Incidence of Post-Thoracotomy Chronic Pain and Its Impact on Quality of Life

Posttorakotomi Kronik Ağrı İnsidansı ve Yaşam Kalitesi Üzerine Etkisi

Cemil YEŞİLDAĞ,[a]
Elvan ERHAN,[a]
M. Nuri DENİZ,[a]
Ufuk ÇAĞRICI,[b]
Alpaslan ÇAKAN,[b]
Kutsal TURHAN,[b]
Mehmet İbrahim YEGÜL[a]

Departments of
[a]Anesthesiology and Reanimation,
[b]Thoracic Surgery,
Ege University Faculty of Medicine, İzmir

Geliş Tarihi/*Received:* 04.02.2013
Kabul Tarihi/*Accepted:* 11.04.2013

This study was presented as a poster at Congress of 6th World Institute of Pain, February 4-6, 2012, Florida

Yazışma Adresi/*Correspondence:*
M. Nuri DENİZ
Ege University Faculty of Medicine,
Department of
Anesthesiology and Reanimation,İzmir,
TÜRKİYE/TURKEY
mnurideniz@hotmail.com

ABSTRACT Objective: Chronic pain is common after thoracotomy. The goal of this study was to investigate the incidence of chronic post-thoracotomy pain and its impact on quality of life. **Material and Methods:** Two hundred and thirty three patients who had undergone a classic postero-lateral thoracotomy in our institution between January 2007 and October 2009 were evaluated. Patients who had more than one operation or died during follow up were excluded. All patients were contacted by telephone and were questioned about the presence of post-thoracotomy pain. Patients who had post-thoracotomy pain were invited for face to face interview with a Pain Questionnaire Form. **Results:** Seventy four patients were excluded from the study. One hundred twelve out of 159 patients were contacted by telephone. The incidence of chronic post-thoracotomy pain was 56%. Pain Questionnaire revealed that 69.4% of the patients had mild, 26.5% had moderate and 4.1% had severe chronic pain. Thirty-nine percent of the patients with pain needed analgesia, 24% felt their pain was their worst medical problem and 24% reported that it limited their daily activities. The prevalence of each neuropathic symptom was between 4% and 61%. **Conclusion:** Our study confirms that chronic post-thoracotomy pain is a common problem. About 30.6% of patients have moderate to severe chronic post-thoracotomy pain affecting their quality of life.

Key Words: Chronic pain; thoracotomy; pain

ÖZET Amaç: Torakotomi operasyonlarından sonra kronik ağrı gelişimine sık rastlanmaktadır. Bu çalışmada torakotomi geçiren hastalarda kronik post-torakotomi ağrı insidansı ve ağrının yaşam kalitesine etkisi araştırıldı. **Gereç ve Yöntemler:** Kliniğimizde Ocak 2007 ile Ekim 2009 tarihleri arasında klasik posterolateral torakotomi operasyonu geçiren 233 hasta incelendi. Birden fazla operasyon geçiren, ölüm nedeniyle kaybedilen, torakotomi dışında cerrahi girişim geçiren hastalar çalışmaya dâhil edilmedi. Çalışmaya dâhil edilen tüm hastalar telefon ile arandı ve telefon ile ulaşılabilen hastalara torakotomi sonrası ağrı varlığı soruldu. Torakotomiye bağlı ağrı duyduğunu bildiren hastalar yüz yüze görüşme için çağırıldı ve ağrılarının değerlendirilmesinde Ağrı Sorgulama Formu kullanıldı. **Bulgular:** Torakotomi geçiren 74 hasta çalışmaya dahil edilmedi. Çalışmaya 159 hasta dahil edildi ve 112 hastaya telefon ile ulaşıldı. Bu hastalarda kronik post torakotomi ağrı insidansı %56 bulundu. Ağrı Sorgulama Formuna verilen yanıtlara göre kronik post torakotomi ağrı gelişen hastaların %69,4'ünde ağrı şiddeti hafif, %26,5'inde ağrı şiddeti orta, %4,1'inde ise ağrı derecesi şiddetli bulundu. Hastaların %39'u ağrılarına yönelik analjezik kullandıklarını, %24'ü ağrının en kötü medikal problem olduğunu ve %24'ü ağrının günlük aktivitesini kısıtladığını bildirdi. Nöropatik ağrı semptomlarının oranının %4 ile %61 arasında değiştiği görüldü. **Sonuç:** Bu çalışma, torakotomi geçiren hastalarda kronik post-torakotomi ağrısını sık olduğunu doğrulamaktadır. Hastaların yaklaşık %30,6 kadarında ağrı orta ve ciddi şiddette olmakta, ve yaşam kalitesini düşürmektedir.

