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The impact of post-traumatic stress disorder on the pain perception in a perioperative period in serviceman

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An estimation of psycho-emotional state allows to further select appropriate distinctive strategy of treatment, moreover protect complications due to feeling of pain is a subjective reaction. Objective. To identify the relationship between intensity of pain syndrome before and after surgical intervention depending on initial psycho-emotional condition. Methods. The psychological state of 138 servicemen who had upper limb injuries was studied. Assessment was conducted using the Mississippi scale for combat-related posttraumatic stress disorder and the PSM-25 psychological distress scale. The average age the patients was (40,5 ± 10,6). Pain intensity was assessed using a visual analogue pain scale (VAS).The pain assessment was studied 2 hours before and 24 hours after surgery. Results. According to the Mississippi PTSD scale, the normal control group (first) had an average score of (62,92 ± 9,16), psychiatric patent group up to (88,13 ± 8,47), PTSD patients' group had an average score of (119,66 ± 5,50). Data obtained on the PSM 25 scale, namely the low stress group had an average score of (60.73 ± 24.5), the medium group up to (95.33 ± 29.8), and the high group had an average score of (123 ± 29.7). The pain assessment according to the VAS: the average score in the first group was (4.4 ± 1.6), in the second — (5.75 ± 2.0), in the third — (6.8 ± 1.6). The amount of 1% morphine solution administered postoperatively was significantly different between the first and second groups (p = 0.03). No significant difference was found when comparing the second and third groups. Conclusions. The largest percentage of military personnel had a medium level of stress, the development and clinical manifestation of PTSD was detected in 6.52 % of the studied. The pain indicator before the operation depended on the initial psycho-emotional condition of the patient.

Оцінювання психоемоційного стану пацієнта дозволяє в подальшому вибрати відповідну індивідуальну стратегію лікування та попередити ускладнення, адже сприйняття болю є виключно суб'єктивною реакцією. Мета. Виявити взаємозв'язок між інтенсивністю больового синдрому до операції та після залежно від початкового психоемоційного статусу хворого. Методи. Досліджено психологічний стан 138 військовослужбовців, які мали травмування верхніх кінцівок. Оцінювання проводили за Міссісіпською шкалою ПТСР (посттравматичного стресового розладу) і шкалою психологічного стресу PSM-25. Середній вік хворих складав (40,5 ± 10,6) року. Інтенсивність болю вивчали за візуальною аналоговою шкалою болю (ВАШ). Оцінювання болю проводилося за 2 доби до оперативного втручання та через 24 год після. Результати. За Міссісіпською шкалою ПТСР група «добре адаптовані» (перша) мала середнє значення в балах (62,92 ± 9,16), група «психічні розлади» (друга) — (88,13 ± 8,47), група з розвитком ПТСР (третя) — (119,66 ± 5,50). Отримано дані за шкалою психологічного стресу PSM-25, а саме: група низького рівня стресу мала середнє значення (60,73 ± 24,5) бала, середнього — (95,33 ± 29,8), високого — (123 ± 29,7). Оцінювання болю за ВАШ: середнє значення в балах в першій групі було (4,4 ± 1,6), у другій — (5,75 ± 2,0), у третій — (6,8 ± 1,6). Кількість введеного післяопераційно розчину морфіну 1 % мала достовірну різницю між першою та другою групами (p = 0,03). Під час порівняння другої та третьої груп достовірної різниці не виявлено. Висновки. Найбільший відсоток військовослужбовців мав середній рівень стресу, розвиток та клінічний прояв ПТСР було виявлено в 6,52 % досліджених. Показник болю до операції залежав від початкового психоемоційного стану пацієнта. Ключові слова. Післятравматичний стресовий розлад, біль, знеболення, післяопераційний період.

Keywords. Post-traumatic stress disorder, pain, analgesia, postoperative period

Introduction

In the conditions of martial law in Ukraine, there was a need to study the impact of the initial psycho-emotional state of military personnel on the intensity of pain. The risk of developing post-traumatic stress disorder (PTSD) is associated with several factors, including the type of exposure, psychopathology, characteristics and strategies for coping with stress, which independently affect the level of PTSD development [1]. A study by F. Kurhan et al. showed that under the influence of severe stress, such as a natural disaster, the frequency of developing PTSD can reach 71.4% in the case of early assessment and 57.1 % in the long term [2]. Emotional stress, preoperative anxiety, depression, are significantly correlated with complications that occur after surgical intervention, namely: the development of postoperative delirium within 3 months [3], cognitive disorders [4, 5], development of chronic pain [6]. Identification of preoperative risk factors and stress symptoms allows for adjustment of targeted therapy after surgical interventions.

