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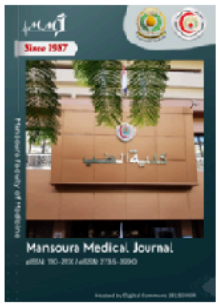

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RADIO ISOTOPIC STUDY OF KIDNEY FUNCTION IN OBSTRUCTIVE JAUNDICE

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INTRODUCTION

Acute renal failure after biliary tract surgery was first described by Clairmont and VonHaberer (1911). The cause of supression of renal function in patients with obstructive jaundice is controversial. Dawson (1964) suggested defficient renal perfusion. He reported significant improvement of kindey function following mannitol diuresis. Endotoxaemia has a deleterious effect on renal function and structure. Endotoxaemia is due to absence of bile salts from the small itestine (Cavanough et al. 1970) and Mckay et al. (1966).

After biliary drainage (PTD), Lygidakis (1987) showed improvement of blood urea, serum creatinine and creatinine clearance. Thompson et al., (1986) using isotopic renal scan ^{99m}TC DTPA showed that in jaundiced patients G. F. R. was lower before biliary drainage than controls and that it increased significantly after drainage.

In this paper we studied renal function in 15 patients with obstructive jaundice before and after biliary drainage using isotopic renal scan in one surgical unit in Mansoura teaching hospital.

Material and Methods

This study was performed on 15 patients with obstructive jaundice and 12 non jaundiced renal transplant donors who acted as controls in Mansoura teaching hospital during the year 1989. Renal isotop scaning was done preoperatively and eight weeks after biliary drainage.

Technique :

The basic system operation of the digital Dyna Camera (DPCD picker) is to detect gamma events from a radioactive source. The location of the dot on the ossilloscope corresponds to the location of the gamma event in the detection. Over a period of predetermined time enough dots will accomulate to present a nuclear image.

The control group for the renal isotopic study were 12 donors of renal transplants.

A dynamic study is selected to evaluate renal function. The first minute of the study shows the perfusion phase of the kidneys (kidney to arota ratio), while the ninth minute represents the accumulation and elimination of the radioactive material (Total time of the study is 20 minutes). During the study, the patient is kept in prone position at well hydrated condition.

From 6 mci to 8 mci are injected as ani. V. bolus. The radioisotope used is ^{99m}TC DTPA (Diethyline triamine penta acetic acid).

The images of the study are stored in the computer attached to the comera after processing the nuclear images, the computer will display the renogram and also compute the relative efficiency and the clearance values (GRE), also the maximum time of perfusion (Figs. 1, 2, 3).

RESULTS

Table (1) shows the preoperative renal perfusion (kidney/aorta ratio) in 15 jaundiced patients compared to control cases. Most of the jaundiced patients had decreased renal perfusion. Comparing the perfusion ratio of both right and left kidneys to that of controls, it is shown that there was a significant reduction of renal perfusion in jaundiced patients.

Table (2) shows renal perfusion (kidney/aorta ratio) in 15 jaundiced patients, comparing the postoperative to preoperative values. Taking the patient as his own control, 8 weeks postoperatively, there was a significant increase of renal perfusion both in the right and left kidney.

Table (3) shows the preoperative maximum time of isotopic accumulation in minutes in 15 jaundiced patients compared to control cases. For both the right

and left kidney there was a significant prolongation in maximum time of accumulation which reflects a diminished renal perfusion.

Table (4) shows the maximum time of isotopic accumulation in 15 jaundiced patients, comparing the postoperative to preoperative values. Taking the patient as his own control 8 weeks postoperatively, there was a significant shortening of maximum time of isotopic accumulation both in the right and left kindey indicating improvement in renal perfusion.

Table (5) Shows the preoperative isotopic clearance in 15 patients compared to control cases. It is shown that clearance value for the right kidney, the left kidney and the total clearance are decreased significantly when compared to controls.

Table (6) Shows isotopic clearance in 15 jaundiced patients, comparing the postoperative to preoperative values. Taking the patient as his own control, it is shown that clearance value for right and left kidney and total clearance are significantly increased postoperatively.

DISCUSSION

Altered renal perfusion has been suggested as a cause of hepatorenal syndrome in patients with obstructive jaundice. An increased sensitivitiy of vascular smooth muscle fibers to norepinephrine was found in rats when common bile duct was ligated (Gali et al. 1981).

A circulating factor could account for the changes in vascular reactivity. Bile salts may sensitize the kidney to ischaemic changes (Bomzon and kew, 1983; Aoyagi and Lowenstein, 1968). Other suggested factors included increased Renin level which produces afferent renal vasoconstriction (Berkowitz et al., 1974) vasoactive intestinal polypeptide (Hunt et al., 1979) kinin defficiency which produces decreased vasodilator activity (Wong et al., 1979).

