

The Influence of the Gyne-T 380S IUD on Menstrual Blood Loss and Iron Status

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The influence of the Gyne-T 380S intrauterine contraceptive device (IUD) on menstrual blood loss (MBL) and iron status (hemoglobin, hematocrit, red cell count and indices, and serum ferritin) was evaluated. MBL was determined objectively by the alkaline hematin method in 18 women (mean age 37.1 ± 1.6 yr, range 22–46 yr) before and 3, 6 and 12 months after insertion of a Gyne-T 380S IUD. MBL prior to IUD insertion was 59 ± 8 ml and increased to 91 ± 11 ml ($p < 0.01$) 3 months after insertion. MBL then remained largely unchanged during the remainder of the observation period (6 months, 94 ± 12 ml; 12 months, 92 ± 13 ml). The percentage increase in MBL at the respective measurement points ranged between 54 and 59% which is comparable with previous reports regarding the increase in MBL associated with the use of a copper IUD. There were no significant changes recorded in iron status parameters during the 12-month observation period following IUD insertion. Based on the results of the present study, women from developed countries apparently tolerate an increased MBL of approximately 55% without developing iron deficiency anemia. Iron stores were unchanged indicating an adequate adaptive increase in intestinal iron absorption. CONTRACEPTION 1995;52:175–179

KEY WORDS: intrauterine device, menstrual bleeding, contraception, iron status, ferritin

Introduction

The use of an intrauterine device (IUD) for contraceptive purposes varies considerably between different countries and in different age groups of women.¹ IUDs are a relatively uncommon method of contraception in North America compared to Scandinavia and many other European countries.¹ Recent epidemiological studies from Scandinavia have reported that approximately 6–10% of women

aged 20–24 years, 12–29% of women aged 25–29 years, and 30–40% of women aged 30–44 years are at present using an IUD for contraceptive purposes.^{2–4}

The majority of Scandinavian women are at present using a copper-bearing IUD (Gyne-T 380S and Nova-T are the most commonly used IUDs) although the use of an IUD releasing levonorgestrel (Levonova®)⁵ is increasing. Copper IUDs with a copper surface area of ≤ 250 mm² (e.g., Nova T) were most commonly used, but now the number of women using an IUD with a larger copper surface area, ≥ 375 mm² (e.g., Gyne-T 380S) has increased. The Gyne T 380 Slimline (Gyne-T 380S) is almost identical with the TCu 380A IUD and carries 320 mm² copper wire wound around its vertical stem and a copper sleeve at the ends of the transverse arm adds an additional 60 mm² to the surface area. The use of the Gyne-T 380S/TCu 380A has been reported to provide certain advantages over other copper IUDs with a smaller copper surface area, e.g., lower cumulative pregnancy rate, reduced risk of ectopic pregnancy and longer life span.^{1,6–10}

An increase in menstrual blood loss (MBL) is one of the commonest side effects associated with the use of an intrauterine contraceptive device.^{11–14} The increase in MBL has been shown to vary according to the type of IUD used, in particular the surface area of the IUD.^{15,16} Earlier studies have, however, demonstrated that an increase in copper surface from 250–375 mm² does not increase MBL.^{17,18} As far as we are aware there are no previous reports objectively evaluating the influence of the Gyne-T 380S IUD on menstrual blood loss. The aims of the study were to quantify the increase in MBL following insertion of a Gyne-T 380S IUD and to determine if changes in MBL influenced iron stores during a 12-month observation period.

Material and Methods

Twenty women who attended the Department of Obstetrics and Gynecology, East Hospital, Göteborg, for insertion of an IUD volunteered to participate in this study. All the women gave informed consent and the study was approved by the Ethics Committee, Faculty of Medicine, University of Göteborg. The women

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were healthy and none of them had a history or evidence of pelvic pathology as judged by clinical and gynecological examination. All the women had regular menstrual cycles, and at least six spontaneous menstrual periods after delivery, abortion or cessation of lactation, or a minimum of two spontaneous menstrual cycles after the use of hormonal or intrauterine contraception. Throughout the study, the following medications were not permitted: antifibrinolytic drugs, prostaglandin synthetase inhibitors, acetylsalicylic acid and iron replacement therapy.

MBL was determined during one control cycle prior to IUD insertion, during which time the women used barrier methods of contraception, and 3, 6 and 12 months after IUD insertion. The women were supplied with marked polythene bags for the collection of used sanitary pads and tampons. Detailed instructions were given to the women regarding steps to ensure that all bleeding was collected in the polythene bags, e.g., particular attention to avoid the loss of clots during micturition. MBL was calculated by spectrophotometric analysis of alkaline hematin extracted from pads and tampons with 5% NaOH.^{19,20} A Gyne-T 380S IUD was inserted postmenstrually. Menstrual pattern, possible intermenstrual bleeding and dysmenorrhea were recorded with bleeding charts during the control cycle prior to IUD insertion and during the 12 months after insertion.

