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Factors associated with acute and chronic pain after inguinal herniorraphy

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Abstract

Objectives: The aim of this study was to analyse the relationship between types of anaesthesia, patients' demographic variables, preoperative emotional states and the prevalence of postoperative pain.

Method: In this randomized prospective study, postoperative pain was assessed in 100 patients, who were ASA (American Society of Anaesthesiologist) I-II and between 18-65 years old, undergoing inguinal herniorrhaphy with either general or spinal anaesthesia. In addition, postoperative pain compared with patients' demographic properties and psychological conditions in each group was also considered. Acute pain was evaluated at 1, 2, 4, 6, 12 and 24th hours with the Numerical Rating Scale (NRS) and chronic neuropathic pain was at 1, 2 and 3rd months with Douleur Neuropathique 4 Questions (DN4). All patients were treated with the same analgesics after operation.

Results: Group spinal anaesthesia had lower acute pain at 1 and 2nd hours but they felt more severe pain at the 24th hour. Also patients' anxieties were correlated with acute and chronic postoperative pain. Ten patients complained about postoperative chronic pain after 3 months and there was no significant difference between groups.

Conclusion: Spinal anaesthesia decreased acute pain intensity at the first postoperative hours. Patients with anxiety felt high pain levels and they had an increased chronic pain prevalence.

Keywords: inguinal hernia, surgery, acute pain, chronic pain

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Introduction

Postoperative pain is a kind of acute pain, which starts with surgical trauma and is reduced with tissue recovery; however, in some patients it may become chronic [1, 2]. Though the importance in the improvement of postoperative pain management has come to light in the last few decades there still is not an ideal postoperative pain management strategy. Usually postoperative pain treatment is the same in all patients but the sensation of pain can be affected by different factors. Also damage to a portion of the peripheral or central nervous system is associated with pain and impaired function or altered stimulation. Neuropathic pain can persist independent of the injury or severity of the injury, and can even be aggravated within weeks, months, or years [3, 4].

After some elective operations, chronic postoperative pain has been reported to be more frequent than after others [5]. Some studies have evaluated the relationship between the type of anaesthesia, or certain characteristics of patients such as demographics, emotional, and the postoperative acute/chronic pain. All these factors have been suggested to affect postoperative pain [6, 7].

The aim of this study was to evaluate the relationship between the type of anaesthesia, demographic characteristics of the patients, presence of anxiety and depression and the postoperative acute and chronic pain after inguinal hernia repair.

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Methods

The study was carried out by the Department of Anaesthesiology and Reanimation of Haseki Training and Research Hospital of Ministry of Health between 15.06.2014 - 15.12.2014. After approval of the hospital Ethics Committee and the written consent of the patients, 100 patients, who were scheduled for elective, unilateral inguinal hernia repair with the Lichtenstein method, who were ASA I-II group and were between 18 and 65 years, were included in this prospective randomized study. Patients with the following characteristics were excluded: pregnant and lactating patients, patients who cannot participate in social and mental aspects of work, patients with known alcohol and drug dependence or under chronic pain treatment and chronic analgesic use, with allergies to the drugs used in the study, with recurrent inguinal hernia, with perioperative complications.

Patient age, gender, monthly average income, education level were recorded and their body mass index (BMI), body surface area (BSA) were calculated. On the operation morning, the Hospital Anxiety and Depression Scale (HADS) [8] and Physicological Vulnerability Index (PVI) [9] were applied to all patients. The patients were also informed about the Numerical Rating Scale (NRS, NRS = 0 no pain and NRS = 10 the most severe pain imaginable), in which they were going to record the value of their pain levels, after the operation at 1st, 2nd, 4th, 6th, 12th and 24th hours to evaluate acute post-operative pain.

After these preparations the patients were randomly divided into two groups.

1) Group G (n = 50): Group of patients undergoing general anaesthesia

On the operation table, standard monitorization was applied and an intravenous (i.v.) cannula was placed while patients were in a supine position. Orotracheal intubation was performed with 0.1 mg/kg midazolam, 1 mcg/kg fentanyl, 2 mg/kg propofol and 0.6 mg/kg rocuronium. For maintenance 6% desflurane in 50% mix O_2/air were used.

2) Group S (n = 50): Group of patients undergoing spinal anaesthesia

On the operation table subarachnoid space was approached with a 22-gauge spinal needle between L3-4 space and 15 mg of 0.5% bupivacaine was applied in a sitting position. The patients were put in the supine position immediately after spinal block, and the level of anaesthesia was confirmed with a pinprick test.

