

SLEEP/WAKE CYCLE OF WOMEN SUBMITTED TO ELECTIVE GYNECOLOGICAL SURGERY WITH A ONE-DAY HOSPITAL STAY

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The aim of this descriptive study was to compare preoperative and post-operative sleep/wake cycle (SWC) patterns of 22 women undergoing elective surgery, with up to one day of hospitalization. The study was approved by the local Review Board. Voluntary women (average age 39 ± 9) filled out a Sleep Journal for 23 consecutive days, before and after the surgery (46 days total). Data were analyzed with Wilcoxon's matched-pairs test. The findings showed slight and transitory SWC changes (increased latency, reduced efficiency and later wake-up time) after the surgery. Nevertheless, sleep quality was improved and there was a fast return to the SWC patterns observed before the intervention, perhaps due to the early exposition to daily routine, e.g. the environmental clues that are important to rhythmic synchronization.

DESCRIPTORS: sleep; surgery; nursing; women; hospitalization

CICLO VIGILIA/SUEÑO DE MUJERES SOMETIDAS A CIRUGÍA GINECOLÓGICA ELECTIVA CON UN DÍA DE HOSPITALIZACIÓN

Este estudio tuvo como objetivo comparar las características del ciclo vigilia/sueño (CVS) de 22 mujeres sometidas a cirugía ginecológica electiva con hasta un día de hospitalización, entre las etapas pre y post operatoria. El estudio fue aprobado por el Comité de Ética de la institución. Las voluntarias (39 ± 9 años) llenaron un Diario del Sueño durante 23 días consecutivos, antes y después de la cirugía (46 días en total). Los datos fueron comparados por medio de la prueba de Wilcoxon para muestras pareadas. Lo encontrado reveló alteraciones discretas y transitorias del CVS (aumento de la latencia, reducción de la eficiencia y despertar más tardío) después de la cirugía, sin embargo con mejoría de la calidad del sueño y rápido retorno a las características anteriores a la intervención, talvez por la exposición precoz a la rutina del día a día, o sea, a las señales ambientales relevantes para la sincronización del ritmo.

DESCRIPTORES: sueño; cirugía; enfermería; mujeres; hospitalización

CICLO VIGÍLIA/SONO DE MULHERES SUBMETIDAS A CIRURGIA GINECOLÓGICA ELETIVA COM UM DIA DE HOSPITALIZAÇÃO

Este estudo teve como objetivo comparar as características do ciclo vigília/sono (CVS) de 22 mulheres submetidas a cirurgia ginecológica eletiva com até um dia de hospitalização, entre as etapas pré e pós-operatória. O estudo foi aprovado pelo Comitê de Ética da instituição. As voluntárias (39±9 anos) preencheram um diário de sono durante 23 dias consecutivos, antes e após a cirurgia (46 dias no total). Os dados foram comparados por meio do teste de Wilcoxon para amostras pareadas. Os achados revelaram alterações discretas e transitórias do CVS (aumento da latência, redução da eficiência e despertar mais tardio) após a cirurgia, porém, com melhora da qualidade do sono e rápido retorno às características anteriores à intervenção, talvez pela exposição precoce à rotina do dia-a-dia, ou seja, às pistas ambientais relevantes para a sincronização do ritmo.

DESCRITORES: sono; cirurgia; enfermagem; mulheres; hospitalização

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INTRODUCTION

In the 20th century, women started to have access to new work areas and, with the changes in the family structure, more time for themselves and more opportunities for new achievements besides marriage and others that are complimentary to it, such as work and education⁽¹⁾.

Besides these achievements, advances in women's healthcare can be represented by the improvement of widely used surgical techniques. Currently, certain gynecological surgeries, such as surgical hysteroscopy and gynecological laparoscopy can be performed within a one-day hospital stay. Such interventions have been employed more and more frequently, due to the differentiated pre- and post-operative routine in relation to medium- and large-size surgeries, since they offer a low risk of infection and allow for a prompt return to daily activities⁽²⁾.

However, other consequences of these procedures, such as changes in the rhythmic processes of the organism, can negatively affect the patient's health. Hospitalization and surgical stress, by causing changes in the woman's physiology and daily routine, can cause disorders in her biological rhythms, among which the sleep/wake cycle (SWC)⁽³⁻⁴⁾.

