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EFFECTS ON HEALTH-RELATED QUALITY OF LIFE, SLEEP QUALITY, AND DAYTIME SLEEPINESS IN PATIENTS WITH TOTAL HIP ARTHROPLASTY IN DEVELOPMENTAL HIGH DISLOCATION OF THE HIP

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Research Article

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Abstract

To determine changes in quality of life (QOL), sleep quality (SQ), and daytime sleepiness in patients diagnosed as Crowe 4 high dislocations after treatment with total hip arthroplasty (THA). There was not enough data in the literature about changes in the QOL, SQ, and daytime sleepiness in patients with Crowe 4 high dislocations treated by THA. A total of 38 patients diagnosed as Crowe 4 high dislocations and treated with THA in the previous 3 years participated in the study. The 36-item short-form survey questionnaire (SF-36), Pittsburgh Sleep Quality Index (PSQI), and Epworth Sleepiness Scale (ESS) were applied to all of the subjects preoperatively and at 6 months postoperatively, and compared. The QOL scores and SQ showed an increase during the postoperative period, with statistical significance in subdimensions of the SF-36, such as general health (P: 0.048), physical well-being (P: 0.041), vitality (P: 0.042), physical functioning (P: 0.028) and bodily pain (P: 0.044); and subdimensions of the PSQI, such as sleep disturbances (P: 0.040), sleep latency (P: 0.048), and day dysfunction (P: 0.036). No statistically significant differences were observed between the mean scores of the ESS. Our study is a unique study in the literature, which shows the positive effects of surgery in different directions, such as the QOL, SQ, and daytime sleepiness via questionnaires in a homogeneous group treated with the same surgical method.

Key Words: Health related quality of life, Sleep quality, Crowe 4 hip arthroplasty, SF-36, PSQI, ESS.

Özet

Çalışmamızın amacı, Total Kalça Artroplastisi (TKA) ile tedavi edilen Crowe 4 yüksekte kalça çıkıklı hastalarda tedavinin yaşam kalitesi (YK), uyku kalitesi (UK) ve gündüz uyukluluk haline etkisini belirlemektir. Literatürde TKA ile tedavi edilen Crowe 4 yüksek çıkıklı hastalarda YK, UK ve gündüz uyukluluğundaki etkileri inceleyen az sayıda çalışma mevcuttur. Çalışmamıza son 3 yılda Crowe 4 yüksekte kalça çıkığı tanısı ile TKA yapılan toplam 38 hasta dahil edildi. Katılımcılara ameliyat öncesi ve ameliyat sonrası 6. ayda 36 maddelik kısa form anket soru formu (SF-36), Pittsburgh Uyku Kalitesi İndeksi (PUKİ) ve Epworth Uyukluluk Ölçeği (EUÖ) uygulanmış ve sonuçlar değerlendirilmiştir. SF-36'nın alt boyutları olan ve YK skorlarından genel sağlık (P: 0.048), fiziksel refah (P: 0.041), canlılık (P: 0.042), fiziksel işlevsellik (P: 0.028) ve bedensel ağrı (P: 0.044) ve PUKİ alt ölçeklerinden olan uyku bozuklukları (P: 0.040), uyku gecikmesi (P: 0.048) ve gün fonksiyon bozukluğu (P: 0.036) istatistiksel olarak bir artış gösterdi. EUÖ' nin ortalama skorları arasında ise istatistiksel olarak anlamlı bir fark gözlenmemiştir. Çalışmamız literatürde, aynı cerrahi yöntemle tedavi edilen homojen bir hasta popülasyonunda anket desteğiyle YK, UK ve gündüz uyukluluğuna cerrahinin olumlu etkilerini gösteren tek çalışmadır.

