Original Article

Preincisional ipsilateral stellate ganglion block for acute post operative pain control in unilateral mastectomy

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ABSTRACT

Objective: To evaluate the effect of preincisional ipsilateral stellate ganglion block for acute post operative pain control in unilateral mastectomy.

Methodology: In a randomized clinical trial, 62 patients selected for unilateral mastectomy were recruited in Tabriz Imam Reza educational Hospital during 18-month period. They were randomly divided into two equal groups; receiving either preincisional ipsilateral stellate ganglion block using bupivacaine (study group) or without these blocks (control group). Postoperative pain was evaluated based on visual analogue scale (VAS). The total dose of analgesics were also compared between the two groups.

Results: Thirty one female patients with a mean age of 48.7±7.4 (36-60) years and 31 other female patients with a mean age of 50.7±6.9 (36-60) years were enrolled in the study and control groups, respectively (p=0.292). The number of patients with decrease in postoperative pain was significantly higher in the case study group comparing with that of the control group (p<0.001). Decrease in total dose of postoperative analgesics was also significantly lower in the case study group compared with control group (P<0.001). Forty eight hours after operation, there were 15 pain-free patients in the study group with no pain-free patients in the control group. This difference was statistically significant (P<0.001).

Conclusion: Based on our findings, the preincisional ipsilateral stellate ganglion block is an effective method in controlling the postoperative pain after unilateral mastectomy. This approach had also got a considerable analgesic-sparing effect.

KEY WORDS: Mastectomy, Stellate Ganglion, Postoperative Pain.

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INTRODUCTION

Post mastectomy pain syndrome is a neuropathic pain condition that can follow surgical treatment for breast cancer, including radical mastectomy, modified radical mastectomy, and segmental mastectomy (Lumpectomy). This pain can be severe enough to interfere with sleep and performance of daily activities. There are plenty of options available for controlling this pain. Stellate ganglion block is among these options and is proposed as a therapeutic method. However, available data is heterogeneous in this regard.

How can pain be controlled? This question has occupied our minds from the past until the present day and endless efforts have been made to control and reduce pain. Not controlling pain in postoperative stage leads to numerous complications which can not only alter operation results but also endanger patients' lives. Opioids administration in this

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regard is associated with unwanted complications such as ileus, nausea, vomiting, itching, unpleasant situation and prolonged hospital stay.[1] Utilizing alternative approaches which can provide acceptable analgesia without associated complications is one of the accepted solutions.[1-3]

Preemptive analgesia is one of the confirmed approaches which can reduce acute postoperative pain.[2] Breast surgery is one of the operations commonly associated with postoperative pain. Considering the importance of controlling acute postoperative pain and its relation with complications, morbidity and mortality after operation and also considering the complications of opioids administration we decided to evaluate the efficacy of stellate ganglion block approach, which is one of the preemptive methods in controlling acute pain after unilateral mastectomy.[1]

Stellate ganglion block acts through reducing sympathetic tone and blocking nociceptive afferent pain nerves which share the same route with sympathetic nerve.[2-4] This approach is associated with minute or less important complications which are usually observed transiently when administrating volumes more than 20ml. Since these complications are masked while patients being under anesthesia, even in case of emergence, the patient would be anesthetized and intubated.[5,6] In this study our hypothesis is that performing stellate ganglion block in unilateral mastectomy operation would reduce pain and complications and would not be accompanied by any associated complications.

METHODOLOGY

In a randomized clinical trial study, this research was approved by the institutional ethics committee of Tabriz University of Medical Science and was carried out in the surgery ward of Tabriz Imam Reza Hospital and lasted for 18 months. Primary data collection and analysis were performed from February 2009 to August 2010. Patients who were candidates for unilateral mastectomy operation were divided into two groups: intervention group, with ipsilateral stellate ganglion block before surgical incision, with 31 patients as study group and 31 patients without being performed ipsilateral stellate ganglion block before surgical incision,. Degree of pain after operation and the need for analgesic were compared between two groups.

Sixty two patients were candidates for unilateral mastectomy got enrolled in the study using non probable sampling. These patients were divided into two groups of 31 patients each. To perform this, treatment approaches were written on paper and placed in envelopes which were later given to a colleague who was not the main researcher of the project. The patient tagged envelopes were opened in an order as the patients were enrolled in the study and later the researcher was informed about treatment type. Randomization was performed using fourfold randomly permuted blocks and their related online software. 62 patients with ASA class I-II who were referred to Tabriz Imam Reza educational therapeutic hospital for mastectomy enrolled in our study after obtaining written consents. Pain degree measurement was taught to the patients by pain scaling ruler based on VAS.

Anesthesia induction was performed using TIVA, propofol 1-2.5 mg/kg and remifentanyl 1µ/kg and was maintained using propofol 50-150µg/kg/h and remifentanyl 0.05 -0.1 µ/kg/min and atracurium 0.5 mg/kg which was repeated when needed. Oxygen and N2O were administered by a ratio of 50% to 50%; volatile agents however were not used. In the intervention group, inferior stellate ganglion block was performed using Marcaine (bupivacaine) 0.5% to 10ml through anterior approach. To be sure of a successful block, Horner syndrome and changes in the range of pulseoximetry waves were used. After the termination of the operation and complete awakening, pain degree was measured by the related resident in the hours zero, two, four, six, 12, 24 and 48 and registered in the questionnaire.