Every activity of a living being is the result of multiple biochemical and physiological processes that are temporally organized, i.e. rhythmic. This cyclical routine is as ancient as life itself, in order to allow for synchronicity with the external environment⁽⁵⁾.

In the human being, the SWC is accompanied by daily variations in other rhythms, such as body temperature, respiratory and heart rate, blood composition and nearly all other body functions. Besides keeping this phase relation stable with the other endogenous rhythms, the SWC should be synchronized with environmental and social rhythms, contributing to the attainment of a primordial internal economy in the organism. This synchronization is known as "temporal organization", and is fundamental for the integration of living beings with environmental temporal markers⁽⁵⁾.

The SWC desynchronization in the human being can lead to sleep disorders and entail short- and medium-term consequences. Among the most important are sleep deprivation, which may cause changes in the immune function, reduction of awareness and damage to physiological and cognitive

functions, also decreasing the sensation of well-being⁽⁶⁾.

Several days may be necessary to restore synchronization⁽⁷⁾, comprehending the moment of post-surgical recovery, when the integrity of the organic functions is essential. The instability of the biological rhythms, caused by surgical stress, can interfere in the immune response, in the healing of the surgical wound and resistance to infection⁽³⁾. In this sense, surgical interventions requiring short hospital stays could result in lower impact and alteration on the SWC, besides the well-known effects of the reduction of stressor agents and the risks inherent to this type of procedure.

It is believed that this study can contribute to knowledge on the effects of a socio-temporal challenge, such as a surgical procedure, on women's SWC. The study is relevant, since it is related to women's health and well-being, and also because it provides healthcare professionals with elements that can aid in the healthcare offered to the patient.

Therefore, this study aims to compare the SWC characteristics of women submitted to elective gynecological surgery with a maximum hospital stay of 24 hours, from the pre-operative to the immediate post-operative stages, and to describe the time interval necessary, in the post-operative, for the SWC to return to the characteristics of the pre-operative stage.

CASUISTIC AND METHOD

This is a descriptive, cross-sectional field study, with a quantitative approach, developed at a hospital that sees to patients with healthcare insurance and those who pay for their treatment, in the city of Limeira (SP), Brazil.

Twenty-two women, aged 24 to 64 years old, participated in the study. They met the following inclusion criteria: indication of elective gynecological surgery; predicted hospital stay of up to 24 hours, including one night in hospital for immediate post-operative period; voluntary participation, by signing the term of consent; authorization to participate in the study by the assistant physician; a minimum interval of 23 days between the initial interview for data collection and the surgery date. The exclusion criteria, in turn, were: Not spending the night in hospital for the immediate post-operative period,

either before or after the surgery; presenting surgical complications; post-operative internment due to these complications.

The instruments used for data collection were: Questionnaire for Identification of Population (QI), Additional Data Sheet for Surgery and Internment – *Ficha de Dados Adicionais de Cirurgia e Internação* (FDACI), elaborated for the study; Sleep Journal – *Diário de Sono* (DS). They were all filled out by the volunteers themselves, after receiving orientations from the researcher.

QI and FDACI were employed to characterize the women studied, obtaining, respectively, socio-demographical data and information about the surgical procedures (FDACI). The DS was filled out with the following information about the SWC: time of going to bed, sleep beginning, time of awakening, latency, interruptions, length, efficiency and quality of sleep, permanence in bed, nap length, physical activity and level of anxiety. This instrument was applied in two stages, before and after the surgery, each comprehending three weeks and three to four weekends, with each stage totaling 23 consecutive days.

At first, the obtained data were submitted to descriptive analysis (tables of frequency and measurements of position and dispersion). Information from the DS was employed to characterize the volunteers' SWC in each of the stages. These data were analyzed week-by-week, separately, including only weekdays in this analysis. The furthest pre-operative week from the surgery day was named Pr3, followed by Pr2 and Pr1 (immediately before the surgery). In the post-operative stage, the Po1, Po2 and Po3 weeks were obtained, with Po3 being the furthest from the surgery day. Next, the weeks of each stage were compared,

in pairs. Data about the weekends were analyzed together, comparing the pre- and post-operative stages.

Wilcoxon's test for matched-samples was used to analyze the characteristics of the SWC between the stages, as well as the intraindividual variety (standard deviations) of these characteristics. The results were considered significant when $p < 0.05$.

