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A Comparative Study of Tramadol and Pentazocine in Postoperative Pain Management

Parepalli Suresh[1], V.P.Karthik[2], K Satynarayana murthi[3], B Kodandaramu[4]

[1]Demonstrator, Department of Pharmacology, Sri Ramachandra Medical College, Chennai, India
[2]Assistant Professor, Department of Pharmacology, Sri Ramachandra Medical College, Chennai, India
[3]Professor and HOD Dept of Pharmacology, GSL Medical College & General Hospital, Rajahmundry, Andhra Pradesh, India.
[4]Tutor, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagram, Andhra Pradesh, India.

Abstract

Post-operative pain is considered a form of acute pain due to surgical trauma, characterized by incisional damage to skin or mucosa and various other tissues, application of thermal and chemical stimuli to the wound, and often prolonged traction and manipulation of soft tissues, with an inflammatory reaction and initiation of an afferent neuronal barrage. The study of comparative effects of tramadol (25 patients) 50mg and pentazocine (25 patients) 30mg in post operative pain management among 24 males and 26 females taken in GSL medical college, Rajahmundry. The comparative results of this study clearly demonstrate that intravenous pentazocine is significantly better than intravenous tramadol ($P < 0.05$). However, both produced side effects that were minor but do not appear to influence the outcome. The duration of action of a drug depends on its half-life but its efficacy is chiefly dependent on its route, consistency and frequency of administration. Side-effects are inevitable however in each case.

Keywords: Tramadol, Pentazocine and Postoperative Pain

*Corresponding Author: Parepalli Suresh, Demonstrator, Department of Pharmacology, Sri Ramachandra Medical College, Chennai, India. Email: spsuresh9@gmail.com

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Introduction

Pain is an unpleasant sensory and emotional experience resulting from tissue damage or described in terms of such damage. [1] Even a tiny amount of pain, irrespective of the cause, can hamper daily activity. But the most apprehending of all pains is that produced by surgery. [2] During surgery, millions of cells are damaged, evoking the pathway of inflammation, releasing thereby abundant chemical mediators that trigger the pain. It is said that "the pain of mind is worse than the pain in body" and its management would require alleviating both the mental and physical pain thus making the patient comfortable. [3] The management of such pain would vary from delivering analgesics in parenteral form, oral form or patches depending on the intensity and availability. [4]Post-operative pain is considered a form of acute pain due to surgical trauma, characterized by incisional damage to skin or mucosa and various other tissues, application of thermal and chemical stimuli to the wound, and often prolonged traction and manipulation of soft tissues, with an inflammatory reaction and initiation of an afferent neuronal barrage. [5]

The best postoperative regimen is one that offers broad analgesic coverage, easy to administer, is safe and economical.[6] Anesthetists and surgeons must do everything possible to eliminate postoperative pain without causing undesirable effects such as respiratory or vascular depression, gastrointestinal and visceral motility disorders, coagulation anomalies and drug tolerance and dependence.[7] Postoperative pain is currently treated

with two classes of drugs: Non-steroidal anti-inflammatory drugs (NSAIDs), which act by prostaglandin synthesis to achieve analgesic and anti-inflammatory actions, but associated with poor gastrointestinal and renal tolerance and risk of interference with coagulation system; and Narcotic analgesics, which act directly on central nervous system opiate receptors, but can cause drug dependence, respiratory depression, constipation, nausea, vomiting and sedation.[8]

The search for appropriate drugs to treat patients with moderate to severe pain has led to the development of Tramadol hydrochloride, a centrally acting synthetic analgesic with a novel mechanism of action: a complementary and synergistic interaction between an inhibition of neuronal monoamine reuptake and a weak affinity for opioid receptors. [9] In humans, Tramadol causes minimal respiratory depression and few gastrointestinal effects, and has less potential for causing opiate like dependence than morphine. [10]

Pentazocine is a kappa opioid receptor agonist and μ-opioid receptor antagonist. Pentazocine is more likely to cause hallucinations and other psychotomimetic effects; cardiovascular effects make it unsuitable for use in myocardial infarction. Unlike morphine its respiratory depressant action is subject to a "ceiling" effect. [11]

The purpose of this analysis is to comparatively assess the best post operative analgesia outcome in surgery using small doses of pentazocine (30 mg IV) and Tramadol (50 mg IV). A brief mention of the pharmacology and pharmacokinetics of the respective drugs is also made.