Anahtar Kelimeler: Kronik ağrı; torakotomi; ağrı

doi: 10.5336/medsci.2013-34425

Turkiye Klinikleri J Med Sci 2013;33(6):1395-401

Today, chronic postsurgical pain (CPSP) is agreed to be a medically significant clinical condition that occurs after specific surgical interventions.[1] It is believed that thoracotomy, together with limb amputation, is a surgical intervention that has the highest risk for serious CPSP.[1] Chronic post-thoracotomy pain (CPTP) is defined as a continuing or reemerging pain at the thoracotomy incision site at least 2 months after the surgical intervention.[2] Thoracotomy is one of the most painful surgical interventions and CPTP developing after a thoracic surgery can adversely affect patients' lives for years.[3,4]

Although there is very little information about the etiology of CPTP, it is suggested as a combination of nociceptive and neuropathic pain.[5] During thoracotomy, occurrence of damage in intercostal nerves and an inflammatory reaction at the surgical incision site lead to peripheral and central sensitization in the sensorial system followed by pain, hyperalgesia and/or allodynia at the surgical incision site.[6] Similar to the characteristics of other chronic pain syndromes, CPTP is described as to have burning, stinging and electric shocking effects. It is usually mild or moderate, but may also be severe in a small group of patients.[3,7]

Incidence of CPTP is variable, but high rates (around 50%) have also been reported.[5,6,8-15] The pain can become chronic after thoracotomy in spite of all the treatments attempted in its acute phase.[5] It was reported that the incidence of CPTP varied between 9% and 80%, and the reason for such a wide range was how the chronic pain was defined in studies, how long after the surgery it was assessed, how the data were collected and what method was used for analgesia.[6] Despite the common belief that CPTP is temporary, it could not be demonstrated for certain that the pain diminished in time.[16] For example, in a study investigating the incidence of CPTP, the incidence of chronic pain was reported as 80% 3 months after the operation, 75% after 6 months and 61% after a year, and pain affected the normal lives of 50% of patients.[12] The social implications of chronic pain and use of analgesics have been explored in a smaller number of studies.

This study aimed to determine the incidence of CPTP in patients who underwent thoracotomy in Thoracic Surgery Department of Faculty of Medicine. The impact of pain on daily life, the progress, severity and characteristics of CPTP, and use of analgesics were investigated.

MATERIAL AND METHODS

Patients who underwent thoracotomy in Department of Thoracic Surgery of Faculty of Medicine between January 2007 and October 2009 were investigated. Patients who underwent more than one operation, who were lost to follow up due to death, and who had other surgical interventions besides thoracotomy were not included in the study. The demographical data of patients [age, gender, body mass index (BMI)], diagnosis, type of surgical intervention and the date of operation were obtained from patient charts and recorded. All patients included in the study were called up, and the ones who could be reached over the phone were asked whether they had any pain associated with the surgical intervention. Patients who felt thoracotomy-associated pain were called for an interview, and their pain was assessed using a Pain Questionnaire. The questionnaire was modified from the study of Maguire et al. (Table 1).[6] The impact of pain on daily life, the progress, severity and characteristics of CPTP, and use of analgesics were assessed on this questionnaire.

For statistical evaluations, t-test was used for the age and BMI; Fisher-Freeman-Halton test was used for gender and diagnosis. A p value of <0.05 was considered statistically significant. BMI data were presented as mean±standard deviation.

RESULTS

Two hundred and thirty three patients who had an operation in Department of Thoracic Surgery of Faculty of Medicine were examined. Seventy four patients (31.7%) were excluded from the study: 27 of them died and 47 patients had more than one operation. One hundred and fifty nine patients were included in the study and were called by phone. Forty seven patients could not be reached,

112 patients were reached by phone. The percentage of patients from whom a response could be obtained was 70.4% (Figure 1). Sixty-three of the 112 patients who were interviewed over the phone reported that they had pain associated with the thoracotomy they underwent; the incidence of CPTP was 56% in patients from whom a response could be obtained.