Anahtar Kelimeler: Crowe 4 Kalça displazisi, Artroplasti, Yaşam kalitesi, Uyku Kalitesi, Uyukluk ölçeği

1. Introduction

Health-related quality of life (HRQOL) and sleep quality have recently begun to be used to evaluate orthopedic diseases. HRQOL can be defined as the patient's subjective perception of dissatisfaction related to his/her own health (WHO,1993; The WHOQOL Group, 1995). Crowe 4 developmental hip dysplasia is a chronic orthopedic condition that directly affects daily life. The shared result of these few studies which investigate the effect of surgery on the quality of life is that the surgery enhances the quality of life (Gambling, 2019) Moreover, it can affect an individual's quality of life (QOL) and sleep quality as the result of aches, and cosmetic and emotional problems in the long term (The WHOQOL Group, 1995; Sanei, 2016).

Regardless of the questionnaire used to evaluate the HRQOL, it reflects a total score with its subgroups. This means that the change in subscores needs to be evaluated and the areas where treatment is most effective should be determined concerning quality of life. Considering our study population with chronic pain and loss of functionality, it is mandatory to define which areas are negatively or positively effected by surgical treatment. Sleep is a physiologic necessity which is

directly effected by pain and an improvement in sleep quality has been reported in patients who have undergone THA (Luo, 2019; Hochreiter, 2019).

It is not possible to evaluate sleep and quality of life separately. Daytime sleepiness and quality of sleep is closely related, and an important improvement has been shown in patients undergoing total hip arthroplasty due to chronic hip problems (Hochreiter, 2019). On the other hand, no study which evaluates the effect of surgery on sleep quality and daytime sleepiness in chronic patients with Crowe 4 developmental hip dysplasia can be found in the literature.

Total hip arthroplasty (THA) is widely used for the treatment in patients with developmental high dislocation of the hip. Surgical methods for total hip replacement are also different in the treatment of Crowe 4 developmental hip dysplasia. The fact that the patients were treated with the same surgical method is important for the homogeneity of the population in the evaluation of QOL, sleep quality, and daytime sleepiness assessments. This study aimed to determine the effect of changes in quality of life, sleep quality and daytime sleepiness in patients with the same chronic disease that were treated by same surgical method.

2. Materials and Methods

A prospective, descriptive study was conducted from June 2015 to March 2018. The study design complies with the Declaration of Helsinki ethical standards. Written informed consent was obtained from the patients who participated in this study. All of the patients signed written consent before participating in the study. Ethics committee approval was received for this study from the local ethics committee of Ethical Committee for Clinical Studies of Ankara Yıldırım Beyazıt Education and Research Hospital (2013-2019).

A total of 38 patients were included who had undergone primary cementless total hip arthroplasties for Crowe 4 or Hartofilakidis type-3 hips in the previous 3 years. Arthroplasties were performed by direct lateral approach in combination with a subtrochanteric transverse shortening osteotomy and Zweymüller femoral stem without any fixation instruments for the osteotomy. The acetabular component was placed at the level of the anatomic hip center. Patients who need recurrent surgeries or experienced moderate or severe adverse events related or unrelated to surgery were excluded from the study. Moreover, patients who were not able to answer the questionnaires due to cognitive abilities were excluded from the study. There were 38 patients (33 of whom were women) who were included in the study.

Demographic data were collected from medical records. The body mass index (BMI) of the patients were calculated from their preoperative records. Smoking status and prior diagnosis for sleep disturbances were also requested from the patients. The duration of daily cell phone use was evaluated based on the patients' cell phone records over the previous month and divided into 2 groups, as more than 4 h and less than 4 h.

The SF-36, PSQI, and ESS were applied to the patients 1 week preoperatively and 6 months postoperatively. Patients were evaluated preoperatively 1 week before and 6 weeks after the operation. In case the patient missed the sixth month follow up, the questionnaire was completed via phone interview. The preoperative and postoperative results were compared.

Generic QOLs of the patients were measured using the SF-36 questionnaire, which was standardized into Turkish (Demiral et al., 2006). The SF-36 questionnaire has 8 sections, including general health (5 items), vitality/energy/fatigue (4 items), physical functioning (10 items), bodily pain (2 items), general health perceptions (5 items), physical role functioning (4 items), emotional role functioning (3 items), emotional well-being (5 items), and social functioning (2 items). It consists of items to which the participants are asked to respond to on a 1- to 6-point Likert scale, based on questions. A web based medical calculator was used. In accordance with the manual, the subscales of these 8 dimensions were combined to form a total score. The subscale scores and total score were calculated so that a higher score corresponded to a higher QOL.

