ORIGINAL ARTICLE

A Comparison of the Efficacy of Gabapentin and Diclofenac Sodium as Pre-Emptive Analgesia, for Post-Operative Pain Relief in Patients Undergoing Major Abdominal Surgeries

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ABSTRACT

Aim: To compare the efficacy of Gabapentin and Diclofenac sodium as pre-emptive analgesia, for post-operative pain relief in patients undergoing major abdominal surgeries.
Study Design: Randomized control trial.
Methods: This randomized clinical trial was conducted at Department of Anesthesia, DHQ teaching hospital Gujranwala, from January 2017 to December, 2017. Total 140 patients undergoing abdominal surgery, were included. Each patient was given cap. Gabapentin 600mg and tab. Diclofenac sodium 100mg along with sip of water one hour before shifting to operation theatre under my own supervision. All patients were anesthetized with standard general anesthesia protocol with same inducing agent. After completion of surgery and extrubation patient was shifted to recovery area adjacent to Operation Theater. Where pain was measured at 0 and 30minutes then patient will be shifted to ward and observed for 12hours. In ward pain was measured by VAS half hourly for 1st hour and then for 2 hourly 120,(2hours) 240(4 hours), 360(6hours) and 720(12hours) minutes after the surgery. Time interval between admission and patient's first requirement for analgesic was noted. Along with the pain score ie VAS, HR, BP, SpO2 were noted.
Results: In this study pain score at 0 and 30th minutes was same in both treatment groups. However at 60th minute patients in Group-A had better pain control as compare of Group-B patients as at this point 77% patients in Group-A and 67% in Group-B had no pain. (P-value (60th Min) = 0.032) At 120th minute 70% patients in Group-A and 64% in Group-B did not experienced any pain. From 240th minute till 720th minute pain control of patients was significantly better in Group-A as that of Group-B. Better control of pain status means that patient's pain score was very low or very minor.
Conclusion: The use of a single oral dose of Gabapentin is significantly effective as compared to diclofenac sodium when used as Pre-emptive analgesic for post-operative pain control. The effect not only lasts longer but it also reduces the need for rescue analgesia.
Key words: Efficacy, Gabapentin, Diclofenac sodium, Pre-emptive analgesia, Post-operative, Pain relief.

INTRODUCTION

Pain is a common and unpleasant human perception that provokes both fear and anxiety which may last for a life time[1]. Pre-emptive analgesia is defined as a treatment that is initiated before surgery in order to inhibit the establishment of central sensitization evoked by inflammatory damage occurring during operation and in early post-op period. The focus of preventive analgesia is not the relative timing of intervention but on decreasing the impact of peripheral nociceptive barrage associated with noxious pre-operative, intra-operative or post-operative stimuli[2,3].

Pre-treatment with Gabapentin decreases acute pain after various surgical procedures and can inhibit the development of hyperalgesia. Gabapentin has a selective effect on the nociceptive process including central sensitization[4]. Gabapentin is believed to exert its analgesic effect by binding to pre-synaptic voltage gated Ca^{2+} channels and inhibits the release of excitatory neurotransmitters. Gabapentin also decrease central sensitization by reducing hyper excitability of dorsal horn neurons produce by tissue damage. These anti allodynics and anti hyperalgesic properties may therefore also be useful in acute post-op pain[4,5,6]. Pathak L; found that pre-medication with Gabapentin was effective in reducing pre-operative anxiety as well as postoperative pain[7].

Gabapentin a newer agent is found effective for chronic pain, is now used for postoperative pain relief[8,9]. We intend to find, if it has effective pre-emptive analgesic effects. The study aims to compare Gabapentin with diclofenac sodium for post-op pain in patients undergoing major abdominal surgeries-

Received on 09-10-2018
Accepted on 19-01-2019

MATERIAL AND METHODS

This study was conducted by the consent of ethical committee of DHQ teaching hospital, Gujranwala. Under the consent of patient, basic and demographical (age gender etc.) information was obtained. All the patients undergoing abdominal surgery, admitted through OPD (fulfilling inclusion criteria), were randomly allocated according to computer-generated randomization and divided into two groups i.e., group A (Gabapentin)and group B (diclofenac sodium) with 70 patients in each group. Before giving medication, each patient was educated for both groups about the drugs which were to be used in the study. I guided them regarding the benefits and side effects of the drugs. Each patient in both groups were given cap. Gabapentin 600mg and tab. Diclofenac sodium 100mg

along with sip of water one hour before shifting to operation theatre under my own supervision.

