Thyroid Function Before and After Induced Abortion in Normal Pregnant Women

HIDEO HARA, YOSHIO BAN, YOSHIO MORITA, AND RYUJI SATO
The 3rd Department of Internal Medicine, Showa University School of Medicine, Tokyo 142, Japan

Abstract. We assessed thyroid function before and after induced abortion in 25 normal pregnant women. Serum TSH was significantly increased (P<0.02), and serum hCG-β was significantly reduced (P<0.001) 1 week after induced abortion, compared with the levels before induced abortion. There was a significant negative correlation between hCG-β and TSH, and a positive one between hCG-β and FT4 before induced abortion (P<0.02). No difference was observed in thyroid hormones before and 1 week after induced abortion. The results suggest that hCG stimulates the thyroid gland, gaining an advantage over TSH, in normal pregnant women.

Key words: Pregnant women, Thyroid function, Induced abortion, hCG.

SOME REPORTS have mentioned changes in thyroid hormones and the existence of some cases among normal pregnant women in which there was thyrotoxicosis [1, 2]. Previously, we reported that TSH showed a tendency to be reduced in the first trimester of pregnancy, using a highly sensitive immunoradiometric assay and checking thyroid functions before and after evacuation in patients with hydatidiform mole, to clarify the influence of hCG on thyroid function [3].

We report here thyroid function before and after induced abortion in normal pregnant women.

Subjects and Methods

The subjects were 63 normal pregnant women (average age: 25.2±4.1 and average weeks of pregnancy: 7.5±2.0), and induced abortion was performed on 25 (average age: 24.7±3.5 and average weeks of pregnancy: 7.5±1.9) out of 63. Serum samples were obtained before (at 1330 h), 2 h after induced abortion (at 1530 h) and 1 week after induced abortion (at 1330 h), and measurements were made of serum thyroid hormones, human chorionic gonadotropin (hCG)-β (as hCG), cortisol, thyroid stimulating hormone (TSH), αTSH (as α subunit), and TSH-β. The methods used were RIA for TSH-β, α TSH, cortisol, free thyroxine (FT4) and free triiodothyronine (FT3), and a highly sensitive immunoradiometric assay (IRMA) for TSH and hCG-β.

The results were expressed as the mean ± SD, and Student's paired t-test was used for statistical testing.

Results

Serum TSH levels in normal pregnant women without induced abortion and serum hCG-β, TSH, TSH-β, thyroid hormones, cortisol and α TSH levels in normal pregnant women before and after induced abortion

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Correspondence to: Dr. Hideo HARA, The 3rd Department of Internal Medicine, Showa University School of Medicine, 1-5-8 Hatanodai, Shinagawaku, Tokyo 142, Japan.
Table 1. Serum levels of hCG-β, TSH, TSH-β, FT4, FT3, cortisol, and α-TSH in normal pregnant women before and after induced abortion

<table>
<thead>
<tr>
<th></th>
<th>Before induced abortion</th>
<th>2 h after induced abortion</th>
<th>1 week after induced abortion</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>25</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>24.7±3.5</td>
<td>24.7±3.5</td>
<td>24.4±3.8</td>
</tr>
<tr>
<td>Gestational weeks</td>
<td>7.5±1.9</td>
<td>(7.5±1.9)</td>
<td>(8.8±1.6)</td>
</tr>
<tr>
<td>hCG-β (ng/ml)</td>
<td>163.3±117.7</td>
<td>119.1±84.2*</td>
<td>8.9±6.7**</td>
</tr>
<tr>
<td>TSH (μU/ml)</td>
<td>1.06±0.97</td>
<td>0.86±0.66</td>
<td>1.30±0.63***</td>
</tr>
<tr>
<td>TSH-β (ng/ml)</td>
<td>0.49±0.25</td>
<td>0.40±0.17</td>
<td>0.44±0.20</td>
</tr>
<tr>
<td>FT4 (ng/dl)</td>
<td>1.18±0.14</td>
<td>1.19±0.15</td>
<td>1.15±0.16</td>
</tr>
<tr>
<td>FT3 (pg/ml)</td>
<td>3.60±0.68</td>
<td>3.18±0.56*</td>
<td>3.48±0.42</td>
</tr>
<tr>
<td>Cortisol (ng/dl)</td>
<td>9.55±2.79</td>
<td>12.80±5.21***</td>
<td>10.25±3.82</td>
</tr>
<tr>
<td>α-TSH (ng/ml)</td>
<td>&gt;10</td>
<td>—</td>
<td>2.12±1.78</td>
</tr>
</tbody>
</table>

T4, thyroxine; T3, triiodothyronine. Data are expressed as the means±SD. Significant difference from pregnant women before induced abortion by Student's paired t-test. *, P<0.001; **, P<0.01; ***, P<0.02.

Serum TSH levels in 38 normal pregnant women without induced abortion were 1.20±1.10 μU/ml, which was not significantly different from 1.50±1.31 μU/ml in 95 normal subjects. Ten cases (16%) showed values lower than the normal value.

Four of 25 women who underwent induced abortion, whose TSH levels were lower than the normal value before induced abortion, had serum TSH levels within normal limits 1 week after induced abortion.

Serum hCG-β, TSH, FT4, FT3, TSH-β, α-TSH, and cortisol levels before, 2 h after and 1 week after induced abortion are shown in Table 1. Serum hCG-β levels 2 h after and 1 week after induced abortion were reduced significantly (P<0.001, and P<0.01, respectively) compared with the levels before induced abortion. Serum TSH levels were increased significantly (P<0.02) 1 week after induced abortion compared with the levels before induced abortion, but there was no significant difference from the levels 2 h after induced abortion.