The issue of the peculiarities of pain perception in military personnel with limb injuries who have different levels of stress or PTSD remains relevant. According to the International Association for the Study of Pain, pain is an unpleasant sensory and emotional experience associated or perceived to be associated with actual or potential tissue damage [7], i. e., it has a subjective assessment. In patients who have been injured in combat, pain perception occurs through the prism of an already acquired psychoemotional disorder, which, in turn, is clinically reflected during its assessment both in the pre- and postoperative periods.

Purpose: to investigate the relationship between the intensity of pain syndrome before and after surgery depending on the initial psychoemotional status of the patient.

Material and methods

The study was performed at the State Establishment Professor M. I. Sytenko Institute of Spine and Joint Pathology of the National Academy of Medical Sciences of Ukraine. The study was approved by the local bioethics committee (Protocol No. 231 dated 20.05.2023) of the relevant institution in accordance with the ICH GCP rules, the Helsinki Declaration of Human Rights of 2002, the Council of Europe Convention on Human Rights and Biomedicine approved in 1977, as well as the current legislation of Ukraine.

The research involved assessment of 138 medical cases of male military personnel with injuries and upper limb injuries. The average age of the patients was (40.5 ± 10.6) years. Patients gave oral and written consent to participate in the study. The analysis excluded military personnel with cardiac arrhythmia, respiratory, renal or hepatic failure, patients who had previously used opioids for pain relief, and drug addicts. The Mississippi PTSD scale (military version) was used to diagnose PTSD, and the PSM-25 psychological stress scale was used to determine the level ofstress disorders. The questionnaire was administered 2 days before surgery. According to the Mississippi PTSD scale, all subjects were divided into three groups depending on the number of points scored, namely: well-adapted (first), with mental disorders (second) and PTSD (third). The tool for studying pain intensity was the VAS scale. The assessment was carried out 2 days before surgery and 24 hours after the procedure. According to the American Society of Anesthesiologists (ASA) scale, all patients were classified as Class I–II. The study involved military personnel who underwent surgery under general anesthesia (1 % propofol and 0.005 % fentanyl solution in standard dosages), muscle relaxation was provided by pipecuronium bromide. Postoperative pain relief was provided by the following regimen: paracetamol, nonsteroidal anti-inflammatory drugs, 1 % morphine solution. All patients had comparable blood loss and duration of surgery (Table 1).

Statistical analysis. The obtained data were studied using the IBM SPSS 9.0 computer software. The distribution of samples was checked using the Kolmogorov-Smirnov test. The mean value and standard deviation were calculated. Differences between groups of indicators were analyzed using Student's t-test.

Results and discussion

Analysis of the initial psycho-emotional state of military personnel

It should be noted that the injuries received by the patients were a consequence of combat operations. Assessment of findings showed that the highest average score was in the third group (PTSD), which corresponded to (119.66 ± 5.50), the average age of the patients was (38.83 ± 10.24) years. In the second group (“mental disorders”), the average value was (88.13 ± 8.4), the age of the patients varied (42.4 ± 10.5) years. The first group (“well-adapted”) comprised patients aged (36.33 ± 8.14) years, its average indicator was the smallest — (62.92 ± 9.16). Thus,

the first group — 63 subjects (45.65 %), the second — 66 (47.83 %), the third — 9 (6.52 %).

Patients of these groups were also examined using the PSM-25 method. It was found that the stress level was (60.73 ± 24.52) in the first group of patients, which corresponded to a low level, (95.33 ± 29.80) in the second group (average stress level), and (123 ± 29.71) in the third group (high level), which indicated a significant comparability of both scales (Table 2).

Thus, most patients belonged to the second group, which corresponded to the Mississippi scale "mental disorders" group and according to the PSM-25 scale they had an average level of stress. The next largest group was the first one, which according to the Mississippi scale was "well-adapted", and with a low level of stress according to the PSM-25. However, 9 servicemen had PTSD and corresponded to a high level on both scales, which did not depend on the age of the patients.

According to contemporary studies, the development of mental disorders and neuroses in wartime is one of the most common problems. B. C. Kok et al. showed that the probability of developing PTSD in military personnel was 13.2 %, while in the civilian population only 5.5 % [8]. Almost 44–72 % of military personnel experience a high level of stress. The key risk factors for its development are poor social support, low stress coping skills, extensive combat experience and depression [9]. The probability of developing PTSD increased by 2.8 times in military personnel with depression, compared to respondents without affective mental disorders [10].