TABLE 1: Pain questionnaire.

1. Do you suffer pain due to your chest surgery? Y/N
* If the answer is Yes continue completing the rest of the questionnaire
* If No: do not complete the rest of the questionnaire (but please return it anyway)
2. Which side(s) of your chest was operated on?
3. Do you have pain over the scar? Y/N
4. Is your pain felt in the chest wall on the side that was operated on? Y/N
5. How long have you had this pain 0-1 year
   1-5 year
   >5 years
6. Did the pain come on straight after the surgery? Y/N
7. Did the pain improve in time? Y/N
8. Do you rate the pain as MILD/MODERATE/SEVERE
9. Are you still receiving treatment or taking medication for the pain? Y/N
10. Have you ever attended a specialist Pain Clinic for this pain? Y/N
11. Is pain your worst medical problem? Y/N
12. Does the pain limit your daily activities? Y/N

Think about how the pain has felt over the last week

13. Does your pain feel like strange, unpleasant sensations in your skin? Words like pricking, tingling, pins and needles might describe these sensations. Y/N
14. Does your pain make the skin in the painful area look different from normal? Words like mottled or looking more red or pink might describe the appearance. Y/N
15. Does your pain make the affected skin abnormally sensitive to touch? Getting unpleasant sensations when lightly stroking the skin, or getting pain when wearing tight clothes might describe the abnormal sensitivity. Y/N
16. Does your pain come on suddenly and in bursts for no apparent reason when you're still? Words like electric shocks, jumping and bursting describe these sensations. Y/N
17. Does your pain feel as if the skin temperature in the painful area has changed abnormally? Words like hot and burning describe these sensations? Y/N
18. Other comments you may have.....

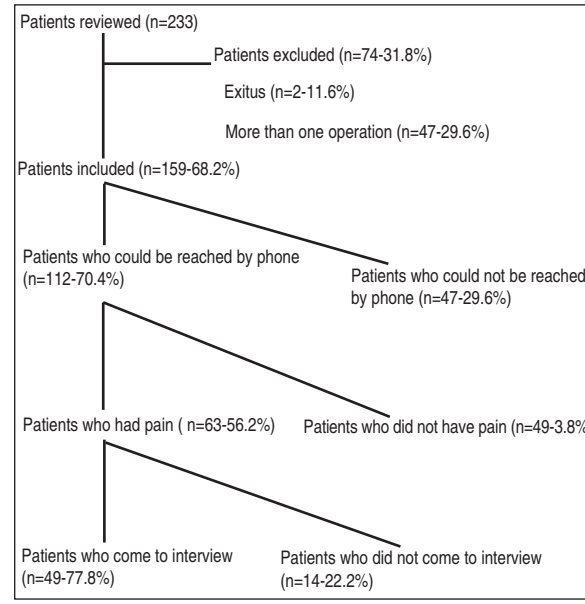

FIGURE 1: Patient flow pattern.

The demographic data and diagnoses of 159 patients who were included in the study (those who could be reached by phone or could not be reached) are shown in Table 2. The demographic data and diagnoses of 112 patients who could be reached by phone (with or without pain) are shown in Table 3.

Forty nine out of 63 patients who reported pain came to the hospital for an interview. The answers of 49 patients to the questions in the Pain Questionnaire are shown in Table 4. The answers obtained from the Pain Questionnaire revealed that 69.4% of the patients who had CPTP had mild pain, 26.5% had moderate pain and 4.1% had severe pain. Of these patients, 89.7% stated that their pain decreased in time. Approximately 38.7% of the patients were using analgesics for their pain, 24.4% of them reported that pain was the most disturbing health problem and 24.4% that pain restricted their daily activities. Approximately 14.2% of the patients presented to the Pain Clinic due to their pain. When the duration of pain was assessed in 49 patients, 28 patients had pain between 2 months and one year, 10 patients had pain between 1-2 years, and 11 patients had pain between 2-3 years.

