Operacja ginekologiczna jako przyczyna zobiektywizowanego stresu u kobiet

Gynaecological operation as an objective stressor in women

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Streszczenie

Cel pracy: *Celem pracy była próba określenia przydatności Liczbowej (Numerycznej) Skali (0-10), stosowanej do oceny natężenia bólu i stężenia prolaktyny (PRL) w surowicy krwi dla oceny stresu psychologicznego u pacjentek poddawanych interwencji chirurgicznej na oddziale ginekologicznym.*

Materiał i metodyka: *Badaniami objęto 200 pacjentek z różnymi schorzeniami ginekologicznymi, operowanych w Katedrze i Klinice Andrologii i Rozrodczości Akademii Medycznej im. F. Skubiszewskiego w Lublinie. Narzędzia badawcze stanowiły kwestionariusz ankiety i arkusz do analizy dokumentacji, własnej konstrukcji oraz Numeryczna Skala 0-10 do oceny poziomu stresu. Ponadto oznaczano poziom prolaktyny w surowicy krwi jako obiektywny marker reakcji stresowej. Istotność różnic między badanymi cechami sprawdzono testem U Manna-Whitneya oraz Kruskala-Wallisa. Do porównania cech badanych na dwóch poziomach w grupach zależnych użyto testu kolejności par Wilcoxona. Przyjęto 5% błąd wnioskowania i związany z nim poziom istotności p<0,05, wskazujący na istnienie znamiennych statystycznie różnic.*

Wyniki: *Wyższy poziom stresu zaznaczały badane w okresie przedoperacyjnym, niż po operacji (p<0,001). Znamiennie wyższe stężenie PRL obserwowano u kobiet w okresie pooperacyjnym (p<0,001). Nie stwierdzono korelacji między subiektywnym poziomem stresu a stężeniem PRL w okresie oczekiwania na operację (p=0,254). U pacjentek, które deklarowały wyższy poziom stresu, stwierdzono wyższy poziom PRL w okresie pooperacyjnym. Najwyższy poziom PRL po operacji obserwowano u pacjentek po laparoskopii i laparoskopii z histeroskopią, a najniższy u tych po histeroskopii.*

Wnioski: *Interwencja chirurgiczna, niezależnie od rodzaju schorzenia i rozległości operacji, była sytuacją stresującą w odczuciu kobiet. Subiektywna ocena pacjentek wskazywała na wyższy poziom stresu podczas oczekiwania na zabieg, odwrotnie do zachowania się prolaktyny, której stężenie było wyższe w pierwszej dobie po operacji. Prolaktyna nie była obiektywnym markerem stresu psychologicznego w badanej grupie. Uraz związany z interwencją zabiegową, jako stresor biologiczny indukował wzrost stężenia hormonu w surowicy krwi w okresie pooperacyjnym.*

Słowa kluczowe: **operacje ginekologiczne** / **prolaktyna** / **stres** / **kobieta** /

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Abstract

Objectives: *The purpose of the study was to verify the usefulness of Number Scale of 0-10 points (used to assess pain) and the concentration of prolactin (PRL) in the blood serum for the evaluation of stress in patients undergoing surgical intervention on gynaecological wards.*

Material and methods: *The study was carried out among 200 patients with different gynaecological illnesses operated in The Department of Reproduction and Andrology Skubiszewski Medical University of Lublin. The study used a questionnaire and Medical Documentation Analysis Sheet, especially constructed for the purpose of study, and Numerical Scale 0-10 to self-evaluate the stress level. Moreover, prolactin (PRL) concentration as a marker of stress reaction in the blood serum has been evaluated as well. The differences were determined by U Mann-Whitney and Kruskal-Wallis tests. Wilcoxon's test was used to compare the parameters examined on two levels in dependent groups. The calculations assumed 5% conclusion error and p<0.05 as statistically significant different.*

Results: *The patients reported higher stress prior to the operation than after it (p<0.001). PRL concentrations were significantly higher in the patients after the operation (p<0.001). No correlation between subjective level of stress and PRL concentrations before operation (p=0.254) have been found. The patients who reported higher stress had higher PRL concentrations in the postoperative period. The highest PRL concentrations were observed in the patients who underwent laparoscopy and laparoscopy with hysteroscopy and the lowest values were noted among the patients after hysteroscopy.*

Conclusions: *Surgical intervention was perceived by women as stressful, disregarding the type and extent of an operation. Patients' subjective evaluation revealed higher stress level before the operation while they were waiting for the surgery. Contrary to that, prolactin concentration was higher in the first day after the surgery. Therefore, prolactin was not an objective marker of psychological stress in the examined group. Trauma caused by surgical intervention as a biological stressor induced an increased prolactin concentration in blood serum during the post-operative period.*

Key words: **gynaecolocical operation** / **prolactin** / **stress** / **women** /

Introduction

Surgical intervention is a continuously more common therapeutic method, used to treat gynaecological diseases.