In the present study, by performing renal isotopic scanning using ^{99}TCm DTPA and estimating the renal perfusion as kidney/aorta ratio in 15 jaundiced patients, preoperatively there was a significant reduction of renal perfusion as compared to control group. Eight weeks after biliary drain-

age taking the patient as his own control, there was significant increase of renal perfusion. This confirms the effect of drainage on improvement of renal perfusion and kidney function.

Summy

^{99m}TC DTPA renal scan was performed on 15 patients with obstructive jaundice treated in Mdnsoura Teaching hospital during the year 1989. Renal isotopic scanning was done preoperatively and 8 weeks after biliary drainage. In addition the study was done on 12 non jaundiced patients who were renal transplant donors and acted as controls.

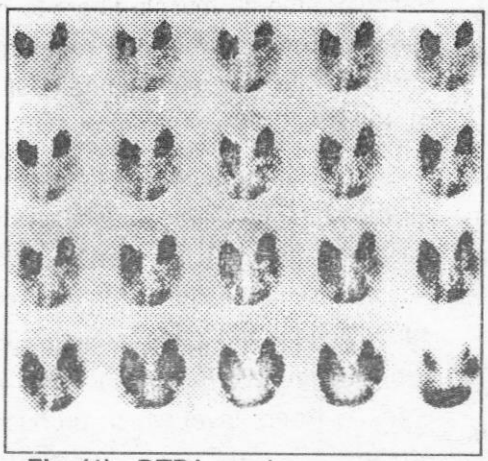

Fig. (1) : DTPA renal scan

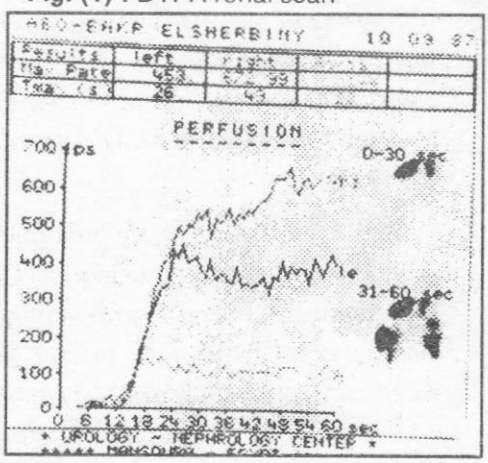

Fig. (2) : Renal perfusion : kidney/ aorta ratio and maxim. m. time

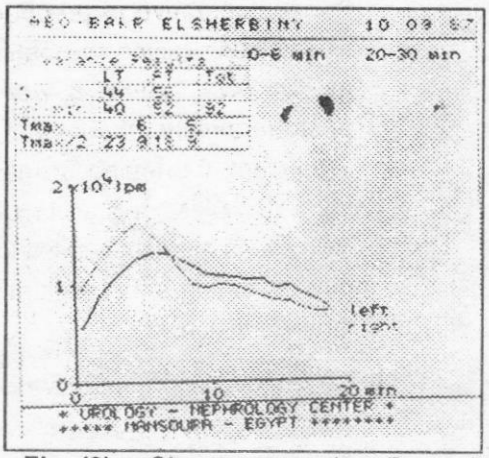

Fig. (3) : Clearance results : Rt. and left kidney and total value.

Table (I) : Renal perfusion (kidney/aorta ratio) in 15 jaundiced patients Comparison of preoperative and control values (12 cases).

Case No.	Right kidney		Left kidney	
	Control	Patient	Control	Patient
1	3.2	2.6	3	1.9
2	2.8	3.6	3.1	3.8
3	3.1	2	3	1.5
4	3.2	4	3	3
5	2.9	2.8	2.8	3
6	2.8	2.5	2.6	2
7	3	2	3.2	2.1
8	3	2.6	3.1	3.1
9	3.7	1.6	3.5	2.3
10	3.2	2.5	2.9	1.5
11	3.3	1.9	2.8	2
12	4	2.1	2.9	1.5
13		2.25		2.1
14		1.8		2
15		2.5		3
Mean	3.183	2.45	2.992	2.32
S. D. ±	0.356	0.65	0.227	0.696
P	< 0.05 Sig.		< 0.05 Sig.	

Table (2) : Renal perfusion (kidney/aorta ratio) in 15 jaundiced patients comparison of preoperative and postoperative values.

Case No.	Right kidney		Left kidney	
	Preop.	Postop.	Preop.	Postop.
1	2.6	3	1.9	2.7
2	3.6	3.8	3.8	3.8
3	2	2	1.5	3.1
4	4	3.8	3	3.4
5	2.8	3	3	3.4
6	2.5	-	2	-
7	2	-	2.1	-
8	2.6	3.5	3.1	3.2
9	1.6	3.4	2.3	3.1
10	2.5	-	1.5	-
11	1.9	3.8	2	2.9
12	2.1	2.5	1.5	2.4
13	2.25	2.5	2.1	2.2
14	1.8	2.9	2	3.1
15	2.5	3	3	3.5
Mean	2.45	3.04	2.32	2.95
S. D. ±	0.65	0.333	0.696	0.403
P	< 0.05 Sig.		< 0.05 Sig.	

