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Original Research Paper

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COMPARISON OF ANALGESIC EFFICACY OF GABAPENTIN AND PARACETAMOL AS A PRE-EMPTIVE ANALGESIC AGENT.

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ABSTRACT

Introduction: Post operative pain after surgery is a cause of significant morbidity and patient dissatisfaction. In this study we try to compare efficacy between 1 gram acetaminophen oral dose with 300mg oral dose of Gabapentin in controlling post operative pain when administered preoperatively as a method of preemptive analgesia.

Material and methods: This study is a prospective, randomized and comparative study conducted at NRI institute of medical sciences, Visakhapatnam between Oct 2016 to October 2017. 90 patients belonging to ASA status I and II of both genders, age group- 18 to 50 years and undergoing surgeries under general anaesthesia lasting less than 2 hours were enrolled for the study. 2 groups out of which Group A received 1gm oral paracetamol and Group B received 300mg of oral Gabapentin. The groups were compared post operatively for pain scores at 30, 60, 90, 120, 150 minute after surgery using visual analogue scale(VAS).

Results: The mean VAS scores were 2.78, 4.07, 5.81, 6.36, 6.5 for Group A and 2.18, 3.5, 4.76, 6.04, 6.43 for Group B. Thus pain scores were consistently lesser in Group B than Group A. The time of first rescue analgesia (i.e, Fentanyl) was compared in both the groups. Mean for time of demand for analgesia was 87.34 mins and 100.6 mins in Group A and Group B respectively. P value was 0.05 thus a significantly earlier requirement of rescue analgesia in Group A.

KEYWORDS :

INTRODUCTION:

According to a WHO report of 2012 there were about 266.2 to 359.5 million operations performed in 2012 among the member states of WHO1 which is constantly increasing year upon year, a large number of these patients undergoing surgery are vulnerable to development of chronic pain due to inadequate pain relief in the immediate post-surgical period. Along with the thromboembolic or pulmonary complications from inadequate acute pain management and impaired quality of life, surgical tissue damage can cause long-term alteration of central processing of spinal nociceptive information, and this fact can cause hyperalgesia. Out of the different pharmacological methods for pain control, Acetaminophen is one of the oldest and safest analgesic drug used2 whereas Gabapentin was introduced as an anticonvulsant3 but it has been found to be useful different types of neuropathic pain conditions. Here in this study we wish to compare the efficacy in between the two in controlling post-operative pain after general anaesthesia for short duration surgeries.

AIM:

1.To compare the efficacy of 1 gram acetaminophen oral dose with 300mg Gabapentin oral dose.
2.To estimate whether oral Gabapentin is effective as a pre emptive analgesia agent in controlling post operative pain.
3.To compare the pain scores for oral Acetaminophen and Gabapentin at each time intervals.

MATERIAL AND METHODS:

Study was conducted on patients admitted to NRI Medical College Hospital, Visakhapatnam who were admitted during the period of March 2018 to October 2018, undergoing surgeries that last for less than 2 hours under general anaesthesia. This study is a prospective, randomized and comparative study. Sealed opaque envelope system was used for randomization of the subjects . Inclusion Criteria: 90 patients belonging to ASA status I and II of both genders, Age group- 18 to 50 years, Patients undergoing surgeries under general anaesthesia lasting less than 2 hours. Exclusion Criteria: Patients on chronic analgesic therapy, Pregnant or lactating patients, Patients with impaired liver function tests, Patients suffering from nausea/ vomiting, Patients with known allergy to Acetaminophen or Gabapentin were excluded from study. Patients were randomly allocated to 2 groups, 45 patients in each group using closed envelope randomization: Group A: Acetaminophen 1 gram oral. Group B: 300mg Gabapentin oral dosing. Pre-anaesthetic evaluation: A thorough evaluation was done prior to the day of surgery. Consent was taken. Patient was explained about the Visual analogue scale and its use post operatively. On the night before surgery, patient would be given: 1mg Lorazepam and 150mg Ranitidine tablet. Patient was to be kept nil per orally for 6 hours. On the day of surgery: Oral acetaminophen or Gabapentin were administered 2 hours before induction of anaesthesia. In the operation theatre Blood Pressure (B.P.), Heart rate (HR), Oxyhaemoglobin saturation (SPO2) monitors connected. Preoxygenation was done. Induction of anaesthesia using: Fentanyl 1mcg/kg, Propofol 2mg/kg, Vecuronium 0.1mg/kg, Controlled ventilation using N2O:O2 70:30 with Isoflurane. The following data was collected post operatively: a) The 11 point, 100 mm Visual Analogue Scale for pain assessment at 30, 60, 90, 120 and 150 minutes. b) The average time of first rescue analgesic.

Statistical analysis was done using SPSS (Statistical Package For Social Sciences) version 19. Quantitative data was calculated using student t test and qualitative test was done using Chi square test.

