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Impressionable of Bupivacaine at Pain Relief in Post-Operative Disc Herniation Surgery

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Abstract

Aim: there are many reports about the efficacy of analgesics in reducing postoperative pain after disc herniation surgery. This study aimed to investigate the effect of subdermal and intramuscular injection of bupivacaine on the severity of postoperative pain relief disc herniation.

Material and Methods: in this RCT double-blind, 60 patients who candidate for disc herniation surgery elective for this them. . Bupivacaine (0.25%) in the intervention group and normal saline (30 ml) in the control group were injected subcutaneously and intramuscularly. Factors of type, size of surgical cutting, number of operating space, duration of operation, the rate of dose analgesia, and the severity of pain at times of 6,12 and 18 hours after surgery were assessed.

Results: the severity of pain in Bupivacaine group, in hours 6,12 and 18 after postoperative surgery was less than control group (P value<0.01). Also There were significant difference between the two groups in terms of mean pain intensity using repeated measure design (P value<0.01). Within Bupivacaine group, pain severity significantly decreased during the12 and18 hours after surgery. (p<0.01)

Conclusion: Although bupivacaine (0.25%) results in reducing pain after surgery, more studies are recommended to investigate the effect of bupivacaine in combination with other drugs in cases of disc herniation surgery. Also, it reduces pain during the 12 and18 hours after surgery is very important.

Keywords: Bupivacaine, Pain Relief, Disc Herniation

Introduction

Disc herniation surgery is indicated whenever pain and neural complications of herniated discs, despite conservative treatment, continue. Lumbar decompression is a common procedure for treatment of spine pathology [1]. Despite progresses in realizing postoperative acute pain entity in recent decades, still 80% of patients suffer from pain after surgery [2]. Undermanaged pain could lead to depression, autonomic over-reaction and joints stiffness [3, 4]. Post laminectomy pain has been reported to be caused by some potential pathological changes occurring around the nerve tissue such as inflammation, edema, fibrosis and mechanical pressure on the posterior longitudinal ligament and central sensitization [5]. The origin of lumbar and back pain is irritation of no acceptors and mechanoceptors of vertebrae, discs, duramater, facet capsules, muscles and ligaments [3, 6].

By activating the sympathetic system, uncontrolled postoperative pains may lead to complications and even death. Sympathetic activity increases myocardial oxygen consumption and causes cardiac ischemia and infarction [7]. Sympathetic activity may also decrease gastro-intestinal motility and depth of inspiration leading to paralytic ileus and respiratory complications [7].

Administration of non-steroidal anti-inflammatory drugs (NSAIDs) and opioids is a common method in postoperative pain control [8]. Using opioids alone in not effective in reducing these types of pains, so different drugs including corticosteroids and local anesthetics are also noted [9]. Although analgesics are usually used to control moderate to severe post discectomy pains but their side effects reduce their applying range [4].

Local anesthetics affect cell wall proteins and inhibit secretion and activity of prostaglandins and nociceptors stimulating lysosome enzymes [10]. On the other way, local anesthetics, by inhibiting the Na pumps, block the transit of neural messages along the nerve [11]. Local anesthetics for reducing pain Decreases the high costs of anti-inflammatory drugs, opioids and infusion pumps. Local infiltration of bupivacaine is a known method of postoperative pain reduction in many other surgical specialties effective in some, none effective in others [12-15].

Combination of long acting anesthetic agent and corticosteroid can reduce postoperative discomfort [16]. As there are limited numbers of such studies in our country, we decided to perform the study to see whether it could lead to better pain control or not.

Materials and Methods

This is a double blind randomized clinical trial performed on 60 patients with disc herniation referring to Rajaee hospital, Qazvin (2020), to evaluate the effects of local injection of bupivacaine in reducing postoperative pain. This study approved by ethical committee of Qazvin University of Medical Sciences with ethical number of IR.QUMS.REC.1395.119.

There is no conflict with ethical considerations. Also the research protocol was approved by the Iranian Registry of Clinical Trials (IRCT2017020625676N8). After signing the personal testimonial papers of participating in the clinical trial, 60 patients (class ASA I and II) randomly entered in groups: interventional and control. The interventional group (30 patients) was injected sub dermal and intramuscular bupivacaine and the control group (30 patients) received only normal saline in the same way. Addicted patients and those with surgery duration more than 2 hours were omitted from the study. At the end of operation in the interventional group, bupivacaine 0.25% and in the control group, 30 ml normal saline were infiltrated subdermally and intramuscularly while the surgeon and educated nurse were not aware of the type of drugs injected. Before surgery, the patients were educated to use VAS (visual analogue scale) to point their postoperative pain severity. Pain severity was registered at hours 6, 12 and 18 by educated personnel (either nurse or physician). For those patients with VAS≥4 morphine was injected intravenously and the dose used were documented in the clinical dossier.

Statistical method

Non parametric test (ǫ2) was used for qualitative factors analysis, T-test two independent samples, for quantitative factors and repetitive measures in SPSS-25 software was used for evaluation of pain intensity during different periods of time.

Results

Information of 60 patients was analyzed. 30 (50%) received bupivacaine and 30(50%) received normal saline. In bupivacaine group the average age was 43.62±11.41 and in saline group was 44.54±15.25. Age range of patients was 25-72 years. 13 men (45.8%) and 17 women (57.7%) received bupivacaine. 16 men (54.2%) and 14 women (45.3%) received saline.

There were significant difference in regard to age (P= 0.001) and gender (P= 0.01) between the two groups. Other patient characteristics are shown in table I. significant difference at 6, 12 and 18 hours were noted in the two groups (Table II).

