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ORIGINAL ARTICLE

The effect on traumatic stress disorder of peripheral block anaesthesia performed in diabetic foot surgery

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Abstract

The aim of this study was to evaluate the effect of peripheral block anaesthesia performed in diabetic foot surgery on traumatic stress disorder, psychological stress, and patient satisfaction. This cross-sectional study was conducted on 85 patients in the Diabetic Foot Clinic of Gulhane Training and Research Hospital between April 2021 and March 2022. The data were collected using a Sociodemographic Data Collection Form, the Impact of Event Scale-revised (IES-R) to determine stress, and a Patient Satisfaction Evaluation Form. Evaluation was made of 85 patients, comprising 77.6% males and 22.4% females with a mean age of 60.93±13.17 years and mean duration of diabetes of 15.46±7.05 years. According to the diabetic foot wound classifications, 51.3% of the wounds were WAGNER Grade 3 and 69.4% were PEDIS Grade 2. Minor amputation was performed on 58.8% of the patients. The IES-R scale total points were median 11.0 (4.0-21.0). As the education level of the patients increased, so there was an increase in the IES-R subscale points of Intrusion and Hyperarousal (p=0.046, p=0.008). The Hyperarousal subscale points of patients who underwent minor amputation were determined to be increased (p=0.049). The results of this study showed that peripheral block anaesthesia in diabetic foot surgery created psychological stress in the patients but did not lead to traumatic stress disorder. Especially for patients with a university or postgraduate education level, preoperative information about the anaesthesia and wound care presented by nurses and other healthcare professionals would be able to significantly decrease the stress levels of patients who are to undergo diabetic foot surgery, including minor amputation, and thus the efficacy of the treatment process would be increased.

Keywords: Diabetic foot, traumatic stress disorder, peripheral block anaesthesia

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Introduction

Diabetic foot ulcers are one of the most serious complications of diabetes and have a significant effect on the quality of life of patients [1,2]. Although the prevalence of these ulcers varies in different geographic regions, the reasons leading to ulceration are usually similar. Ulcers generally develop with an event triggered by one or more risk factors in the etiology such as peripheral artery disease and/or peripheral neuropathy associated with diabetes [3].

Lower extremity surgery with wound care techniques are usually preferred in the management of diabetic foot ulcers. The aim of these surgical methods is to preserve life and limb. However, the surgeries performed have long-term quality of life and social effects, which can have a negative impact on the psychology of the patient [4]. In addition, the range of surgery-related comorbidities is extremely broad in this patient group. These comorbidities make the application of general anaesthesia more difficult and increase the risk of perioperative and postoperative complications [5].

Therefore, peripheral block anaesthesia is usually selected as the anaesthesia technique in amputations due to diabetic foot ulcers. Peripheral block anaesthesia is a good alternative to avoid the potential complications of general and spinal anaesthesia, especially in patients with diabetes mellitus (DM) [6]. When local anaesthetic is applied to the peripheral nerve with this technique, the anterior, lateral, and posterior lower leg, the ankle, and the foot are blocked intraoperatively, and limited pain control is provided in the postoperative period [7].

It has been reported in the literature that it is difficult to provide intraoperative hemodynamic stability in patients undergoing amputation because of diabetic foot because of the presence of long-term diabetes, comorbidities, and advanced age [8]. Therefore, it has been emphasized that regardless of autonomous neuropathy in these patients, peripheral nerve block anaesthesia is better in terms of providing intraoperative hemodynamics [9].

In addition to providing ideal surgery and comorbidity management, peripheral block anaesthesia in diabetic foot patients makes positive contributions such as facilitating hospital discharge, but the state of being awake and conscious during the operation can become a factor increasing psychological stress or traumatic stress disorder. Psychological stress is defined as all the responses given by an organism against a threat, causing the individual to experience physical, behavioural, emotional, and psychological problems [10]. There are previous studies in literature that have examined the relationships between the type of anaesthesia and psychological problems such as anxiety and depression. However, there are no studies of the relationship between the levels of psychological stress and patient satisfaction, and the peripheral block anaesthesia technique used in diabetic foot ulcer surgery. Therefore, the aim of this study was to examine the effect on traumatic stress disorder, psychological stress, and patient satisfaction of peripheral block anaethesia applied in diabetic foot surgery.

Materials and Methods

This cross-sectional study was conducted in the Diabetic Foot Clinic of Gulhane Training and Research Hospital Hospital between April 2021 and March 2022. The study universe consisted of all the patients with diabetic foot ulcer who underwent surgery in the specified period, and the study sample was formed of 85 patients who met the study inclusion criteria and agreed to participate. The power of the study with 0.05 error margin was calculated after data collection using G.Power-3.1.9.7 software. Accordingly, the effect size of the study was calculated to be 6.50, alpha value 0.05, and power 0.99.

