RADIOLOGICAL DIFFERENTIATION BETWEEN WILM'S TUMOUR AND NEUROBLASTOMA IN ABDOMINAL MASSES

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INCIDENCE OF WILM'S TUMOUR AND NEUROBLASTOMA

Wilm's tumour and neuroblastoma each and together represent a significant proportion of childhood malignant lesions.

Hope and Koop[5] of America assessed the proportions of the various childhood malignant lesions as follows:

TABLE I

PROPORTIONS OF CHILDHOOD MALIGNANT LESIONS IN AMERICA BY HOPE AND KOOP

Leukaemia and lymphoma -	30-35%
Tumours of C.N.S. and eye -	25-30%
Wilm's tumour and neuroblastoma Ratio = 1 : 2	20%
The rest - -	20%

OUTRAM ROAD GENERAL HOSPITAL 1959-1967

Wilm's tumour - -	= 14 cases
Neuroblastoma - Ratio = 1 : 1	= 13 cases

From the available records in the Outram Road General Hospital between 1959 to 1967 are found these 27 histologically proven cases. Unproven cases are rejected.

Locally we see a higher ratio of Wilm's tumour to neuroblastoma than in Western centres.

PRESENTATION OF WILM'S TUMOUR

Wilm's tumour most commonly presents as a silent abdominal mass for investigation[4]. Abehouse[1] gave the incidence of presenting symptoms in 856 cases as follows:

TABLE II

PRESENTATION OF WILM'S TUMOUR

	856 Cases of Abehouse	14 Cases Locally
Tumour mass	85%	93%
Pain	30%	
Hematuria	10%	29%
	125%	122%

The total of over 100% is due to some cases presenting themselves with more than one symptom. Hematuria is a bad prognostic sign[4] as it signifies invasion of the renal pelvis.

The lesion most commonly confused with Wilm's tumour is neuroblastoma[1,2].

Abehouse[1] put the frequences of lesions misdiagnosed as Wilm's tumour as follows:

TABLE III

LESIONS MISDIAGNOSED WILM'S TUMOUR FROM DATA FROM 93 SURGEONS

Neuroblastoma - -	55 x
Congenital hydronephrosis -	49 x
Serous cyst of kidney - -	20 x
Polycystic disease of kidney -	18 x
Miscellaneous - -	30 x

PRESENTATION OF NEUROBLASTOMA

The majority of neuroblastoma present themselves with the toxic effects of maligant growth. Only a small number present themselves as abdominal masses alone[2]. There is no reliable figure to show the exact percentage. However, of the 43 cases of Barrett, 32 had abdominal masses detectable by radiology.[2] Of the 129 cases of Bodian 69% had their primary site in the abdomen.[3]

The presentations of the local cases are as follows:

TABLE IV

PRESENTATION OF 13 LOCAL CASES OF NEUROBLASTOMA

Abdominal mass - -	5
Enlarged lymph nodes - -	3
Lump on head - -	2
Systemic effects of malignant lesion - -	2
Bilateral proptosis - -	1

The differential diagnosis of neuroblastoma both clinically and radiologically are numerous

TABLE V

CLINICAL PARAMETERS

Wilm's Tumour 14 Local Cases	Neuroblastoma 13 Local Cases
Age range: $\frac{3}{12}$ to 6 yrs.	Age range: $\frac{11}{12}$ to 7 yrs.
Age averange: 2·5 yrs.	Age average: 3·5 yrs.
Sex: 8 M 6 F	Sex: 5 M 7 F
6 R sided 8 L sides	2 R sides 3 L sides
856 cases of Abehouse	43 cases of Barrett
Majority in first 4 yrs. of life	Age range—at birth to 7 yrs.
Age average: 3·2 yrs.	Age average: 2·6 yrs.
No sex predominance	No sex predominance

depending on the presentation. However when the presentation is a firm abdominal mass, the principal differential diagnosis is Wilm's tumour.[6]

CLINICAL PARAMETERS OF WILM'S TUMOUR AND NEUROBLASTOMA

In the differential diagnosis of these two lesions clinical parameters of age, sex and laterality of tumour mass are not helpful. (Table V)

PLAIN FILM DIAGNOSIS

In advanced cases of Wilm's tumour and neuroblastoma there could be no difficulty both clinically and radiologically in making the correct diagnosis. Radiologically in Wilm's tumour there would be the large abdominal mass with pulmonary metastasis.