Sleep quality and patterns were evaluated using the PSQI, which is an effective instrument (Agargun et al., 1996). It differentiates poor from good sleep quality by measuring 7 areas (components): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the previous month. The sum of the 7 component points is between 0 and 21. If the total score increases, then sleep quality decreases. Scores of more than 5 are related to poor sleep quality.

In addition, the patients were asked to complete a second questionnaire called the ESS to evaluate daytime sleepiness and sleep propensity (Izci et al., 2008). The ESS score (the sum of the scores of 8 items, 0–3) can range from 0 to 24. The higher the ESS score, the higher that person's average sleep propensity in daily life, or their daytime sleepiness. The total scores are related to 5 situations; 0–5: lower than normal daytime sleepiness, 6–10: higher than normal daytime

sleepiness, 11–12: mildly excessive daytime sleepiness, 13–15: moderately excessive daytime sleepiness, and 16–24: severely excessive daytime sleepiness.

2.1. Statistical analyses:

Data analyses were performed using SPSS v.22.0 for Windows (IBM Corp., Armonk, NY, USA). Whether the distribution of continuous variables was normal or not was determined using the Kolmogorov Smirnov test. The Levene test was used for the evaluation of the homogeneity of the variances. Unless specified otherwise, continuous data were described as the mean \pm SD for normal distributions, and median (range) for skewed distributions. Categorical data were described as the number of cases (%). Statistical analysis differences in the normally distributed variables between 2 independent groups were compared using the Student's t test, and the Mann-Whitney U test was applied for comparisons of the non-normally distributed data.

3. Results and Discussion

There were 38 patients (33 of whom were women) enrolled in the study as the result of the inclusion and exclusion criteria. The demographic and clinical data of the patients are summarized in Table 1.

Table 1: Summaries of the demographic and clinic characteristics of the participants.

Variable	Mean \pm SD / number of patients
Age	37.6 \pm 5.8 years
BMI	24.2 \pm 6.6 kg/m ²
Sex (male/female)	5/33
Smoker	10
Prior diagnosis for sleep disturbances	No patient
Duration of discharge	8.2 \pm 2.4 days
ASA classification	
ASA I	26
ASA II	12
Daily cell phone use	
<4 h	8 patients
>4 h	30 patients
Side operated on	
Left	22
Right	16

Table 2 summarizes the scores for each of the subdimensions of the SF-36 questionnaire pre- and postoperatively. Subdimension scores including general health, physical well-being, vitality, physical functioning, and bodily pain were lower preoperatively in comparison to the postoperative scores ($P = 0.048$, $P = 0.028$, $P = 0.042$, $P = 0.041$, and $P = 0.034$, respectively).

Table 2: Pre and postoperative mean scores of the SF-36 questionnaire for each subdimension

SF-36 subdimensions	Mean of the scores (100%)		P-value
	Preoperatively	Postoperatively	
General health	70.2	77.3	0.048
Physical functioning	65.7	78.2	0.041
Vitality/energy	66.5	74.3	0.042
Role limitations due to physical health	58.6	78.2	0.028
Role limitations due to emotional problems	64.5	67.3	0.069
Emotional well-being	62.9	65.3	0.065
Social functioning	84.3	85.2	0.078
Pain	63.5	54.3	0.034

When the patients with THA were compared pre- and postoperatively using correlation analysis in terms of 3 factors that could affect a patient's QOL: age, BMI, and daily duration of cell phone use, it was revealed that the increase in their QOL was not associated with these variables.

Table 3 summarizes the PSQI scores of the participants pre- and postoperatively. Subdimension scores, including sleep disturbances, sleep latency, and day dysfunction scores, were higher pre-operatively in comparison to their postoperative scores ($P = 0.040$, $P = 0.048$, and $P = 0.036$, respectively).

Table 3: Summaries of the PSQI scores of the participants pre- and postoperatively.