We did find significant difference in average pain severity between the two groups but in each group, pain severity during 12 and18 hours after operation, decreased significantly (p=0.0001<0.01)) Figure 1). Although during 12 to 24 hours after operation, bupivacaine reduced pain severity but in both groups changes in pain severity were close and showed statistical difference (P=0.004). Also, whole pain average during 18 hours after operation was 1.66±0.35 in bupivacaine group and 3.68±0.36 in saline group. So significant difference were found between the two groups (P=0.008((Figure 1).

The effect of bupivacaine on pain reduction in regard to patients' characteristics were significant but in women and in ages below 42 and also in patients with one level surgery and operations lasting more than 80 minutes, bupivacaine mildly reduced the pain during 12 and 18 hours after operation.

Table1: Demographic characteristics of two groups

Parameter	Rank	Bupivacaine	Normal Saline	P-value
age	<42	(4/74%)	(6/35%)	0.001
>42	(9/60%)	(1/79%)		
Operated side	unilateral	(7/66%)	(3/33%)	0.003
bilateral	(1/51%)	(9/68%)		
Operated levels	One level	(3/84%)	(7/25%)	0.006
More than one level	(7/46%)7	(3/83%)		
operation duration	<80 min	(1/77%)	(9/32%)	0.004
>80 min	(5/45%)	(5/74%)		
Analgesic dose	-	41/3±53/4	64/3±25/5	0.001
Pain severity (3 hours after operation)	-	46/2±08/5	15/2±88/4	0.006
Pain severity (12 hours after operation)	-	05/2±73/3	15/2±75/3	0.006
Pain severity (24 hours after operation)	-	65/1±19/2	61/1±42/2	002/0

Table 2: Comparison of groups regarding different parameters

Parameter		Bupivacaine			Normal Saline		
		3 hours	12 hours	24 hours	3 hours	12 hours	24 hours
gender	Male	91/1±36/2	11/2±36/3	29/2±45/4	86/0±08/2	75/1±62/3	55/1±38/4
	Femal	48/1±07/2	03/2±4	56/2±53/5	18/2±82/2	62/2±91/3	65/2±45/5
	P-value	659/0	446/0	279/0	310/0	747/0	233/0
Age	<42	41/2±25/5	22/2±67/3	44/1±92/1	18/2±73/4	05/2±67/3	52/1±20/2
	>42	58/2±93/4	96/1±79/3	82/1±43/2	21/2±11/5	42/2±89/3	78/1±78/2
	P-value	748/0	886/0	441/0	678/0	813/0	408/0
One level		52/2±84/4	09/2±53/3	80/1±16/2	24/2±88/4	25/2±4	41/1±38/2
Operated levels	More than	36/2±71/5	97/1±29/4	25/1±29/2	10/2±88/4	98/1±25/3	07/2±5/2
one level							
	P-value	435/0	413/0	865/0	0.999	433/0	863/0
Operation	<80 min	74/2±25/5	16/2±8/3	86/1±44/2	02/2±42/4	15/2±42/3	40/1±17/2
Duration	>80 min	04/2±8/4	95/1±6/3	22/1±8/1	27/2±33/5	19/2±08/4	82/1±67/2
	P-value	638/0	803/0	348/0	307/0	460/0	460/0

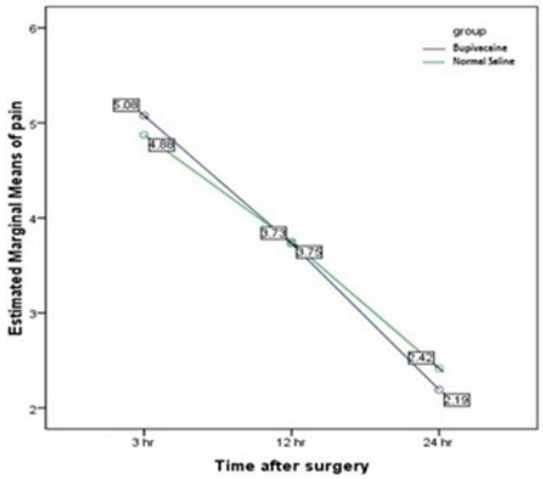

Figure 1: Mean of decrease pain at time of postoperative surgery

Discussion

In this study, we compared the effects of bupivacaine and saline (as placebo) injection in time intervals and found significant differences in the two study groups, with regard to mean age, gender distribution, pain relief and analgesic drug requirement.

Cook and Mullen (1979) firstly suggested local bupivacaine injection for lumbar post laminectomy pain relief. Teddy et al (1981) in a double blind clinical trial found no significant difference in VAS grading postoperative pain in "case" and "control" groups [17]. Rahmanian et al study (2015) also showed no significant difference in pain relief in "bupivacaine" and "saline" groups [18]. Donadi et al (2017) concluded that the local injection of magnesium sulfate and bupivacaine provided better pain control and analgesic effect was more significant [5]. Steel et al (1998) concluded that bupivacaine can reduce patients' pain score by more than 50% in the recovery room [19].

A reliable study to show the individual effects of bupivacaine on no acceptors is not available yet. Although in the present study normal saline 0.9% is supposed to be none effective on nociceptors but it may reduce the pain by decreasing the concentration of inflammatory mediators. Saline may also compress the nerve endings, thereby blocking the conduction of nerve pulses and producing analgesia [20].

In study on cats (2007) normal saline was none effective on thermal, electrical and pressures no inceptor's [21]. In some studies, bupivacaine alone or in a combination with other drugs has been reported to be effective in reducing postoperative pain and the length of postoperative hospital stay [5]. Some recent studies have shown effectiveness of pregabalin in reducing pain and postoperative anxiety [22-24].

Conclusion

With regard to previous studies and our present study, although bupivacaine alone had the effectiveness dose at less pain post-surgery, performing wider studies on the effect of bupivacaine combined with other drugs is suggested in lumbar spine surgery.

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