

Ultrasonographic Findings in Patients with Malnutrition Related Diabetes Mellitus

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ABSTRACT

One hundred and twenty four cases of malnutrition related diabetic subjects (MRDM) attending the diabetes clinic at the S.C.B. Medical College Hospital, Cuttack, Orissa between May, 1989 and October, 1991 were subjected to pancreatic ultrasonography.

Diagnosis of MRDM was based upon the criteria accepted by W. H. O. study group, 1985 (1). Sixteen of the patients were categorised as fibrocalculous pancreatic diabetes (FCPD) on the basis of radiological evidence of pancreatic calculi. The rest were considered as cases of protein deficient diabetes mellitus (PDDM).

Ultrasonography corroborated the presence of pancreatic calculi in patients with FCPD and additionally revealed gross dilatation of pancreatic duct. Among the patients diagnosed as PDDM, pancreas appeared normal in 84 (77%) while features of chronic pancreatitis were evident in the rest 24. None of the latter had ductal calculi Parenchymatous calcification was detectable in 5 (6%).

Evidence of chronic pancreatitis in 23% and pancreatic calcification in 6% of cases clinically and radiologically diagnosed as PDDM indicate heterogeneity of MRDM.

INTRODUCTION

Gray scale ultrasonography has proved to be an important tool in the evaluation of pancreatic disease (2, 3, 4). Determination of the normal size and contour of the pancreas is very important in the early diagnosis of small tumours. In some cases, pancreatic disease may be characterised only by a change in tissue consistency notably a change in the amplitude of the returned echoes (4) as well as by a change in a spatial distribution of

the echoes (5).

In our centre, malnutrition related diabetes mellitus (MRDM) accounts a high proportion (82.4%) of young diabetes having the onset of the disease by the age of 30 years. On the basis of radiological evidence of pancreatic calculi, 24.2% are classed as fibrocalculous pancreatic diabetes (FCPD) and rest 58.2% as protein deficient diabetes mellitus (PDDM).

While exocrine involvement of the pancreas is obvious in FCPD the possibility of pancreatic pathology in the genesis of PDDM has been a constant question in the minds of investigators particularly in view of morphological changes described in patients with Kwashiorkor. Pancreatic function tests have been found to be normal in cases diagnosed as PDDM (7). Only a cross section has been investigated by such expensive and time consuming procedures. Ultrasonography (US) by far, is more convenient, relatively precise and now easily available method for assessment of pancreatic structural status particularly for those attending outpatient's clinic. It was therefore planned to subject a sizeable number of patients with MRDM to pancreatic ultrasonography to find out if we are not overdiagnosing PDDM.

PATIENTS AND METHODS

From amongst patients evaluated and followed up for a period of at least one year, 16 FCPD and 108 diagnosed as PDDM was taken at random for US. Their age ranged from 19 to 30 years. Male: female = 3:1. All except 2 cases of FCPD had BMI < 18 at presentation. Three cases of FCPD including the two with BMI > 19 were of average socio-economic status, the rest were all below the poverty line. After the usual preparation (Dimol 2T thrice daily for 2 days and 2T of Dulcolax the night previous to the day of US examination

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the cases were subjected to abdominal ultrasonography using Shimadzu 700 with 3.75 MHz sector Transducer and 5MHz Linear Transducer. Reporting was done by two qualified sonologists.

RESULTS

Subjects with FCPD(n=16) on ultrasonography of pancreas revealed subnormal size without parenchymatous calcification. The ducts were grossly dilated ranging from 5-15 mm in body region and showed bright echogenic areas with posterior shadowing in its line suggesting calculi in duct system (Group-A, Table-1).

Eighty four out of 108 patients (78%) earlier diagnosed as PDDM without radio opaque calculi in plain x-ray of abdomen had no significant abnormality in ultrasonography in respect of shape, size, outline, echogenicity and ducts (Group-B, Table-1).

The rest 7 (6%) cases without radio opaque calculi on routine X-ray of the abdomen, US revealed shrunken pancreas with irregular outline, increased echogenicity and bright echogenic areas. The ducts were dilated with irregular outline (Group-D). Simultaneously 25 age and sex matched controls were included in the study.

TABLE 1
Ultrasonographic Measurements in mm
(Transverse)

GROUP		HEAD	BODY	TAIL	DUCT CALCULI	CALCIFICATION
Normal (n=25)	R	18-22	13-17	8-12	1-2	--
	M	20.2	14.9	10.0		
	SD	± 1.4	± 1.10	± 1.3		
Group-A (n=16)	R	16-20	12-15	8-10	3-15	3-15
	M	17.9	13.2	8.8	9.9	9.0
	SD	± 1.2	± 1.0	± 0.8	± 3.5	± 4.4
Group-B (n=84)	R	18-21	12-17	8-11	1-2	---
	M	19.4	14.7	9.4		
	SD	± 1.1	± 1.6	± 1.0		
Group C and D (n=24)	R	1-12	8-12	5-7	3-9	3-5
	M	10.8	9.9	5.8	3.7	3.5
	SD	± 0.7	± 1.4	± 0.7	± 0.8	± 0.8

R – Range, M- Mean, SD – Standard Deviation

No pseudocysts or biliary abnormalities were noted in any of the patients on US.