Methodology

The study of comparative effects of tramadol (25 patients) 50mg and pentazocine (25 patients) 30mg in post operative pain management among 24 males and 26 females taken in GSL medical college, Rajahmundry. This study a Visual Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured. For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain. From the patient's perspective this spectrum appears continuous ± their pain does not take discrete jumps, as a categorization of none, mild, moderate and severe would suggest. It was to capture this idea of an underlying continuum that the VAS was devised.

Operationally a VAS is usually a horizontal line, 100 mm in length, anchored by word descriptors at each end, as illustrated in Fig. 1. The patient marks on the line the point that they feel represents their perception of their current state. The VAS score is determined by measuring in millimetres from the left hand end of the line to the point that the patient marks. This controlled, completely randomized trial will design to compare study of tramadol and pentazocine in the treatment of postoperative pain. All post surgical patients aged 20 to 50 years who will be admitted during the period from November 2012 to November 2013 will be included in the study. Following a randomization list, each patient will be give tramodal (50 mg/2ml) or pentazocine (30mg/ml) by intra venous injection whenever the patent compliance pain within the three days. Pain intensity will be assessed on a visual analog scale on administration of drug interval of every 30min, 1hr, 2hr, 4hr and 6hr. The end points of the 100 mm VAS were ‘no pain’ and ‘pain could not be worse’. The mean from VAS were classified as none/no pain 0–10 mm, mild pain 11–30 mm, moderate pain 31–60 mm and severe pain 61–100 mm. All the patients enrolled completed the study. No patient was excluded because of inadequate analgesia.

In our study we included Orthopedics surgery, Appendicitis Surgery, Thyroid surgery and Cesarean surgery from this study. Patients who come under the following categories were excluded from this study. Like Metabolic disease, Cancer patient, Neurological diseases, Genetic diseases, Respiratory diseases, Patients with history of hypersensitivity to pentazocine or Tramadol, Patients with blood dyscrasias, Patients with liver or kidney diseases and Patients with head injury patients excluded from this study.

Statistics: All statistical analyses will be done by using SPSS software trial version 16. Values will be presented as mean ± SD and in percentages. Statistical analyses $p<0.05$ will be considered as statistical significant**.**

Results

In our study 50 post surgical patients aged 20 to 50 years who will be admitted during the period from November 2012 to November 2013 will be taken from this study at GSL Medical College & General Hospital, Rajahmundry. The comparative results of this study clearly demonstrate that intravenous pentazocine is significantly better than

intravenous tramadol (P < 0.05). However, both produced side effects that were minor but do not appear to influence the outcome.

s/e	TRAMADOL	PENTAZOCINE
Nausea	5	3
Vomiting	1	1
Respiratory depression	No	No
constipation	2	1
Dizziness	1	0
Dry mouth	2	1
Diarrhea	1	1
Headache	2	1
Drowsiness	2	0
Hallucinations	0	2
seizure	No	No

Table 1: Main characteristics of severe pain.

