

Serum Progesterone Levels in Abortions

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Summary

In the present study, serum progesterone levels were estimated in normal pregnancy, abortion and luteal phase of non-pregnant females. Total 110 patients were selected and divided into three (A,B,C) groups. Group A including 50 females with normal pregnancy. Group B comprised of 50 pregnant females with threatened abortions while group C consisted of 10 nonpregnant females. Serum progesterone level increased gradually from 6-20 wks in control group due to transfer of normal secretion from corpus luteum to placenta. The difference in serum progesterone levels in patients of group A and viable pregnancies of group B was not significant whereas when compared with non-viable pregnancies of group B it was statistically significant ($P < 0.01$). The difference in progesterone level between viable and nonviable pregnancies of group B was also significant ($P < 0.01$). Serum progesterone levels in patients with threatened abortion who progressed onto viability as compared to mean progesterone levels in patients with missed, complete, incomplete abortion and H. mole is statistically significant ($P < 0.001$).

Group C non-pregnant females showed mean serum progesterone 13.40 ± 3.86 ng/ml. The study concluded that measurement of progesterone levels in patients with complications of early pregnancy, especially in clinically more difficult cases can facilitate the diagnosis of non-viable pregnancy when progesterone level is found to be low as compared to that during normal pregnancy.

Introduction

Abortion is the termination of pregnancy before stage of viability. In majority of early abortions the casual factor has remained unidentified although several attempts have been made so far and numerous etiological factors identified e.g. ovular, foetal factors, maternal and paternal factors. Lack of sufficient knowledge on the physiology of early human pregnancy, most of therapeutic regimens used for treatment of imminent abortion have been of empirical nature. The poor efficiency of prevention and treatment of early abortion has inspired several researchers to study the physiology and pathophysiology of 1st trimester pregnancy. These studies have shown a prominent role of progesterone in maintaining early pregnancy (Ogasawara et al 1997 and Rajan 1998). Now a days progesterone assay has become readily available in major health centres and serum

progesterone can be measured precisely and rapidly. Progesterone is secreted by granulosa cells, its level starts increasing in the secretory phase of menstrual cycle. At 6-9 weeks of pregnancy which is the critical period, progesterone production is shifted from corpus luteum to placenta. Placenta can utilize cholesterol as a precursor to produce pregnenolone and ultimately progesterone.

The mean serum progesterone concentration increases gradually from 6 weeks (17 ng/ml) to 51 ng/ml at 20 weeks. Serum progesterone assay in case of threatened abortion has a prognostic value. As patients with signs of threatened abortion who progress to age of viability has slightly low progesterone levels as compared to normal pregnancy whereas in spontaneous, missed abortion serum progesterone concentration is < 15 ng/ml irrespective of period of gestation (Sangeeta and Ghosh, 1996).

The present study was aimed to compare serum progesterone levels of healthy gravidae and those exhibiting clinical signs of abortion. Low serum progesterone values are of great diagnostic and prognostic value in indicating non-viable pregnancy and facilitating clinical management in the form of hormonal supplementation in such cases. Supplementing this deficit with exogenous progesterone as to achieve normal progesterone blood levels may prevent abortions.

Selection of patients

The present study was conducted on 110 patients attending Gyane O.P.D. or presenting clinically as cases of abortion admitted in ward or Labour Room in the Department of Obstetrics and Gynaecology, DMC & H. These patients are grouped as :-

- Group A : 50 Females carrying 6-20 wks of normal pregnancy.
 Group B : 50 Females carrying 6-20 wks of pregnancy and presenting clinically as case of abortion (threatened, missed, complete, incomplete, H. Mole).
 Group C : 10 non-pregnant females in secretory phase of menstrual cycle were also taken to assess level of serum progesterone.

All the patients were 20-30 yrs of age had middle socio-economic status. Patients may be primigravida and 2 or 3 gravida. 60% patients had no previous abortion whereas 30% had one and 10% had two previous abortions. Gestational age was calculated from date of LMP and duration of pregnancy confirmed by history,

clinical examination and ultrasonogram as and when required. Patients with > 20 wks of gestation and irregular menstrual cycle were not included in the study. Patients with local cause of bleeding which may be cervical polyp, Ca cervix or local trauma were excluded.

