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2nd Department of Radiology, Medical University of Lublin
Department of Reproduction and Andrology, Medical University of Lublin

WITOLD KRUPSKI, GRZEGORZ JAKIEL, JANUSZ ZŁOMANIEC

Diagnostic value of US and CT in the assessment of ovarian teratomas and their qualifications for surgical treatment with laparoscopic method

Teratomas are the most common ovarian tumours. They constitute about 10% and malignant teratomas 0.1% of all ovarian tumours. (1, 5). They usually occur in young women between 18 and 30 years of age. The clinical course is varied, it depends on the size of tumour, is initially symptomless, later with periodic ailments which are given by the freely mobile tumour within the abdomen. Teratomas are frequently recognised accidentally mainly on clinical examination or US, less often on CT. About 4% of teratomas show specific morphologic features manifested on the radiogram as odontogenic calcifications.

MATERIAL AND METHODS

The aim of the study is to assess the value of per-abdominal US and CT in examinations of ovarian teratomas, to determine the role of these techniques in the diagnostic algorithm and in the qualification for laparoscopic operations.

The material comprises 17 women (aged 15-66 years) operated on with laparoscopic method with histopathologically confirmed ovarian teratomas in whom US and CT exams had previously been done. In 15 cases the tumour was single and twice it involved both ovaries. There were assessed 19 ovarian teratomas. The diameter of the recognised tumours ranged from 1 to 9 cm.

RESULTS

In the examined teratomas US and CT let distinguish four elements of morphologic structure: liquid component, tissue mass, fat and calcifications.

18 tumours showed the presence of all these four elements of the structure apart from a single,

smallest change of 1mm diameter which was mainly composed of fatty mass and a small fatty component.

On CT in 17 tumours exams recognised calcifications which usually showed high densities over 200 H.u. corresponding with the density of compact bone or enamel. On US calcifications in 15 tumours (88.2%) were recognised.

The presence of three types of tumour pictures was found: with prevailing liquid, fatty and tissue component.

In 9 tumours with prevailing liquid component US pictures were typical of thick-walled cysts which additionally showed the presence of parietal solid, fatty tissue and calcification elements (Fig. 1A). CT showed slightly increased cyst content with the density of 15-30 H.u. Thick walls got enhanced by contrast by 10-20 H.u. (Fig. 1B). In 2 cases a thick hyperechogenic wall visible on US (Fig. 2A) was a peripherally localised, semilunar fatty streak (Fig. 2B).

Fig.1A. US picture of a thick-walled cyst with hyperechogenic area corresponding to the fatty part

Fig. 1B. CT picture revealed a thick-walled cyst and two round, fatty elements of the tumour accompanied by calcifications of very big densities

Fig. 2A. US – A thick-walled cyst with solid irregular elements inside

Fig. 2B. CT revealed a complex cyst with contents of increased density, with a peripheral fatty streak and calcifications of enamel density

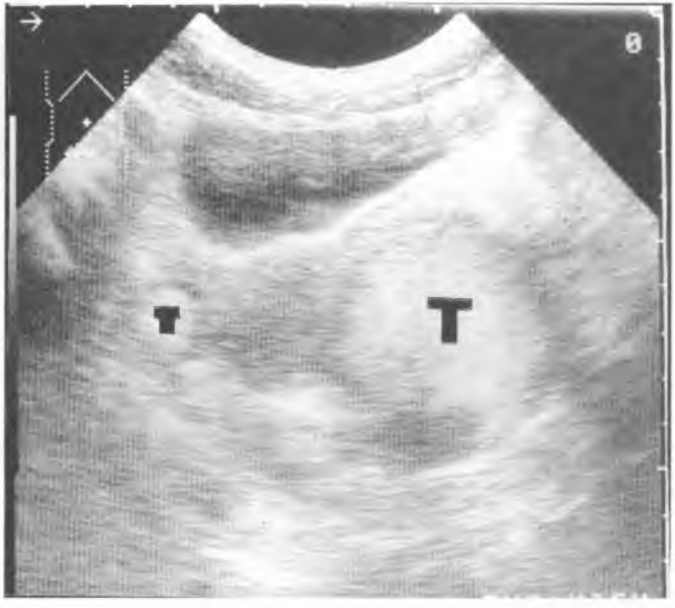

Fig. 3. US – Teratomas of both ovaries visible as hyperechogenic areas on both sides of the uterus (T – tumour)

Fig. 4. US – Round hyperechogenic fatty area inside the cyst

Fig. 5. US – Oval tissue area of differentiated echogenicity, with blurred contours and presence of hyperechogenic areas inside giving subsequent shadows (arrows)

In 7 tumours with prevailing fatty tissue US showed prominently hyperechogenic, round, homogenous areas (Fig. 3). In 2 cases with their bigger sizes a decrease of hyperechogenicity dependent on the increase of distance from the head could be observed. The remaining morphologic elements were localised peripherally in the form of tissue streaks and small streaky liquid areas. In 2 cases a spheric fatty tumour was intussuscepted within the cystic space (Fig. 4). On CT a hypodensic fatty component had negative values of attenuation coefficient from –22 H.u. to –110 H.u. These tumours were difficult to reveal on US because of their similarity to intestinal loops filled with gases. On CT they presented difficulties in differentiating with fatty tissue of the rete and with a narrow imaging window /below 250 H.u./ and high values of its centre /over 40H.u. they imitated gas-filled intestinal loops.

In 3 cases of tumours with prevailing tissue elements US revealed complex echogenicity and blurred contours (Fig. 5). On CT tissue mass showed mean contrast enhancement.