In neuroblastoma there would be the radiological triad[2] of:

TABLE VI

RADIOLOGICAL TRIAD OF NEUROBLASTOMA

a) Abdominal or thoracic primary
b) Skull changes
c) Peripheral bone lesions

The difficulty arises when these lesions present as abdominal masses only. The oversea workers find pathological calcifications of these lesions useful in their separation[2, 4, 6] but this has not been our experience: (Table VII)

I.V.P.

We rely on I.V.P. to differentiate between these two conditions.

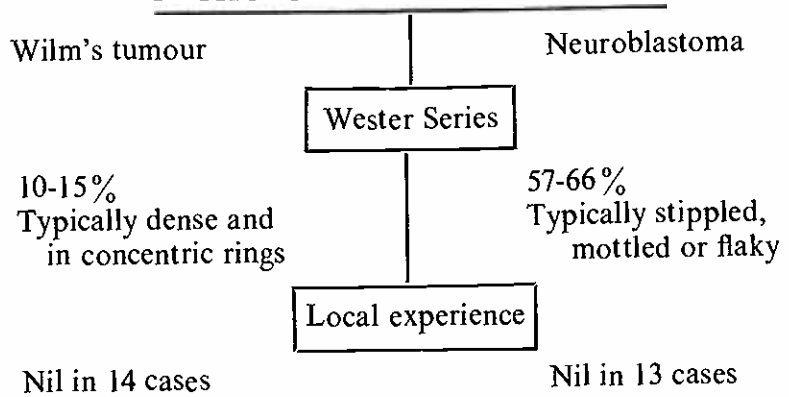
I.V.P. TECHNIQUE

1. Adequate amount of contrast medium of up to 1 c.c. per lb. body weight should be given.
2. In instances of "non-functioning" kidneys delay films of up to one or two hours are useful. These films often show up the renal calyces and prove that the "non-functioning" kidneys are just poorly functioning. (Figs. 1, 2 and 3).
3. Lateral films should be taken especially in uncertain cases whether the soft tissue mass is intrarenal or extrarenal. (Figs. 4, 5, 6 and 7).

The aim of the I.V.P. examination is to establish if the lesion is *intrarenal* and thus a Wilm's

TABLE VII

PATHOLOGICAL CALCIFICATION



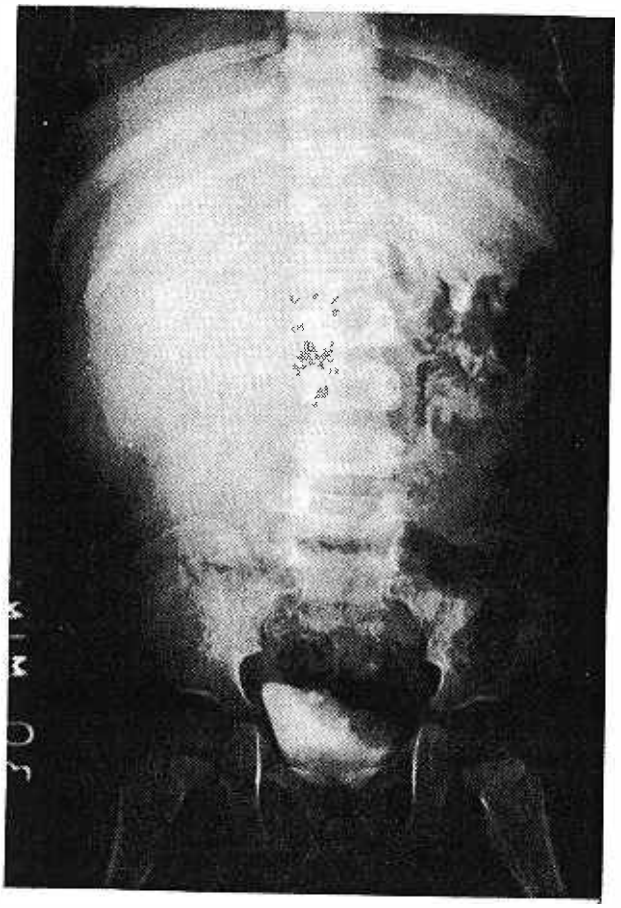


Fig. 1. A 30 minute I.V.P. film shows a "non-functioning" right kidney in a case of Wilm's tumour. No later film was taken.