PSQI subdimensions	Preoperatively (Mean ± SD)	6 months postoperatively (Mean ± SD)	P-value
Total scores	6.7 ± 2.3	4.7 ± 2.1	0.035
Duration of sleep	0.8 ± 0.9	0.7 ± 0.7	0.098
Sleep disturbances	1.5 ± 1	1.1 ± 0.6	0.040
Sleep latency	0.7 ± 0.5	0.3 ± 0.4	0.048
Day dysfunction	1.3 ± 0.4	0.9 ± 0.5	0.036
Efficacy	0.3 ± 0.4	0.2 ± 0.1	0.078
Sleep quality (overall sleep)	1.5 ± 1.1	1.2 ± 0.8	0.089
Medications use for sleep	0.3 ± 0.2	0.2 ± 0.1	1.235

When the patients with THA were compared pre and post-operatively using correlation analysis in terms of 3 factors that could affect a patient's PSQI scores: age, BMI, and daily duration of cell phone use, no association was found.

Figure 1 summarizes the ESS results of the participants. Postoperatively, 2 patients that had severely excessive daytime sleepiness preoperatively reported moderately and mildly excessive daytime sleepiness postoperatively. Overall, 6 patients who had reported higher, mild, moderate, or severe daytime sleepiness reported a change to higher or normal daytime sleepiness.

The QOL of patients with THA has been the subject of many studies in the literature, and when considering a limited sample and/or assessment scale, the QOL was found to be less, more, or equal when compared pre- and postoperatively or compared with a healthy population (Abbas-Zadeh et al., 2018; Montin et al., 2011; Świtoń et al., 2017; Tellini et al., 2018; Zhang et al., 2018). As an example, Bahardoust et al. found remarkably reduced HRQOL in an Iranian population when compared with their reference population (Bahardoust et al., 2019). What was striking in all of these studies was that the variety of surgical methods that may have affected the patients was not considered. Konopka et al. reported substantially increased patient QOL in primary hip arthroplasties; however, revision hip arthroplasties resulted in an increase in QOL, but with lower scores. Moreover, they reported that there was a considerable variation in patient results across

all procedures in 2018 (Konopka et al., 2018). A recent study distinguishing 2 surgical approaches in THA reported no differences between them (Araújo et al., 2017). In another report, the QOL of patients who underwent THA in Japan versus Korea were compared and an increase in QOL was determined in both groups, but the Japanese patients had better QOL scores (Fujita et al., 2018). Therefore, while creating the groups herein, the surgical method differences were minimized by choosing patients who had Crowe 4 or Hartofilakidis type-3 hips and underwent primary cementless THA, and the majority of them were women, employees, or laborers of similar ages that were from the same region of Turkey. All of the participants were symptomatic with pain and discomfort and had been admitted to our clinic for surgical treatment within the previous 3 years.

