



EVALUATION OF THE EFFICACY AND TOXICITY WITH THE USE OF DIAZEPAM IN COMBINATION WITH PENTAZOCINE AND KETAMINE AS IV SEDATIVES

Divya James., Manay Roshini Srinivas and Muthusekhar M. R

Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Chennai

ARTICLE INFO

Article History:

Received 16th October, 2017

Received in revised form 10th November, 2017

Accepted 26th December, 2017

Published online 28th January, 2018

Key words:

Pentazocine, ketamine, diazepam, IV sedatives, pain, anxiety

ABSTRACT

Aim: Evaluation of the efficacy and toxicity with the use of diazepam in combination with pentazocine and ketamine as IV sedatives in minor oral surgical procedures.

Material and Methods: Patients undergoing minor oral surgical procedure were divided into two groups. One group was administered IV Ketamine and another group was administered IV pentazocine, both in combination with diazepam.

Results: A significant increase in heart rate and systolic pressure was seen in both the groups. A significant difference was seen in the respiratory rate and O₂ saturation in Group 2 patients. The time of recovery is more in Group 1 than in Group 2 patients.

Conclusion: The administration of Pentazocine significantly reduced the mean dose of Diazepam required to produce satisfactory sedation, thereby reducing some of its side effects.

Copyright©2018 Divya James et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Oral and maxillofacial surgeons have been concerned with the problem of controlling pain and anxiety. In oral surgery pain can be effectively managed with the use of local anaesthetic drugs. But in some situations, it becomes difficult to control the anxiety levels under local anaesthesia and sometimes administration of local anaesthesia becomes a traumatic procedure for many patients. The evolution of general anaesthesia till present date allows complete relief from intraoperative pain and anxiety.

The intravenous use of Diazepam, the most commonly used Benzodiazepine is used to sedate ambulatory out patients during minor oral surgical procedure. Along with the advantages of diazepam, disadvantages include, pain during injection, venous sequelae at the site of injection, a long half life of elimination and lack of analgesic properties.

Ketamine produces a clinical state of dissociative anaesthesia, with wide margin of safety, amnesia and analgesia. Unfavourable side effects of ketamine include delirium and hallucination.

Pentazocine, a benzomorphin derivative has both opioid agonistic and weak antagonistic activity. The effect of pentazocine includes analgesic and sedation. Also known to produce respiratory depression.

**Corresponding author: Divya James*

Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Chennai

Aim

Evaluation of the efficacy and toxicity with the use of diazepam in combination with pentazocine and ketamine as IV sedatives in minor oral surgical procedures.

MATERIAL AND METHODS

This study was carried out in the Department of Oral and Maxillofacial Surgery, Saveetha Dental College on out patients.

Patients included

1. Patients requiring minor oral surgical procedure under local anaesthesia.
2. Surgical procedures included impaction, transalveolar extraction, pre – prosthetic surgery, drainage of abscess.
3. Informed consent was taken prior to the procedure.
4. Case history taken and required data collected.
5. Routine blood and urine investigations done for every patient.

Inclusion Criteria

Age group between 15 to 50 years.

Exclusion Criteria

1. Patients with medical history.
2. Pregnant patients.

Instructions

Patients were asked to remain nil orally 6 hours before the surgery.

Patient to be accompanied by a family member.
Body weight and temperature was recorded in each case.
Procedure was performed in the dental chair, in a reclining position.

METHOD

Once the patient arrives to the operating room, a monitor was connected. A No. 21 G scalp vein needle was inserted in a vein of the forearm. After the procedure was over, patient was kept under observation for 20 minutes and shifted to the recovery room.

Drugs administered

Group 1 and Group 2 of 10 patients each were selected randomly -

Patients in Group 1 received:

IV induction dose of -

Diazepam 0.2mg/kg body weight

Atropine-0.01mg/kg body weight

Which after 3 minutes is followed by-

Ketamine-0.6mg/kg body weight (Loading Dose)

0.4 mg/kg body weight (repeat dose)

Patients in Group 2 received:

IV induction dose of -

Diazepam 0.2mg/kg body weight

Which after 3 minutes is followed by-

Pentazocine – 0.6mg/kg body weight (Loading Dose)

0.4 mg/kg body weight (repeat dose)

Repeat doses of Ketamine and Pentazocine were given after the signs of wearing of sedation like phonation, rapid eye movement and movement on surgical stimulation were seen.

After two minutes of drug administration, patients were given local anaesthetic injection of 2% lignocaine with 1:80000 adrenaline. Amount of local anaesthesia given was recorded.

Parameters evaluated were:

1. Heart rate
2. Systolic and diastolic pressure.
3. O₂ saturation
4. Respiratory rate
5. ECG
6. Amnesia
7. Recovery time.
8. Side effects

Monitoring the Patient

Once the patient has arrived, the multifunctional monitor with pulse oximeter and ECG monitor was connected to the patient. Patient was monitored continuously for –

- Heart rate
- Blood pressure
- O₂ saturation
- ECG

Respiratory rate was observed using a stethoscope and recorded.

