Acta Paediatrica Academiae Scientiarum Hungaricae, Vol. 13 (1), pp. 57—62 (1972)

Isotope Renography in the Diagnosis of Recurrent Abdominal Pain of Children

J. SIEGLER

Second Department of Paediatrics, Semmelweis University Medical School, Budapest

(Received November 7, 1971)

In 45 children, suffering from recurrent abdominal pain, isotope renograms were made. The procedure proved of diagnostic use not only in cases of suspected nephrologic disease but even when routine examinations failed to reveal the cause of the complaints. From the 45 patients, 21 displayed an abnormal renogram; in 11 of these, a significant nephrologic change could be proved by other methods, first of all by intravenous pyelography. In 5 of these cases the pathologic finding was unexpected. In those 10 patients in whom in spite of an abnormal renogram no pyelographic changes could be detected, a functional disturbance of urine flow was assumed to cause the recurrent abdominal pain.

According to everyday experience, recurrent abdominal pain is a frequent complaint in children over 3 years of age. According to APLEY's data [1] its incidence in schoolchildren is about 10%. Whatever the cause of the complaints, the pain is mostly localized to the periumbilical region and has therefore been termed "Nabelkolik".

APLEY [1] found in a group of children suffering from recurrent abdominal pain that organic diseases could be detected only in 8%; in the remaining 92% of the cases psychological factors played a part in the origin of the complaints. In fact, psychological disturbances may have a decisive role in recurrent abdominal pain, but their significance should not be overemphasized against that of organic diseases. In every case, even in the presence of psychological factors, we must try to exclude or find any organic cause possibly related to the recurrent abdominal pain.

In addition to various diseases of the gastrointestinal tract, of the nervous system, of metabolic and of gynaecologic disorders, many types of renal disease may induce recurrent abdominal pain [6].

We have studied the question, what assistance can be expected from radioisotope renography, this simple and harmless method [5, 12], in the diagnosis of nephrologic disorders manifesting themselves with recurrent abdominal pain. We do not know of any paper in the literature concerning this type of observation in children.

MATERIAL AND METHODS

A total of 45 children observed over a period of two years, all suffering from recurrent abdominal pain, formed the material of the present study. On the basis of a

positive history or of the findings of routine examinations a disease of the kidneys or of the urinary tract could be suspected in 9 cases, and physical and laboratory examinations revealed no definite cause of the recurrent abdominal pain in 36 cases.

Isotope renography was performed after moderate hydration by the administration of about 8 ml per kg body weight of water 2 hours following the last meal. One half hour later, after having emptied the bladder, the patient lying in supine position was given 0.3 μCi per kg body weight of sodium ^{125}I-hippurate intravenously. Radiation measurement was done with scintillation detectors of 40 mm diameter (Gamma Co., Budapest, No ND 130-E). The length of collimators was 8 cm. Recording was done by half-minute readings.

In cases, where the hippurate stagnated in the area of one or both kidneys, after 15 minutes the patient was made to sit up, then brought into the original recumbent position to judge whether the slowing down of urine flow was due to anatomical or functional causes [3].

The renogram was regarded as pathologic (positive) if there was a significant deviation in the shape of the curves, or a great difference between the height or time of the peaks of both renal curves, or if the drainage of the isotope was considerably slowed down either permanently or for at least two minutes.

Results

Table I shows the results of renography.

As seen in Table I, from the 21 patients exhibiting a positive renogram, in 11 cases significant nephrologic changes could be proved by other methods, first of all by intravenous pyelography. In 5 of these (Table I c) on the basis of the history and routine investigations, renal disease was not suspected until the renogram had turned the attention to this possibility. Further nephrologic investigations then revealed renal abnormalities as the cause of recurrent abdominal pain. The data of these patients are shown in Table II.

Fig. 1 shows the renogram of patient No. 1. The prolonged drainage phase on the left side was the consequence of hydronephrosis clearly visualized by the intravenous pyelogram performed following the isotope renogram (Fig. 2).

In patient No. 5, the renogram (Fig. 3) showed weak secretion and a prolonged drainage phase on the left

Table I

Diagnosis at admission	Diagnosis at discharge	Number of cases	Number of isotope renograms	
			positive	negative
Nephrologic disease (9 cases)	a) nephrologic disease	6	6	Ø
	b) no nephrologic disease	3	Ø	3
No nephrologic disease (36 cases)	c) nephrologic disease	5	5	Ø
	d) no nephrologic disease	31	10	21
Total:	nephrologic disease	11	21	24
	no nephrologic disease	34		