The rate of neuropathic pain symptoms (Questions 13, 14, 15, 16 and 17 in Table 1) varied be-

TABLE 2: Demographic data and diagnoses of 159 patients included in the study

	Reached by phone n=112 (70.4%)	Not reached by phone n=47 (29.6%)
Gender (M/F)	88/24	30/17
Age (yr)	50.1±5.4	28.7±11.2
Body mass index Diagnosis	25.1±2.6	24.6±3.4
Malignant lung tumor	54 (48.2%)	19 (17%)
Benign lung tumor	42 (37.5%)	19 (17%)
Malignant pleural tumor	2 (1.8%)	2 (1.8%)
Benign pleural tumor	1 (0.9%)	1 (0.9%)
Trauma	1 (0.9%)	2 (0.9%)
Other	12 (10.7%)	4 (3.6%)

TABLE 3: Demographic data and diagnoses of 112 patients who could be reached by phone.

	Patients with painn=63 (%56.2)	Patients without no pain n=49 (%43,8)	
Gender (M/F)	47/16	41/8	0.246
Age (yr) (mean±SD)	51.5±5	50.2±3.6	0.106
Body mass index Diagnosis	25.6±2.6	24.5±3.3	0.072
Malignant lung tumor	40 (63.5%)	22 (44.9%)	0.179
Benign lung tumor	15 (23.8%)	20 (40.8%)	
Malignant pleural tumor	1 (1.6%)	0 (0%)	
Benign pleural tumor	0 (0%)	1 (2%)	
Trauma	1 (1.6%)	1 (2%)	
Other	6 (9.5%)	5 (10.2%)	

tween 4% and 61.2%. There was prickling, stinging or tingling in 61.2% of the patients. Approximately 20.4% of the patients described excessive sensitivity to touch. There was burning in 16.3% of the patients and a sudden exploding pain like an electric shock in 12.2%.

DISCUSSION

The incidence of CPTP in patients who underwent thoracotomy operation in Department of Thoracic Surgery of Faculty of Medicine was found as 56% in our study. Pain was mild in 69.4% of the patients, moderate in 26.5% and severe in 4.1%. Our study also revealed that approximately 40% of the patients used analgesics for their pain, and 24% of them reported that pain was the most disturbing health problem and it restricted their daily activities.

The incidence of CPTP was investigated in same studies. Dajczman et al. reported CPTP incidence as 54% between 2 months-5 years in the postoperative period.[8] In this retrospective study including 56 patients, the CPTP incidence of 55% in the 1st postoperative year declined to 45% in the 2nd year and to 38% in the 3rd year.[8] Researchers showed that pain affected the lives of approximately 40% of patients.[8] Kalso et al. found CPTP incidence as 44% in their retrospective study on 134 patients, and reported that 66% of the patients used analgesics due to pain.[9] In their prospective study including 23 patients, Katz et al. reported that the CPTP incidence as 52%, and the severity of early postoperative pain was the determinant for developing CPTP.[11] In their prospective study in-

TABLE 4: Answers obtained from the pain questionnaire.

Question No	Questions		"Yes" (%)
2	Surgery side	Right	61.2
		Left	38.8
3	Pain on the surgical scar		91.8
4	Pain on the same side as the operation?		100
5	Pain onset straight after surgery?		59.1
6	The severity of pain after surgery		
		Mild	34.7
		Moderate	48.9
		Severe	16.3
7	Pain improved in time		89.7
8	Pain severity		
		Mild	69.4
		Moderate	26.5
		Severe	4.1
9	Taking analgesic		38.7
10	Attended pain clinic		14.2
11	Pain the worst problem		24.4
12	Pain limits daily activities		24.4
13	Skin sensations strange, unpleasant		61.2
14	Skin looks different		4.0
15	Abnormally sensitive skin		20.4
16	Pain in sudden bursts		12.2
17	Skin temperature haschanged		16.3

cluding 84 patients, Perttunen et al. found the incidence of CPTP as 80.6% in the 3rd month, 75% in the 6th month and 61% in the 1st year.[12] The authors reported that the incidence of severe pain was 3-5% and pain affected the normal lives of half of the patients.[12]

There are studies reporting a lower CPTP incidence. Keller et al. defined CPTP as a complaint requiring regular use of analgesics 3 months after the surgery, and found the incidence of CPTP as 11% in their study covering 238 patients.[17] One of the main reasons for this varying CPTP incidence among studies (incidence between 11% and 80%) is the differences in defining pain. More serious criteria such as regular use of medication as mentioned above were used in some studies, whereas broader assessments such as feeling of discomfort were used in others. Another difference among the studies is how long after the surgery CPTP was assessed. Pain was assessed in the 1st postoperative month in some studies, in the 2nd month in some others and in the 6th month or 1st year in others. The way of collecting data and the method of analgesia used are other factors being responsible for the differences among studies.[6]