Carlson, et al. [1] reported 90% hysterectomies were performed for other than oncological reasons. According to Crosignani, et al. [2] every third woman in America had hysterectomy performed before the age of 65.

Diagnosis of gynaecological disease that requires surgical treatment is very difficult for many women, as it concerns her intimate life, often bearing the connotation of loss of femininity. In addition, an operation is a strong stressor initiating an array of psycho-emotional, metabolic and hormonal changes [1, 2, 3, 4]. The stressor triggers physio-chemical changes on the cellular level and systemic neurohormonal response [7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20].

According to Roberts, et al. [21] stress or abnormal reactions to stress increase the activity of the sympathetic nervous system and adrenal medulla. In acute phase of response to stress the levels of circulating adrenaline and noradrenaline increase rapidly and the hypothalamus-pituitary-adrenals system is activated.

There are many hormonal and immune markers of response to stress, prolactine being one of them [7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20].

Objectives

The purpose of the investigation was to verify the usefulness of Number Scale of 0-10 points (used to assess pain) and the concentration of prolactin (PRL) in the blood serum for the evaluation of stress in patients undergoing surgical intervention on gynaecological wards.

Material and methods

A cross-sectional study of 200 consecutive patients with different gynaecological problems who were operated in gynaecological ward.

The investigation was carried out in The Department of Reproduction and Andrology, F. Skubiszewski Medical University of Lublin from February 1, 2003 to July 31, 2003.

The study was conducted in the group of 200 consecutive patients with different gynaecological problems who were treated surgically in the Department.

The patients who had diseases associated with increased blood prolactin levels detected were excluded from the study.

The patients were 16-78 years old (mean 36.3±10.1 years). Almost in half of the women examined (87, i.e. 43.5%) infertility had been detected and the other 113 women (56.5%) had other gynaecological diseases. Gross patients (177, i.e. 88.5%) had undergone endoscopy, 15 women (7.5%) classic laparotomy and 8 (4.0%) other surgical procedures.

Over the entire period the patients were hospitalized in standard hospital setting with night rest from 22.00-6.00.

The therapeutic team consisted of 12 doctors and 16 nurses/midwives. On admission, the women were shown round the ward and presented with ward routine. The managing doctor explained the essence of the procedure to each patient and informed about possible necessity to extend the operation. Each patient signed informed a consent.

Each patient was given information about the exact time and date of the operation and position on the operating table. The day before the operation patients met an anesthesiologist. All patients were given diazepam 5mg as premedication.

Each patient was fasting from 1 pm but was allowed to drink until 10 pm. The midwife prepared the operative area. The day before the operation patients were administered laxatives Bisacodyl 10mg. Some patients were also given enema if the laxative had not been efficient.

The next morning the midwife administered prescribed premedication, asked a patient to stay in bed and looked after her until the beginning of the operation.

After the patient returned from the operating theatre, midwives monitored vital parameters, transfused fluids and administered analgesics (Tramal 100mg or 50mg) prescribed by the anesthesiologist. The patients were administered analgesics on request however, not more frequently than every 3 hours. Above that, midwives would encourage the patients to verbalize their feelings and reported troubling findings to the doctor on duty. They also performed necessary nursing procedures (e.g. swabbing the lips, bedside toilet, repositioning the patient). Midwives run their own record of the nursing process over the entire perioperative period. In the afternoon, the doctor would have a talk with each of the patients who had undergone surgery and explained the details of surgical intervention.

All patients received a course of antibiotics (1g ceftriakson twice a day) as a precautionary measure, the first dose given intraoperatively, followed by another one in the evening on the same day. All patients were given Metoclopramid (20mg) in the first day after the operation to stimulate peristalsis.