The study inclusion criteria were defined as (i) literate, (ii) no vision problem, and (iii) age ≥18 years who underwent elective surgery with peripheral block anaesthesia. Patients were excluded from the study if emergency surgery was performed or if they did not wish to participate in the study. Written informed consent was provided by all the study participants. Data were collected with the questionnaire method in face-to-face interviews.

Data collection tools

Demographic Data Collection Form: This form consisted of 10 questions to elicit information such as age, gender, duration of DM, HbA1c level, and ASA score.

Impact of Event Scale-Revised (IES-R): This scale aims to determine the stress at the time the scale is administered of trauma experienced by the individual due to any event or situation. After the publication of the original IES in 1979 by Horowitz [11], the revised form, the IES-R, was developed by Weiss and Marmar according to the American Psychiatry Association criteria [12]. The success of the IES-R has been emphasized by several studies in the literature that have used the scale to determine levels of psychological stress and post-traumatic stress disorder (PTSD). The scale contains 22 items referring to the first 7 days, each of which is scored from 0-4 points. There are 3 subscales of the IES-R; intrusion (items 1, 2, 3, 6, 9, 14, 16, 20), avoidance (items 5, 7, 8 11, 12, 13, 17, 22) and hyperarousal (items 4, 10, 15, 18, 19, 21). A score of >22 points is defined as significant stress disorder symptoms, and higher scores indicate more severe symptoms. Validity and reliability studies of the Turkish version of the scale were conducted by Çorapçıoğlu et al. in 2006 [13]. When the cutoff value is accepted as 24-33, the sensitivity and specificity values have been found to be >70% for both [13]. In this study, the Cronbach alpha coefficient was found to be 0.929.

Patient Satisfaction Evaluation: The question format of the patient satisfation evaluation was prepared by the authors with the support of a psychiatry specialist. It was aimed to evaluate the severity of pain on postoperative day 1 and the peripheral block stress and patient satisfaction levels with a Visual Analog Scale (VAS) score.

Study procedure

The aim of this study was explained by the researcher to each patient in a face-to-face interview in the patient room. The study included 85 patients who provided verbal and written consent for participation in the study. The data were collected on postoperative Day 1 in an interview lasting 10-15 minutes.

Ethical aspect of the research

Approval for the study was obtained from the Health Sciences University Gülhane Scientific Research Ethics Committee (decision no: 2021/136, date: 25.03.2021). All the study procedures were in compliance with the principles of the Helsinki Declaration.

Statistical analysis

Data obtained in the study were analyzed statistically using IBM Statistical Package for Social Sciences, Statistics for Windows, Version 24.0 software (IBM Corp., Armonk, NY, USA, released 2016). The conformity of numerical variables to normality was assessed with the Kolmogorov-Smirnov test. Descriptive analyses were stated as mean, and standard deviation values for continuous variables and as number and percentage for categorical variables. Cronbach's alpha coefficient was used to determine the reliability of the scores obtained from the scales. The Mann-Whitney U-test and Kruskal Wallis test were used to examine differences between independent variables and the total scores in the measurement tool. A value of $p<0.05$ was considered statistically significant for all the analyses.

Results

Evaluation was made of 85 patients, comprising 77.6% males and 22.4% females with a mean age of 60.93±13.17 years and mean duration of diabetes of 15.46±7.05 years. According to the diabetic foot wound classifications, 51.3% of the wounds were WAGNER Grade 3 and 69.4% were PEDIS Grade 2. The mean points on the VAS 2 scale indicating the level of satisfaction of having had an operation without general anaesthesia were found to be 8.67±2.23. The sociodemographic and clinical characteristics of the study participants are shown in Table 1.

The IES-R subscale points were compared according to the sociodemograhic and medical characteristics (Table 3). The mean intrusion points and mean hyperarousal points were determined to be statistically significant different according to education level (p=0.046, p=0.008, respectively). As the education level increased, the intrusion and hyperarousal IES-R subscale points also increased. A statistically significant difference was determined in the hyperarousal score according to the type of operation (p=0.049) with higher points obtained by patients undergoing minor amputation.

Table 1. The sociodemographic and clinical characteristics of the study participants (n=85).

