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COMPARATIVE STUDY OF PREEMPTIVE EFFECT OF MULTIMODAL OPIOID VERSUS NON-OPIOID ANALGESIA IN FUNCTIONAL ENDOSCOPIC SINUS SURGERY

Anesthesiology

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ABSTRACT

Multimodal analgesia is the combination of different analgesics, act by different mechanisms and sites in the nervous system, resulting in synergistic analgesia with lowered adverse effects of individual analgesics. Analgesia will be more effective if given before nociceptive stimulus. Study was conducted on 60 patients under two groups between 16-60 years of ASA1 and ASA2 undergoing elective Functional Endoscopic Sinus Surgeries under General Anesthesia after institutional ethical committee approval and written informed consent from each patient. Patients were explained about sedation and analgesia scores. The overall study of two groups in comparison of Ramsay sedation score(1-6) and VAP score(0-10) was found to be more effective in group D compared to group F (p value <0.05). The duration of analgesia was more in group D (p-value <0.0001). Thus, our study showed that preemptive effect of multimodal non-opioid analgesia is superior to multimodal opioids for prevention of pain in functional endoscopic sinus surgery.

KEYWORDS

Multimodal analgesia; Preemptive analgesia; Opioid versus non-opioid analgesia; Functional endoscopic sinus surgery.

INTRODUCTION

Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described interms of such damage", by International Association for the study of Pain (IASP)[1]. Providing analgesia in the setting of moderate to severe pain, especially for surgical care is the primary ethical responsibility of the medical profession and providing adequate analgesia is an integral part of balanced anesthesia, because it influences the clinical outcome and patient's wellbeing in the post-operative period[2,3].

Current perioperative pain management relies strongly on the use of opioid analgesics which have delayed onset and significant side effects. Intraop pain (50%) may remain as chronic pain if not treated properly. At lower doses (analgesic ceilings) and escalating or sustained use of opioids may contribute to an opioid induced hyperalgesia.

No single analgesic is fool-proof, or free from potential side effects or complications. Multimodal analgesia is the combination of different analgesics that act by different mechanisms and at different sites in the nervous system, resulting in additive or synergistic analgesia with lowered adverse effects of sole administration of individual analgesics[4].

Administration of analgesic drugs may be more effective if given before nociceptive stimulus. Extension of this concept is that effective analgesia administered before a nociceptive stimulus may also reduce the risk of post-operative chronic pain syndrome[5]. Some clinical work supports this concept of using two or more combination of non-steroidal anti-inflammatory drugs, local anesthetics, alpha2 agonists, magnesium sulphate, steroids, systemic opioids, ketamine, Gabapentin etc. It is important to discriminate between the effects of multimodal analgesic (non-opioid) approach versus traditional techniques of opioid analgesic intervention. Since many references are not available, there is a continuing need to explore new drug combinations to achieve all of the purported goals of multimodal analgesia. Hence, we have selected this study to compare the pre-emptive effects of multimodal opioid versus non-opioid drugs in elective Functional Endoscopic Sinus Surgery cases where procedure lasts for one-and-a-half to two hours.

AIMS AND OBJECTIVES

To evaluate and compare the benefits of pre-emptive analgesic effect of intravenous opioid v/s non-opioid medications in attenuating the hemodynamic responses and perioperative analgesic efficacy and recovery in patients undergoing elective FESS.

MATERIALS AND METHODS

Source Of Data

The study was conducted on patients aged between 16-60 years of ASA 1 and ASA 2 grade posted for elective FESS surgeries under General Anesthesia, at Adichunchanagiri Institute of Medical Sciences, B.G Nagara, Mandya District, Karnataka.

Duration Of Study: November 2018 –June 2020.

METHOD OF COLLECTION OF DATA

Study Design: Prospective Double Blind Randomized Study.

The study was conducted on 60 patients in the age group of 16-60 years of ASA1 and ASA2 undergoing elective FESS surgeries under General Anesthesia after institutional ethical committee approval and written informed consent from each patient. The patients was allocated into 2 groups, Group F and Group D. Patients were explained about sedation and analgesia scores.

Group F, patients received

- inj. aqueous diclofenac sodium 75mg in 100mL normal saline as infusion over 10-15minutes followed by inj. dexamethasone 8mg slow i.v.
- Premedication includes inj. fentanyl 2mcg/kg, inj. glycopyrrolate 0.01mg/kg and inj. midazolam 0.02mg/kg intravenously prior to induction.