The study was approved by the Review Board at the authors' institute of affiliation, on April 19, 2005. The volunteers signed the term of consent, elaborated according to the guidelines of Resolution 196/96, which regulates research with human beings.

RESULTS

The population consisted of 22 women, whose age varied from 24 to 64 years old (average age: 39 ± 9 years old), submitted to elective gynecological surgery. Among them, 64% were married, 86% lived with other people (usually family members), 64% reported having college or postgraduate education, 82% held jobs outside the house and 36% had an income between one and five times the minimum wage.

Surgical access was distributed among abdominal (41%), vaginal (41%) and breast (18%). The procedure lasted from 15 to 85 minutes, averaging $45 (\pm 18)$ minutes. General anesthesia was predominant, used in 64% of the volunteers, followed by peridural in 27% and spinal in 9%. The duration of anesthesia varied from 30 to 140 minutes, averaging $73 (\pm 25)$ minutes.

The SWC characteristics were compared between the pre- and post-operative stages, week-by-week, for the weekdays. The average values of these characteristics are presented in Table 1.

Table 1 – Characteristics of the sleep/wake cycle (SWC) in the pre- and post-operative stages, week-by-week, according to the Sleep Journal (n=22): Average values. Limeira, 2005-2006

Variables	Pre-operative Stage			Post-operative stage		
	Week Pr3	Week Pr2	Week Pr1	Week Po1	Week Po2	Week Po3
Time of going to bed	22h58min	22h52min	23h00min	22h54min	23h01min	23h03min
Sleep beginning	23h25min	23h25min	23h33min	23h33min	23h34min	23h28min
Sleep latency	26 min	34 min	33 min	39 min	33 min	26 min
Interruptions (amount)	1.3	1.1	1.1	1.1	1.3	1.0
Time of awakening	6h34min	6h42min	6h43min	7h03min	6h43min	6h46min
Sleep length	431min	435min	429min	452min	428 min	436min
Permanence in bed	457min	470min	463min	490min	462min	463min
Sleep efficiency	95%	93%	93%	92%	93%	94%
Sleep quality*	6.3	6.2	6.1	6.8	6.9	7.2
Nap length	13min	7min	5min	13min	13min	8min
Physical activity	11min	9min	7min	1min	4min	1min
Level of anxiety [†]	6.3	4.8	3.6	7.2	6.5	7.1

* = evaluated with the 10-centimeter Visual Analogue Scale.

† = 11 volunteers estimated this variable; the higher the value, the lower the degree of anxiety.

When the SWC values were compared between the week furthest from surgery (Pr3) and the first post-operative week (Po1), a significant difference was observed ($p < 0.05$, Wilcoxon's test) in the following variables: *sleep latency*, higher in Po1; *time of awakening*, later in Po1; *permanence in bed*, longer in Po1; *sleep efficiency*, lower in Po1. No significant differences were found between Pr3 and the second post-operative week (Po2). When Pr3 was compared with the third post-operative week (Po3), a significant difference was observed only for the variable *length of physical activity*, higher in Pr3.

When Pr2 was compared with the first post-operative week (Po1), significant differences were observed ($p < 0.05$, Wilcoxon's test) in the following variables: *time of awakening*, later in Po1; *sleep length*, longer in Po1; *permanence in bed*, longer in Po1. No significant differences were observed when Pr2 was compared to the second post-operative week (Po2). Between Pr2 and the third post-operative week (Po3), there were significant differences in the following variables: *sleep quality*, rated as better in Po3, and *level of anxiety*, lower in Po3.

The comparison between the week closer to the surgical intervention (Pr1) and the first week of the post-operative stage (Po1) yielded significant differences ($p < 0.05$, Wilcoxon's test) for the variables: *time of awakening*, later in Po1; *sleep length*, longer in Po1; *permanence in bed*, longer in Po1; and *level of anxiety*, lower in Po1. When Pr1 and the second post-operative week (Po2) were compared, there was a significant difference in the *level of anxiety*, lower in Po2, and, between Pr1 and the third post-operative week (Po3), a significant difference in *sleep quality* was found, better in Po3, and in the *level of anxiety*, lower in Po3.

Regarding the SWC characteristics at weekends, significant differences were observed in the variable *length of physical activity*, higher in the pre-operative stage in relation to the post-operative stage. Table 2 shows the average values of the volunteer's SWC characteristics, during the weekends of these two stages.

