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*Morphological and clinical characteristics
of renal cancers accidentally detected
with ultrasound examination*

Cechy morfologiczno–kliniczne raków nerek
odkrytych przypadkowo badaniem USG

The course of renal cancer can be asymptomatic at an early stage. Clinical symptoms occur late and are not typical (1, 4, 8). Modern imaging techniques make it possible to recognise renal tumours at an early stage, in the pre–clinical period (2, 3, 15, 16).

The aim of this study is to assess the most common morphological signs of these tumours in ultrasound pictures, basing on clinical data. Attention was paid to atypical character of the clinical picture and purposefulness of USG scanning examination and emphasis was placed on the diagnostic value of non–invasive and commonly available ultrasound examination in determining the advancement stage of tumours.

MATERIAL AND METHOD

The material comprises 41 patients (25 men and 16 women), whose mean age was 59 years, in whom renal tumours were accidentally detected with ultrasound examination. The patients were treated in the departments of the Teaching Hospital no. 1 of the University School of Medicine in Lublin (manager–in–chief A. Borowicz M.D.) in the years 1993–1999.

Accidental detections accounted for 0.26% of the general number of prophylactically screened or examined because of various ailments. In the group of patients with recognised renal cancer, however, they made up 27%. Histopathological verification after nephrectomy or biopsy showed claro–cellular cancer (26 cases), adenocarcinoma (11 cases) and cancer from the cells of transitional epithelium (2 cases).

Multiple accessory CT examinations were performed to confirm the suspicion and determine the stage of cancer advancement according to Robson's classification (11).

RESULTS

In 9 cases (22%) those were tumours below 3 cm in diameter, at an early stage, Stage I (intra-renal) according to Robson's classification was found in 29 cases, stage II (spreading of the neoplastic process beyond the kidney) in 9 patients. Stage III and IV (venous invasion and metastases to lymphatic nodes) occurred in 3 cases only. As metastatic were considered lymphatic nodes with the diameter over 2 cm. There was found no significant correlation between the character of clinical symptoms and the stage of tumour advancement.

In 6 cases tumours uniformly hyperechogenic in their parenchymal layer had the diameter below 3 cm, 3 times penetrating into the hilus of kidney (Fig. 1). Normoechogenic tumours were found in 3 patients and they brought out the contour of the kidney by two times. In 7 cases echogenicity of the tumour was non-uniformly increased (Fig. 2). On CT examination small contrast enhancement was then shown. In 2 cases a sub-capsular haematoma formed a band of heterogenous, hyperechogenic reflections on the renal periphery (Fig. 3).

Venal thrombus in vena cava inferior was diagnosed in 3 patients, in 2 of them it made up a parietal band-like hypoechoic area with irregular outlines, in one case it formed an intravascular tissue band corresponding to thrombolytic mass.

In 2 cases of tumours with the diameter over 3 cm diagnosis was encumbered due to the modelling and adhesion of vena cava inferior to the tumour mass. In 1 case, however, involvement of renal vein lumen by tumour mass was observed (the vein within the tumour). In 2 cases widening of renal vein was revealed. Widening of renal veins and vena cava inferior was assessed as an indirect symptom of invasion since it was impossible to visualise directly the clot in the vascular lumen. Irregular clusters of calcifications in the central part of the tumour were found in 3 cases of changes showing mixed echostructure (Fig. 4).

Hypoechoic structure of parenchymal tumours was found 6 times on ultrasound examination. They showed in a subsequent CT examination moderate contrast enhancement (Fig. 5). In 4 cases a cystoid cancer with internal echoless spaces formed a structure resembling a «honeycomb». It was essential to reveal with USG irregularity of the contours of thick walls and partitions.

Cystoid-solid tumours were shown 6 times, the solid component being intensely contrast enhanced in a subsequent CT examination. In 3 cases of tumours with heterogenous structure in the central part a hypoechoic area of necrotic cyst character was found (Fig. 6). In 2 patients tumour masses were revealed in the kidney with cystoid degeneration (Fig. 7).

Renal tumours were detected in patients reporting with complaints of the cardiovascular system (11 cases), liver and biliary tract diseases (14 cases) and during general examinations (16 cases). The most common symptom were persistent fevers of unestablished aetiology (16 cases – 39%). In 2 cases pains occurred in the lumbar region on the side opposite to the tumour. In 6 patients weight loss bigger than 5 kg was found over the last 3 months and arterial hypertension in 5 patients. Time elapsing from the onset of complaints was often difficult to establish since patients had previously been treated for various illnesses.

In none of the patients the classical triad of renal tumour symptoms was observed. In 2 patients cysts were revealed in the adjacent kidney and in 2 others in the kidney with tumour. Nephralithiasis was found in 3 patients.

