

Ultrasonic demonstration of local myometrial thickening in early intrauterine pregnancy

O. P. Tadmor, R. Rabinowitz and Y. Z. Diamant

Department of Obstetrics and Gynecology, Shaare Zedek Medical Center, Jerusalem, Israel

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ABSTRACT

In a group of women in the first and early second trimesters of pregnancy, local thickening of a limited region of the myometrium was observed ultrasonically. This prospective study aimed to evaluate the incidence and nature of this phenomenon. Local myometrial thickening was observed in 72 women out of 5521 examined (1.3%). Twenty-two were given ritodrine hydrochloride 10 mg by mouth, and 46 were monitored for up to 60 min without treatment. The local myometrial thickening in the ritodrine hydrochloride-treated group disappeared in 21 out of 22 women (95.5%) compared with the observed group, where the phenomenon disappeared in only 37 women (80.4%). Local myometrial thickenings probably represent transient uterine contractions; they tend to appear early in pregnancy, are prolonged, and may respond to ritodrine hydrochloride.

INTRODUCTION

The clinical implications, nature, and duration of local myometrial thickening during the first trimester of pregnancy are still unknown. Two kinds of myometrial contractions are described in the literature: local myometrial thickening, which lasts several minutes or hours; and rapid myometrial thickening, which lasts for several seconds. Sample¹ presumed that local myometrial thickenings were due to an unsoftened portion of the uterus, lasting for a considerable time (several weeks). Rapid myometrial contractions, lasting only seconds, have been described^{2,3}, but since they differ from the phenomenon presented in our study, they are not considered in this paper.

Ultrasound offers the physician a unique opportunity to view the entire gravid uterus and its contents in a relatively undisturbed physiological state. Ultrasonic demonstration of local myometrial thickening was investigated prospectively to determine its incidence and define its nature – whether it is a myometrial contraction, a

decidual reaction, or an area of myometrial hypertrophy under the placenta. We studied the nature of these local myometrial thickenings over a long period of time, as well as the possible response of the myometrial segment to tocolytic drugs.

MATERIALS AND METHODS

Between October 1990 and May 1991 we investigated 5521 pregnant women with gestational ages of 7–22 weeks at the Shaare Zedek Obstetric and Gynecological Ultrasound Unit. All the women represented a low-risk population referred from the antenatal clinics for reasons unrelated to uterine contractions. Those referred for cytogenetic studies were examined before any invasive procedures were performed. Of 5521 women examined, 72 (1.3%) demonstrated local myometrial thickening, defined as a myometrial thickening or bulging of more than 2 cm in length and 1 cm in width, interrupting the smooth border between the myometrium and placenta (Figure 1). This subpopulation with local myometrial thickening was prospectively subdivided into two groups

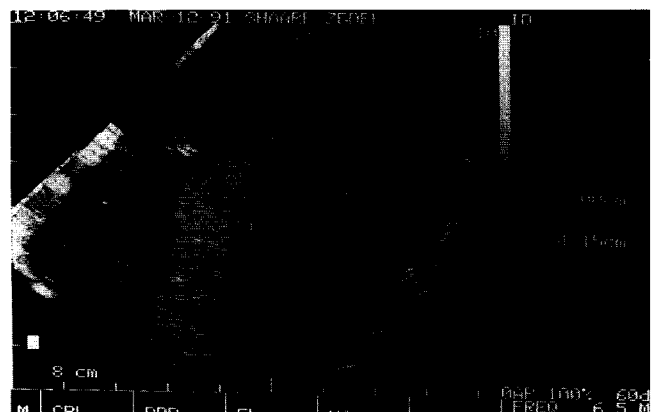


Figure 1 Local subplacental myometrial thickening

Table 1 Clinical characterization of the study population with local myometrial thickening (LMT). All results were non-significant

	Total population (n = 5521)	Total LMT (n = 72)	Observation group (n = 46)	Treatment group (n = 22)
Mean age (years)	25.5 ± 2.5	24.1 ± 3.2	25.2 ± 2.8	23.8 ± 3.5
Age range (years)	16–48	17–45	17–42	18–41
Mean pregnancy length (weeks)	16.2 ± 3	15.6 ± 2.5	14.8 ± 2.2	16.1 ± 3.1

- an observation group (46 women), and a treatment group (22 women) treated with ritodrine hydrochloride. Women over 12 weeks' gestation were examined while in the semirecumbent position, and those under 12 weeks were examined in the lithotomy position.

