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## SONOGRAPHIC EVALUATION OF OVARIAN VOLUME IN POSTMENOPAUSAL WOMEN: A SCREENING TEST FOR OVARIAN CANCER?

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*Summary:* Ovarian cancer is the first cause of death from gynaecological malignancy. The poor over-all five year survival rate requires a specific procedure for early detection of ovarian carcinoma. An evaluation of ultrasonography as a screening test in early ovarian cancer is currently used in our Institute. A group of 500 volunteers without clinical symptoms, older than 45 years, and/or in postmenopausal period, were submitted to the procedure. We used a real-time mechanical sector scanner with 3 mHz transducer. The morphology and size of both ovaries were assessed. Abnormal results were obtained in 11 women. Four (4) postmenopausal patients underwent surgery. At the moment our study proves that ultrasonography is a valid procedure in the investigation of the ovaries in postmenopausal women. We need further evaluations to assess the real effectiveness of ultrasound examination as a screening test for early detection of ovarian cancer.

### INTRODUCTION

The mortality caused by ovarian cancer is the highest among the neoplasias of the female genital apparatus, being only second to that caused by breast carcinoma.

If considered in different periods, the overall five year-survivals have undergone poor modification<sup>(1)</sup>.

This is related to a persistent difficulty in making an early diagnosis.

In fact, few cases come under observation in the initial stage of tumor development since patients are asymptomatic for a long time<sup>(12)</sup>.

In recent years, with the aim of redefining the therapeutic strategies for ovarian cancer and improving rates of survival, research for diagnostic tools available for proper detection of affected patients, has started.

Assays based on employment of monoclonal antibodies (CA-125) that were formerly used exclusively in follow-up of treated patients, seem to hold most promise.

A good correlation (93%) between clinical stage of the disease and seric values of CA-125<sup>(2)</sup> being demonstrated, its possible use in the early diagnosis of ovarian cancer is now being discussed.

It must be remembered that this antigen is present also in patients affected with other tumors (in the pancreas and lungs).

Also, other tumoral markers (OCAA, OC) are scarcely specific because they present cross-reactions with tumors of other sites (breast, colon) or are detectable also in benign gynecologic pathology (<sup>3, 17</sup>).

It seems, then, evident that a screening assay for ovarian cancer must have the following requisites: high sensitivity and specificity, acceptability of the subject who undergoes screening, low cost, harmlessness, repeatability.

Echotomography seems to respond to these requisites, so that some Authors (<sup>4, 7</sup>) have proposed this technique as a screening test for ovarian cancer in a population considered at risk for tumor growth. For these Authors, thanks to the resolution power of today's equipment, it is almost always possible (99% of cases) to identify the ovary and evaluate its structure even when it happens during menopause and its size is very small.

In this regard, they propose to evaluate ovary volume because this measure is independent from position variations of the ovary in the pelvis. After they had investigated 1084 women older than 45 years with echography, these Authors defined the average values of ovary volume ( $3.70 \text{ cm}^3 \pm 1.42 \text{ 2SD}$ ) considering suspect an ovary with a volume higher than 2nd SD of reference values.

Other Authors (<sup>10, 11</sup>) underline the echostructural features of ovary besides its dimensions (presence of cystic formation or solid masses, presence of septa, well-defined or unclear outlines).

Echotomography can, then, be employed to identify the ovary, evaluate its volume and structure, and establish a prognosis depending if mass is benign or malignant. This test with other investigations, can give a judgment on the probability of histologic diagnosis (<sup>8</sup>).

It must be considered that besides high aggressiveness of ovarian neoplastic pathology, this tumor has a low incidence (16:100,000 in Italy). This could not justify recourse to screening programs.

In American statistics, instead (<sup>16</sup>) about 1.4% of female neonates or 1:70, will be affected by an ovarian tumor during their lives.

#### AIM OF THE STUDY

We want evaluate the possible employment of echotomography for early diagnoses in preclinic phase of neoplastic pathology of ovary, measuring the ovarian volume in a population considered at risk for tumor onset.

That has the finality to improve the prognosis of the disease.

Epidemiologic studies devoted to identify risk subjects in women population have underlined various factors, mainly connected with reproductive life: parity, age of first pregnancy, menarchal and menopausal age (<sup>6</sup>). We have considered a statistical datum that is the increase of incidence of ovarian tumor after 45 years, in pre- and post-menopausal periods of reproductive life.

Then we have defined to submit women older than 45 years, clinically asymptomatic, in postmenopause (cessation of menses for at least one year) to pelvic echography with the aim to study the features of menopausal ovary.