The transition from acute postoperative pain to CPSP is a complex process. Some studies showed an association between the intensity of acute postoperative pain and the development of CPSP.[4] Regional techniques using local anesthetics were shown to be effective to reduce acute postoperative pain severity compared to systemic analgesics including opioids.[4,18] In a study which compared the effect of intrapleural analgesia, intercostal analgesia and preoperative intravenous tramadol administration, the authors showed that the pain scores at coughing and the need for additional analgesia were significantly lower in the group receiving intrapleural analgesia with bupivacaine for 24 hours compared to the group receiving preoperative intravenous tramadol.[18]

ISenturk et al. compared preoperative thoracic epidural analgesia (Pre-TEA), postoperative thoracic epidural analgesia (Post-TEA) and intravenous patient-controlled analgesia, on a telephone interview based survey and asked the severity of pain after the 2nd month and at 6th month, the effect of pain on the daily lives and the use of analgesics.[14] They found the CPTP incidence at month 6 as 62.2% and the incidence of pain lasting beyond the 2nd month as 68%. The most effective pain control method at the early stage was thoracic epidural analgesia that was initiated preoperatively and continued in the peroperative and postoperative periods. However, the CPTP incidence beyond 2nd month was found as 50% even in this group. The authors noted that the patients in this group reported continuous, mild and unpleasant feelings, and such complaints could be clinically significant when they were long-lasting even if not so severe or they affected patients physically or psychologically.[14]

In their study investigating CPTP occurrence in 255 patients, Pluijms et al. initiated preoperative TEA and continued epidural analgesia for 48 hours in their patients.[5] The patients were sent a questionnaire at month 6 and they were called up. Interviewed 149 patients were asked about their chronic postoperative pain, and the severity and characteristics of the pain. The authors reported CPTP incidence as 52% and the incidence of moderate or severe pain as 36% despite effective postoperative analgesia.[5] The authors pointed out that nociceptive stimulus could not be blocked sufficiently by thoracic epidural analgesia when in fact humoral nociceptive stimuli must also be blocked to prevent CPTP.[5] The glial activation that occurs via humoral factors is increasingly being blamed for the development of pain and being chronic. New studies reported that many humoral factors such as interleukins and cytokines could activate neuroaxial glia (microglia and astrocytes). When activated, such glia release many mediators including pro-inflammatory cytokines, prostanoids, excitatory amino acids and other neuromodulators. These mediators in turn sensitize the central nervous system.[19] Moreover, some patients may have a higher risk for developing pain after surgery. Changes in the nervous system may cause plasticity, amplification of sensorial stimuli and somatic or visceral hyperalgesia.[20]

Studies on CPSP incidence are carried out using questionnaires in broad populations.[4] The incidence of pain is found higher in studies where the incidence of chronic pain was one of the top subjects being investigated. This makes one think that patients do not report this complaint to physicians unless they are questioned about it.[4] CPTP data were collected by a telephone interview in the aforementioned studies.[5,14] Sending questionnaires to patients and evaluating incoming answers may cause the incidence to turn out to be higher, because it can be estimated that patients with pain will be more willing to answer the questionnaires and send them back.[5]

In the present study, the patients were also phoned to find out the incidence of pain, and they were asked to come to the hospital to fill out the questionnaire in order to evaluate the pain-related characteristics in more detail. The rate at which the answers were obtained by phone was 70.4%. The rate at which the questionnaires were answered was 63% in the study of Maguire et al.[6] whose pain questionnaire was modified and used in our study. In their study, the authors included all patients who had undergone thoracic surgery including video-assisted thoracoscopic surgery (VATS) and thoracotomy. They found CPTP incidence as 45% for thoracotomy and 41% for VATS in 600 patients from whom answers were obtained. The authors reported the prevalence of each neuropathic symptom between 35% and 83%. In our study, the rate of neuropathic pain symptoms (Questions 13, 14, 15, 16 and 17 in Table 1) varied between 4% and 61.2%. There was prickling, stinging or tingling in 61.2% of the patients. Approximately 20.4% of the patients described excessive sensitivity to touch. There was burning in 16.3% of the patients and a sudden exploding pain like an electric shock in 12.2% of them.