Assessment of the level of pain depending on the initial emotional-behavioral reaction

Analysis of the VAS index before surgery showed that its average value in the first group was (4.6 ± 1.4) points, the average age of the patients was (36.33 ± 8.14) years; in the second one, the VAS index was (5.75 ± 1.5) points, the average age was (42.4 ± 10.5) years; in the third one, the VAS index was (5.66 ± 1.5) points, the average age was (38.83 ± 10.2) years. That is, the assessment of pain intensity did not depend on the age of the patients. A significant difference in pain indices before surgery was found between the second and first groups ($p = 0.03$). The average VAS values after surgery were as follows: in the first group — (4.4 ± 1.6), in the second one — (5.75 ± 2.0) and in the third one — (6.8 ± 1.6) points. After the operation, a significant difference was recorded between the second and first groups, the intensity of pain in the second was higher ($p = 0.04$). No significant difference was obtained between the VAS level when comparing the second and third groups.

The decisive indicator for assessing pain syndrome in the early postoperative period was the amount of 1% morphine solution administered during the first 24 hours. In the first group, it was (22.2 ± 4.3) mg, in the second one — (32.7 ± 4.8) mg, in the third one — (34.3 ± 5.2) mg (Table 3).

A significant difference in the amount of 1 % morphine solution administered was found ($p = 0.03$) between the first and second groups. When comparing the second and third groups, no such difference was found.

Table 1

Blood loss and duration of surgery in patients tested on the Mississippi PTSD scale

Patient group	Duration of surgical intervention, min	Perioperative blood loss, ml
I (n = 63)	126 ± 24.5	650 ± 35.5
II (n = 66)	135 ± 29.8	700 ± 28.4
III (n = 9)	128 ± 25.9	680 ± 37.3

Table 2

Comparison of Mississippi PTSD Scale and PSM-25 test results (M ± SD)

Patient group	Age, years	Mississippi PTSD scale, points	PSM-25, points
I (n = 63)	38,83 ± 10.24	62.92 ± 9.16	60.73 ± 24.52
II (n = 66)	42,40 ± 10.50	88.13 ± 8.47	95.33 ± 29.80*
III (n = 9)	36,33 ± 8.14	119.66 ± 5.50	123 ± 29.71 **. ***

Notes: * — statistically significant difference between the second and first group, $p = 0.030$; ** — statistically significant difference between the third and first group, $p = 0.020$; *** — statistically significant difference between the third and second group, $p < 0.005$.

Table 3

Comparison of psychoemotional state with pain assessment in the postoperative period and the amount of morphine solution administered

Patient group	Mississippi PTSD scale (points)	PSM-25 (points)	VAS pain score before intervention	VAS pain score after intervention	Amount of 1% morphine solution administered (mg)
I (n = 63)	62.90 ± 9.10	60.70 ± 24.50	4.60 ± 1.40	4.40 ± 1.60	22.10 ± 4.30
II (n = 66)	88.10 ± 8.40	95.30 ± 29.80	5.75 ± 1.50 *	5.70 ± 2.00 $^{\Delta}$	32.70 ± 4.80 $^{+}$
III (n = 9)	119.60 ± 5.00	123.00 ± 29.70	5.66 ± 1.50 **	6.80 ± 1.60 $^{\Delta\Delta}$	34.30 ± 5.20 $^{++}$

Notes: *— statistically significant difference between the indicators of the second and first group, p = 0.04; ** — statistically significant difference between the indicators of the third and first group, p = 0.03; $^{\Delta}$ — statistically significant difference between the indicators of the second and first group, p = 0.04; $^{\Delta\Delta}$ — statistically significant difference between the indicators of the third and first group, p < 0.05; $^{+}$ — statistically significant difference between the indicators of the second and first group, p = 0.03; $^{++}$ — statistically significant difference between the indicators of the third and first group, p = 0.05.

N. L. Hudock et al. found that posttraumatic stress disorder increased the risk of postoperative opioid use, but the increase in postoperative pain did not correlate with the initial state of the psychoemotional sphere [11]. M. Jeantieu et al. found that the development of PTSD occurred after surgery if there was preoperative anxiety and stress and severe postoperative pain [12]. K. R. Archer, in analyzing the medical cases of 213 patients, found that the intensity of pain was statistically associated with depression [13].

Conclusions

Assessment of findings on psycho-emotional stress showed that the largest percentage of servicemen had an average level. The development and clinical manifestation of post-traumatic stress disorder was recorded in 6.52 % of the studied, which amounted to 9 patients.

Analysis of the level of pain according to the VAS scale determined that the assessment of the pain index before surgery and in the postoperative period depended on the initial psycho-emotional state of the patient, but it was not affected by either the age or gender of the patient.

A relationship was found between the Mississippi Post-Traumatic Stress Disorder Scale (military version) and the PSM-25 Psychological Stress Scale. Correspondence of the groups: in the "well-adapted" group, a low level of stress was recorded, with an average level in the "mental disorders" group, and a high one in the PTSD group. According to surveys of military personnel, the PSM-25 psychological stress scale was more adapted for perception.

The symptoms and state of anxiety before surgery did not correlate with any parameters of recovery or postoperative morbidity.

Conflict of interest. The authors declare the absence of a conflict of interest.

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