#### MATERIAL AND METHODS

Women attending the outpatient Service of Colpocytology of our Institute, older than 45 years or in postmenopause, were asked to submit to a pelvic echography.

These were gynecologically asymptomatic subjects who came to the outpatient Service, spontaneously or on gynecologic indication, for the screening of tumors of the uterine cervix.

About 50% of the invited women accepted.

In the period from July 1985 to May 1987, 500 echographies were performed with an appa-

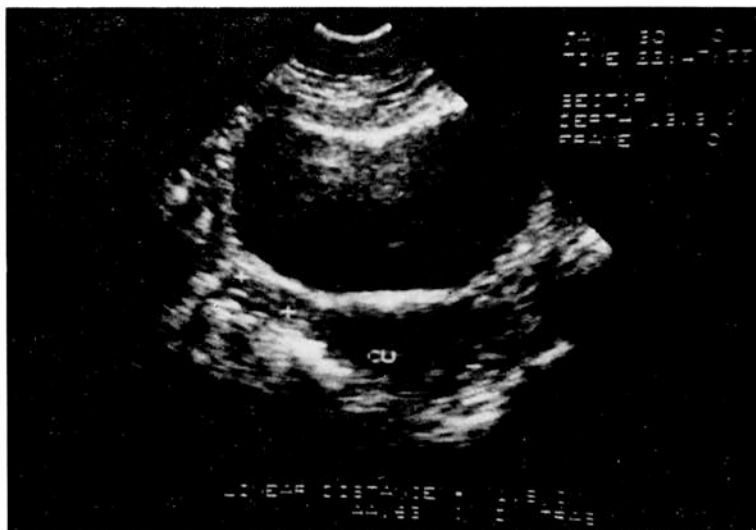


Fig. 1. — 63 year-old woman (13 years postmenopause). Transverse scan: normal right ovary.

ratus real-time with automatic scanning, utilizing a 3 MHz sector probe (ATL MK 300).

The patients were given enteroenemas before ultrasound examinations.

Both ovaries appear as two ovoid formations with a constant hypogenic structure in menopause, normally situated laterally to the uterus but both difficult to investigate with a one trans-

versal section because they are frequently put on a different plane section (figs. 1, 2).

Besides the corpus uteri, important reference points for its identification especially after a hysterectomy or other pelvic surgery that has distorted the normal anatomic rapports, are the pelvic vessels (mainly ovarian ones, situated laterally to the ovary) easily identifiable with real

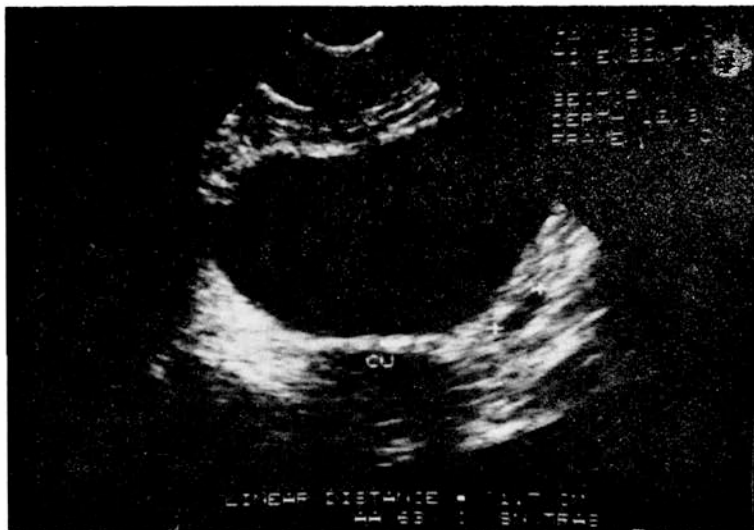


Fig. 2. — Previous case. Transverse scan: normal left ovary.

Table 1. — *Reasons for failure to display the ovaries.*

– Obese patients	12
– Presence of bowel loops	16
– Inability to fill bladder adequately	16
– Adhesions secondary to pelvic surgery	5
– Presence of pathological uterine findings	4
– Tiny ovaries (impossible to measure accurately)	14
	<hr/> 67

time apparatus because they are pulsating and with inner obturator and anal elevator muscles.

With paramedian longitudinal scannings, transversal and if necessary oblique scannings, longitudinal (D<sub>1</sub>), anteroposterior (D<sub>2</sub>) and transversal (D<sub>3</sub>) diameters of each ovary are measured.

The ovary volume is calculated with this algorithm:

$$\frac{4}{3} \pi \times \left( \frac{D_1}{2} \times \frac{D_2}{2} \times \frac{D_3}{2} \right)$$

For each ovary the site, form, echostructural features (presence of eventual follicles, cystic uni-

locular or plurilocular formations, presence of septum/septa or solid masses, outline definition, evidence of capsular invasion or adhesions) are defined.