Routine investigation like Hb, Urine, ABO, Rh, VDRL, RBS were done. Special investigation including antibodies to toxoplasma, cytomegalovirus and hepatitis were done in study group as and when indicated.

Method

Blood sample collected immediately after admission to hospital before any treatment was started which comprised of tocolytic progesterone, sedation and strict bed rest. Serum progesterone was estimated by ELISA-KIT (Boehringer Mannheim Immunodiagnostic) using Spectrophotometer Hitachi - 2000.

Results

In group A, normal pregnant females had mean serum progesterone level 27.35±1.10 ng/ml with a range of 15.90-51.92 ng/ml and then there was a gradual rise in progesterone levels till 20 wks of pregnancy (Table I). There were no patients at 17 & 19 wks of gestation. In group B, abnormal pregnant females were further grouped according to type of abortion i.e. threatened (viable and non-viable), missed, complete, incomplete, and H. mole. Serum progesterone levels in different subgroups (Table II) were calculated and compared with normal pregnancy (Group A) and among all subgroups

Table - I : Serum progesterone in Group-A according to period of gestation.

| Gestational Age (wks) | No. of Patients | Serum progesterone ng/ml Mean±S.D. | Range |
|-----------------------|-----------------|------------------------------------|---------------|
| 6 | 10 | 17.40 ± 0.71 | 15.90 - 18.90 |
| 7 | 6 | 20.47 ± 0.74 | 19.13 - 21.61 |
| 8 | 7 | 22.92 ± 1.47 | 20.92 - 25.45 |
| 9 | 4 | 18.11 ± 0.44 | 17.54 - 18.74 |
| 10 | 5 | 24.63 ± 1.19 | 23.60 - 26.84 |
| 11 | 1 | 27.42 ± 0.00 | 27.42 - 27.42 |
| 12 | 4 | 29.16 ± 0.83 | 28.60 - 30.62 |
| 13 | 1 | 33.3 ± 0.00 | 33.3 - 33.3 |
| 14 | 3 | 36.81 ± 2.26 | 34.62 - 39.92 |
| 15 | 2 | 44.82 ± 1.90 | 42.92 - 46.72 |
| 16 | 3 | 46.01 ± 1.45 | 44.62 - 48.0 |
| 18 | 1 | 50.04 ± 0.00 | 50.04 - 50.04 |
| 19 | 3 | 50.58 ± 1.75 | 49.21 - 51.92 |
| Total | 50 | 27.35 ± 1.10 | 15.90 - 51.92 |

Table - II Mean serum progesterone in different subgroups of Group B.

| Subgroups | No. of Patients | Serum progesterone ng/ml (Mean+S.D.) | Range |
|---------------|-----------------|--------------------------------------|---------------|
| a. Threatened | | | |
| i) Viable | 13 | 25.57 ± 8.18 | 15.03 - 38 |
| ii) Nonviable | 7 | 11.10 ± 1.50 | 8.56 - 13.29 |
| b. Missed | 15 | 4.35 ± 2.19 | 1.1 - 8.77 |
| c. Complete | 8 | 3.49 ± 0.89 | 2.30 - 4.90 |
| d. Incomplete | 5 | 8.23 ± 1.57 | 6.23 - 10.20 |
| E. H. mole | 2 | 85.81 ± 1.80 | 77.97 - 93.64 |

of study group B.

The difference in mean serum progesterone level in patients with threatened abortion who progressed onto viability as compared to mean serum progesterone levels in patients with missed, complete, incomplete or H. mole pregnancy is statistically significant ($P < 0.001$). The difference in mean serum progesterone levels in patients with threatened abortion who progressed onto non-viability as compared to missed, complete, incomplete, H. mole is statistically significant ($p < 0.001$). The mean progesterone levels between normal pregnant (27.35 ± 10) & Patients with threatened abortion with viable progesterone (25.57 ± 8.18) is not statistically significant.