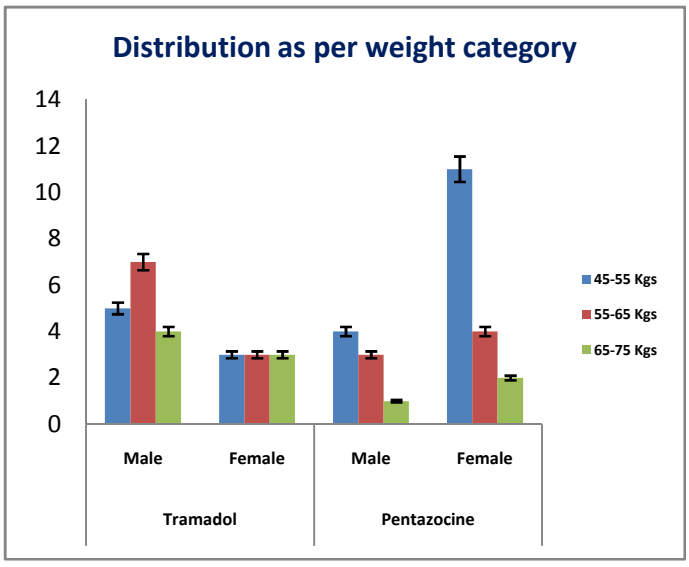

Figure1: Distribution of patients according to weight

The study was done among 50 patients with 25 patients in each treatment group of Tramadol and Penazocine. 44% reported no pain with tramadol at the end of 6 th hour of day 1 while 68% reported no pain with pentazocine which is 24% higher than tramadol found to be statistically highly significant (p=0.0001). 76% reported no pain with tramadol at the end of 6th hour of day 2, while 68% reported no pain with treatment with pentazocine. 80% reported no pain with tramadol at the end of 6 th of day 3, while 92% had no pain with treatment of pentazocine significant which is 12% higher than tramadol, found to be statistically highly significant (p=0.0001). Assess pain frequently during the immediate postoperative period: 1) at regular intervals, consistent with surgery type and pain severity (e.g., every 2 hours while awake for 1 day after surgery); 2) with each new report of pain; and 3) at a suitable interval after each analgesic intervention (e.g., 30 minutes after parenteral drug therapy, and 1 hour after oral analgesics). Increase the frequency of assessment for changing interventions or inadequate pain control.

Discussion

Post-operative pain is considered a form of acute pain due to surgical trauma, characterized by incisional damage to skin or mucosa and various other tissues, application of thermal and chemical stimuli to the wound, and often prolonged traction and manipulation of soft tissues, with an inflammatory reaction and initiation of an afferent neuronal barrage. Severe postoperative pain may have psychological consequences, increasing the stress response to surgery, seen as a cascade of endocrine-metabolic and inflammatory events that ultimately contribute to organ dysfunction, morbidity, increased in-hospital stay and mortality. Pain often causes the patient to remain immobile, thus becoming vulnerable to deep vein thrombosis, pulmonary atelectasis, muscle wasting, and urinary retention. Besides restlessness, severe pain may contribute to postoperative hypoxemia. The inflammatory mediators released as a result of trauma activate the primary afferent nerves which in turn can evoke changes at the level of spinal cord, a process referred to as “peripheral sensitization”. If acute pain is not properly treated, prolonged activation of pain pathways can lead to further neurophysiologic changes, collectively called “central sensitization,” which may prolong recovery and convert acute pain to a chronic condition. Additionally, patients with moderate to severe pain during the postoperative period, and those having undergone operations with the risk of nerve damage are most likely to develop chronic pain.

Postoperative pain is currently treated with two classes of drugs: Non-steroidal anti-inflammatory drugs (NSAIDs), which act by prostaglandin synthesis to achieve analgesic and anti-inflammatory actions, but associated with poor gastrointestinal and renal tolerance and risk of interference with coagulation system; and Narcotic analgesics, which act directly on central nervous system opiate receptors, but can cause drug dependence, respiratory depression, constipation, nausea, vomiting and sedation. Approaches to the

measurement and assessment of pain include verbal and numeric rating scales, VAS, behavioral observation scales, and psychological responses. Of these, the VAS is the most frequently used self-rating scale. The most common VAS consists of a 10 cm horizontal or vertical line with the two end points labeled “No Pain” and “Worst Pain”. Patients are asked to place a mark on the 10 cm line at a point that corresponds to the level of pain intensity they presently feel. Advantages of VAS include ease of scoring, its minimum intrusiveness, its greater sensitivity to detect intervention based changes in pain, and its conceptual simplicity.