In all patients, in case of pain emergence in PACU and ward Pethidine 0.5 mg/kg was administrated according to the request of the patients and finally the total dose in both groups was calculated and evaluated. Inclusion criteria for the study was: age range of 20-60 years, not having any contraindication for stellate ganglion block and being selected for unilateral mastectomy. Exclusion criteria from the study were: Coagulopathies, using antipsychotic medications, history of chronic use of painkillers and opioids, unwillingness to take part in the research, infection at the blockade site, bradycardia resistant to medications, using beta blockers, existence of other painful diseases at the site of operation, age below 20 years and history of hypersensitivity to local anesthetics.

This study was approved by ethics committee of Tabriz Medical Science University. Studied variables were age, weight, history and degree of pain before operation, history of painful chronic diseases, pain score (VAS), dose of the analgesic administrated (equal dose) and pain-free cases (VAS=0) in both groups. Based on the obtained data, main and

specific objectives of the study were evaluated (Ref to introduction). It should be mentioned that pain score and analgesic administered were recorded at the hours zero, two, four, six, 12, 24 and 48. Obtained data were presented as mean±SD, frequency and percentage. SPSS software version 15 was used for statistical analysis. Quantitative variables were compared using independent samples t-test or Mann-Whitney U-test. Categorical variables were compared by contingency tables and using chi-square test and Fisher's exact test according to the situation. To compare the changes in quantitative parameters between two groups repeated measures analysis was used. In all parts of the study, $p < 0.05$ was considered statistically significant.

RESULTS

The mean ages of the intervention and control groups were 48.7± 7.4 and 50.7± 6.9 years respectively which revealed no statistically significant difference (p= 0.292). The mean weight of intervention and control groups were 70.2± 9.1 and 71.8± 6.8 kg respectively which revealed no statistically significant difference (p= 0.423). The changes in the mean pain score in both groups are presented in Figure 1. Degree of pain reduction after operation was significantly more in the intervention group compared to the control group (p<0.001).

The median of mean pain score after operation in the intervention group was significantly less in the control group. The changes in the mean administered analgesic dose in both groups are presented in Figure 2.. The percentages of the pain-free cases in both groups in different times after operation are demonstrated in Figure 3. Only the frequency of pain-free cases at our 48 was significantly more in the intervention group compared to the control group (p<0.001). The analgesics requirements were significantly less in intervention group.

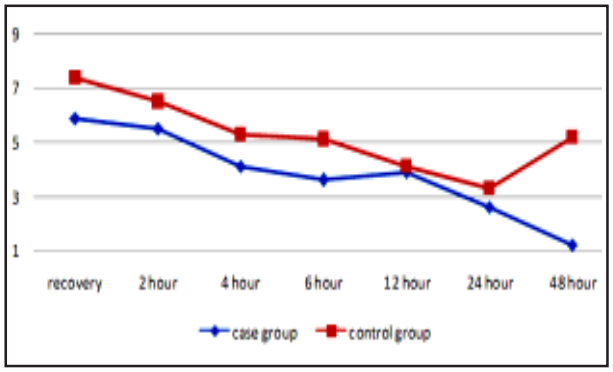

Fig-1: the changes in the mean pain score (VAS) after operation in the patients of two groups

DISCUSSION

In this study we evaluated the effect of preincisional ipsilateral stellate ganglion block in reducing acute pain after unilateral mastectomy. The reduction in degree of pain after operation based on VAS was significantly more in the group with ipsilateral stellate ganglion block (intervention group) compared to the group without ipsilateral stellate ganglion block (control group). Analgesic requirement after operation (equal dose) was also significantly less in the intervention group compared to the control group. Stellate ganglion block is a known method of reducing pain in different medical and surgical situations.

Chester et al, in a study demonstrated that stellate ganglion block can significantly reduce chronic and refractory angina pain.[4] Khan and Ahmed also in a study concluded that in patients undergoing CABG operation, stellate ganglion block can significantly reduce postoperative pain.[5] Kirvela and Katilainevi in another study concluded that stellate ganglion block is a safe and efficient method in reducing chest pain and upper limb pain after trauma.[7] Garner and Coats achieved similar results in their study in patients with pain in the shoulder after thoracotomy.[8] Reuben et al carried out a study on 100 patients with the pain in the upper parts of the trunk and limbs after surgery in the mentioned areas.