Many patients who developed CPTP do not seek help to control their pain, but mention it when they are asked about their pain.[10] Letting the patients know that the CPTP problem is an unavoidable outcome like a wound infection in a certain group of patients and making this information available to patients particularly in the preoperative period will increase their awareness in the postoperative period. With this information, patients may be more open to be directed for treatment.

In conclusion, our study confirms that CPTP is a common problem and about 30.6% of patients have moderate to severe CPTP, affecting their quality of life.

REFERENCES

1. Kehlet H, Jensen TS, Woolf CJ. Persistent postsurgical pain: risk factors and prevention. Lancet 2006;367(9522):1618-25.
2. Merskey H, Bogduk H. Classification of chronic pain. In: Merskey H, Bogduk H, eds. Descriptions of Chronic Pain Syndromes and Definitions of Pain Terms. 2nd ed. Seattle: IASP Press; 1994. p.143-4.
3. Rogers ML, Duffy JP. Surgical aspects of chronic post-thoracotomy pain. Eur J Cardiothorac Surg 2000;18(6):711-6.
4. Macrae WA. Chronic post-surgical pain: 10 years on. Br J Anaesth 2008;101(1):77-86.
5. Pluijms WA, Steegers MA, Verhagen AF, Scheffer GJ, Wilder-Smith OH. Chronic post-thoracotomy pain: a retrospective study. Acta Anaesthesiol Scand 2006;50(7):804-8.
6. Maguire MF, Ravenscroft A, Beggs D, Duffy JP. A questionnaire study investigating the prevalence of the neuropathic component of chronic pain after thoracic surgery. Eur J Cardiothorac Surg 2006;29(5):800-5.
7. Karmakar MK, Ho AM. Postthoracotomy pain syndrome. Thorac Surg Clin 2004;14(3):345-52.
8. Dajczman E, Gordon A, Kreisman H, Wolkove N. Long-term postthoracotomy pain. Chest 1991;99(2):270-4.
9. Kalso E, Perttunen K, Kaasinen S. Pain after thoracic surgery. Acta Anaesthesiol Scand 1992;36(1):96-100.
10. Landreneau RJ, Mack MJ, Hazelrigg SR, Naunheim K, Dowling RD, Ritter P, et al. Prevalence of chronic pain after pulmonary resection by thoracotomy or video-assisted thoracic surgery. J Thorac Cardiovasc Surg 1994;107(4):1079-85; discussion 1085-6.
11. Katz J, Jackson M, Kavanagh BP, Sandler AN. Acute pain after thoracic surgery predicts long-term post-thoracotomy pain. Clin J Pain 1996;12(1):50-5.
12. Perttunen K, Tasmuth T, Kalso E. Chronic pain after thoracic surgery: a follow-up study. Acta Anaesthesiol Scand 1999;43(5):563-7.
13. Gotoda Y, Kambara N, Sakai T, Kishi Y, Kodama K, Koyama T. The morbidity, time course and predictive factors for persistent post-thoracotomy pain. Eur J Pain 2001;5(1): 89-96.

14. Sentürk M, Ozcan PE, Talu GK, Kiyan E, Camci E, Ozyalçin S, et al. The effects of three different analgesia techniques on long-term postthoracotomy pain. Anesth Analg 2002; 94(1):11-5, table of contents.
15. Steegers MA, Snik DM, Verhagen AF, van der Drift MA, Wilder-Smith OH. Only half of the chronic pain after thoracic surgery shows a neuropathic component. J Pain 2008;9(10): 955-61.
16. Gerner P. Postthoracotomy pain management problems. Anesthesiol Clin 2008;26(2):355-67, vii.
17. Keller SM, Carp NZ, Levy MN, Rosen SM. Chronic post thoracotomy pain. J Cardiovasc Surg (Torino) 1994;35(6 Suppl 1):161-4.
18. Yeğin A, Arslan A, Karslı B, Trakya A. [The comparison of intrapleural, intercostal and preemptive analgesia in postthoracotomy pain relief]. Turkiye Klinikleri J Med Sci 2003;23(2): 141-5.
19. Wieseler-Frank J, Maier SF, Watkins LR. Glial activation and pathological pain. Neurochem Int 2004;45(2-3):389-95.
20. Macrae WA. Chronic pain after surgery. Br J Anaesth 2001;87(1):88-98.