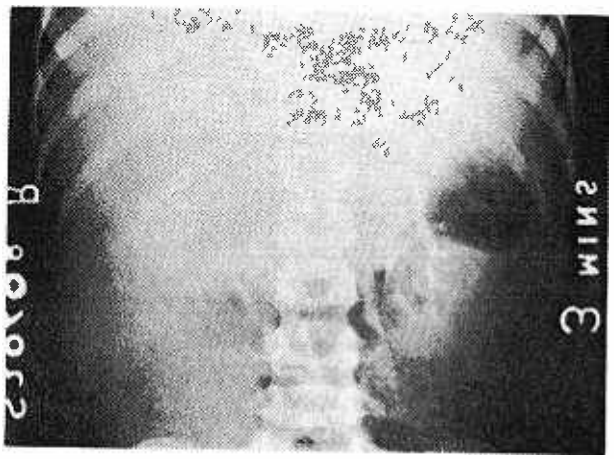


Fig. 2. 3 minute film of another case of Wilm's tumour shows that the right kidney is "non-functioning".

Fig. 3. 60 minute film of the same case in fig. 2 shows that the right kidney is just poorly functioning. An intrarenal mass is clearly demonstrated.

Fig. 4. In this supine I.V.P. film there is some doubt whether the abdominal mass is intra- or extra-renal.

Fig. 5. Lateral view of the same case in fig. 4 shows that the mass is intrarenal and thus is a Wilm's tumour.

Fig. 6.

Fig. 7.

Figs. 6 and 7. These two figures of a same patient further illustrate the usefulness of lateral film in deciding if an abdominal mass is intra- or extra-renal.

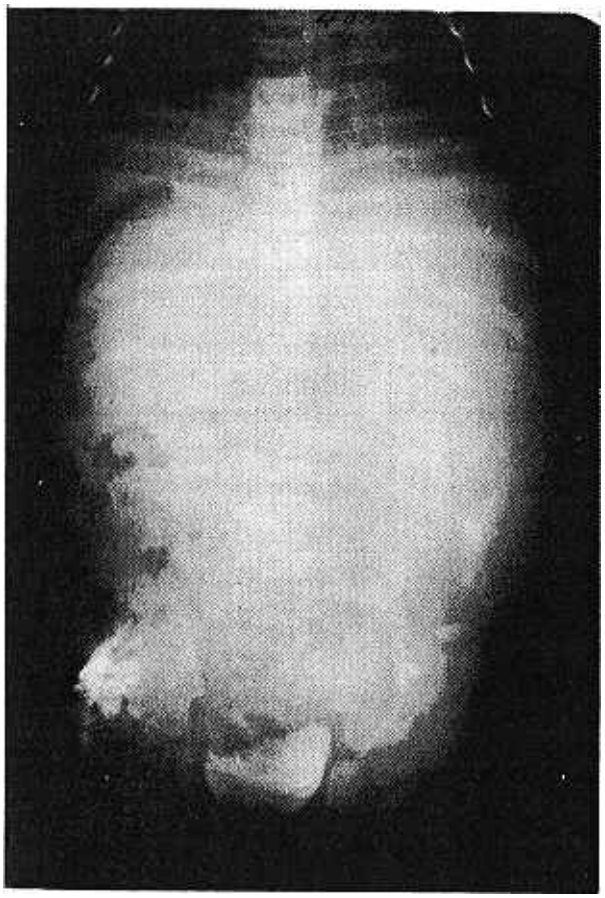


Fig. 8. This film shows a typical intrarenal mass of Wilm's tumour with splaying and stretching of the calyces.