In this study patients were divided into two equal groups randomly and in one group stellate ganglion block was performed. Within months after operation, the pain degree was significantly less in the intervention group compared to the control group (10% versus 72%).[9] In another study, Reuben suggested

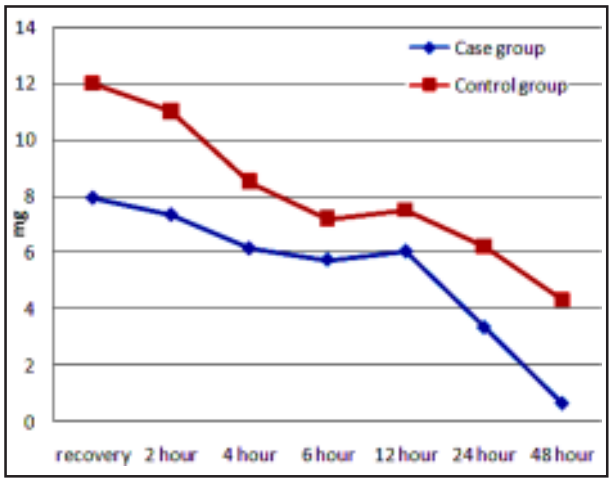

Fig-2: the changes in the mean equal dose of administered analgesic after operation in the patients of two groups.

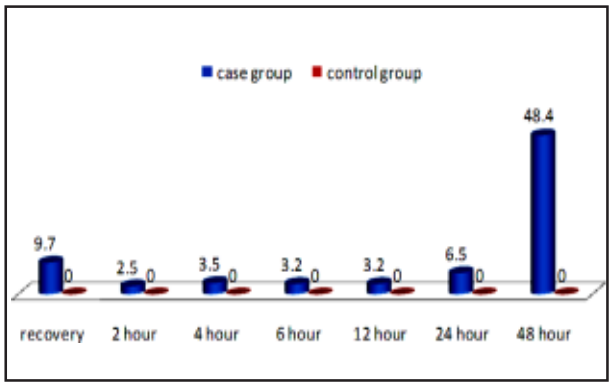

Fig-3: Percentage of the pain-free patients after operation in two groups.

stellate ganglion block in patients with post-operative pain.[10] The first use of stellate ganglion block in the patients undergoing breast surgery dates back to 50 years ago.[11,12] However this method has not been used commonly for reducing pain after breast surgery operation and mostly its effect on reducing hot flushes and sleep disorders in these patients has been emphasized.[13-17]

Miguel et al in a study followed up 55 patients with post mastectomy pain syndrome for many years. In this study stellate ganglion block was performed in 46 patients (85%) to control pain. Only 10 of these patients needed further alternative analgesic method.[18] Although this study emphasizes on efficacy of stellate ganglion block in controlling post mastectomy pain, its being retrospective and not being clinical trial type have decreased its validity. The present study, as far as we searched, is the first study carried out in this field with correct methodology.

Kwekkeboom and Vecht reported that the efficacy of stellate ganglion block in reducing post mastectomy pain associated with axillary dissection is due to the injury of lateral cutaneous branch of second intercostals nerve in 80 to 100% of the patients.[19,20] On the other hand, Steinberg et al in a case report presented a case of breast pain syndrome after bilateral mammoplasty. In this study, all symptoms disappeared after operation performing stellate ganglion block.[21] Therefore it should be mentioned that this method is not only for the patients undergoing mastectomy associated with axillary dissection but also it can be used after other breast surgeries for controlling pain. To compare the efficacy of this method with other methods of controlling pain after breast surgeries, Hosseinzadeh et al studied 60 patients which were randomly divided into two groups. In one group stellate ganglion block was performed using Bupivacaine 0.25% solution and the other group was given oral gabapentin 900 mg in three separate doses. Studying the pain degree 48 hours after operation revealed that pain degree was significantly lower in the group being performed stellate ganglion block. However opposite results were obtained in the evaluations carried out in one week, one and three months after operation.[22] In the present study we used Bupivacaine 0.5% to block stellate ganglion. It has previously been confirmed that the volume of anesthetic used affects the quality of pain control after operation.[6] On the other hand, it has also been confirmed that the type of breast surgery affects the efficacy of stellate ganglion block in reducing postoperative pain.[18] Therefore to achieve a decisive conclusion regarding the comparison of the efficacy of different methods, further controlled studies (equalizing patients regarding all probable confounding factors) are required.

However even the mentioned study revealed that a short-term stellate ganglion block is superior to oral anticonvulsants regarding controlling acute pain. This can explain that this method can at least be used to control or reduce acute pain after breast surgeries. This is of great importance specially in reducing the dose of administrated analgesics from the end of operation to patient discharge. In fact, as it was previously mentioned, in this study we showed that stellate ganglion block reduces the total dose of administered analgesic after surgery significantly.

CONCLUSION

Pain reduction after surgery based on VAS was significantly more in the group with ipsilateral stellate ganglion block (intervention group) compared to the group without ipsilateral stellate ganglion block (control group). The analgesic need after operation (equal dose) was significantly less in the group with ipsilateral stellate ganglion block (intervention group) compared to the group without ipsilateral stellate ganglion block (control group). According to the findings of present study, performing ipsilateral stellate ganglion block before surgical incision is recommended to control acute pain and also reduce required analgesic dose after unilateral mastectomy surgery. To compare the efficacy of different existing methods in this regard further controlled studies are recommended

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