A venous blood sample (one heparinized tube, 10 ml for blood hemoglobin and cell count, and one tube, 10 ml without anticoagulant for serum ferritin analysis) was taken prior to IUD insertion, and 3, 6 and 12 months after insertion. Samples were obtained between 8.00 and 11.00 hr, after a normal breakfast, on the 5th-12th day of the menstrual cycle. The women were instructed not to donate blood or perform blood tests during the study. Prolonged fasting was not permitted.²¹ Hemoglobin, hematocrit and erythrocyte indices were analyzed the same day. Serum (5 ml) was immediately frozen for later analysis of serum ferritin by a double-antibody-polyethylene glycol radioimmunoassay (Diagnostic Products Corp., Los Angeles, CA, USA).²¹ The properties of the assay in our hands have been described previously,^{17,21} as have the results from a comparison with an immunoradiometric assay²¹ and an immunochemiluminometric assay.¹⁶ Results from in-house quality controls (pooled human serum) indicated absence of change in imprecision or bias in this study compared with previous studies and with results from a large international quality assessment programme. All samples were assayed within a few days. For each individual, all samples were positioned next to each other in the assay runs to ensure minimal influence of assay imprecision.

Statistical Analysis

The results are expressed as means \pm SEM. Duncan's multiple range test was used for the evaluation of statistical significance ($p < 0.05$ was considered to be statistically significant).

Results

Eighteen of the 20 women who had an IUD inserted completed the 12-month observation period. One woman had her IUD removed after 2 months because of heavy menstrual bleeding and one woman was excluded from the study after 4 months because of an intercurrent, non-gynecological illness. No pregnancies occurred during the observation period.

Clinical details of the 18 women who completed the 1-year study period were as follows: age 37.1 ± 1.6 years, range 22-46 years; parity 1.7 ± 0.3 , range 0-4. All the women reported having a regular menstrual cycle both before and after IUD insertion. However, several women experienced one or more cycles with intermenstrual bleeding after IUD insertion. The duration of menstruation increased ($p < 0.001$) from 4.8 ± 0.2 days prior to IUD insertion to 6.1 ± 0.3 days following IUD insertion. There was no significant difference in the number of women suffering from dysmenorrhea following IUD insertion (before 4/18; after 5/18).

MBL prior to IUD insertion was 59 ± 8 ml and increased to 91 ± 11 ml ($p < 0.01$) during the menstruation 3 months after insertion. MBL then remained largely unchanged during the remainder of the observation period (6 months 94 ± 12 ml; 12 months 92 ± 13 ml). The percentage increase in MBL was 54%, 59% and 56%, respectively, 3, 6 and 12 months after IUD insertion (Table 1). Individual values of MBL determined before and 3, 6 and 12 months after IUD insertion are shown in Figure 1.

Table 1 also shows the results of analysis of serum ferritin, blood hemoglobin, hematocrit and erythrocyte indices. There were no significant differences in any of the hematological parameters following IUD insertion. Individual serum ferritin concentrations determined before, and 3, 6 and 12 months after IUD insertion are shown in Figure 2. The variations in serum ferritin concentration were seemingly unaffected by the insertion of an IUD (Figure 2). Five individuals had a low serum ferritin concentration ($< 10 \mu\text{g/l}$) prior to IUD insertion. In four of these women serum ferritin remained $< 10 \mu\text{g/l}$ during the remainder of the 1-year observation period. However, none of these women had a low hemoglobin concentration ($< 120 \text{g/l}$) at any time during the study period. Only one other woman of the remaining 13 women had at any time during the study a serum ferritin $< 10 \mu\text{g/l}$.