The ultrasonographic findings in the different sub groups listed above are shown in Table-1.

Some of the important clinical parameters of these sub-groups of diabetics are tabulated (Table 2).

TABLE 2
Different Subgroups Compared
(Clinical)

PARAMETERS	SUB GROUPS			
	A	B	C	D
Mean age of onset (years)	26	22	45	24
Mean duration of DM (years)	5.8	4.5	3.6	4.9
Severity of DM (%)				
FBG (mg/dl) >180	55	43	58	56
>250	45	57	42	44
Abdominal pain (%)	72	10	44	45
Fatty stools (%)	15	–	12	15
Mean insulin required (Units/day)	40	60	60	50

DISCUSSION

The pancreatic measurements in healthy adults observed in the present study are comparable to those of Caspers et al (6) (Table-3).

The ultrasonographic findings in the normal and the different subgroups of diabetics are compared in Table-4.

The Group-A cases (FCPD) have significant reduction in size of pancreas compared to the healthy controls. These cases had ultrasonographic evidence of ductal dilation with stones in the major duct. The ductal dilatation was gross ranging from 3-15 mm compared to group C and D where the values ranged between 3-9 mm.

The Group-B subjects (PDDM) who had significant abnormality noted on radiology and ultrasonography and because definite aetiological factor could not be established, can justifiably be classed as PDDM.

The Group-C subjects ultrasonographically showing significant shrunken pancreas with irregular outline and increased echogenicity and irregular dilated ducts without parenchymatous calcifications suggested presence of chronic pancreatitis without calcification as the basic or an associated cause of diabetes in them.

TABLE 3
Transverse Measurements of Pancreas
in Controls(mms)

Study		Head	Body	Tail	Duct
Casper et al (6)	M	20.8	11.6	--	--
	SD	4	3		
Present study	M	20.2	15.2	9.3	1.2
	SD	1.4	1.4	1.3	--

TABLE 4
Transverse Measurements of Pancreas
in Controls(mms)

Study	Head	Body	Tail
NVA	S	S	S
AVB	NS	NS	NS
AVC & B	HS	HS	HS
BVC & D	HS	HS	HS
S (p<0.05)	NS (p>0.05)	HS (p<0.001)	

The minor subset of subject (Group-D) who had all ultrasonographic findings very similar to that of Group-C along with bright echogenic areas in the parenchyma of pancreas suggest a similar role for

REFERENCES:

1. Report of a WHO Study Group. T. R. S. 727, Geneva 1985, 18.
2. Filly, R. A., Freimanss, A. K.: Echographic diagnosis of pancreatc lesions. Ultrasound scanning techniques and diagnostic findings. Radiology, 1970; 96: 575-82.
3. Walls, W. J.: Gonsalves G.: Martin, N. L. et al: B-scan ultrasound evaluation of the pancreas. Advantages and accuracy compared to other diagnostic techniques. Radiology 1975; 114: 127-34.
4. Doust, B. D. Pearce, J. D.: Gray-Scale ultrasonic properties of the normal and inflamed pancreas. Radiology, 1976; 120: 653-7.
5. Taylor, KJW: The principles underlying the classification of soft tissues imaged by reflection techniques with non-linear amplification (Grey Scale). (In.) White, DN, et al. Recent advances in ultrasound in Biomedicine, Forest Grove, Ore, Research Studies Press, 1977; P. 157-71.
6. Casper S de Graff, Kenneth J. W. Taylor, Bruse D. Simonds, and Arthur J. Rosen field. Gray-Scale: Echography of the Pancreas. Radiology. 1978; 129: 157-61.
7. Tripathy B. B., Samal K. C., and Tej S. C.: (Clinic) Profile of young diabetes in India: Diabetes mellitus in developing countries Ed. Bajaj J. S. 1984; 159-64.
8. Samal K.C., Tripathy B.B. and Mishra, H. Exocrine pancreatic calculi. Jr. Asso. Physicians Ind. 1983;23:103-6

chronic pancreatitis in the pathogenesis of diabetes (Calcific pancreatitis).

When the different subgroups are compared, one finds hardly any significant difference in their age of onset and mean duration of diabetes suggesting that probably duration of the disease is not contributory to the ultrasonographic findings of pancreas in the different subgroups particularly Groups B, C and D. The role of pancreatitis in the genesis of diabetes (Group-C and D) cannot be overlooked, in view of the gross pathology in the pancreas. Yet the severity of diabetes and very high insulin requirement suggest that malnutrition and genetic or other environmental factors also play some role. Further we are yet to see a well nourished young diabetic below 30 years of age having Ultrasonographic features of chronic pancreatitis since this is not observed in most our early NIDDM patients undergoing routine US.

CONCLUSION

US is an useful tool to certainly recognise diabetes with pancreatitis. Ordinary skiagram of abdomen is not sensitive enough to detect chronic pancreatitis with parenchymal calcification. The knowledge of structural irregularity and ductal status is essential to finally classify patients of MRDM and to avoid over diagnosis of PDDM.