The ovarian volume obtained is compared to normal reference values according to Campbell ( $3.70 \text{ cm}^3 \pm 1.42 \text{ SD}$ ). The echographic features are divided into normal, uncertain for pathology (a second check is programmed) and pathologic features.

In this last case, the patient is submitted to a gynecologic exam, TAC and, if the suspect of ovarian neoplasia is confirmed, a laparotomy.

## RESULTS

The age of women participant in investigation ranged between 38 and 77 years (average age, 54 years). Three-hundred and forty-two women were in post-menopausal phase; in the remaining 158 cases, cycles were also present.

The average time of investigation took about 10-15 minutes.

On the 500 investigated subjects, the identification of one or both the ovaries was not possible in 67 cases (13.4%).

The causes are reported in Tab. 1.

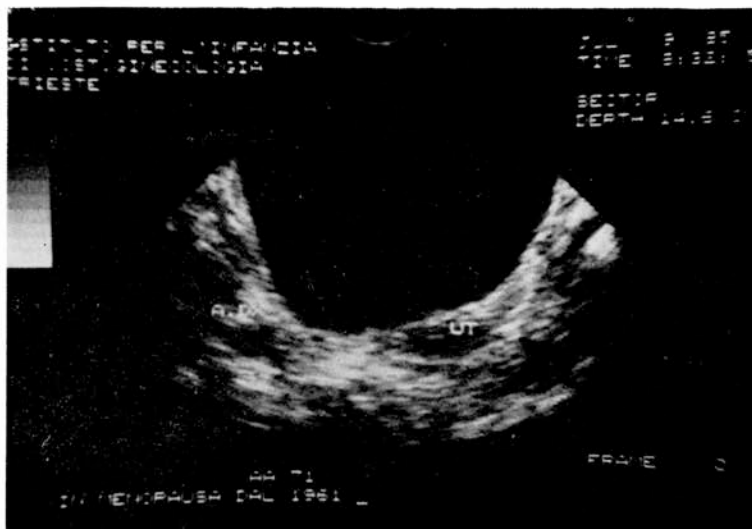


Fig. 3. — R.A. aged 71 year-old woman (24 years postmenopause). Transverse scan: normal right ovary (vol.  $1.6 \text{ cm}^3$ ).

Table 2. — *Subjects with abnormal ovaries.*

Name	Age	Ovarian volume		Sonar morphology
		Right	Left	
C. M.	59	/	56	Entirely cystic Left ovary
Z. M.	52	5.7	40	Entirely cystic Left ovary
D. L.	47	4	30	Left ovary with cysts
T. L.	47	42.4	9.6	Left ovary with cysts

At the first check in 472 cases, the ultrasound picture resulted normal (ovaries with normal volume and echostructure).

It was necessary to re-check 12 cases with one or more investigations to define the normality of these uncertain cases. Seven cases were women in premenopausal state with irregular cycles, in whose ovaries small-sized anecho-genic areas (follicular cysts) were seen, and subsequently could no longer be evaluated.

The other 5 cases were menopausal women whose involved ovary was twice as large as the contralateral one, without echostructural modifications, and unmodified at subsequent checking.

Five doubtful cases must be re-checked. Eleven cases (2.2%) resulted "positive" to echography in the first instance (postmenopausal patients) or after re-control performed in their subsequent menses in women with ovarian function.

In 6 cases it was opportune that patients underwent surgical intervention after TAC was performed.

One patient has preferred to select another institution; the other 3 patients did not present themselves for the programmed checks.

These 11 cases are shown in Tabs. 2 and 3.

Tab. 4 reports average values obtained by evaluation of left and right ovarian volume, considering overall the cases defined echographically normal and subdividing the sample according to premenopausal and post-menopausal status.

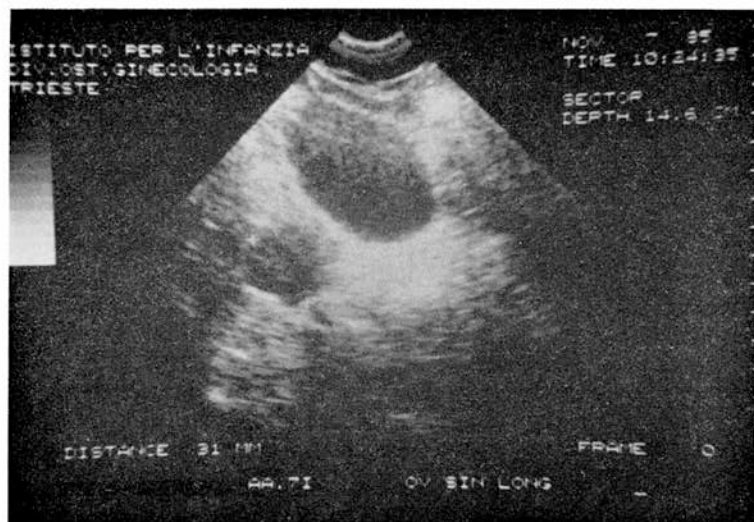


Fig. 4. — Longitudinal scan: left ovary with cyst and irregular outline (vol. 16.5 cm<sup>3</sup>). Histological diagnosis: serous cystadenoma.