Ultrasonography, with the use of either an Elscint 2000, ATL Mark IV, or an ALOKA 650 machine, was used to obtain serial measurements of the local myometrial thickening. Measurements were made with electronic calipers at 2–5-min intervals for a period of 60 min. Women under 12 weeks of gestation were examined with a 6.5-MHz vaginal probe; women over 12 weeks of gestation were examined with a 3.5-MHz transducer. In each examination it was easy to discriminate between placental tissue, decidua and uterine muscle. The local myometrial thickening was measured in two dimensions, with the transducer placed perpendicularly to the uterine wall to prevent oblique measurements. The circumference and area of the local myometrial thickening, as well as the placental margin and location (in relation to the contraction), were noted and recorded. Every case was recorded on a video printer and the images reviewed independently by two of the authors (O.T. and R.R.).

The women were divided into two groups. The first group (Group I) comprised 22 women willing to receive a single dose of ritodrine hydrochloride (10 mg). All the women gave informed consent, and the drug was given immediately after completion of the measurements. The second group (Group II) included all untreated women (n = 46). In Group I, maternal heart rate was recorded before and 60 min after starting treatment. All the women were examined continuously until either the local myometrial thickening disappeared, or 1 h had elapsed. Four women, one from the treatment group, and three from the observation group, elected to leave before completion of the study, and were therefore excluded from the analysis. The presence of submucous leiomyomata versus local myometrial thickening could have presented a diagnostic dilemma, since the former is certainly capable of distorting a localized area of endometrium. In women in whom the local myometrial thickening did not disappear after 60 min, a repeat scan directed to the same region was performed 1 week later. The two women who showed no change a week later were presumed to have had a uterine myoma, and were therefore excluded from the study group. The hospital records of all the women were reviewed, and information regarding delivery weight and gestational age noted. A *t*-test for paired data was used to evaluate the significance of intergroup differences, and Student's *t*-test for unpaired data was used to evaluate intragroup differences.

Table 2 Location of the local myometrial thickening in relation to the placenta (n = 72)

Myometrial thickening	Under placenta	Not under placenta
Posterior wall	56 (90%)	6 (10%)
Anterior wall	6 (60%)	4 (40%)
Total	62 (86%)	10 (14%)

Statistical significance for thickening location, $p < 0.0001$

RESULTS

We screened 5521 women whose gestational ages ranged from 7 to 22 weeks. Table 1 describes the clinical characteristics of the study population. Seventy-two women (1.3%) showed local myometrial thickening. The average size of the thickening was: length, 4.7 ± 1.0 cm (range 2.7–7.9 cm); width, 3.01 ± 0.3 cm (range 1.2–4.3 cm). The circumference averaged 16.03 ± 2.9 cm (range 10–21 cm). The mean placental width over the thickening was 2.5 ± 0.7 cm (Figure 1). Local myometrial thickening appeared on the posterior uterine wall of 62 women and on the anterior wall of ten women. The relationship between the location of the local myometrial thickening and the placenta is shown in Table 2. The table shows that the local myometrial thickening tended to be on the posterior wall and retroplacental (86%). The differences between posterior and anterior wall position of the local myometrial thickening and retroplacental versus not under the placenta were highly significant ($p < 0.0001$). Of the 72 women with local myometrial thickening, 68 completed the study. In 58 women the thickening resolved, while it persisted for more than 60 min in ten. In all ten, thickening was not seen in a follow-up examination a week later. Of the 22 women treated by ritodrine hydrochloride, the local myometrial thickening disappeared in 21 (95.5%), while in the observation group (n = 46) it disappeared in only 37 (80.4%). There was no statistically significant relationship between the site of the thickening in relation to the placenta, or the probability of the thickening disappearing.

The computerized delivery room records of the 72 women with local myometrial thickening were compared with those of a sample control population of 8000 women, and no statistically significant differences were found with regard to length of pregnancy or birth weight.