In both groups 50 mg intramuscular (i.m.) pethidine was administered 5 minutes before the end of the operation. For postoperative acute pain treatment, 100 mg tramadol i.v. was administered 3 times a day for the first 24 hours.

Patients were visited in the postoperative period and the sheets with NRS were given to them in order to record pain values. After 24 hours, sheets were collected from patients.

After discharge, a nonsteroidal anti-inflammatory drug was prescribed for analgesia.

For chronic pain evaluation, neuropathic pain was assessed by the DN4 scale [10] by contacting the patients at 1, 2 and 3rd months by phone.

Statistical analysis

The SPSS 18.0 program (Statistic Package for Social Sciences for Windows ver. 15.0, IBM, USA) was used for statistical analysis in this study. Descriptive statistics; number and percentage for categorical variables, and mean, standard deviation for numerical variables. The chi-square and Fisher exact tests were used for categorical variables when the groups were compared. The Student t test was used when two groups of numerical variables were compared with a normal distribution condition. Multiple group comparisons were made with the Kruskal Wallis test. Pearson correlation analysis was performed for the degree of relation of numerical variables to each other. The level of significance was considered as $p < 0.05$ when assessed.

Results

All 100 patients included in the study completed the 3-month follow-up; there were no exclusions.

There was no difference in terms of demographic data between the spinal and general anaesthesia groups.

Postoperative NRS scores of the groups within 24 hours are shown in Table 1. In Group G NRS scores were significantly higher at postoperative 1 and 2nd

Table 1. 1st-24th hour NRS scores between groups

	Group S	Group G	p
NRS 1st hour	2.44 ± 2.40	6.50 ± 2.76	0.001
NRS 2nd hour	2.72 ± 2.31	5.18 ± 2.55	0.001
NRS 4th hour	3.24 ± 2.04	3.72 ± 2.02	0.24
NRS 6th hour	2.76 ± 2.11	3.02 ± 2.09	0.53
NRS 12th hour	2.02 ± 1.66	1.86 ± 1.60	0.62
NRS 24th hour	1.70 ± 1.40	1.04 ± 1.04	0.009

hours when compared with Group S (p = 0.001). In Group S, NRS score was significantly higher than Group G at the postoperative 24th hour (p = 0.009).

No statistically significant difference between Group S and Group G was found in postoperative chronic neuropathic pain.

There was no statistically significant correlation between age, BMI, BSA, salary, education and postoperative acute and chronic pain scores.

The HADS averages were similar in both groups. When the HADS scores were assessed within the groups, a significant correlation was found between NRS scores and HADS scores (table 2). Patients with high HADS score felt more pain at postoperative 24th hour in Group S, and postoperative 4, 6 and 24th hours in Group G. As the HADS score increased, there was an increase in postoperative acute pain scores regardless of the anaesthesia technique.

In addition, the HADS scores were correlated with chronic pain in patients in Group G ($p < 0.05$) (table 3).

There was no relationship between acute pain levels and PVI scores in Group S. However, there was a correlation between the PVI scores of the patients in Group G and the neuropathic pain at all times ($p < 0.05$) (table 4).

Discussion

Pain is an important problem to be addressed in the postoperative period. It is necessary to prevent the formation of the pain before it begins [11]. The development of postoperative pain requires psychological variables as well as demographic characteristics [12-14]. The personal differences in the perception of pain are more important than the degree of surgery and trauma. The fear of the unknown, arising from the inadequate knowledge of the operation and anaesthesia, which begins with the arrival of the patient in the hospital, can lead to an increase in anxiety. 'Psychological premedication' provided by the transfer of knowledge before anaesthesia constitutes the first step in postoperative analgesia. Some studies showed reassurance and decreasing patients' anxiety by supplying information that they could expect decreased pain after surgery [15, 16]. Although there was no relationship between anxiety and pain in former studies [17, 18], the following studies stated that acute anxiety leading to depression contributes to chronic postoperative pain [19-21].