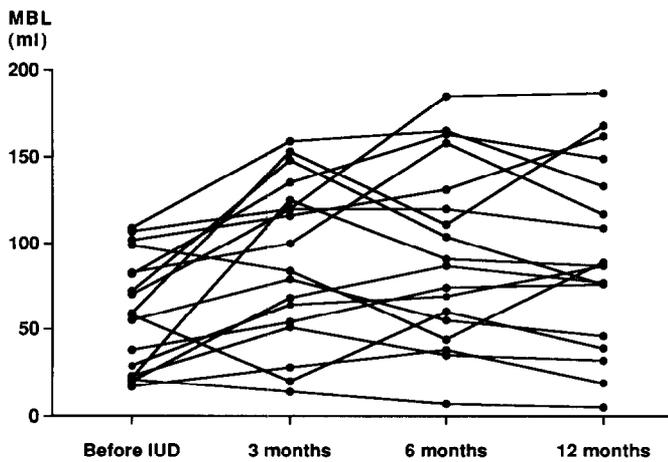


Figure 1. Individual values of menstrual blood loss (MBL) in the women before and 3, 6 and 12 months after insertion of a Gyne-T 380S IUD (n = 18).

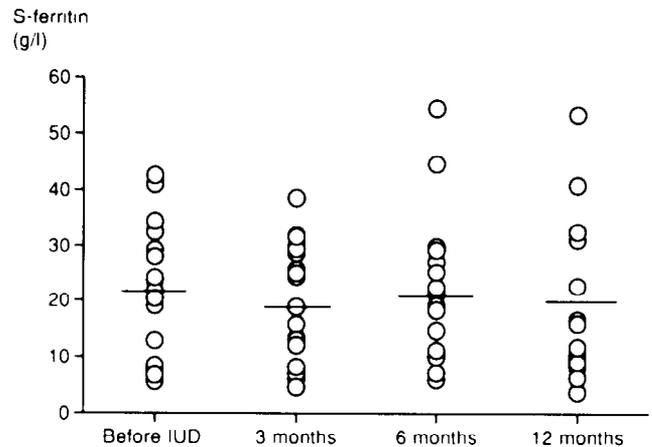


Figure 2. Individual values of serum ferritin concentration in the women before and 3, 6 and 12 months after insertion of a Gyne-T 380S IUD (n = 18).

Discussion

Increased or irregular uterine bleeding are potential drawbacks with intrauterine devices and within two years, about one in five users have been reported to give one of these reasons for discontinuing the method.^{16,22} It is well known that the use of an IUD is associated with an increase in MBL.¹¹⁻¹⁶ The extent of this IUD-induced increase in MBL has been shown to vary according to the type of IUD used, in particular the surface area of the IUD.¹⁵ The use of an inert IUD, e.g., Lippes Loop, has been shown to be associated with a 112-140% increase in MBL during the first year after insertion.^{12,15,16} The corresponding percentage increase in MBL recorded for copper-bearing IUDs such as the Cu-7, Cu-T 200, MLCu-250 and MLCu-375 has been smaller and has varied between 39-84%.¹²⁻¹⁸ In the present study the use of a Gyne-T 380S IUD was associated with a 54-59% increase in MBL, which is comparable with previous reports regarding the increase in MBL associated with the use of a copper IUD. The increase in MBL re-

corded at the measurement 3 months post-insertion remained largely unchanged during the remainder of the observation period.

The increased MBL associated with the use of an IUD has previously been reported to cause iron deficiency, and may lead to anemia or exacerbate existing anemia.^{13,15,23-25} Some studies have shown a decline in either circulating ferritin or hemoglobin after insertion of an IUD,^{15,23-24,26} while other studies have shown no effect.^{13,14} Kivijärvi et al.²⁵ compared the risk of developing iron deficiency and anemia in a group of Finnish women (n = 40) when using 3 different copper IUDs (Nova T, MLCu-375, and Fincoid) and a control group of women without an IUD (n = 20). About 20% of the intrauterine device users developed signs of iron deficiency and 10% had anemia after 12 months of IUD use. The occurrence of anemia did not correlate with the subjective evaluation of the amount of bleeding.

Menstrual blood loss in this study, prior to IUD insertion, was 59 ml which corresponds well with

Table 1. Menstrual blood loss (MBL) and hematological parameters (mean ± SEM) before, and 3, 6 and 12 months after IUD insertion; the normal range for each hematological parameter is shown in brackets

	Before	3 Months	6 Months	12 Months
MBL, ml	59 ± 8	91 ± 11*	94 ± 12*	92 ± 13*
(% increase)		54%	59%	56%
Serum ferritin (11-120 µg/l)	22 ± 2.8	20 ± 2.5	22 ± 3.0	20 ± 3.6
Hemoglobin (116-149 g/l)	131 ± 2.5	128 ± 2.4	131 ± 2.6	130 ± 1.9
Hematocrit (35-44%)	38 ± 0.7	38 ± 0.7	38 ± 0.7	39 ± 0.6
Erythrocyte count (3.7-4.8 × 10 ¹² /l)	4.2 ± 0.1	4.2 ± 0.1	4.3 ± 0.1	4.3 ± 0.1
MCV (82-102 fl)	91 ± 0.9	90 ± 1.3	89 ± 1.1	89 ± 1.1
MCH (28-35 pg)	31 ± 0.3	31 ± 0.4	31 ± 0.4	30 ± 0.5
MCHC (320-360 g/l)	342 ± 2.3	342 ± 1.2	344 ± 1.8	339 ± 3.1