Table (3) : Maximum time of accumulation of isotope in minutes in 15 jaundiced patients. Comparison of preoperative and control values (12 cases).

Case No.	Right kidney		Left kidney	
	Control	Patient	Control	Patients
1	5	10.6	5	5.33
2	4	6.66	5	5
3	3.33	3.33	4	3.33
4	5.66	5	5	7.33
5	7	5.6	6	3.66
6	8	13.3	4	10
7	5	1	3.5	1
8	4	6	7.33	5
9	5	6	5	7
10	5	29	5	29
11	8	7	6	6
12	4	22	5	22
13		13		10
14		18		8
15		10		7
Mean	5.332	10.637	5.069	8.643
S. D. ±	1.564	7.482	1.028	7.368
P	< 0.05 Sig.		< 0.05 Sig.	

Table (4) : Maximin timr of accumulation of isotope in minutes in 15 jaundiced patients comparison of preoperative and postoperative values.

Case No.	Right kidney		Left kidney	
	Preop.	Postop.	Preop.	Postop.
1	10.6	7	5.33	4
2	6.66	4	5	4.8
3	3.33	5	3.33	5
4	8	18.6	7.33	8
5	5.6	5	3.66	-
6	13.3	-	10	-
7	1	-	1	4
8	6	14	5	5
9	6	4	7	-
10	29	-	29	5
11	7	5	6	10
12	22	8	22	10
13	13	8	10	6
14	18	12	8	6.5
15	10	6.5	7	
Mean	10.637	8.66	8.643	6.108
S. D. ±	7.482	4.761	7.368	2.122
P	< 0.05 Sig.		< 0.05 Sig.	

Table (5) : Isotopic clearance value in 15 jaundiced patients comparison between preoperative and control values (12 cases).

Case No.	Right kidney		Left kidney		Total clearance	
	Control	patient	Control	patient	Control	patient
1	56	60	50	32	106	92
2	54	56	51	49	105	105
3	68	49	63	20	131	69
4	63	44	48	37	111	81
5	44	75	35	28	79	103
6	47	46	30	25	77	71
7	57	10	61	12	118	22
8	46	32	58	40	104	72
9	71	43	62	36	133	79
10	64	49	43	29	107	78
11	60	38	40	34	100	72
12	54	16	40	14	94	30
13		30		23		53
14		32		33		65
15		27		27		54
Mean	57	40.47	48.42	29.27	105.33	69.73
S. D. ±	8.63	16.86	11.07	9.77	17.26	23.22
P	< 0.05 Sig.		< 0.05 Sig.		< 0.05 Sig.	

Table (6) : Isotopic clearance value in 15 jaundiced patients comparison between postoperative and preoperative values.

Case No.	Right kidney		Left kidney		Total clearance	
	Preop.	Postop.	Preop.	Postop.	Preop.	Postop.
1	60	60	32	45	92	105
2	56	60	49	50	105	110
3	49	52	20	38	69	90
4	44	43	37	26	81	69
5	75	80	28	58	103	138
6	46	-	25	-	71	-
7	10	-	12	-	22	-
8	32	56	40	34	72	90
9	43	66	36	52	79	118
10	49	-	29	-	78	-
11	38	43	34	44	72	87
12	16	36	14	48	30	84
13	30	32	23	27	53	59
14	32	50	33	56	65	106
15	27	35	27	40	54	75
Mean	40.47	51.8	29.27	42.8	69.73	91.6
S. D. ±	16.86	14.46	9.77	11.33	23.22	18.29
P	< 0.05 Sig.		< 0.05 Sig.		< 0.05 Sig.	

الملخص العربى

دراسة وظائف الكلى بالنظائر المشعة فى حالات اليرقان الانسدادى

أجرى هذا البحث على خمسة عشر مريضاً باليرقان الانسدادى فى مستشفى المنصورة الجامعى فى عام ١٩٨٩ كما أستخدم اثنا عشر مريضاً غير مصابين بالصفراء وهم متبرعين بالكلى لعمليات الزرع ككنترول وقد أجرى للمرضى مسح ذرى للكلى باستخدام التكنيشيوم ٩٩ د. ت. ب. أ. أجرى المسح الذرى للمرضى قبل العملية ثم بعد ثمانية أسابيع من عملية تصريف العصارة الصفراوية.

وقد أوضحت الدراسة أن هناك قصور فى امداد الكلى بالدم وفى تصريف النظير المشع من الكلى قبل العملية فى مرضى اليرقان الانسدادى وأنها قد تحسنت بعد تصريف العصارة الصفراوية..