Group F is the conventional regime which is followed in our institution.

Group D, patients received

- inj. xylocard 1.5mg/kg, inj. magnesium sulphate 40mg/kg in 100mL of inj. paracetamol 1g as infusion over 10-15minutes followed by inj. dexamethasone 8mg slow i.v.
- Premedication includes inj. dexmedetomidine 0.5mcg/kg, inj. glycopyrrolate 0.01mg/kg intravenously prior to induction.
- Group D is the regime tailored for our study group.

Inclusion Criteria

- Consenting patients of ASA Grades 1 and 2.
- Age group of 16-60 years.

Exclusion Criteria

- Reluctance to participate.
- Morbid obesity, anticipated difficult intubation, obstructive sleep apnea.
- General anaesthesia within 2 weeks.
- Known alcohol or drug abuse.
- Pregnancy or lactating females.
- Known drug hypersensitivity.
- Diabetes mellitus and Hypertension.
- Coexisting neurological, cardiovascular, renal, metabolic disorders and chronic pain syndrome.

Methodology

All patients were undergone preanaesthetic evaluation on the previous

day of surgery. Details regarding clinical history, general physical examination were recorded and all routine required investigations were carried out. They were kept fasting for 6 hours prior to surgery. Tab. alprazolam 0.5 mg and Tab. ranitidine 150 mg were given on the night before surgery. Patients were randomly allocated to two groups of 30 each. Group D (n==30) and group F (n=30). Patients received drugs as mentioned above. Preop heart rate, blood pressure (systolic, diastolic and mean arterial pressure) spO2 and EtCO2 were recorded. Sedation was assessed 10 minutes after giving multimodal drugs and premedicants, and later in postoperative period for 24 hours using Ramsay sedation score and pain was assessed using Visual Analogue pain score in the postop period for 24 hours.

After informing ENT surgeons, patient shifted 30minutes early. In the operating room, after placement of an 18G intravenous line, a ringer lactate infusion of 6-8ml/kg/hr was started. Standard ASA monitoring consisting of Heart rate, ECG, spO2, EtCO2 and NIBP were established and recorded. The anesthesiologist who was not involved in the study administered the drugs. Group F, patients received, infusion of inj. aqueous diclofenac sodium 75 mg in 100mL NS over 10-15 minutes and then inj. dexamethasone 8mg slow i.v. It was followed by premedication which includes inj. fentanyl 2mcg/kg, inj. glycopyrrolate 0.01mg/kg, inj. midazolam 0.02 mg/kg prior to induction. Group D, patients received, infusion of inj. xylocaine 1.5mg/kg, inj. magnesium sulphate 40mg/kg in 100mL of inj. paracetamol 1g over 10-15 minutes and then inj. dexamethasone 8mg slow i.v. It was followed by premedication which includes inj. dexmedetomidine 0.5 mcg/kg, inj. glycopyrrolate 0.01mg/kg prior to induction. 10 minutes after administration of premedication, sedation levels was assessed, during which time patient was preoxygenated.

Anesthesia was induced with inj. propofol 2mg/kg. Laryngoscopy and intubation was facilitated by inj. suxamethonium1.5mg/kg. Maintenance of anesthesia was with minimum alveolar concentration of 0.8-1% of Isoflurane, nitrous oxide 67% and oxygen 33% and inj. vecuronium for muscle relaxation. Patients were mechanically ventilated with minute ventilation adjusted to maintain normocapnia. In both the groups, posterior to septum, sphenopalatine ganglion blockade was given by ENT Surgeons with adrenaline 2% 5-6 mL, which also adds to our multimodal analgesic approach. Patients were continuously monitored for heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, spO2, EtCO2. Supplemental neuromuscular blockade was achieved with inj. vecuronium 0.05mg/kg and dose repeated with peripheral neuromuscular monitoring.

Monitored parameters were recorded

- Before study drug
- After premedication
- At induction (0 minute) and
- Subsequently at 3, 5, 10, 15, 20, 25, 30 and then 15 minutes once till the end of surgery.