TABLE II

No. and initials	Age, years	Complaints at admission	Renogram	Diagnosis at discharge
1. K. Zs.	10	Recurrent abdominal pain. Urine sediment repeatedly negative	Drainage phase prolonged on left side	Hydronephrosis
2. T. J.	6	Recurrent abdominal pain on the left side. Once an epileptic seizure	Twice prolonged drainage phase on left side, once normal finding	Pyelectasis. Intermittent stenosis of pyelo-ureteric junction
3. T. J.	13	Recurrent abdominal pain	Plateau of the peak and somewhat prolonged drainage on right side	Pyelectasis. Low grade stenosis of pyelo-ureteric junction
4. Sz. P.	5	Recurrent abdominal pain since one year	Weak secretion and plateau on left side. Periodic drainage on both sides	Pyelectasis. l. s. Compression of left ureter
5. Sz. F.	11	Periumbilical and left side abdominal pain since three weeks	In supine position weak secretion on left side. When sitting, normal curves on both sides	Pyelectasis. Aberrant vessel?

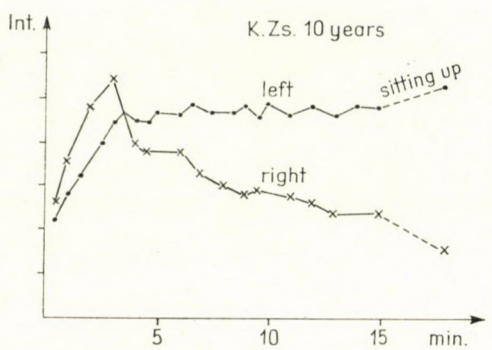

FIG. 1

side. Repeating the examination in the sitting position, a normal renogram was obtained (Fig. 4). An intravenous pyelogram, performed in the supine position, showed a stretching of the left renal pelvis and a hindrance of urine flow, while in the prone position urine flow was free. This finding suggested that the periumbilical and left-side recurrent abdominal pains of the child originated from intermittent inhibition of urine flow.

In patient No. 2, an epileptic seizure was mentioned in the history and a positive electroencephalographic tracing was found. One could have thought that the recurrent abdominal pain of this child was a visceral epileptic equivalent. His renogram (Fig. 5) showed, however, a prolongation of urine flow on the left side, which was postural and ceased on sitting up. On the basis of this finding, the clinical picture and the now performed pyelogram (Fig. 6),

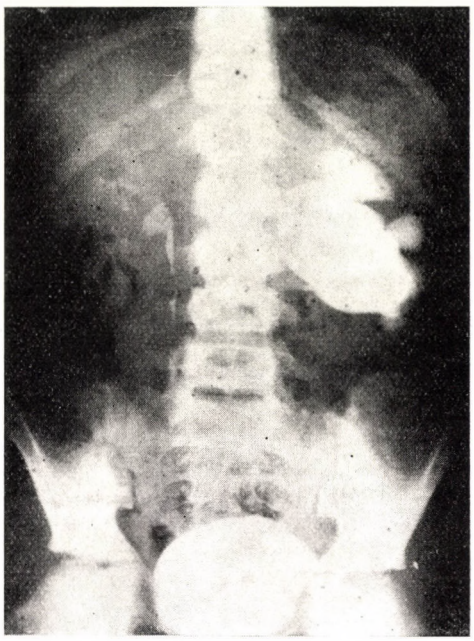

FIG. 2

showing a pyelectasis suggestive of an aberrant vessel on the left side, made it more likely that the cause of the complaints was an intermittent disturbance of urine flow.

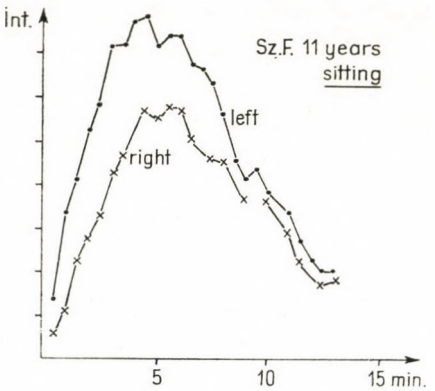

FIG. 4

As seen from Table I d, 10 patients with recurrent abdominal pain exhibited a positive renogram, although no renal disease could be diagnosed in them. The renogram of one of these patients is shown in Fig. 7. According to the above criteria, several abnormalities could be observed in this case; these pointed to a repeated stagnation of urine flow. The possible significance of these findings will be discussed below.