These recording were taken at

1. 15 minutes before the surgical procedure.
2. Immediately after administration of local anaesthetic.
3. Every 15 minutes during surgery.

4. 10 minutes after completion of surgery
5. At the time of discharge.

Amnesia- Questionnaire regarding surgical procedure and presenting separate visual and cutaneous tactile stimuli during surgery. Each patients of both the groups received the visual and cutaneous tactile stimuli in two different intervals.

- One at 12 – 15 minutes after induction.
- Second at 10 -12 minutes before the expected finish of surgery.

For visual stimuli, 2 common objects were shown to the patients from the following list-

Keys Pen Pencil Book Torch

For, cutaneous tactile stimuli, patients were randomly pricked by a sterile needle on one of their extremities.

Amnesia was assessed after surgery, just before discharge by a check list, asking if patient remembered:

- Receiving injection into the mouth.
- Any of the surgical procedure done. Eg drilling, suturing
- Visual and cutaneous applied

The correct, partial or no recall of these parameters were used to grade the degree of amnesia as poor, fair and good.

Recovery- Recovery period measured from the last dose of the drug to the time patient could walk in a straight line without support. Assessed by:

Patient's performance in a Trieger Dot Test.

- Preoperatively
- 15 minutes - postoperatively
- Patient's ability to walk in a straight line without support.
- Time taken to complete this exercise
- Number of dots missed.
- Nature and continuity of the line.

Once the patient was able to walk in a straight line without any support, patient was discharged.

Side effects – After the administration of sedatives, the side effects include

1. Post - operative pain
2. Nausea / Vomiting
3. Body temperature changes
4. Restlessness
5. Headache
6. Dizziness
7. Hallucination
8. Cough
9. Burning sensation in the injection site.
10. Any other

OBSERVATION AND RESULTS

This study consists of 20 patients divided into two groups-

Group I: Patients who received Ketamine – Diazepam combination.

Group II: Patients who received Pentazocine – Diazepam combination.

The mean age of group I – 21.8 years.
The mean age of group II – 25.5 years.

Effect on heart rate

A significant increase in heart rate was seen in both the groups. But the level of increase in heart rate at all stages were significantly higher in Group I (25 to 30%) patients than those in Group II (6 to 15%). An increase in mean heart rate was seen at 30 minutes in Group I and 45 minutes in Group II and gradually decreased.

Effect on blood pressure

A significant increase in the systolic pressure was seen in Group I and Group II. A statistically significant difference was found in the level of increase in systolic pressure at different time intervals except post local anaesthesia administration period, where the rise is 15% in Group I and 5% in Group II ($P < 0.05$). On an average, the rise in systolic blood pressure ranged from 8 to 15% in Group I and 5 to 10% in Group II. Similarly, the rise in diastolic blood pressure ranged from 5 to 14% in Group I and 3 to 8% in Group II. No significant difference in the diastolic pressure was seen.

Effect on Respiratory rate

A highly significant difference was seen ($P < 0.001$) below the predrug value was found at all stages in Group II patients whereas in Group I patients did not show any significant change in respiratory rate.

O₂ Saturation

It was measured from the pulse oximeter. Showed no significant difference in Group I but a significant difference in Group II was seen.

ECG

Arrhythmias of any sort was not seen in the ECG monitor throughout the procedure.

Amnesic effect

When patients were questioned in the post operative testing session, 20 patients said that they could remember the venipuncture and therefore no retrograde amnesia was established in both the groups. Amnesia was recorded as good, moderate and poor for each group. 90% patients in Group I experienced good amnesia compared to 10% patients in Group II.

Recovery

The mean recovery time shows the average recovery time of Group I patients (152 +/- 73 minutes) is 10 – 11 minutes more than the Group II (141 +/- 51 minutes) patients, which is not statistically significant.

Side effects

Burning sensation during Diazepam injection was reported by 6 patients, three in each group. Three patients were vociferous during surgical procedure and two patients showed involuntary purposeless movements in Group I and in Group II one patient was vociferous during procedure. One incidence of emergence delirium, post operative vomiting, hiccough immediately after administration of diazepam was seen in Group I patients whereas one patient complained of post operative dizziness in Group II.

DISCUSSION

Anxiety, fear and pain are still experienced by patients undergoing oral surgical treatment. This is noticed in the articles published in Journals since 1943, recognized in the National Institute of Dental Research Consensus Conference on pain and Anxiety Control in Dentistry in 1986 [1]. In order to help anxious patients accept such procedures, IV sedation techniques have been used as general anaesthesia is often unwarranted [2] and local anaesthesia seems inadequate.

The technique of producing sedation in dentistry using IV Diazepam started with its use by Davidau in Paris in 1965 and then by Main in 1967 and Brown *et al* in 1968 [3]. Diazepam was more effective, producing faster onset of drowsiness, smoother sedation, better amnesia and faster recovery time [4]. Diazepam was a drug with wide toxic therapeutic ratio and did not severely alter the cardio pulmonary stability [5].