Characteristics	Mean±SD	
Age (years)	60.93±13.17	
DM duration	15.46±7.05	
HbA1c	10.66±11,50	
VAS 1: Is it stressful to have an operation without general anaesthesia?	1.88±2.68	
VAS 2: How satisfied are you with having had an operation without general anaesthesia?	8.67±2.23	
VAS 3: What is the level of your pain on postoperative Day 1?	2.18±3.02	
	Number (n)	**Percentage (%)**
Gender		
Female	19	22.4
Male	66	77.6
Education level		
Primary school	49	57.6
High school	29	32.9
University and above	8	9.4
WAGNER Classification		
Grade 2	4	4.7
Grade 3	44	51.8
Grade 4	37	43.5
PEDIS Classification		
Grade 2	59	69.4
Grade 3	26	30.6
ASA Score		
ASA 2	20	23.5
ASA 3	65	76.5
Type of Operation		
Minor Amputation	50	58.8
Debridement	20	23.5
Minor Amputation and Debridement	15	17.6

Abbreviation: *SD: Standard deviation*
ASA: American Society of Anesthesiologists

Table 2. The mean IES-R points of the study participants (n=85).

IES-R	Median (Q1-Q3)	Min-Max
Total (0-88)*	11.0 (4.0-21.0)	0-63
Intrusion (0-32)*	2.0 (0.0-6.5)	0-26
Avoidance (0-32)*	6.0 (1.5-10.5)	0-23
Hyperarousal (0-24)*	1.0 (0.0-4.5)	0-20

**minimum and maximum points obtainable*
Abbreviation: *IES-R: Impact of Event Scale-Revised*

Table 3. Comparisons of the mean IES-R points according to the patient characteristics (n=85).

Characteristics	IES-R Total		Intrusion		Avoidance		Hyperarousal	
	Median (Q1-Q3)		Median (Q1-Q3)		Median (Q1-Q3)		Median (Q1-Q3)	
Gender								
Female	8.0 (6.0-22.0)		2.0 (0.0-8.0)		6.0 (1.0-8.0)		2.0 (0.0-6.0)	
Male	11.5 (3.75-21.0)		2.0 (0.0-6.25)		7.0 (1.75-11.0)		1.0 (0.0-4.0)	
Test* *p*	-0.085	0.932	-0.504	0.614	-1.337	0.181	-0.791	0.429
Education Level								
Primary school	12.0 (3.0-21.0)		2.0 (1.0-6.5)		6.0 (0.5-10.5)		2.0 (0.0-5.0)	
High school	8.0 (3.25-13.0)		1.0 (0.0-3.0)		6.0 (1.5-9.75)		0.0 (0.0-1.0)	
University and above	19.0 (8.0-36.75)		8.0 (1.25-11.25)		9.5 (4.0-9.25)		4.5 (1.25-6.75)	
Test** *p*	4.597	0.100	6.175	**0.046**	2.803	0.246	9.647	**0.008**
WAGNER Classification								
Grade 2	4.0 (0.0-17.75)		0.5 (0.0-6.25)		3.5 (0.0-8.5)		0.0 (0.0-3.0)	
Grade 3	10.5 (6.0-25.0)		2.0 (0.0-8.0)		7.0 (2.25-10.0)		1.0 (0.0-5.75)	
Grade 4	12.0 (3.5-18.0)		2.0 (0.5-4.5)		4.0 (1.”0-11.0)		2.0 (0.0-4.0)	
Test** *p*	2.085	0.353	1.488	0.475	1.703	0.427	1.561	0.458
PEDIS Classification								
Grade 2	10.0 (4.0-21.0)		2.0 (0.0-8.0)		6.0 (2.0-9.0)		1.0 (0.0-5.0)	
Grade 3	13.0 (3.75-21.25)		2.0 (1.0-5.25)		8.5 (1.0-12.0)		2.0 (0.0-4.24)	
Test* *p*	-0.450	0.653	-0.170	0.865	-0.570	0.569	-0.801	0.423
ASA Score								
ASA 2	11.5 (0.25-14.0)		2.0 (0.25-5.0)		4.5 (0.0-8.25)		1.0 (0.0-3.75)	
ASA 3	10.0 (4.0-21.5)		2.0 (0.0-7.5)		7.0 (2.0-11.0)		1.0 (0.0-6.0)	
Test* *p*	-0.723	0.470	-0.453	0.651	-0.350	0.237	-1.183	0.727
Type of Operation								
Minor Amputation	13.0 (4.0-22.5)		2.5 (0.0-8.0)		6.0 (2.0-11.0)		2.0 (0.0-5.25)	
Debridement	6.5 (0.0-12.5)		1.0 (0.0-2.0)		6.0 (0.0-9.0)		0.0 (0.0-2.0)	
Amputation + Debridement	12.0 (4.0-21.0)		2.0 (1.0-8.0)		9.0 (2.0-11.0)		1.0 (0.0-6.0)	
Test** *p*	2.867	0.238	4.775	0.092	0.797	0.671	6.048	**0.049**

Abbreviation: *IES-R: Impact of Event Scale-Revised*
**Mann Whitney U-test*
***Kruskal Wallis test*

Discussion

The results of this study demonstrated that peripheral block anaesthesia applied in diabetic foot surgery created psychological stress but did not lead to traumatic stress disorder. The findings showed that as the education level of the patients increased, the symptoms of intrusion and hyperarousal also increased, and the level of hyperarousal was higher in those who underwent minor amputation.