DISCUSSION

The authors of papers on the subject in question emphasise a considerable increase in the number of renal tumours recognised accidentally (12) in recent years. In the years 1961–1980 they constituted from 13% to 15% (1), in the years 1980–1990 from 24% to 48% (2).

According to other authors their number in the years 1981–1986 amounted to 15%, in 1981–1992 to 25%, amounting to 33.3% in the years 1987–1992 (13). In other studies the observed values in the years 1979–83 were 26.9%, in 1983–87 – 47.1% (6), in 1983–87 – 47% (15), and in 1985–91 – from 30.4% to 48% (1).

The number of detected small tumours has also increased by nearly 5 times (2). In the group of tumours detected accidentally the benign ones constituted 20% while in the symptomatic group only 23% (21). In the asymptomatic period more frequently revealed are tumours of the right kidney 58.7–60.3% than of the left one 39.7% (13). The increase in the frequency of accidental detection of renal tumours results from better quality of equipment and combination of examination techniques (12). We believe this is also due to an easy and common access to ultrasound examinations and non-invasiveness as well as low costs of the examination.

Renal cancer diagnosed at an early, asymptomatic stage gives better prognosis. (17). A 5-year survival in the group of patients with symptoms was 40% compared to 80–80.7% among patients without symptoms (6, 13). Survival 5–10 years amounted to 61% in the group of asymptomatic tumours and 44% of symptomatic ones (1). Accidentally recognised tumours are smaller, at a lower stage of advancement, lower histopathologic degree and less frequently give metastases to the lymphatic nodes (17). The mean size of accidentally detected tumours was 47.3+/-19.9 mm (18) and 57+/-30 mm (1) while the size of symptomatic tumours was 71+/-34.1 mm (13) and 76+/-35 mm (1).

Small tumours with the diameter below 5 cm constituted 47.9–73.8% in the asymptomatic groups while in the group with clinical symptoms 25–34.7% (6). The smallest tumours, however, below 3 cm diameter constituted 25.4% in the group without symptoms while among all the tumours of this diameter as many as 96.7% were recognised accidentally (17). Detections of small asymptomatic tumours, under 3 cm in diameter, is important since in about 85% they are cancers, 8% of which give metastases at the moment of detection (17). In other reports the group of lesions up to 3 cm in diameter are said to be acidophilic adenomas in 82% and adenocarcinomas in 18%. When their diameter exceeds 3 cm, however, acidophilic adenomas constitute 67% and adenocarcinomas 33% (5). Tumours smaller than 3 cm rarely have aggressive character. It is generally accepted that echogenicity similar to angiomyolipoma is shown by 1/3 of cancers with the diameter below 3 cm. (14). Nevertheless, fat is very seldom detected in small renal cancers (16).

In the group of accidentally detected tumours 55% cases were in stage I of advancement, 14% in stage II while symptomatic changes were observed in 39% in stage I and in 27% in stage II (20). A full clinical triad of symptoms was found in 3.8% cases (15). Small homogeneous tumours in advancement stage I and II showed good separation and full encystment was observed in 40% cases (18). Accidentally detected tumours only in 1–3% cases show metastases to the lymphatic nodes (5).

The tendency of renal cancer to grow into the venous system in the form of a plug consisting of neoplastic cells is emphasised in the literature (7). This is the case with renal veins in 10–58.3% cases and vena cava inferior in 4–10% cases (7, 10). In USG the range of plug ingrowth can be determined in 87.5–100% cases (3) and its morphology 95–100% (7). The accuracy of determining venous system invasion in advanced tumours amounts to 84–89% (3, 20) and sensitivity in 78–93%

(8). The possibility of recognising a neoplastic plug in the renal vein by means of ultrasound is higher than by CT examination. Venous complications occur at stage IIA and IIIC of Robson's classification (11).

Central calcifications within solid tumours, found in 67%, account for their malignancy (8). Poor separation suggests perirenal infiltration (8). Distinct contours are observed in 82% tumours whose diameter is smaller than 5 cm while blurred in 72% tumours with diameter over 5 cm (22). The assessment of contours belongs to essential morphologic criteria (20). Poor separation evidences a perirenal infiltrate (8). Distinct outlines are observed in 82% tumours with the diameter below 5 cm while blurred ones in 72% tumours over 5 cm in diameter (22). About 5–7% renal cancers have a cystoid form and therefore hyperechogenic changes require special attention. Cysts can be unilocular, multilocular or necrotic. The tumour can also leave the cystic wall or grow in the cystoid-like changed kidney (9).