No significant difference between measurement before insertion and respective measurement after insertion unless indicated by: * = p < 0.01 (Duncan's multiple range test).

earlier studies performed by our group during the 90's.^{17,18} Earlier studies,^{12,13,15} performed in the 1970's, have reported a somewhat lower menstrual blood loss (32-37 ml) during objective control measurements. There are several possible explanations for this discrepancy noted in reported menstrual blood loss between studies performed in the 70's and our studies performed in the 90's. Studies performed in the 70's, objectively evaluating MBL, relied on manual extraction of blood from sanitary towels or tampons with 5% sodium hydroxide solution. This entailed pressing (using rubber gloves) out the solution containing alkaline hematin from the towels and tampons. In recent years we have used a machine (Stomacher blender) to press out the solution containing alkaline hematin. It is possible that this is a more effective means of pressing out the hematin solution and may result in higher MBL values. However both these techniques have been evaluated methodologically with recovery studies. Hallberg and Nilsson¹⁹ in the early 60's performed recovery studies and we have also performed recovery studies in our laboratory. A known amount of blood was added to the sanitary towels. The towels were left for several days and then the accuracy of the amount recovered was evaluated. The recovery was found to always exceed 95% and was often close to 100% with the Stomacher blender.

Another possible factor is the woman's technique of collecting the sanitary towels and tampons. It is extremely important that all menstrual blood is collected by the women. This is especially important during visits to the toilet and women should be advised to pay particular attention to avoid the loss of clots during micturition. At our unit we have considerable experience of MBL measurements and our staff are well aware of the importance of informing the study women regarding this point.

Hallberg et al.²⁷ demonstrated in their classic paper from 1965 that the mean blood loss in a population sample of 476 women was 43 ± 2.3 ml. The studies^{12,13,15,17,18} compared above were based on smaller numbers of patients and hence the mean control value before intervention may differ from the accepted mean based on a large population sample. It is also possible that women in the 90's have a higher menstrual blood loss today, either a greater physiological loss or a greater observed loss due to more effective collection with modern sanitary protection.

In the present study, there were no significant changes in any of the studied hematological parameters during the 12-month observation period, despite the fact that iron replacement therapy was not permitted. None of the women included in this study developed anemia despite the fact that MBL increased

by approximately 55%. The analysis of serum ferritin has been demonstrated to be a reliable indicator of iron deficiency.²⁸ In the present study, there were no significant changes in serum ferritin after IUD insertion. The results from this study illustrate the adaptive increase of intestinal iron absorption following changes in blood loss. Women with a low daily intake of iron, or intake of dietary components that inhibit iron absorption, may suffer more from the increased blood loss associated with the use of an IUD. However, none of the women included in this study with low serum ferritin concentrations or with a decrease to low concentrations after IUD insertion had such a limitation of their iron stores that the synthesis of hemoglobin was compromised. Thus, based on the results of the present study, women from developed countries apparently tolerate an increased MBL of approximately 55% without developing anemia. However, women with gastrointestinal disorders affecting iron liberation from food, mucosal uptake and/or transport from the intestines via the blood or lymphatics may be more sensitive to an increased demand for iron. In developing countries, a similar increase in MBL may well result in anemia due to a concomitant poorer dietary intake of iron and multiparity.

This study confirms our earlier reports^{17,18} that women may have a serum ferritin concentration as low as 5 $\mu\text{g/l}$ for several months/years without developing iron-deficiency anemia. This observation is of interest when considering the decision limit for serum ferritin in the evaluation of anemia. By tradition, limits of 10 or 12 $\mu\text{g/l}$ have been used to indicate depleted iron stores in an anemic patient.²⁸ Several women in our study had low iron stores throughout the study, which was unaffected by the increased blood loss. In healthy volunteers subjected to repeated phlebotomy, we have found undetectable serum ferritin values ($< 2 \mu\text{g/l}$) when the subjects could no longer maintain their blood hemoglobin concentration.²⁸ Thus, based on both these earlier reports and the results of the present study, a serum ferritin concentration of approximately 4 $\mu\text{g/l}$ would appear to be a more appropriate decision limit for the diagnosis of depleted iron stores requiring replacement therapy.

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