After shifting to operation theatre all the standards of monitoring were followed i.e. standard one and standard two monitoring was instituted to all patients. General anesthesia was induced with IV Propofol 2mg/kg followed by inj atracurium 0.5mg/kg to facilitate endotracheal intubation IV nalbufen 0.1mg/kg bolus was given for intra operative analgesia. Anesthesia was maintained with 50% oxygen and 50% nitrous oxide isoflurane 2 volume% and intermittent 10mg bolus of inj atracurium as per requirement. Intra operative hemodynamic parameters were recorded with the 5 minutes interval with the total blood loss, length of anesthesia, length of surgery and time to tracheal extrubation. A 4mg odensteron was treated for every patient 15 minute before end of surgery.

Isoflurane was discontinued at the beginning of skin closure. At the end of surgery after initiation of spontaneous respiration, reversal of neuromuscular blockage was done with IV neostigmine 0.05mg/kg and glycopyrolate 0.01mg/kg. After patient started obeying commands patient was extrubated then patient was shifted to recovery area adjacent to Operation Theater. Where pain was measured at 0 and 30minutes then patient will be shifted to ward and observed for 12hours. In ward pain was measured by VAS half hourly for 1st hour and then for 2 hourly 120,240,360 and 720 minutes after the surgery.

Time interval between admission and patient first requirement for analgesic (i.e. time first analgesic demand) was noted. Along with the pain VAS, HR, BP, SpO2 and side effects like nausea, vomiting, headache, sedation, and respiratory depression will be observed post operatively. Side effects observed were treated whenever indicated like respiratory depression or SpO2 <90% was treated with oxygen supplementation.

The data was analyzed in the statistical program SPSS 20.0 version. The results for quantitative data like age and pain (VAS scale) was expressed by mean ± standard deviation. Qualitative data (like, gender) was presented in form of frequency and percentages (%) Chi-square and fisher's exact test was applied to see any significant difference between independent variables and outcome variables A level of 5% (p-value $\leq$ 0.05) was used for significant testing and association.

RESULTS

Mean age of patients in Group-A and in Group-B was 42.18±12.69 and 41.42±10.41 years. In Group-A there were 34 male and 36 female patients while in Group-B there were 37 male and 33 female patients included in this study. From 0 minute till 30th minute pain score was statistically same in both treatment groups. [0th-Min=0.653, 30th Min=0.653]. At 60th minute pain score was significantly different in both treatment groups. Pain score of patients in Group-A was more stable as that of Group-B patients. [60th-Min (p-value)=0.032]) At 120th minute 70% patients in Group-A and 64% in Group-B did not experienced any pain. [120th-Min (p-value)=0.7259] From this point forward means from 240th till 720th minute pain status was significant better as that of Group-B. [240th-Min (p-value)=0.041, 360th-Min (p-value)=0.048 & 720th-Min (p-value)=0.031].

At 0, 30, 60 and 120th minute systolic blood pressure in Group-A was 127.28±15.87, 126±16.00, 121.85±11.95 and 127.71±6.17 respectively. However at 240, 360 and at 720th minutes mean blood pressure in Group-A patients was 124±7.10, 120±7.98 and 125.71±9.71 respectively. In Group-A till 60th minute systolic blood pressure drop and at 120th minutes it rises again and after that again tend to drop till 360th minute and at 720th minute it again rise.

However in Group-B mean systolic blood pressure at 0, 30, 60 and 120th minute was 115.08±6.92, 115.57±9.03, 121.74±11.73 and 123.85±11.20. At 240, 360 and at 720th minutes mean systolic blood pressures in Group-B patients was 122.71±9.91, 125.28±6.53 and 122.71±8.15.

In figure-2 trend of systolic blood pressure in both treatment groups can be seen during follow up time intervals.

Mean diastolic blood pressure in Group-A and in Group-B at 0th minute was 79.28±19.05 and 71.28±10.06. At 30th minute it was 85.85±12.33 and 72.71±9.91 in Group-A and in Group-B. At 60th minute diastolic blood pressure sin both treatment groups was A and B was 78.00±6.04 and 77.42±11.25. At 120th minute mean diastolic blood pressure in Group-A and in Group-B was 79.71±7.21 and 74.85±10.86. At 240th and 360th minute mean diastolic blood pressure in Group-A and in Group-B was 78.57±5.71, 79.00±5.93 and 70.85±10.03 and 75.14±8.11 respectively. However at final follow up time interval mean diastolic blood pressure in Group-A and in Group-B was 76.00±10.12 and 78.14±11.45 respectively.