The search for appropriate drugs to treat patients with moderate to severe pain has led to the development of Tramadol hydrochloride, a centrally acting synthetic analgesic with a novel mechanism of action: a complementary and synergistic interaction between an inhibition of neuronal monoamine reuptake and a weak affinity for opioid receptors2. In humans, Tramadol causes minimal respiratory depression and few gastrointestinal effects, and has less potential for causing opiate-like dependence than morphine . Pentazocine has bouth agonist action and weak antagonistic on the opioid receptors. The analgesic effects of pentazocine are attributed to nagonistic on k-opioid receptors less potent than morphine, will precipitate withdrawal in dependent individuals may produce dysphoria. Pentazocine is more likely to cause hallucinations and other psychotomimetic effects; cardiovascular effects make it unsuitable for use in myocardial infarction. Unlike morphine its respiratory depressant action is subject to a "ceiling" effect.

There are several studies comparing the efficacy of various analgesics used for the control of postoperative pain in surgeries. It is well-known fact that parenteral route is more reliable and effective especially for the patients undergoing surgeries under general anesthesia. The results of this study indicate that adequate analgesic treatment can reduce the intensity and limit the duration of postoperative pain in the population considered. Excellent results were demonstrated with the use of intramuscular pentazocine for treatment of postoperative pain in surgery. Pentazocine provided effective pain relief in high percentage of cases than tramadol at every scheduled post-operative VAS record. It has been reported that intravenous Tramadol 50 mg, given postoperatively, has an analgesic effect equivalent to 30 mg of Pentazocine but is less potent than 10 mg of morphine. The maximum pain, as experienced by patients, was of moderate type in both the groups.

The most common side effects associated with Tramadol are nausea and vomiting. Only 1 patient in Group-T had an episode of vomiting while two patients complained of nausea during initial two postoperative hours. These patients were given a single dose intravenous Ondansetron stat, following which no further episodes of vomiting were reported. Since these are common post-general anesthesia sequels, it is difficult to conclude whether or not Tramadol had resulted in postoperative nausea and vomiting. An intra-operative parenteral antiemetic and H-1 blocker, Ondansetron, a regular protocol drug in general anesthesia, can explain the insignificant number of these commonest side effects of Tramadol. Therefore, despite the principle side effect being nausea and vomiting, Tramadol can be given safely to patients under the cover of an antiemetic.

Of the 25 patients in the pentazocine-group, two developed hallucination one patient complained of sweating and nausea. However, both the complications were mild and did not require any treatment. Regular monitoring of vital signs was done in both the groups and found to be within normal limits. We could conclude that all patients tolerated their group drug well. There are several studies comparing the analgesic efficacy of parenteral Tramadol and pentazocine and most of them are in favor of pentazocine with regard to postoperative pain control. However, few authors have found pentazocine-induced vomiting to be significant which can be controlled by anti-emetics that have been found to be safe in normal healthy adults.

Conclusion

To conclude, though both the drugs were effective in controlling postoperative pain in patients undergoing surgery. The comparative results of this study clearly demonstrate that intravenous pentazocine is significantly better than intravenous tramadol ($P < 0.05$). However, both produced side effects that were minor but do not appear to influence the outcome. The duration of action of a drug depends on its half-life but its efficacy is chiefly dependent on its route, consistency and frequency of administration. Side-effects are inevitable however in each case. . Future randomized placebo-controlled research trials need to be performed to determine rational dose–response curves, in order to minimize

undesirable side-effects but maximize benefits, economically. The maximum no pain response treatment with pentazocine was reported at 1st day 3rd day. It is also found to be cheaper than tramadol which further strengthens its overall edge of prescription in post operative patients. Pentazocine is also found to be superior in terms of lesser adverse events than Tramadol. However in this study no severe pain incidence is reported. The therapeutic effect of Pentazocine was superior in post operative management.

Conflict of interest: None declared

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