] Da Rocha-Afodu and Adesola[9] reported prevalences of 0.18% for cholelithiasis and 0.3% for cholecystitis from 5,529 autopsies in Lagos. It seems therefore, that some factor(s) protect Africans from the development of gall stones. Diet seems to be favoured and Heaton[11] has suggested that this may be due to the low consumption of refined fibre-depleted foods by most Africans. Low comsumption of cholesterol would be another protective factor. However, as the dietary habits of many Africans change and

many more patients with SCA survive to adulthood, the prevalence of cholelithiasis is likely to increase.

Had the present study focussed mainly on symptomatic patients, probably many more cases of gallstones would have been identified. However, since the present study has again confirmed the rarity of cholelithiasis in Nigerian children with SCA, no case can, at present, be made for routine screening of these patients for gallstones as is done in north America.

References

1. Mintz AA, Church G and Adams ED. Cholelithiasis in sickle-cell anaemia. *J Pediat* 1955; **47**: 171–7.
2. Lachman BS, Lazerson J, Starshak RJ, Vaughters FM and Werlin SL. The prevalence of cholelithiasis in sickle-cell disease as diagnosed by ultrasound and cholecystography. *Pediatrics* 1979; **64**: 601-3.
3. Karayalcin G, Hassani N, Abrams M and Lanzkowsky P. Cholelithiasis in children with sickle-cell disease. *Am J Dis Child* 1979; **33**: 306–7.
4. Stephens CG and Scott RB. Cholelithiasis in sickle-cell anaemia. *Arch Intern Med* 1980; **140**: 400–2.
5. McCall IE, Desai P, Serjeant BE and Serjeant GR. Cholelithiasis in Jamaican patients with homozygous sickle-cell disease. *Am J Hematol* 1977; **3**: 15–21.
6. Perrine RP. Cholelithiasis in sickle-cell anaemia in a caucasian population. *Am J Med* 1973; **54**: 327–32.
7. Akinyanju O and Ladapo F. Cholelithiasis and biliary tract disease in sickle-cell disease in Nigerians. *Postgrad Med J* 1979; **55**: 400–2.
8. Sarnaik S, Slovis TL, Corbett DP, Emami A and Whitten CF. Incidence of cholelithiasis in sickle-cell anaemia using the ultrasonic gray scale technique. *J Pediat* 1980; **16**: 1005–8.
9. Da Rocha-Afodu JT and Adesola AO. Cholecystitis in Nigerians. *J Nig Med Ass* 1971; **1**: 47-50.
10. Edington GM and Gilles HM. Pathology of sickle-cell anaemia and sickle-cell haemoglobin-C. In: Pathology in the Tropics. 1st edit., London. Edward Arnold (Publishers) Ltd., 1970: 386:
11. Heaton KW. In: Recent advances in medicine No 17. Baron DN Campston M and Dawson AM eds. Edinburgh: Churchill Livingstone (Publishers) 1977:323.

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