In figure-3 trend of diastolic blood pressure in both treatment groups can be seen during follow up time intervals.

Table-1: Descriptive statistics for systolic blood pressures in treatment groups at different time intervals

	Systolic Blood Pressure	
Time Interval	***Group-A***	***Group-B***
0-Min	127.28±15.87	115.08±6.92
30-Min	126.00±16.00	115.57±9.03
60-Min	121.85±11.95	121.74±11.73
120-Min	127.71±6.17	123.85±11.20
240-Min	124.00±7.10	122.71±9.91
360-Min	120.00±7.98	125.28±6.53
720-Min	125.71±9.71	122.71±8.15

Table-2: Descriptive statistics for diastolic blood pressures in treatment groups at different time intervals

	Diastolic Blood Pressure	
Time Interval	*Group-A*	*Group-B*
0-Min	79.28±19.05	71.28±10.06
30-Min	85.85±12.33	72.71±9.91
60-Min	78.00±6.04	77.42±11.25
120-Min	79.71±7.21	74.85±10.86
240-Min	78.57±5.71	79.00±5.93
360-Min	70.85±10.03	75.14±8.11
720-Min	76.00±10.12	78.14±11.45

Table-3: Severity of pain in treatment groups during follow up time period

Pain Status	0-Min		30-Min		60-Min		120-Min	
	Group-A	Group-B	Group-A	Group-B	Group-A	Group-B	Group-A	Group-B
No Pain	59(84%)	57(81%)	59(84%)	57(81%)	54(77%)	47(67%)	49(70%)	45(64%)
Mild	11(16%)	13(19%)	11(16%)	13(19%)	14(20%)	12(17%)	15(21%)	19(27%)
Moderate	0(0%)	0(0%)	0(0%)	0(0%)	2(3%)	11(16%)	6(9%)	6(9%)
Severe	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
Total	70	70	70	70	70	70	70	70
p-value[(a)]	0.653		0.653		0.032*		0.7259	

Table-4**:** Severity of pain in treatment groups during follow up time period

240-Min		360-Min		720-Min	
Group-A	Group-B	Group-A	Group-B	Group-A	Group-B
47(67%)	34(49%)	44(63%)	30(43%)	41(59%)	29(41%)
12(17%)	24(34%)	8(11%)	20(29%)	13(19%)	18(26%)
6(9%)	3(4%)	10(14%)	11(16%)	12(17%)	9(13%)
5(7%)	9(13%)	8(11%)	9(13%)	4(6%)	14(20%)
70	70	70	70	70	70
0.041*		0.048*		0.031*	

(a) p-value was calculated by using Chi-Square Test, (*) p-value<0.05 (Significant)

DISCUSSION

The concept of preemptive analgesia has gained popularity and previous researches have shown the value of preemptive effect of some drugs like opioids, local anesthetics and nonsteroidal anti-inflammatory drugs[10,11].

In this study postoperative pain scores of patients at 0 and 30th minutes was statistically same in both treatment groups. However at 60th minute patients in Group-A had better pain control as that of Group-B patients. 77% patients in Group A and 67% in group B had no pain (60th Min)=0.032) From 240th minute till 720th minute pain scores were significantly lower in Group-A as that of Group-B. Previous literature searches did not show comparison of diclofenac sodium with gabapentin as pre-emptive analgesia especially in patients undergoing major abdominal surgeries. Most of the studies have done gabapentin comparison with other drugs or mostly with placebo focusing on postoperative pain status and analgesia requirement.

Gabapentin appears to be a useful for the treatment of postoperative pain, preemptive use of oral gabapentin 600 mg effectively reduces the post-operative pain and reduces the use of analgesic requirement for the patients has been reported to be a safe, well-tolerated, and efficacious drug[12,13].

Turan et al, also showed that gabapentin administered one hour prior to operation significantly decreased the post-operative pain scores and Tramadol requirement in patients of Total abdominal hysterectomy[14].

CONCLUSION

Results of this study demonstrated that use of a single oral dose of Gabapentin as Pre-emptive analgesic in patients undergoing major abdominal surgeries is effective for post-operative pain control the effect of this drug not only lasts longer but it also reduces the need for rescue analgesic.

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