The women who underwent hysteroscopy received food by mouth as early as 0 day. The patients after laparoscopy and laparoscopy with hysteroscopy resumed normal feeding in the 1st day after the operation. The patients after other operations from vaginal approach received similar mode of feeding.

The patients after laparotomy were receiving liquids alone administered in intravenous infusions (about 2000ml) and small amounts of liquids by mouth in 0 and 1st day after the operation. In the 2nd day they received gruel and liquids by mouth, any additional liquids were given parenterally. In the 3rd day liquid diet was started, extended to the normal diet in the 5th day after the operation.

The patients after endoscopy and conisation were mobilized 6-12 hours after the surgery; the patients after the surgery performed from vaginal approach (Fothergill's technique) and classic laparotomy after 24 hours had passed. First attempts at mobilization were accompanied by midwife.

Blood was drawn fasting at 7.30-8.00 a.m. and sent to laboratory to determine the levels of prolactin. Each patient had blood taken twice, on the day prior to the operation and in the 1st postoperative day (before administering medicaments).
PRL concentrations (ng/ml) were determined by enzymo-immuno-fluorescence method with VIDAS Prolactin quantitative test (Bio-Mérieux, France).

The study material concerning self-evaluation of stress was collected by Visual-Number Scale of 0-10 (generally used to evaluate pain) according to Mc Kinley et al. [5] and Elkins et al. [6]. Additionally, blood serum levels of prolactin (PRL) were measured on the day before the operation and the day afterwards. The participation was voluntary and anonymous.

The material was analysed descriptively and statistically. Differences were determined by U Mann-Whitney and Kruskal-Wallis tests. Wilcoxon's test was used to compare the parameters examined on two levels in dependent groups. The calculations assumed 5% conclusion error and p <0.05 as statistically significantly different.

Results

In the study group, perioperative stress was evaluated subjectively and PRL concentrations were measured at the same time. The results are presented in Table I and Figure 1 and 2.

Wilcoxon's test revealed statistically significant differences in subjective level of stress and PRL concentrations determined pre and postoperatively. The patients reported higher stress before the operation than afterwards ($Z=8.31$, $p<0.001$). PRL concentrations were significantly higher in the patients after the operation ($Z=12.23$, $p<0.001$).

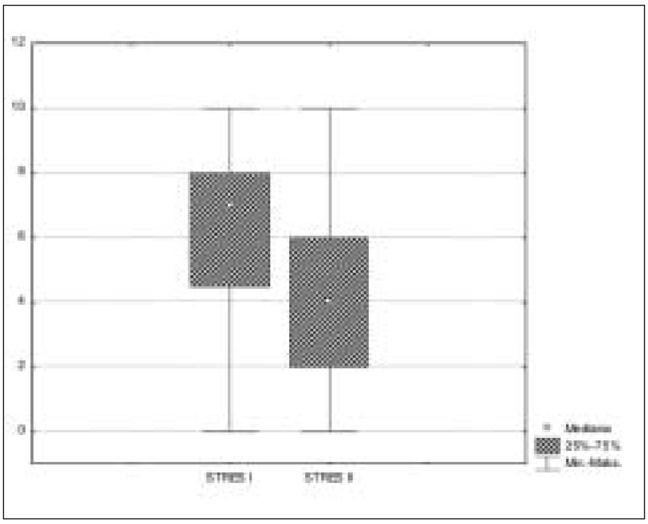

Figure 1. Subjective level of stress (STRES I – level of preoperative stress, STRES II – level of postoperative stress) in perioperative period.

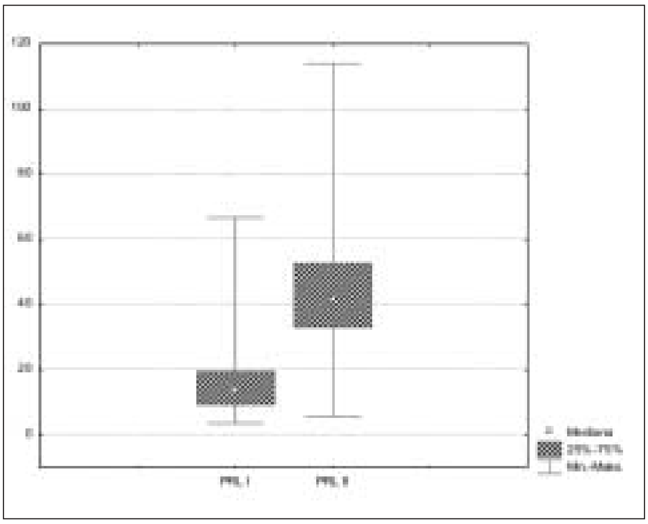

Figure 2. Prolactin (PRL I – prolactin concentrations in preoperative period, PRL II – prolactin concentrations in postoperative period) concentrations in perioperative period.