In this study it was observed that the scales evaluating anxiety/depression and the vulnerability of the patients were significantly associated with postoperative pain. Chronic pain was detected in patients with a high

Table 2. Comparison of postoperative acute pain scores with HADS

	NRS 1	NRS 2	NRS 4	NRS 6	NRS 12	NRS 24
Group S – HADS						
Pearson correlation	0.029	0.138	0.095	0.205	0.201	0.296
p value	0.84	0.33	0.51	0.15	0.16	0.03
Group G – HADS						
Pearson correlation	0.219	0.262	0.322	0.321	0.274	0.303
p value	0.12	0.06	0.02	0.02	0.05	0.03

Table 3. Comparison of postoperative chronic neuropathic pain with HADS

		Hospital anxiety depression scale			p value
		1st month	2nd month	3rd month	
Group S Neuropathic pain	yes	7.8 ± 3.8	7.0 ± 3.4	5.7 ± 2.9	> 0.05
	no	8.5 ± 5.0	8.6 ± 4.7	8.4 ± 4.5	
Group G Neuropathic pain	yes	9.8 ± 4.9	11.8 ± 6.8	11.8 ± 6.8	< 0.05
	no	6.3 ± 3.8	6.8 ± 3.7	6.8 ± 3.7	

Table 4. Comparison of postoperative chronic pain with PVI

		PVI			p value
		1st month	2nd month	3rd month	
Group S Neuropathic pain	yes	17.2 ± 5.9	15.2 ± 5.6	17.7 ± 3.3	> 0.05
	no	18.7 ± 5.3	18.8 ± 5.3	18.0 ± 5.7	
Group G Neuropathic pain	yes	20.6 ± 3.2	20.6 ± 1.8	20.6 ± 1.8	< 0.05
	no	16.7 ± 3.7	17.5 ± 4.0	17.5 ± 4.0	

HADS score in Group G. Similar to this study, many studies showed the significant relationship between anxiety/depression and postoperative pain after different operations [22-25].

As we see in our daily routine chronic postsurgical pain (CPSP) has become an important health problem and is scheduled to be included in the upcoming version of the International Classification of Diseases, 11th Revision (ICD-11) [26]. After elective mastectomy, thoracotomy, joint amputations, cholecystectomy, hysterectomy and nephrectomy chronic postoperative pain has been reported to be more frequent than after other operations. Postoperative neuralgia due to nerve compression or damage is most commonly seen in intercostobrachial, intervertebral, iliohypogastric, ilioinguinal, genitofemoral, femoral and sciatic nerves. In some studies, the frequency of postoperative pain after hernia repair was reported to be 5-35% [27, 28]. Poobalan et al. reviewed studies between 1987-2000 and found a higher ratio of CPSP, nearly up to 53% [29]. Aasvang and Kehlet searched the literature between January 2000 - May 2004 and found that the risk of CPSP was 12% [30]. Karaman et al. found that the incidence of pain, 3 months after surgery was 18.6% [31]. It is possible that the recognition of CPSP has increased after 2000 and as the prevention gained importance, the incidence might have declined. In this study, when the patients were asked about their pain status 3 months after the operation, only 10% reported postoperative pain.

There are many methods to examine acute postoperative pain. NRS is recommended, because it is both easier to understand and more reliable [32].

Several studies have shown that the severity of acute and chronic pain is related to the type of anaesthesia. In this study, the postoperative NRS scores of Group S were significantly lower at 1. and 2. hours. However, the NRS scores at the 24th hour were significantly higher. As in this study, Harsten et al. observed that during the first 2 hours after general anaesthesia, patients had higher pain scores, but after 6 hours the spinal group had significantly higher pain scores [33]. This finding may be due to the pain perception of the patients; during the first postoperative hours the analgesic action of spinal anaesthesia continues and the patients are pain free. Therefore, the pain perception may be more severe in later hours.

In this study there was no significant correlation between age and postoperative pain. Some studies showed that as the age increased, the need for analgesia and risk of chronic pain decreased [34, 35].

Studies conducted to investigate the relationship between education level and pain have found that postoperative chronic pain is independent of the level of education or the employment status of patients [36, 37]. Zhou and Gao reported that exclusion in social life and loss of money increased the persons' tendency to have pain [38]. In our study, education and monthly income were not associated with the postoperative acute or chronic pain of the patients. This difference may be due to the fact that there were no significant differences in the social status of the patients.

Conclusion

The results of our study suggest that spinal anaesthesia may be more effective in preventing early acute postoperative pain, but does not affect the occurrence of CPSP. Patients, who were anxious, depressed or vulnerable may be more prone to develop postsurgical chronic pain. Therefore, it should be recommended that the psychological status of the patients be examined along with the physical exam in order to give reassurance and alleviate the anxiety of patients.

Conflict of interest

Nothing to declare

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