Table 3. – *Subjects with abnormal ovaries histological results.*

Name	Age	Ovarian volume Right	Left	Sonar morphology	Pelvic examination	TAC	Histological diagnostics
R. G. Menop. 5 years	48	2.28	34	Left ovary with two cysts	Positive	Ovarian cyst	Two para-ovarian cysts
R. A. Menop. 24 years	71	1.6	16.5	Left ovary with cyst and irregular outline	Negative	Negative	Serous cystadenoma
R. O. Menop. 25 years	71	4	78	Bilateral multi-loculated cysts	Unevaluable pelvic organs for obesity	Two cysts	Serous cysts (both ovaries)
S. N. Menop. 1 year	52	2.7	51	Entirely cystic left ovary	Positive	Cyst with irregular outline	Serous cyst
B. A. Menop. 29 years	77	133	31	Entirely cystic left ovary	Unevaluable pelvic organs	Cyst with regular outline	Serous cyst
G. A. Regular cycles previous surgery for Porto- mesenteric	53	5	7.9	Ascites near right ovary Solid mass with papillomatous morphology – Adhesions? – Tumoral vegetation?	Unevaluable pelvic organs	Solid mass 10 cm diameter – Ascites –	Chronic inflammation

## DISCUSSION

The average ovarian volume obtained in our population does not differ from that found in other studies (<sup>4, 7</sup>).

Besides the volume increase that must always be interpreted with suspicion, with out doubt, the most important criterion is the echostructural modification that represents an indication for surgical intervention.

We remember that in a case where a cystoadenoma was identified with histolo-

gic diagnosis, the ovary measured just 3.5 cm of diameter in the echographic evaluation but had an anechogenic area with undefined outlines.

In our opinion, the poor anatomopathologic findings resulting in our operated patients (excluding the above mentioned cystoadenoma) justifies, however, the decision for surgical treatment.

In fact, it is not possible to make a sure echographic diagnosis of benign or malignant ovarian masses.

On the other hand we do not know today the evolutive malignant potential of benign ovarian lesions nor the evolutive potential of complications (twisting, hemorrhage, etc.).

The case with ascites can certainly be defined a false positive even if echography had expressed a doubt on the ovarian origin of ascites.

Unfortunately, the wrong diagnosis of TAC and the underevaluated pathologic background of the patient misled us.

Table 4. – *Ovarian volume.*

	Right ovary 3.95 ± 2.67 S.D.	Left ovary 3.81 ± 2.26 S.D.
Post-menopausal women	Right ovary Left ovary	2.93 ± 1.49 S.D. 3.10 ± 1.42 S.D.
Pre-menopausal women	Right ovary Left ovary	6.04 ± 2.86 S.D. 5.84 ± 2.83 S.D.

In our percentages, identification of ovaries result lower than in other works. Nevertheless, for an early diagnosis of ovarian tumors, a judgment on the absence of adnexial pathologic masses can be made especially if the ovary is not visible because of its minimal size. Echography has almost always been shown to be superior to pelvic examination for diagnosing the presence of ovarian pathologic presence.

We underline that all the echographically positive patients were asymptomatic. The echographic examination was always accepted by the women who underwent it, and especially the older women remarked they preferred it to pelvic examination.

Proposing echography for screening ovarian tumors, we believe that there is the possibility of detecting many subjects "at risk" who refuse gynecologic examinations.

## CONCLUSIONS

Echotomography is today an irreplaceable tool for diagnosing ovarian neoplasias although it does not allow a sure diagnosis on the nature of the diagnosed ovarian pathologies.

This investigation is harmless, repeatable, acceptable. It has a low operating cost and can be proposed as a test for screening ovarian cancer. In connection with this fact, a definitive evaluation will be made only after carrying out an experimental investigation on a sample of population greater than that investigated by us. Nevertheless, in patients over 45 years

with an incomplete pelvic examination, in the presence of some risk factors (late menopause, familiarity, etc.) and without clinical symptoms, we believe pelvic echotomography is really indicated.

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