Tabela I. Subjective level of stress and PRL concentrations in perioperative period (n = 200).

Period	Subjective level of stress (scale 0 – 10)				Prolactin concentrations (ng/ml)			
	x ± SD	Q1	Q2	Q3	x ± SD	Q1	Q2	Q3
preoperative	6.3±0.18	4.5	7	8	16.17±0.68	9.4	13.6	19.4
postoperative	4.07±0.18	2	4	6	43.05±1.07	33.3	41.6	52.6

x ± SD – mean value ± standard deviation,
Q1 – lower quartile, Q2- median, Q3 – upper quartile

Figures 3 and 4 illustrate the correlations between subjective level of stress and PRL concentrations in the perioperative period.

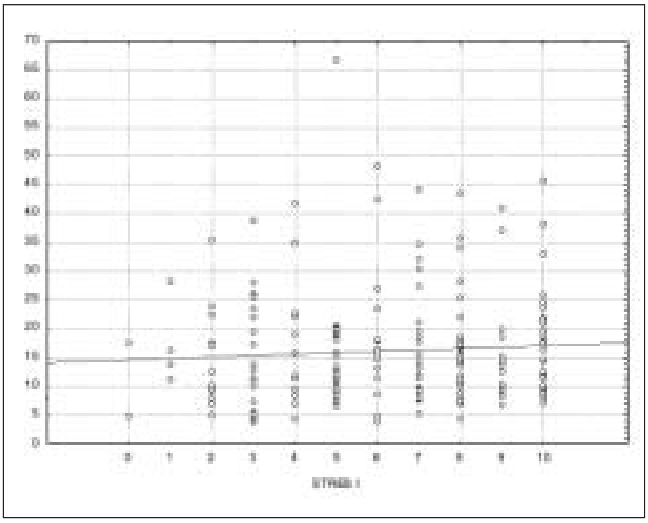

Figure 3. Subjective level of preoperative stress – STRES I (scale of 0-10 points) *vs.* preoperative PRL I concentrations (ng/ml) .

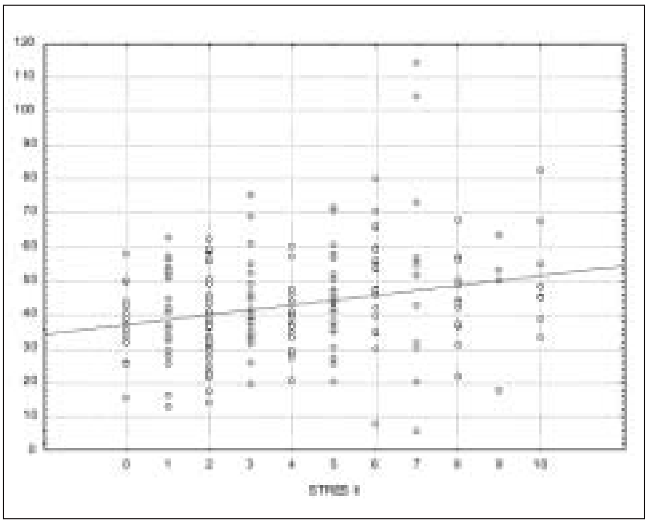

Figure 4. Subjective level of postoperative stress – STRES II (scale of 0-10 points) *vs.* postoperative PRL II concentrations (ng/ml).

R-Spearman's test did not find any correlations between subjective level of stress and PRL concentrations before operation (r=0.08, p=0.254).

R-Spearman's test revealed correlation between subjective stress and PRL concentrations after surgery (r=0.24, p<0.001). The patients who reported higher stress had higher PRL concentrations in postoperative period.

We also investigated differences between PRL concentrations pre and postoperative, between the patients operated on by different surgical methods. The results are presented in Table II.

Tabela II. Operative procedure *vs* PRL concentrations determined pre- and postoperatively.