No significant difference was observed in serum FT4 levels at any time. However, the levels of FT3 were reduced significantly (P<0.001) 2 h after induced abortion compared with the levels before induced abortion, but they were increased significantly (P<0.05) 1 week after induced abortion compared with those 2 h after induced abortion.

Serum cortisol levels increased significantly (P<0.02) 2 h after induced abortion compared with the levels before induced abortion.

No difference in serum TSH-β levels was observed at any time. However, serum α TSH levels were higher than 10 ng/ml in all cases before induced abortion, normal values being 1.87±1.71 ng/ml in premenopausal women, and after induced abortion, they were reduced significantly.

Correlations between serum TSH levels and serum hCG-β levels and between serum thyroid hormones levels and serum hCG-β levels

The correlation between serum hCG-β levels and serum TSH levels before induced abortion is shown in Fig. 1. A significantly negative correla-
Fig. 1. Correlation between serum TSH levels and serum hCG-β levels in normal pregnant women before induced abortion.

Fig. 2. Correlation between serum FT4 levels and serum hCG-β levels in normal pregnant women before induced abortion.

tion was exhibited ($r = -0.475, P < 0.02$), but there was no significant correlation between the two levels 2 h after and 1 week after induced abortion.

A positive correlation was observed between serum hCG-β levels and serum FT4 levels before induced abortion as shown in Fig. 2 ($r = 0.483, P < 0.02$). However, no significant correlation was observed between serum hCG-β levels and serum FT3 levels at any time.

There was no significant correlation between serum TSH-β levels and serum hCG-β levels, between serum αTSH levels and serum hCG-β levels, or between the balance of serum hCG-β levels before and after induced abortion and that of serum TSH levels.

Discussion

It is known that some patients with hyperemesis gravidarum and in normal pregnancy exhibit thyrotoxicosis [4, 5, 6, 7], and it is important to study the influence of human chorionic gonadotropin (hCG) on thyroid function in normal pregnancy. However, not all patients with hCG-producing tumors and hydatidiform mole always exhibited thyrotoxicosis [8, 9, 10, 11], and it is doubtful that hCG itself stimulates the thyroid gland. We previously suggested that a substance other than hCG might stimulate the thyroid gland by assessing thyroid function in patients with hydatidiform mole before and after evacuation and the same function in normal pregnant women [3]. And we reported how the existence of the chorionic villus exerted an influence on the thyroid gland in normal pregnant women.

There are many reports indicating that TSH is reduced in the first trimester of pregnancy [1, 2, 4]. However, in the present assessment, no difference was observed in TSH in the first trimester of pregnancy from the normal value, though the value was slightly low, and ten cases (16%) had TSH lower than the normal value even though thyroid function was normal. We can assume that some substance stimulates the thyroid gland in pregnancy from the fact that TSH in all the cases was found in the normal range 1 week after induced abortion and that no difference was seen in FT4 before and after induced abortion, though TSH increased significantly ($P < 0.02$) compared with its value before induced abortion. And it is considered that a mechanism of the chorionic villus-thyroid gland rather than the pituitary-thyroid gland is active in the first trimester of pregnancy from the evidence that all cases which had TSH values below the normal value showed signs of its restoration to the normal range after induced abortion, and that hCG-β and FT4 exhibited a positive correlation ($P < 0.02$) before in-
duced abortion and further hCG-β and TSH were in a negative correlation (P<0.02). Since the villus may stimulate the thyroid gland but not convert FT4 into FT3 in peripheral tissues and the receptor sensitivity to thyroid hormones may be transformed in pregnancy as changes in receptor concentrations occur in cells [12], there was no correlation between FT3 and hCG-β at any time. Because hCG could not relate to synthesis of TSH-β, we did not observe a significant correlation between the two.

Since the cross-reactivities of LH and FSH to hCG-β in the IRMA were very low and there was a significant correlation between hCG and hCG-β (r=0.725, P<0.001), the IRMA was able to detect serum hCG much more specifically than RIA, so we used the IRMA to measure serum hCG.

It is presumed that hCG stimulates the thyroid gland in some way from the report that hCG-β and α subunit are synthesized separately [13, 14], and also from the fact that 80–90% of biological activity is regained by recombination between hCG-β and the α subunit, and that hCG itself has biological activity [2, 15, 16]. The amino acid composition of hCG that normal chorionic villus secretes, might not be completely identical with the hCG-like substance from hCG-producing tumors and hydatidiform mole.

TSH-β showed no evident change in pregnancy, from which it was presumed that there is no possibility that TSH-β is secreted from the chorionic villus. On the other hand, serum α subunit (αTSH) increased remarkably in pregnancy, suggesting that it is secreted from the chorionic villus, and it is considered that hCG, including a subunit, acts on the receptor of the thyroid gland.

A significant reduction in FT3 (P<0.001) was observed 2 h after induced abortion, and it was presumed that a transient state of nonthyroidal illness was brought about by a significant increase in cortisol (P<0.02) due to operative invasion rather than the influence of an anesthetic [17, 18].

From these results, it is concluded that hCG of chorionic villus origin in the first trimester pregnancy state closely resembles a TSH-like substance, it stimulates the thyroid gland, and that hCG acts on the thyroid gland, gaining an advantage over TSH in normal pregnant women.

References