Table 2 – Characteristics of the sleep/wake cycle at the weekends of the pre-operative and post-operative stages, according to the Sleep Journals (n=22): average values. Limeira, 2005-2006

Variables	Pre-operative stage Post-operative stage	
Time of going to bed	23h37min	23h25min
Sleep beginning	24h30min	23h55min
Sleep latency	26 min	29min
Interruptions (amount)	1.3	1.1
Time of awakening	07h46min	07h43min
Sleep length	465 min	467min
Permanence in bed	490min	497 min
Sleep efficiency	94%	93%
Sleep quality*	6.5	7.1
Nap length	31 min	24 min
Physical activity†	10 min	3 min
Level of anxiety (n=11)*‡	5.4	7.1

* evaluated with the 10-centimeter Visual Analogue Scale.

† $p < 0.05$, Wilcoxon's test

‡ 11 volunteers estimated this variable; the higher the value, the lower the degree of anxiety.

Intraindividual variability was found lower in the pre-operative stage for characteristics like *latency*, *sleep length*, *efficiency* and *time of awakening*, whereas, in the post-operative stage, characteristics like *sleep quality* and *level of anxiety* showed lower intraindividual variability. The average values of intraindividual variability for the SWC characteristics, in the pre-operative and post-operative stages, week-by-week, can be found in Table 3.

Table 3 – Intraindividual variability of sleep/wake cycle characteristics (SWC), week-by-week, in the pre-operative and post-operative stages (n=22). Limeira, 2005-2006

Variables	Pre-operative stage			Post-operative stage		
	Week	Week	Week	Week	Week	Week
	Pr3	Pr2	Pr1	Po1	Po2	Po3
Time of going to bed*	40	36	32	43	38	42
Sleep beginning*	36	37	37	43	42	44
Sleep latency*	15	14	16	23	25	14
Interruptions (amount)	0.9	0.9	0.7	0.8	1.0	0.6
Time of awakening*	30	24	30	44	36	35
Sleep length*	42	47	43	65	51	58
Permanence in bed*	44	46	40	63	51	57
Sleep efficiency (%)	3	3	3	5	5	3
Sleep quality†	2.2	1.8	2.0	1.7	1.7	1.4
Nap length*	15	8	10	15	15	9
Physical activity*	12	5	7	2	6	3
Level of anxiety†‡	1.8	2.5	2.1	1.0	1.6	1.1

* in minutes

† = evaluated with the 10-centimeter Visual Analogue Scale.

‡ = 11 volunteers estimated this variable.

Significant results ($p < 0.05$, Wilcoxon's test): Latency (Pr1<Po2); Time of awakening (Pr2<Po1); Sleep length (Pr3<Po1; Pr2<Po1; Pr1<Po1); Permanence in bed (Pr1<Po2); Efficiency (Pr3<Po1;

Pr3<Po2; Pr1<Po1; Pr1<Po2); Quality (Pr3>Po1; Pr3>Po2; Pr3>Po3); Physical activity (Pr3>Po1; Pr3>Po2; Pr3>Po3); Level of anxiety (Pr2>Po1; Pr2>Po2; Pr2>Po3)

DISCUSSION

Among the women studied, 82% were in the 30-50 year-old range, which corresponds to the results of other authors, since gynecological surgeries are concentrated in this age group⁽⁸⁾. Most volunteers were married and lived with their families, which is in accordance with the female share of the Brazilian population. However, the levels of education and income were higher than those usually found in Brazil⁽⁹⁾.

The detailed comparison of these women's SWC during the pre- and post-operative stages (three weeks each) brought findings that were partially consistent with other studies focused on relations between sleep patterns before and after surgeries⁽¹⁰⁻¹¹⁾. When the week furthest from the surgical intervention was compared with the first week of the post-operative stage, the latter showed evidence of lower quality sleep: higher latency, later awakening, longer permanence in bed and lower sleep efficiency. However, in the third week after surgery, the length of physical activity was the only characteristic with significant differences when compared to the pre-operative stage, showing that the SWC had returned to the characteristics it had before the surgical intervention. The reduction of sleep efficiency was found in studies performed with polysomnography, which shows altered sleep patterns in the post-operative period, when overnight sleep is interrupted several times. Such alterations are usually found after large-scale surgeries, while laparoscopic surgeries do not seem to reproduce this pattern. This fact has been attributed to lower surgical stress caused by endoscopic surgeries when compared to open-air procedures. The studies performed with polysomnography have evaluated the sleeping patterns for up to six post-operative nights, at most. Therefore, the real length of such perturbations is not well-determined⁽¹⁰⁾. In a study comparing sleep quality of patients submitted to cholecystectomy through laparoscopic surgery and laparotomy, monitoring four days prior and four weeks after surgery, patterns compatible with lighter sleep disorders were observed in patients submitted to laparoscopy. However, sleep quality worsened for both