Surgical intervention	PRL I (ng/ml) before operation				PRL II (ng/ml) after operation			
	x ± SD	Q1	Q2	Q3	x ± SD	Q1	Q2	Q3
hysteroscopy n = 25	11.52±1.23	7.7	9.02	15.4	35.70±2.43	29.2	33.7	38.5
laparoscopy n = 109	16.50±0.83	10.2	14.5	20.1	43.27±1.27	35.1	44.0	52.8
laparoscopy with hysteroscopy n = 43	17.45±1.58	10.8	13.4	19.6	45.51±2.46	36.3	43.8	55.7
laparotomy n = 15	16.39±2.96	6.9	11.7	19.8	44.88±4.79	33.2	39.2	54.7
other* n = 8	20.29±6.92	10.3	16.1	19.5	46.33±10.39	29.1	36.8	49.6

x ± SD – mean value ± standard deviation,
Q1 – lower quartile, Q2- median, Q3 – upper quartile
* Fothergil's technique, surgical conization, excision of endometriosis from the postoperative scar, perineoplasty,

Kruskal-Wallis test found differences close to statistically significant in PRL concentrations before and after surgery, between the patients operated on by different surgical method (H=9.03, p=0.06). PRL concentrations determined postoperatively (H=10.42, p=0.03) were statistically significantly different. The highest PRL concentrations were observed in patients who underwent laparoscopy and laparoscopy with hysteroscopy and the lowest values were noted among the patients after hysteroscopy.

U-Mann-Whitney test was used to determine significant correlations in PRL concentrations after operation between the groups who underwent different surgical procedures. The differences were statistically significant between the group of patients after hysteroscopy and laparoscopy (Z=-2.89, p=0.004), between the group after histeroscopy and laparoscopy with histeroscopy (Z=-2.94, p=0.003), and between the group after hysteroscopy and laparotomy (Z=-1.98, p=0.05). There were no significant differences observed between other groups (p>0.05).

Wilcoxon's test was used to determine correlations between PRL concentrations pre- and postoperative for each surgical procedure.

The results revealed significantly higher PRL levels after the operations compared to the corresponding values determined for particular surgical methods: hysteroscopy (Z=4.37, p<0.001), laparoscopy (Z=9.04, p<0.001), laparoscopy with hysteroscopy (Z=5.65, p=0.001), laparotomy (Z=3.41, p=0.001) and other procedures (Z=2.52, p=0.01).

In addition, we investigated pre and postoperative PRL concentrations, depending on the type of gynaecological disease. The results are presented in Table III.

Tabela III. Gynaecological disease *vs* PRL concentrations determined pre- and postoperatively.

Disease	PRL I (ng/ml) before operation				PRL II (ng/ml) after operation			
	x ± SD	Q1	Q2	Q3	x ± SD	Q1	Q2	Q3
infertility n = 87	17.41±1.02	11.2	15.1	19.4	46.35±1.56	37.1	46.9	55.7
other* n = 113	15.21±0.92	8.6	11.8	19.4	40.50±1.43	31.5	38.5	46.3

x ± SD – mean value ± standard deviation,
Q1 – lower quartile, Q2- median, Q3 – upper quartile
* pain syndrome of pelvis minor, cytology class III, bleeding, ovarian multicysts, incontinence, myoma, endometriosis, suspected ovarian tumor.

U Mann-Whitney test found statistically significant differences in PRL concentrations before operation (Z=2.17, p=0.03) and after surgery (Z=3.4, p=0.001), between the women with infertility and other diseases. Higher PRL levels were observed in patients with diagnosed infertility.

Wilcoxon's test revealed significantly higher PRL concentrations after operation in the patients both with infertility (Z=8.09, p<0.001) and other gynaecological problems (Z=9.2, p<0.001).

Discussion

The theory by Lazarus [22, 23] defines stress as a type of transaction between a human being and external and internal environment, which might be threatening, harmful or challenging. The evaluation is based on essential aims, values, beliefs and well-being. The situations or stimuli alone are not stressors yet. They become stressors in particular external (socio-economic status, family relations, relations at work or health status) and internal (experience of emotions, life experience, beliefs and system of values) situation.

Thus, it was interesting to investigate if women subjectively evaluated surgery as stressful. It turned out that the respondents admitted to higher level of stress before surgical operation rather than than afterwards.