Results:

The confounding factors like age, sex and weight were compared to rule out any significant impact on the study. The mean age in Group A was found to be 34.33 years and that of Group B was found to be 37.04 years. The p value was 0.471 implying no significant difference. The mean weights in the groups were found to be 60.29 kgs and 62.58 kgs in Group A and Group B respectively. The p value was found to be 0.277 hence the groups were comparable. Pain scores were compared for each time period and it was found that pain scores were lower at each time period in Group A compared to Group B(Fig 1). The mean VAS scores were 2.78, 4.07, 5.81, 6.36, 6.5 for Group A and 2.18, 3.5, 4.76, 6.04, 6.43 for Group B. Thus pain scores were consistently lesser in Group B than Group A. Pain scores were significantly lower in Group B during the time period 30 mins and 90 mins (p values 0.039 and 0.002 respectively). The time of first rescue analgesia (i.e, Fentanyl) was compared in both the groups. Mean for time of demand for analgesia was 88.67 mins and 102 mins in Group A and Group B respectively. P value was 0.05 thus a

significantly earlier requirement of rescue analgesia in Group A (p values 0.039 and 0.002 respectively). The time of first rescue analgesia (i.e, Fentanyl) was compared in both the groups. Mean for time of demand for analgesia was 87.34 mins and 100.6 mins in Group A and Group B respectively(Fig 2). P value was 0.05 thus a significantly earlier requirement of rescue analgesia in Group A

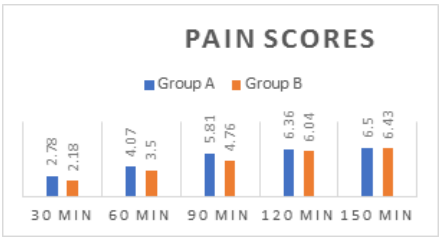

Fig 1 Pain Scores at various intervals

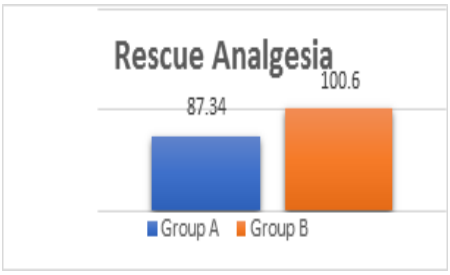

Fig 2 Rescue Analgesia time

DISCUSSION:

Rose and Kam in 20024 stated that Gabapentin is an anticonvulsant that has antinociceptive and antihyperalgesic properties. It has a well-established role in the treatment of chronic pain (Wiffen et al., 2006)5. It binds the α-2-d subunits of voltage dependent calcium ion channels and blocks the development of hyperalgesia and central sensitization. The role of gabapentin in acute post-operative pain management has been studied. These studies sought to determine whether perioperative gabapentin was effective in reducing postoperative pain and whether it had opioid sparing effects. However, differences in the gabapentin dosages, the dosing regimen and types of surgery have yielded contrasting results. In particular, Gabapentin has been effective for neuropathic pain as reported by Bennett and Simpson, 20046, diabetic neuropathy by Backonja et al., 19987, postherpetic neuralgia by Rowbotham et al., 19988 and complex regional pain syndrome (van de Vusse et al., 2004)[9].

Acetaminophen is now the only agent out of the so called "aniline analgesics" (acetanilide, phenacetin, acetaminophen) that is currently in medical use. Acetaminophen was synthesized in 1878 by Morse and first used clinically by von Mering in 1887. Acetaminophen exhibits some special differentiating features from both NSAIDS and Opioids. Unlike NSAIDS it is ineffective in inflammatory and intense pain and doesn't produce any cardio-renal or gastrointestinal side effects and compared to opioids it is ineffective in pain arising from smooth muscle spasm or hollow viscus, it doesn't have any depressant action on respiration. Acetaminophen exhibits antipyretic action as well and is widely used for this property. Acetaminophen is able to inhibit Cyclooxygenase (COX) but only if peroxide concentration is low which is the reason why acetaminophen is inactive in inflammatory conditions where peroxide concentrations are high but remains active in brain owing to low levels of peroxides10. Acetaminophen is a weak inhibitor of Prostaglandin synthetase in brain which plays a major role in its antipyretic action. Studies have suggested that Acetaminophen is an inhibitor of COX-3 which is a splice variant of COX-1. This may be the mechanism by which it causes analgesia and hypothermia11. Acetaminophen also acts by activation of spinal serotoninergic descending projections, involved in the analgesic effect of acetaminophen12. Spinal and supraspinal analgesia induced by high doses of acetaminophen involves brain opioid systems13. Acetaminophen-induced analgesia in rats is associated with a decrease of dynorphin A levels in the frontal cortex, and is prevented by blockade of k-opioid receptors. Acetaminophen bears a striking resemblance to the fatty acid amide N-arachidonoylphenolamine (AM404). AM404 is a potent activator of vanilloid subtype 1 receptors (TRPV1)14, and an inhibitor of the anandamide uptake into cells (anandamide membrane transporter, AMT), which leads to increased levels of endogenous cannabinoids. It was shown that Acetaminophen on deacetylation forms p-aminophenol which on conjugation with Arachidonic acid in brain and spinal cord forms AM404. Thus, increased cannabinoids decrease the body temperature as well as analgesia. It was shown that a CB1 receptor antagonist, at a dose level that completely prevents the analgesic activity of a selective CB1 receptor agonist also completely prevents the analgesic activity of acetaminophen.

Conclusion:

From our study we can conclude that

1. The rescue analgesic requirement was significantly lesser in oral Gabapentin group.
2. The oral Acetaminophen group of patients demanded for rescue analgesic by 88.67 minutes whereas the intravenous group demanded at 102 minutes which is having a significant difference.

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