Hospitalisation for surgery is a situation that generally raises anxiety levels and patients experience physiological, psychological, and social stress [14]. The source of stress is usually associated with the anesthesia experience, postoperative pain, and disruption of bodily integrity [15]. Compared to other anaesthesia methods, peripheral block anaesthesia in diabetic foot patients is an effective anaesthesia technique which provides ideal surgical anaesthesia, cardiovascular stability, good postoperative analgesia, and facilitates hospital discharge [16,17]. Therefore, peripheral nerve block anaesthesia is recommended for these patients [9]. It was determined in this study that peripheral block anaesthesia applied in diabetic foot surgery created psychological stress but did not lead to traumatic stress disorder. When these advantages of peripheral block anaesthesia are evaluated in patients with high levels of comorbidities, they can be said to be associated with low stress levels in the patients included in the study.

In this study, the IES-R subscale points of intrusion and hyperarousal were found to be higher for patients with an education level of university and above compared to the other education level groups. The intrusion subscale dimmension is characterised by intrusive thoughts about unwanted visual images, traumatic aspects, outcomes, and specific images of the situation/event or results that create stress and a trauma effect when awake. The hyperarousal subscale dimension is defined as efforts to avoid thinking about the situation/event, to avoid talking about the subject, and to avoid remembering things [18]. In a study of patients diagnosed with diabetic foot, Öztaş et al. reported that the health literacy level of university graduates was 7.5-fold higher than that of illiterate patients [19]. In another two similar studies, it was found that as the level of health literacy increased in patients who were to undergo surgery, so the levels of fear of surgery also increased [20,21]. In the current study, the fact that the level of health knowledge and awareness was high in patients with an education level of university and above could have increased the levels of psychological stress as a result of having more health-related knowledge, and this could have been associated with these patients showing more intrusion and hyperarousal behaviours.

When the current study patients were evaluated in respect of the type of operation, the intrusion subscale points were found to be higher in the patient group that underwent minor amputation. In the literature, amputation has been associated with a traumatic experience, and is not limited to organ loss, but also has the meaning of loss of body image, function, work, and relationships [22]. In addition, there is a mental dimension determining the responses of the individual to amputation. Rates of depression in these patients have been reported to vary between 28.7% and 51.4% [23,24]. Therefore, when the results of this study are evaluated, it can be said that compared to the other groups, the patient group that underwent minor amputation could perceive peripheral block anaesthesia as a stressor, which was seen as characteristics such as not thinking or talking about and avoiding the situation in the early period.

In the evaluation of the patient satisfaction levels in this study, although peripheral block anaesthesia created a low level of stress, the patients were satisfied with this method, and postoperative pain severity was determined to be low. Interestingly, the low stress levels induced by peripheral block anaesthesia coincide with high patient satisfaction, supporting the notion that this anaesthesia approach is effective and patient-friendly. These findings support the advantages of peripheral block anaesthesia that have been defined in the literature.

This study has some limitations. The cross-sectional design makes it difficult to clearly determine the cause-effect relationships of the findings. The fact that the participants were selected from only one education and research hospital limits the generalizability of the results to a wider audience. The fact that the IES-R Scale and satisfaction assessment were limited to the early period after surgery prevents the observation of long-term effects. However, considering the limitations of this research, the findings have the potential to inform future studies and may contribute to the integration of psychological support mechanisms in health services. Therefore, studies repeated in different health institutions with larger and more diversified sample groups will be of great value in terms of increasing the validity of these findings.

Conclusion

In conclusion, the findings of this study suggest that peripheral block anesthesia creates psychological stress in patients with university or postgraduate education who will undergo diabetic foot surgery, but does not cause traumatic stress disorder. In this context, wound care nurses and other healthcare professionals are recommended to provide comprehensive, structured counseling to patients about anesthesia and surgical preparation strategies. Integration of preoperative counseling processes, especially for patients undergoing minor amputations, can significantly reduce stress levels and make positive contributions to the treatment process. Incorporating such practices into healthcare protocols will increase the general well-being of patients.

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Conflict of interest

There are no conflicts of interest with respect to the authorship and/or publication of this article.

Data availability statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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