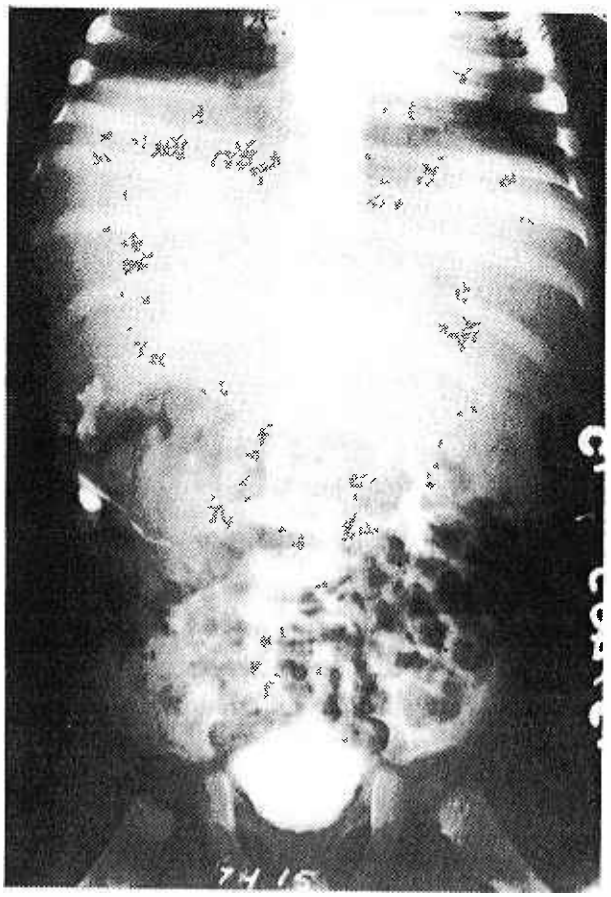
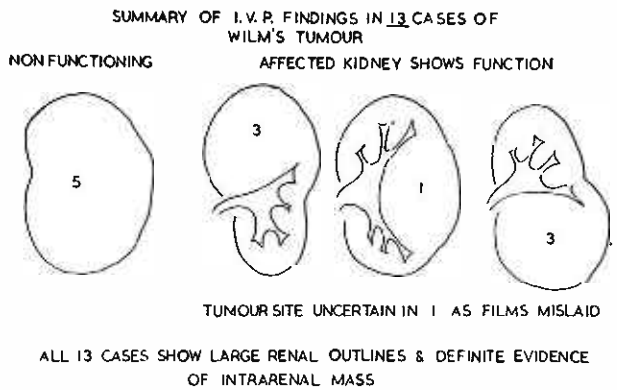


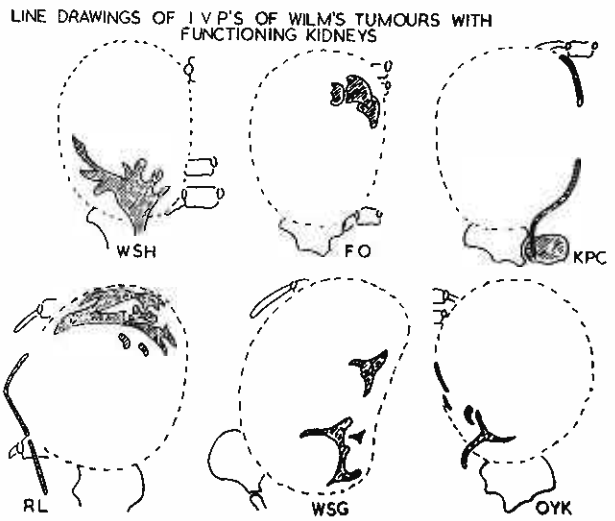
Fig. 9. This film shows a typical extrarenal mass of neuroblastoma with a displaced but otherwise normal right kidney.

tumour (Fig. 8) or *extrarenal* and thus a neuroblastoma (Fig. 9).