Its main disadvantages include pain on injection in 30 – 80% of cases [6], post injection thrombophlebitis and its long half life (24 - 48 hours) and poor analgesic effect [7][8].

Pentazocine showed a reduced degree of respiratory and cardiovascular depression and a minimal risk of addiction in clinical practice [12]. It produced a good anaesthesia in 76 % of the patients [13] and the peak analgesic effect of pentazocine is said to be as fast as within 2 to 3 minutes of injection [14].

Ketamine hydrochloride is a short acting general anaesthetic. The use of this drug has been popular since early 1970. When fully anaesthetized by this agent, the patient is usually in a cataleptic state with eyes open and no loss of pharyngeal, laryngeal or corneal reflexes [15][16][17].

The favourable properties of Ketamine include rapid induction, wide margin of safety, amnesia, analgesia, maintenance of cardiovascular and respiratory function and intact airway [18]. Analgesia associated with Ketamine has been demonstrated even as sub anaesthetic doses [19].

Ketamine in adults continues to be untoward emergence reaction which range from floating out of the body to frank delirium. [20]

CONCLUSION

In order to reduce the side effects of Diazepam and increase the quality of sedation, Diazepam has been used with conjunction with the opiods agonist Pentazocine [7][9][10][8]. The synergistic effect of these two drugs improved sedation. In addition Brown P. R. H. [11] noted that the administration of Pentazocine significantly reduced the mean dose of Diazepam required to produce satisfactory sedation, thereby reducing some of its side effects.

References

1. Jeffery B. Dembo: The use of intravenous anaesthesia and sedation techniques in oral and maxillofacial surgery. *J Oral and Maxillofac Surg*. 51;346-351:1993.
2. Hook P. C. G. and K. M. Lavery: New intravenous sedative combination in oral surgery. A comparative study of Nalbuphine or Pentazocine with Midazolam. *Br J Oral Maxillofac Surg*. 26:95-106:1988

3. Stanley F. Malamed: Sedation – A guide to patient management. First Edition, The C. V. Mosby Company, St. Louis, 1985.
4. Keilty S. R. and Blackwood s.: Sedation for conservative dentistry. *Br. Dent J of Clinical Practice*. 23:365:1969.
5. Jewitt D. E. *et al*: Sedation, local and general anaesthesia in dentistry. *Br Med J*. 1:795:1970.
6. Wood N. and Sheikh A.: Midazolam and Diazepam for minor oral surgery. *Br. Dent J*. 160:9:1986.
7. Dixon H. R. Jr *et al*: A comparison of the sedative and cardiopulmonary effects of Diazepam and Pentazocine premedication. *Anaesthesia and analgesia*. 49:546:1970.
8. Lawson J. I. and Milne M. K.: Intravenous sedation with Diazepam and Pentazocine. *Br Dent J*. 151;379:1981
9. Aldrete J. Antonio *et al*: Pentazepam (Pentazocine and Diazepam) supplementary local anaesthesia for Laproscopic sterilization. *Anesth AnalgCurr Res*. 55:177-181:1976.
10. Corall I. M. *et al*: Sedation for out patient conservative dentistry. *Anesthesia* 34:855:1979.
11. Brown P. R. H. *et al*: Intravenous sedation in dentistry. *Br Dent J*. 139:59:1975.
12. Ahilgren E. W. and Stephen C. R.: A comparative clinical study of morphine, pethidine and pentazocine differ in cardiac patients. *Anesth Anal Curr Res*. 45:673:1966.
13. Jamil S. N. *et al*: Intravenous Diazepam and Pentazocine in Oral Surgery. *Ind J of Anesth*. 29:31:1983.
14. Berkowitz B. A. *et al*: Relationship of Pentazocine plasma levels to pharmacological activity in man. *ClinPharmacolTher*. 10:320:1969.
15. Virtue R. W. *et al*: An anaesthetic agent: Two orthochloro phenyl, 2- methylamino cyclohexanone HCl (CI-581). *Anesthesiology*. 8(5):823-32:1967.
16. Halsband E. R. *et al*: Ketamine hydrochloride in out Patient oral surgery. *J Oral Surg* 29:472-6:1971.
17. O'NEIL A. A. *et al*: Premedication for Ketamine anaesthesia: Phase I the “classic” drugs. *AnesthAnalg*. 51(3): 475-82:1972
18. Richard Bennet C.: Conscious sedation in dental practice. 2nd Edition, The C. V. Mosby Company, St. Louis,1978.
19. Sadove M. S.: Analgesic effects of Ketamine administered in subdissociative doses. *AnesthAnalg* (Cleve). 50:452:1971.
20. White P. F. *et al*: Ketamine – its pharmacology and therapeutic uses. *Anesthesiology*. 56:119-136:1982.

How to cite this article:

Divya James *et al* (2018) 'Evaluation of the Efficacy and Toxicity with the Use of Diazepam in Combination with Pentazocine And Ketamine As Iv Sedatives', *International Journal of Current Advanced Research*, 07(1), pp. 9536-9539. DOI: <http://dx.doi.org/10.24327/ijcar.2018.9539.1580>
