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Ultrasound Assessment of Changes in the Ovary and the Uterus during LHRH Therapy

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ABSTRACT

Twenty-seven women with secondary amenorrhoea have been treated with pulsatile subcutaneous luteinising hormone releasing hormone (LHRH). Serial ultrasonic observations of increasing follicular diameters and changes in the size of the uterus have been recorded. The rate of the increase of the diameter of dominant follicles in LHRH induced cycles is identical to that observed in women undergoing spontaneous cycles. An interesting correlation was observed between follicular diameter and uterine size. The correlation suggests that uterine size measured ultrasonically can be used as a bio-assay of follicular oestradiol production. Uterine growth continues throughout the luteal phase of conception cycles and can be used as a very early sign of pregnancy.

INTRODUCTION

Pulsatile LHRH has been shown to induce follicular maturation in women with hypogonadotrophic hypogonadism (3). Hitherto, pelvic ultrasound has been used to monitor follicular development and ovulation in spontaneous and induced cycles (1,4,6). Changes in uterine size and morphology during the menstrual cycle have also been documented (2,5). We have investigated the use of serial ultrasound imaging in establishing uterine size and its pattern of change during normal and LHRH induced ovulatory menstrual cycles.

PATIENTS AND METHODS

Twenty-seven women with secondary amenorrhoea were treated with pulsatile subcutaneous LHRH. Sequential uterine and ovarian ultrasonic scans were performed three times per week with estimation of serum oestradiol concentrations throughout one menstrual cycle. Nine women volunteers undergoing spontaneous cycles were similarly studies and acted as controls.
An Emisonic 4201 static scanner with a 3.5 mHz long-focussed transducer was employed. The ovaries were imaged and follicles measured according to the technique described by Hackeloer (1). Using the uterine cavity for orientation, serial para-sagittal scans of the pelvis were performed to determine the long axis of the uterus. The uterine cross-sectional area was measured from photographs using the graphis table of an Apple microcomputer.

RESULTS

The similar diameter and growth rate of the dominant follicle seen in both spontaneous and LHRH induced cycles is shown in Figure 1.

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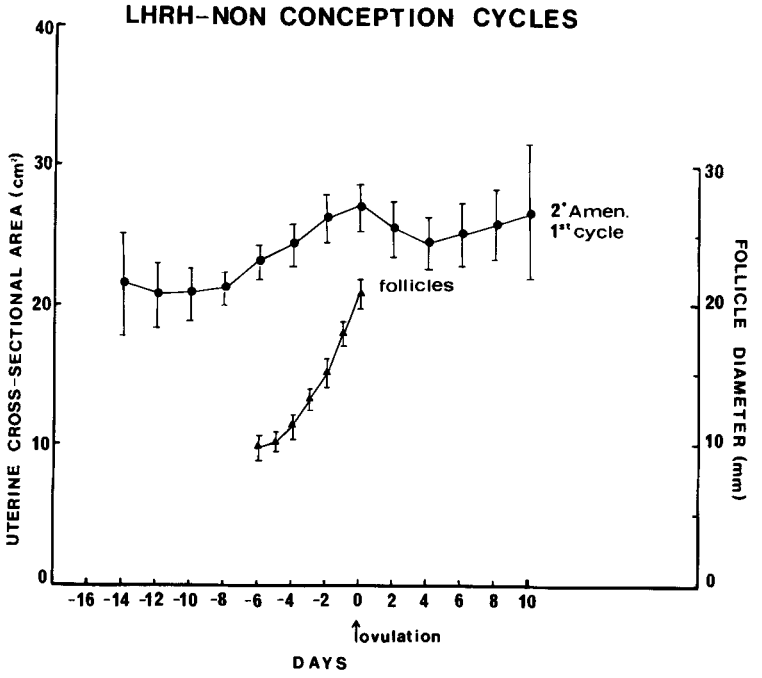
FIGURE 1

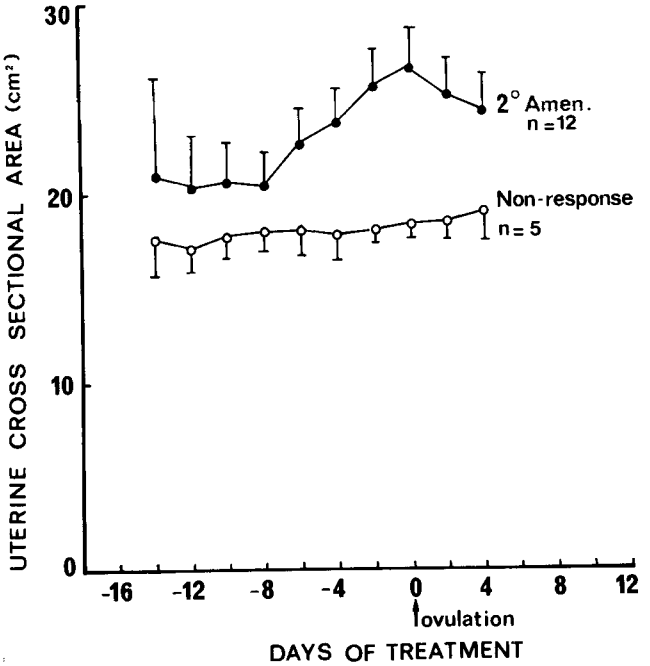
Follicular diameter mm ± SD in spontaneous and LHRH induced cycles

Day	Spontaneous cycle	LHRH induced cycle
-5	10.8 ± 1.8	10.7 ± 1.2
-4	12.0 ± 1.9	13.2 ± 2.3
-3	13.6 ± 2.4	15.0 ± 2.7
-2	16.2 ± 2.9	17.5 ± 2.9
-1	19.2 ± 2.7	19.1 ± 2.0
ovulation	22.4 ± 2.6	20.9 ± 3.4

The enlarging follicle, with its concomitant increase in oestradiol production, stimulates uterine growth in the follicular phase, as shown in Figure 2.



A similar pattern of uterine growth was observed in spontaneous cycles. No uterine growth was observed in five women in whom there was no follicular development in response to treatment with LHRH (Figure 3).



In the luteal phase of non-conception ovulatory cycles induced by LHRH there was a slight fall in uterine cross-sectional area after ovulation, followed by a slight increase. These changes, which were statistically significant ($p = 0.006$) paralleled those in plasma oestradiols. In conception cycles, uterine growth continued throughout the whole luteal phase and the two groups were distinctly different seven days after ovulation.

DISCUSSION

The value of pelvic ultrasound for monitoring follicular activity in spontaneous and induced cycles is widely accepted. In this study we have assessed sequential ultrasonic changes in the uterus as well as in the ovaries. It is technically easier to image the uterus than to obtain accurate dimensions of an ovarian follicle, particularly in obese people.

Increasing serum oestradiol concentrations from an enlarging dominant follicle results in uterine growth. Thus changes in uterine size can be used an an in vivo bio-assay of oestrogen production and lack of uterine growth during LHRH therapy implies a failure of adequate ovarian stimulation. Thus, adequacy of the response to therapy, designed to induce ovulation can be monitored by serial ultrasonic measurements of uterine growth.

Continuing uterine growth in the luteal phase of conception cycles may well reflect a higher secondary rise of oestradiol in conception cycles and may provide a very early sign of pregnancy.

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