DISCUSSION

Ultrasonic demonstration of local myometrial thickening was investigated prospectively to define its incidence and nature. Hicks^{4,7} described the clinical findings of uterine

contractions throughout pregnancy, and postulated their usefulness in the diagnosis of pregnancy. He did not elaborate on whether all of these contractions were subclinical as far as the patients were concerned, but he did state that he could detect them from the first trimester onward, and that the contractions seemed to occur intermittently. They were described as sporadic, painless and non-rhythmic. Of the 5521 women in our study, only 72 (1.3%) between 7 and 20 weeks' gestation showed local myometrial thickening. This reduced incidence compared with other studies^{2,3} may have been due to the exclusion from our study of the retroplacental decidua basalis reaction and short-term contractions as described by De Vries and colleagues².

Of the local myometrial thickening, 86% occurred in the posterior uterine wall, and the same percentage were under the placenta. This may be due to a combination of the following reasons:

- (1) The placental implantation site favors the formation of myometrial contractions;
- (2) Myometrial irritability is slightly greater in areas under the placental implantation; or
- (3) The contractions under the placenta are more easily demonstrated or visualized.

The local myometrial thickening disappeared in 96% of cases after ritodrine hydrochloride treatment, and in 80% without treatment (of no statistical significance), suggesting that the phenomenon is time-limited and resolves spontaneously. Recently, a number of articles described very short-term rapid uterine contractions^{2,3,8,9} that passed through the uterus quickly and did not resemble the contractions described in our paper. Karis and colleagues¹⁰ emphasized the importance of recognizing these contractions. They reported 14 cases in which contractions in the lower uterine segment resulted in an appearance that simulated preterm dilatation of the endocervical canal. Although our report does not explain the clinical significance or etiology of local myometrial thickenings, it does firmly establish their nature as focal uterine contractions, and their presence in the first trimester of pregnancy.

Submucous leiomyomata could have initially posed a diagnostic dilemma, since they are capable of distorting a localized area of endometrium; however, repeat scans in that same region after a period of a week excluded this as a confounding factor.

As a result of our experience and the data presented above, we conclude that local myometrial thickenings noted on ultrasound examination probably represent transient uterine contractions, tend to appear early in pregnancy, are prolonged and may respond to ritodrine hydrochloride.

REFERENCES

1. Sample, W. F. (1978). The unsoftened portion of the uterus. *Radiology*, **126**, 227-30
2. De Vries, K., Lyons, E. A., Ballard, G., Levi, C. S. and Lindsay, D. J. (1990). Contractions of the inner third of the myometrium. *Am. J. Obstet. Gynecol.*, **162**, 679-82
3. Oike, K., Ishihara, K. and Kikuchi, S. (1990). A study on the endometrial movement and serum hormonal level in connection with uterine contraction. *Nippon Sanka Fujinka Gakkai Zasshi*, **42**, 86-92
4. Hicks, J. B. (1871). On the contractions of the uterus throughout pregnancy their physiological effect and their value in the diagnosis of pregnancy. *Trans. Obstet. Soc. London*, **13**, 216-31
5. Hicks, J. B. (1881). Further remarks on the use of the intermittent contractions of the pregnant uterus as a means of diagnosis. *Trans. Intern. Med. Congress London*, **4**, 271
6. Hicks, J. B. (1889). Why does the uterus contract during pregnancy? *Lancet*, **1**, 765
7. Hicks, J. B. (1894). On intermittent contraction of uterine fibromata in pregnancy in relation to diagnosis. *Med. Press Circular*, **May 9**, 481
8. Aichberger, L., Boldizsar, A., Herczeg, C., Obermair, A., Plockinger, B., Strohmer, H., Vatanparast, Z., Kemeter, P. and Feichtinger, W. (1991). Vaginal ultrasonographic observation of uterine contractions in embryo transfer and its relevance to treatment success. *Geburtshilfe Frauenheilkd.*, **51**, 27-30
9. Gross, D. T. and Ginther, O. J. (1988). Uterine contractions in nonpregnant and early pregnant mares and jennies as determined by ultrasonography. *J. Anim. Sci.*, **66**, 250-4
10. Karis, J. P., Hertzberg, B. S. and Bowie, J. D. (1991). Sonographic diagnosis of premature cervical dilatation. Potential pitfall due to lower uterine segment contractions. *J. Ultrasound Med.*, **10**, 83-7