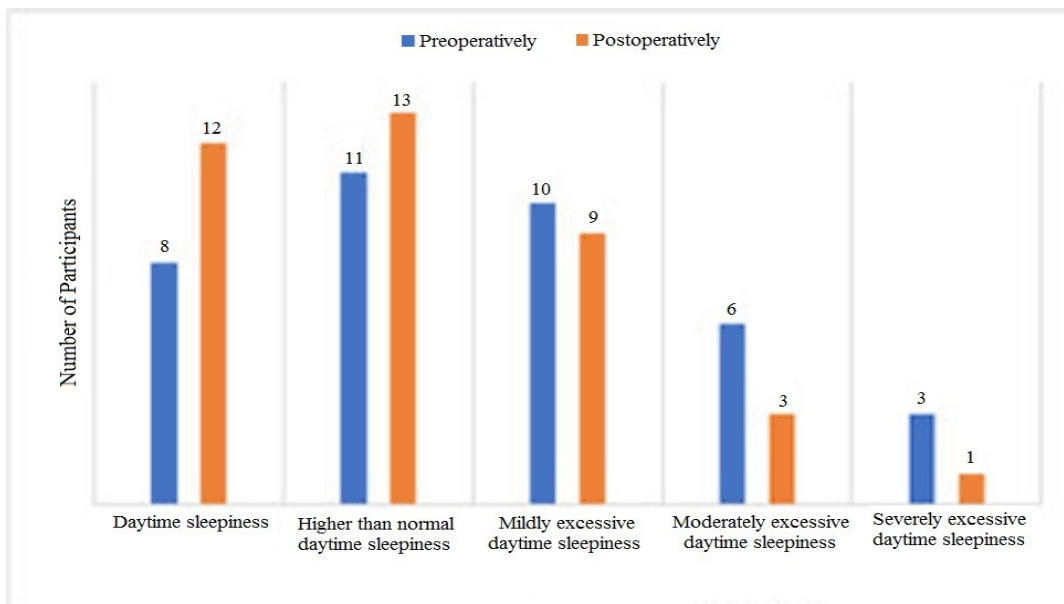


Figure 1: ESS results of the participants.

In this study, the overall QOL included general health, physical well-being, vitality, physical functioning, and bodily pain scores that were statistically significantly lower in the preoperative term when compared with the postoperative term. All subdimensions of the SF-36 questionnaire exhibited an increase, which revealed that surgery affected the QOL of the individuals beneficially. The follow-up period would be an important point to evaluate the surgical effects on patients' QOL over the long-term, but we were unable to do this. The patients

herein were evaluated after THA at 6 months postoperatively for the last time. Sharma et al. found an increase in the QOL of patients with THA who had prior acetabular fractures that were followed-up for more than 4 years (Sharma et al., 2019).

Few studies have evaluated the effect of sleep quality and daytime sleepiness in patients treated with THA with developmental hip dislocation (Fielden et al., 2003). Thus, one of the aims this study was to evaluate changes in sleep quality and daytime sleepiness pre- and postoperatively. The patients were found to have had poor sleep quality before the surgery when compared with the healthy peers in the current study. Pain and functional disability is associated with poor sleep quality before surgery in patients with developmental hip dislocation.

The PSQI scores were still lower than those of the healthy peers 6 months postoperatively, but there was a significant increase in sleep quality between the pre- and postoperative period. All subdimension scores of the PSQI were higher preoperatively in comparison to postoperatively, but statistical significance was detected in only 3 subdimensions: sleep disturbances, sleep latency, and day dysfunction. The ESS scores had improved in the postoperative evaluation; while 3 patients had severely excessive daytime sleepiness preoperatively, only 1 patient reported the same finding postoperatively. Of the patients, 50% had normal or higher than normal daytime sleepiness preoperatively, and this showed an increase to 67.5% postoperatively.

Manning et al. reported transient sleep disturbances in the early postoperative period, with an improvement by the 10-month follow-up after a primary THA. They recommended the evaluation and management of patients before surgery and during the early preoperative period for sleep disturbances. Their findings resembled those of the current study during the 6-month follow-up period (Manning et al., 2017).

This study had several limitations, such as the small sample size, insufficient demographic and clinical data, and the reporting of short-term follow-up and results. One of the most important limitations of this study was the different habits on physical activity of the patients and the patients not having the same rehabilitation programs.

4. Conclusion

In this study, it was aimed to determine the impact of surgery on a patient's QOL, sleep quality, and daytime sleepiness, and their influencing factors and we were able to show increasing

scores after surgery in all study areas. However, this rise in the scores cannot be attributed solely to the surgery due to the limitations of our study and additional limitations in evaluating environmental and personal variables. In future, some further investigations and studies must be undertaken.

What is already know on this topic:

- There is a known and accepted relation between QOL, sleep quality, and daytime sleepiness. We can say, from the study conducted herein, that each of these improved and it was not a surprising result.

What this study adds:

- An increase in the subdimensions of QOL and sleep quality, with statistically significance differences after surgery, was the major outcome of this study.
- Not always, but frequently, surgeries will result in complications that are related to a decrease in QOL over the long-term. A homogeneous population in disease and treatment was chosen herein and no serious complications were experienced.

6. Acknowledge

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7. Conflicts of interest

The author declare that there are no potential conflicts of interest relevant to this article.

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