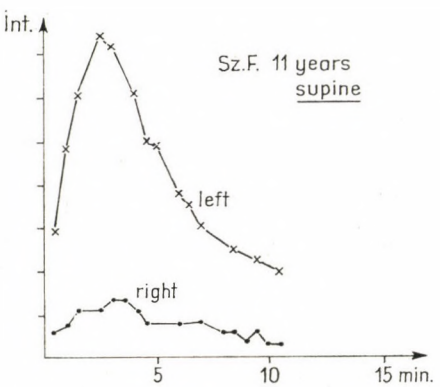

FIG. 3

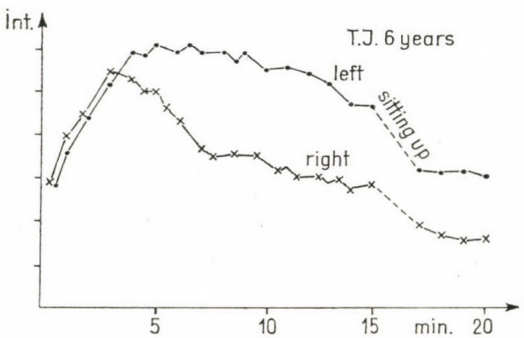

FIG. 5

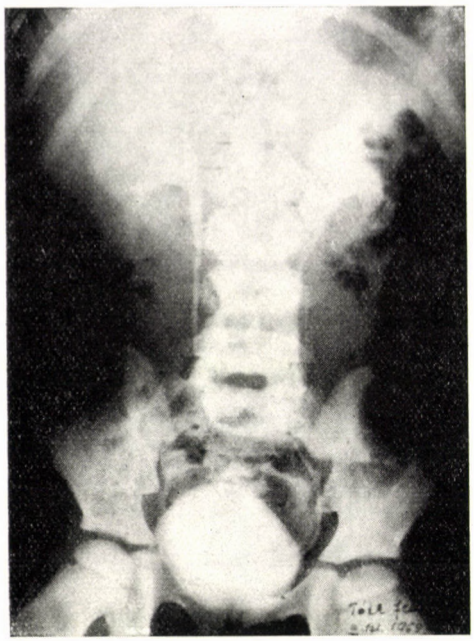

FIG. 6

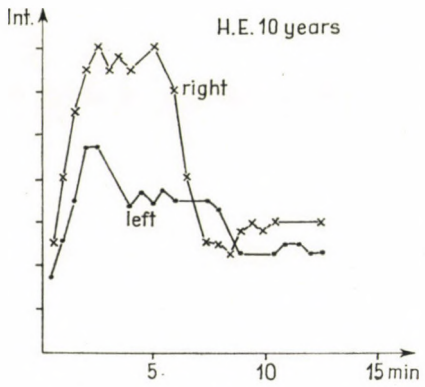

FIG. 7

DISCUSSION

In 5 of our 45 patients examined for recurrent abdominal pain, positive renographic curves drew the attention to a possible nephrologic background, which otherwise would have remained undetected. In some of these cases, urinary infection or the pressure of the inhibited urine flow would have led to an irreversible renal damage.

Concerning the 10 "pseudopositive" renographic cases, the question arose whether there was some relation between their recurrent abdominal pain and the positive renogram. HARVEY and KEELING [4] stated that in half of the adults whose isotope renogram showed temporary urine flow disturbances for more than 2½ minutes, complaints of recurrent abdominal pain were noted without any pathological finding in the urine and in the intravenous pyelogram. Therefore, the term "spastic ureter" was coined in analogy to the concept of the spastic colon. In our 10 patients exhibiting a positive renogram without verified renal disease, the question arose whether their recurrent abdominal pains were connected with some functional disturbance of urine flow, suggested by their isotope renogram.

To sum up, isotope renography, a simple and harmless method, may suggest the possibility of a hitherto unsuspected renal disease, or of a functional disturbance of urine flow as the cause of recurrent abdominal pain in children, necessitating further investigations.

REFERENCES

1. APLEY, J.: The child with abdominal pain. Thomas, Springfield 1959.
2. BALL, G., WOLF, R.: Zur Frage der Strahlenexposition der Anwe beindung

von Radioisotopen im Kindesalter. Mschr. Kinderheilk. **115,** 581 (1967).
3. Ball, F.: Zur Diagnose der Harnabfluß-Störungen im Isotopennephrogramm. Fortschr. Röntgenstr. **108,** 33 (1968).
4. Harvey, R. F., Keeling, D. H.: Investigation of ureteric function by isotope renography. Lancet **1,** 847 (1969).
5. Seltzer, R. A., Kereiakes, J. G., Saenger, E. L.: Radiation exposure from radio-isotopes in pediatrics. New Engl. J. Med. **271,** 84 (1964).
6. Siegler, J., Kun, E.: A gyermekkori visszatérő hasi fájdalmak diagnosztikájának kérdéséhez. Orv. Hetil. **112,** 1395 (1971).

Dr. J. Siegler
Tűzoltó u. 9.
Budapest IX., Hungary