Accidental detections took place during routine examinations of lower urinary tract infections, hypertrophy of prostate gland, diagnostics of hypertension, observations of lithiasis or weight loss (19). Initially, renal cancer courses without symptoms and the first clinical symptoms are not characteristic. The classical triad of symptoms concerns only advanced tumours, occurs in only 10–15% cases (8, 19), 1/3 patients with full triad of symptoms already have distant metastases. (4). Haematuria, most frequently painful one, is still a clinical symptom occurring in about 40–60% cases (8.10%). Non-specific symptoms of a neoplastic disease were found in 5–35% cases (8).

USG is a basic examination in accidental detections of early renal cancers. It can be used for screening examinations (19). In 85% cases it was the first examination which was the basis for preliminary diagnosis, (15) in cases in which USG picture is doubtful or blurred it is necessary to perform an accessory CT and BAC examination (19).

CONCLUSION

1. Irregular enlargement of the kidney, setting off its contour, segmental enlargement of the parenchymal mass or a change of its echogenicity, widening of the central echo with heterogenic structure, the presence of a subcapsular haematoma or widening of the renal vein without evident visualisation of renal tumour can be an intermediate proof of its presence and requires CT diagnostic examinations.

2. Differentiation of the remaining, normal renal parenchyma in the cystoid kidney with the presence of pathologic tissue mass is difficult and in doubtful cases requires subsequent CT examination.

3. The increase in the number of recognised renal cancers in the asymptomatic period results from common use of USG examinations, which should be performed in atypical abdominal complaints and screening examinations.

4. Accidentally detected renal cancers are characterised by early, usually advancement stage I according to Robson's classification, diameter over 5 cm, sharp contours, irregular shape, differentiated echogenicity.

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STRESZCZENIE

W grupie 41 wykrytych przypadkowo badaniem USG raków nerek analizowano ich cechy morfologiczno-kliniczne. Najczęściej stwierdzano w obrazie USG ostre zarysy guzów, ich regularny kształt, zróżnicowaną echogeniczność, średnicę poniżej 5 cm i I stadium zaawansowania wg klasyfikacji Robsona. Były to guzy bezobjawowe lub skąpoobjawowe, natomiast w żadnym przypadku nie stwierdzono klasycznej triady objawów klinicznych.

Podkreślano wartość przesiewowych badań USG w wykrywaniu bezobjawowych guzów nerek.

EXPLANATIONS TO FIGURES

Fig. 1. Oval, hyperechogenic area within the lower real pole causes its widening also including the central echo.

Fig. 2. USG – Hyperechogenic tumour with a small calcification in the middle part of the kidney.

Fig. 3. Hypoechoic, subcapsular haematoma in the region of the renal upper pole with visible homogenous tumour mass and a part of normal parenchyma.

Fig. 4. Numerous tiny calcifications in the central part of the tumour mass typical of the malignant process.

Fig. 5. CT moderate contrast enhancement of the tumour in comparison with normal parenchyma.

Fig. 6. Necrotic cyst in the middle part of the tumour.

Fig. 7. CT – hypodensic areas corresponding to cysts, medially hypodensic tissue area intensely enhanced by contrast with parenchymal calcifications. Renal cancer accompanying cystoid degeneration.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

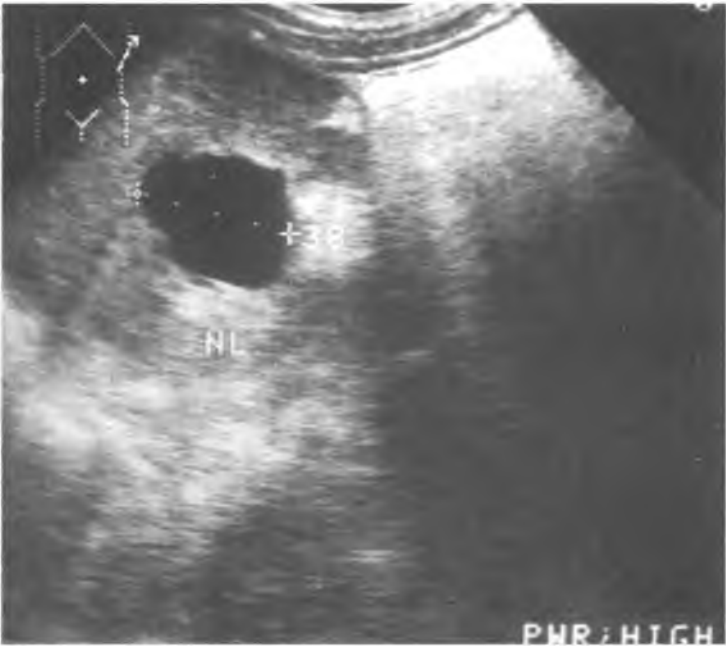


Fig. 6



Fig. 7