groups in the post-operative period. The laparoscopy patients did not show improvements until the fourth week after the surgery, and those submitted to laparotomy reported a discrete improvement by the fourth week, not significant when compared to the pre-operative period. In both groups, the amount of sleep interruptions increased in the first week after surgery, but not in the subsequent weeks⁽¹¹⁾.

In spite of the changes observed in the SWC characteristics, the women expressed, in the present study, significant improvements in sleep quality during the post-operative stage, especially in the third week after surgery, when compared with the pre-operative stage. Such results are, at first, unexpected, because it was considered that the sleep quality could return to the levels of the pre-operative level, instead of showing improvements. Literature mentions that sleep quality decreases in the first days after the surgical intervention, returning to the pre-operative levels at varied intervals, but there are no reports of improvement in sleep quality in the post-operative period, as found in this study⁽¹¹⁻¹²⁾.

The length of physical activity was the only variable with a significant difference between the weekends of the pre- and post-operative stages, with a post-operative reduction in the practice of physical activities. This result is coherent, because such activities are not recommended after a surgical intervention. Therefore, this reduction would be expected to lead to a decrease in the sleep quality of the women in this study, since, nowadays, it seems consensual, in literature, that regular medium- and long-term physical activity contributes to good sleep quality, and that acute effects of physical exercise on a night's sleep are inexistent⁽¹³⁾. Opposing this expectation, sleep quality was superior in the post-operative stage.

The level of anxiety was estimated by 11 out of 22 women, who evaluated it as higher in the pre-operative stage. This fact may have acted upon the perception of sleep quality among these women. Other authors verified that outpatients submitted to surgery, in whom a high state of anxiety was detected, presented strong sleep perturbations for four days of post-operative monitoring⁽¹⁴⁾. There are studies indicating that anxiety, in the pre-operative period, can induce insomnia and sleep deprivation, factors that, in turn, could contribute to the undesired potentialization of the effects of anesthetics. This suggests that this aspect should be investigated by healthcare professionals as part of the pre-anesthetic evaluation and the pre-operative evaluation in general⁽¹⁵⁾.

Women show lower intraindividual variability in characteristics like sleep latency, length, efficiency and time of awakening, in the pre-operative stage, particularly in the week prior to the surgery, in relation to the two post-operative weeks. In relation to the third week after the surgery, no significant differences were detected. Besides, the quality of sleep and the level of anxiety showed lower variability in the post-operative stage. Several authors associate the lower SWC variability to better quality sleep, which would be in agreement with the evidence of the present study, where sleep quality was higher in the third post-operative week than before the surgery. Among the recommended sleep hygiene practices, the maintenance of a regular schedule for going to bed and awakening is considered beneficial⁽¹⁶⁾.

In this study, the early return of the women to their daily activities seems to have favored the maintenance of the SWC characteristics in the post-operative stage. In future investigations, it is important to obtain, besides new registers about the SWC, data about routine activities in the pre- and post-operative weeks, such as times of work, study, leisure, meals and medication intake. Monitoring the

changes in these activities and returning to the usual routine will contribute to elucidate possible correlations with the sleeping patterns, which, in the present study, can only be suggested. By knowing these aspects better, the nurse will be able to intervene, proposing or offering temporal clues that will contribute to the synchronization of the SWC, thus aiding in the recovery of the individual.

FINAL CONSIDERATIONS

According to the findings of this study, the elective gynecological surgery with a hospital stay of up to 24 hours causes discrete and transitory alterations in the SWC, and it quickly returns to the characteristics observed before the intervention, perhaps by favoring the early exposition of the woman to the daily routine, i.e. the relevant environmental clues for the synchronization of the rhythm.

A study about the biological rhythms becomes increasingly fascinating, and the actions developed from their observation can benefit the patients, consolidating the goals of healthcare professionals' actions.

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