Bilateral tumours were mainly fatty, in 1 case the tumour showed prevailing fatty tissue and in 1 case solid tissue elements (Fig. 6).

In 5 patients tumours modelled the urinary bladder, intussuscepting its superior-lateral walls.

Fig. 6. CT reveals in the lumen of smaller pelvis two round areas of complex tissue structure with fatty component and calcifications (T – tumour)

DISCUSSION

On radiograms teratomas are recognised by finding osseous odontogenic opacities and calcifications in the lumen of the smaller pelvis. CT pictures let make diagnosis more accurate, histopathologically confirmed in 2/3 patients with these tumours (6). There are usually visualised low density masses containing a mixture of fat, hair, tissue masses and liquid as well as often arched calcifications, teeth, bony structures, and solid parts – the so-called dermatoid plug forming a thick-walled cyst (4,10).

Definite recognition on CT is obtained when we visualise tumours composed of fatty tissue, thick-walled cyst and calcifications with enamel density.

On US teratomas look like thick-walled cysts localised above the urinary bladder with a parietal solid component and echo reflections giving acoustic shadows (3,7). In our material such a picture concerned only half of tumours, the remaining ones were hyperechogenic when they showed a fatty component and non-uniform one with solid-tissue structure.

Calcifications in ovarian masses are more frequently recognised in CT imaging (1, 8). Teratomas on US give pictures with different echostructures, usually with foci of high echogenicity, benign tumours being as a rule of cystic character and malignant ones of solid nature (6).

US examination lets assess also the morphology of the kidneys and determine the presence and degree of urinary stasis in calyces-pelvic system caused by pressure of distal segments of ureters when tumours become big. Recognised on US deformation of the upper wall of the urinary bladder caused by tumour impression is regarded as an indirect symptom of its presence.

Per-vaginal head increases the percentage of recognitions of tumours of the genital organ (2). Endovaginal US exam in small, cystic endothelial tumours more distinctly reveals the details of the internal structure than MRI sections (9). There are more clearly revealed focal thickenings and small, solid elements in the liquid space.

Operative treatment of ovarian teratomas, for oncologic safety, in big ovarian tumours qualified for laparoscopic surgery requiring tumour fragmentation before removal from the abdomen, must be examined with CT to determine their benign character.

CONCLUSIONS

1. Teratomas in US and CT pictures have very diversified structure, different in every case, but always composed of a few kinds of tissue. It was possible to show the prevalence of one of morphological elements and classify the tumour to one of the three types of pictures of teratoma structure.

2. US, due to the frequency of examinations, lets early diagnose teratomas before they are accessible in the clinical exam, in the symptomless period or when they give indirect, usually dysuric symptoms.

3. CT, due to high sensitivity in recognising fatty tissue and calcifications, is necessary before laparoscopic operation requiring fragmentation of big tumours to determine their character.

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SUMMARY

In the group of 17 women after surgery with histopathologically confirmed diagnosis of teratomas diagnostic usefulness of US and CT was analysed. Differentiated echostructure of tumours was correlated with different densities of pathologic tissues in CT examination, also after their contrast enhancement. In 2 patients teratomas of both ovaries were recognised, in the remaining 15 women tumours were unilateral. In total morphologic pictures of 19 teratomas were assessed, 9 times tumours with prevailing liquid component had the picture of a thick-walled cyst, 7 times these were hyperechogenic fatty foci and in 3 cases had the character of solid tumours. Teratomas had different morphologic pictures, but it was possible to show the prevalence of one element and classify the tumour to one of the three types of teratomas.

It was found that US examination, due to its high frequency, lets early diagnose teratomas before they are accessible in the clinical exam, in the symptomless period or when they give indirect symptoms, usually dysuric ones. CT examination, due to its high sensitivity in recognising fatty tissue and calcifications, is necessary before laparoscopic operation requiring fragmentation of big tumours to determine their character.

Wartość diagnostyczna USG i TK w ocenie potworniaków jajników i ich kwalifikacji do leczenia operacyjnego metodą laparoskopową

W grupie 17 operowanych kobiet z potwierdzonym histopatologicznie rozpoznaniem potworniaków analizowano przydatność diagnostyczną USG i TK. Zróżnicowaną echostrukturę guzów korelowano z różną gęstością patologicznych tkanek w badaniu TK, także po ich wzmocnieniu kontrastowym. U 2 pacjentek rozpoznano potworniaki obu jajników, u pozostałych 15 guzy były jednostronne. Ogółem oceniono obrazy morfologiczne 19 potworniaków: 9-krotnie guzy z przewagą komponenty płynowej miały obraz grubościennej torbieli, 7-krotnie były to hiperechogeniczne ogniska tłuszczowe, a w 3 przypadkach miały charakter guzów litych. Potworniaki miały różne obrazy morfologiczne, ale można było wykazać przewagę jednego z elementów morfologicznych i zaliczyć guzy do jednego z trzech typów potworniaków.

Stwierdzono, że badanie USG ze względu na częstotliwość badań umożliwia wczesne rozpoznanie potworniaków w czasie, gdy nie są jeszcze dostępne w badaniu klinicznym, w okresie bezobjawym lub gdy dają objawy pośrednie, zwykle dyzuryczne. Badanie TK, ze względu na wysoką czułość w rozpoznawaniu tkanki tłuszczowej i zwapnień, jest konieczne przed operacją laparoskopową, wymagającą fragmentacji dużych guzów celem określenia ich charakteru.