Two patients who presented as molar pregnancies had progesterone 85.81 ± 1.80 ng/ml considerably higher than that found in normal pregnant females at the same gestation is also statistically significant ($p < 0.01$).

Serum progesterone level in 10 non-pregnant females in luteal phase of cycle (group-C) was 13.40 ± 3.86 ng/ml which were not statistically significant when compared to study group B whereas serum progesterone levels are significantly higher in group A as compared to both Group B and C ($P < 0.01$) Table - III.

Table - III: Comparative levels of serum progesterone in different groups.

| Group | Progesterone (ng/ml) |
|-------|----------------------|
| A | 27.35 ± 1.10 |
| B | 14.30 ± 17.71 |
| C | 13.40 ± 3.86 |

Discussion

As progesterone has a role in early pregnancy maintenance and quiescent effect on the uterus, it was planned to study the role of progesterone in abortion and normal early pregnancy and in secretory phase of

non-pregnant females. Over the last twenty years many hormones have been measured in plasma and urine in early pregnancy in order to find a more accurate prognostic test which could be used in management of abortion. Unfortunately there have been difficulties in interpreting individual results in part caused by the wide range of normal values seen in early pregnancy (Nygren et al 1973). These studies have shown a prominent role of progesterone in maintenance of early pregnancy. It may be one of the essential substance that contributes to immunoendocrine network.

Abnormal early gestation or recurrent spontaneous abortion had low progesterone levels than those of viable intrauterine pregnancies. Progesterone production becomes exclusively placental before 16th wks of pregnancy, since a placenta incapable of producing sufficient progesterone is unlikely to be able to carry out the numerous other functions essential for foetal survival and development. Progesterone therapy is effective only before 16th wks and its continuation after that time is useless and unnecessary (Johansson, 1970).

The mean serum progesterone level in normal pregnant females (Group-A) with 6-20 wks gestation was 27 ± 1.10 ng/ml with range 15.9 - 51.92 ng/ml which is in agreement with Ewa Radwanska 1978. Its level rises gradually from 6 wks to 8 wks from 17.14 ± 0.71 to 22.92 ± 1.47 and there is slight dip at 9 wks 18.11 ± 0.44 due to declining function of corpus luteum and change over of its function to the maternal trophoblast tissue at 6-9 weeks. Similar dip in progesterone levels has been reported by Dawood Yussoff 1976 and Sangeeta & Ghosh, 1996. The serum progesterone showed continuous rise from 10 wks of gestation to 20 wks.

Serum progesterone in patients with threatened abortion progressing onto viability had progesterone level similar to normal pregnant women whereas patient having non-viable threatened abortion had significant lower progesterone.

Serum progesterone levels in missed, complete,

incomplete abortion was 7.9 ngm/ml whereas in hydatidiform mole it is 85.81 ngm/ml. This three fold increase in molar pregnancy was also observed by Sangeeta & Ghosh, 1996.

Serum progesterone levels in the luteal phase of normal menstrual cycle in the non-pregnant female was 13.40 ± 3.86 ng/ml (Table III). Our results are in accordance with Ewa Radwanska et al (1978) who had reported that progesterone production in the luteal phase follows a parabolic curve. The present study has shown the highest on 21st day of menstrual cycle in the secretory phase and then declining. Patients in group C who had low serum progesterone levels could be future candidate for pregnancy wastage.

It is concluded that measurement of progesterone levels in patients with complications of early pregnancy, especially in clinically more difficult cases, can facilitate the diagnosis of non-viable pregnancy when the progesterone levels is found to be below that encountered during normal pregnancies. The patients who had pregnancy with low serum

progesterone values could be saved from pregnancy wastage by progesterone supplementation. Further pregnancies associated with normal progesterone levels are potentially salvageable and in such patients generally measures employed in the treatment are justified. In borderline value, serial progesterone estimation should provide useful information and should be treated as guide in clinical management.

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