The concentrations of PRL were increased in various situations perceived as stressful, e.g. enhanced emotions (exams), traumas, surgery, flight, diving, physical effort observed both in humans and experimental animals [7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20]. The mechanisms responsible for increased hormonal secretion by the pituitary in stress have not been explained yet.

Donnerer and Lembeck [19] suggested that the mechanisms of ACTH and PRL secretion are different. They concluded ACTH release is stimulated by somatosensoric afferent C fibres and other factors activated directly in CNS, e.g. as a result of emotional excitement while PRL is released due to a PRL releasing factor, unknown as yet.

Physiological role of increased PRL levels in stress has not been explained thoroughly. It is likely to be involved in maintaining the efficiency of immune system. Stressors, too, increase the secretion of glucocorticoids that inhibit PRL release and other immune functions. The interrelated factors provide physiological control of the immune system in situations of health hazards [8, 9].

Meyerhoff, et al. [8] found that psychological stress increases the release of adrenaline and noradrenaline but also prolactin, cortizol, adrenocorticotrophic and beta-lipotrophic hormones.

More than 30 years ago Noel, et al. [14] observed increased blood serum PRL concentrations in patients who underwent abdominal surgery. The highest concentrations were determined during the procedure which was followed by decrease and 24 hours after surgical intervention its values were close to those determined before surgery. PRL concentrations were decisively higher in women than in men. They were also higher in the patients who had been premedicated with phenthanyl and droperidol. Similarly, Corenblum and Taylor [18] observed PRL concentrations increased initially, then decreased during the perioperative period. Our results suggest significantly increased PRL concentrations in the perioperative period (p<0.001). Postoperative PRL concentrations in comparison to preoperative values were higher in women who underwent different operations. The highest values were noted in women after laparoscopy and laparoscopy with hysteroscopy.

There were many reports [7, 8, 10, 11, 15, 16, 17, 20] suggesting that stress affects both the body and mind. Hence we tried to define correlations between self-evaluation of stress and hormonal response of the body. To evaluate subjective perception of stress a Number Scale of 0-10 points was used (the same scale that is used to evaluate pain and fear) [5, 6]. Subjective perception of stress (0-10) before and after operation was correlated with biological stress markers, i.e. blood serum prolactin concentration. Subjective evaluation revealed higher stress before operation, opposite to PRL, concentrations of which increased markedly after the operation. Besides, preoperative PRL concentration did not correlate with self-evaluation of stress. Similar results were obtained by Aardal-Eriksson, et al. [15] who investigated correlations between PRL concentrations and self-evaluated stress among paramedics. In the postoperative period positive correlation was observed since the patients who reported higher stress had higher PRL concentrations. Similar results were presented by Armario, et al. [17] who were examining the students taking exams. They noted similar correlation between anxiety and PRL concentrations. The students who were more anxious had markedly higher blood serum PRL concentrations.

Self-evaluation is a kind of valuating judgement that is formulated on the basis of both: rational factors aside emotions and defence mechanisms.

In the process of self-cognition human being selectively perceives and tends to distort or ignore unfavourable facts and overestimates his/her own success [3, 21]. Women perceived their operation as stressful by their subjective assessments. Psychological tension relieved after the procedure but the stressor, which took the form of trauma continued to affect the body and altered endocrine secretion. Those changes were to maintain the inner environment constant and sustain basic life functions.

The results suggest that inversely proportional correlation between increased PRL concentrations referred to subjective assessments proved little usefulness of The Number Scale for the evaluation of psychological stress or high coefficient of hormonal inertia. Blood serum PRL concentration was not an objective marker of psychological stress in the study group.

Apart from that, pharmacotherapy in the perioperative period, although applied according to the same regime in each patient, was likely to have influenced increased PRL concentrations determined postoperatively. The study confirmed the need for further research in order to explore perioperative stress and mechanisms of hormonal changes involved.

Markers of stress may be used in practice to evaluate patient's psycho-physical status and provide a useful guide to create techniques of managing the patient before and after operation and modify adverse response of the body.

Conclusions

Surgical intervention was perceived by women as stressful, disregarding the type and extent of operation.

Patients' subjective evaluation revealed higher stress level before the operation, while they were waiting for the surgery. Contrary to that, prolactin concentrations were higher in the first day after surgery. Prolactin was not an objective marker of psychological stress in the examined group.

Trauma caused by surgical intervention as a biological stressor induced an increased prolactin concentration in blood serum during the postoperative period.

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