I.V.P. FINDINGS IN WILM'S TUMOURS

In one case both the I.V.P. films and report are mislaid. A summary of the I.V.P. findings in the other 13 cases are as follows:

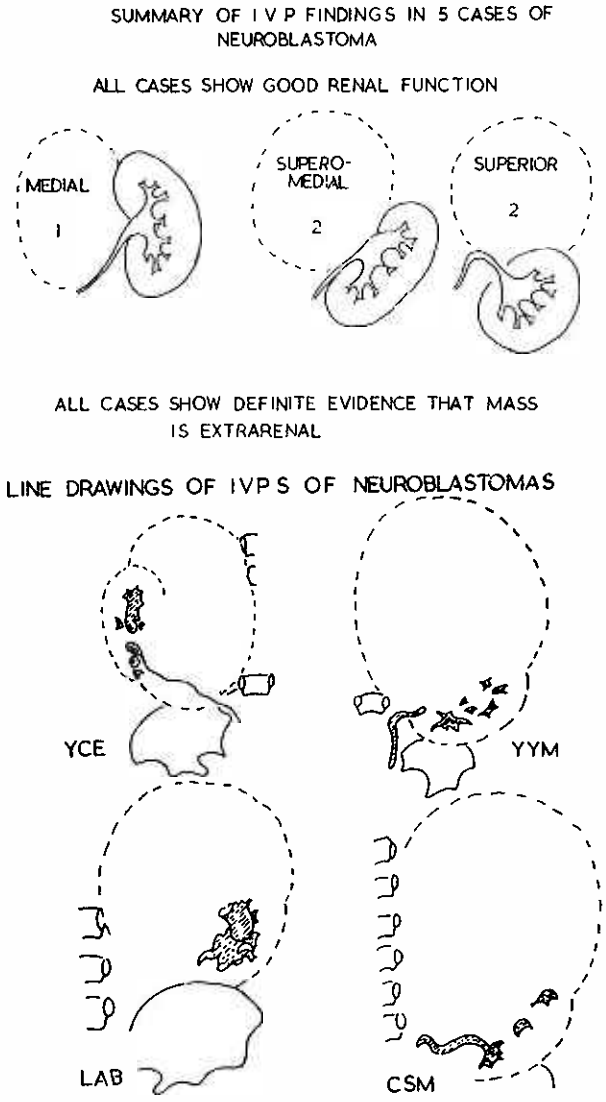




In all 13 cases reviewed the I.V.P. clearly shows that the lesion is intrinsic in the renal substance. It is admitted though Wilm's tumour is by far the commonest unilateral intrarenal mass, but not all such masses are Wilm's tumours. In the very young hamartoma and renal cyst do occasionally occur.

I.V.P. FINDINGS IN NEUROBLASTOMAS

A summary of the 5 cases of neuroblastomas which present as abdominal masses is as follows:



In all five cases the I.V.P. clearly shows that the mass is extrarenal and that the kidney in question is normal other than being displaced.

SUMMARY

The presentations of Wilm's tumours and neuroblastomas are briefly reviewed. Almost all cases of Wilm's tumours and some cases of neuroblastomas present themselves as abdominal masses for investigation. An adequately done I.V.P. is sufficient in the diagnosis of all cases reviewed.

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REFERENCES

1. Abehouse, B.S. (1957): "The management of Wilms' tumour as determined by national survey and review of the literature", J. Urol., 77, 792-813.
2. Barrett, A.F. & Toye, O.K.M. (1963): "Sympathicoblastoma", Clin. Rad., 14, 33-42.
3. Bodian, M. (1959): "Neuroblastoma", Paediat. Clin. N. Amer., 6, 449-472.
4. Cresson, S.L. & Pilling, G.P., IV (1959): "Renal tumours", Paediat. Clin. N. Amer., 6, 473-490.
5. Hope, J.W. & Koop, C.E. (1962): "Abdominal tumours in infants and Children", Med. Radiogr. Photogr., 38, 2-49.
6. Sherman, R.S. & Leaming, R. (1953): "The Roentgen findings in neuroblastoma", Radiology, 60, 837-849.