At the end of surgery, patients were extubated after reversal (inj. neostigmine-0.05mg/kg and inj. glycopyrrolate 0.01mg/kg). After recovery monitored parameters were recorded and patient transferred to recovery room for observation. Patient's first complaint of pain was recorded. First rescue analgesic inj. Tramadol 1ampoule i.m., was given after shifting the patient to postoperative ward when the patient demands. Any untoward effects during study period were recorded.

Scoring assessment scales used were

Ramsay Sedation score

1 = Anxious, agitated and non-cooperative
2 = Cooperative, oriented and tranquil
3 = Respond to verbal commands
4 = Brisk response to loud noise or a light tap
5 = Sluggish response to loud noise or a light tap
6 = No response to stimuli

Visual Analogue Pain Score (VAPS)

0 = No pain
1, 2, 3 = Mild pain
4, 5, 6 = Moderate pain
7, 8, 9 = Severe pain
10 = Worst pain imaginable

Side Effects

1. Hypotension was defined as SBP ≤ 20% of baseline value.
2. Bradycardia was defined as HR < 45 beats/ minute.
3. Nausea, Vomiting and Respiratory depression.

Incidences of all these parameters were recorded in both the groups. Hypotension was treated using 3mg increments of intravenous inj. ephedrine and intravenous fluids.

Bradycardia was treated using 0.6mg of intravenous inj. atropine.

Statistical Methods Employed

Sample Size:

A sample size of 25-30 patients were needed to detect an intergroup difference of atleast 10% in BP and HR with a power of 0.8 and α of 0.05. In order to make good for dropouts, a total number of 30 patients in each group were included for the study. It was also based on the pilot studies done in our hospital and other various previous studies [11,12,13,15]

It was calculated using following formula:

$n = 2x \{Z_{(1-a/2)} + Z_{(1-b)}\}^2 / D^2$

Where,

$Z_{(1-a/2)}$ is the alpha error.

$Z_{(1-b)}$ is the beta error or power of the study.

D=difference in mean / S.D.

Statistical Analysis

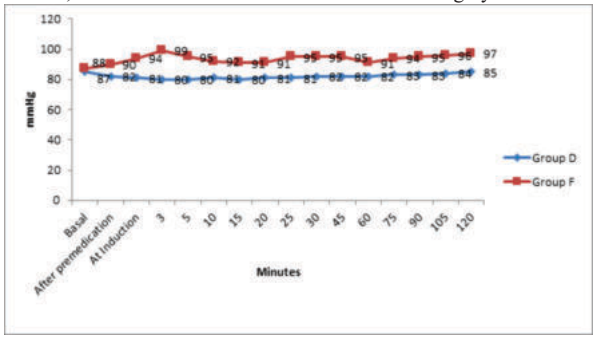
Data analysis was done with the help of computer using SPSS statistical package- version 19. Using this software, measures of central tendency, measures of dispersion,'t' value, chi square and 'p' values were calculated. 't' test was used to test the significance of difference between quantitative variables and Yate's and Fisher's chi square tests for qualitative variables. Haemodynamic variables were represented by mean ± S.D. A 'p' value less than 0.05 will denote significant relationship and p<0.001 was considered as highly significant. Demographic characteristics of cases studied, outcome variables and the significance of the relationship between the outcomes variables of the two groups was analyzed using the above tests.

OBSERVATIONS AND RESULTS

The following observations were made during the course of the study.

MEAN ARTERIAL PRESSURE VARIATIONS INTRAOPERATIVELY AT REGULAR INTERVALS BETWEEN TWO GROUPS

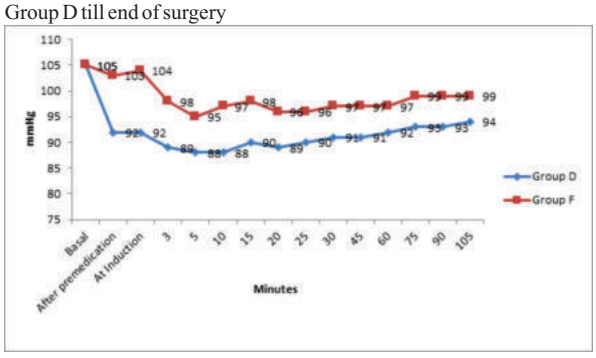
There is no statistical significant difference among the two groups with regard to the basal mean arterial pressure. There is highly significant statistical difference with p value <0.001 among the two groups after administration of premedication and at Induction (0^{th}), 3^{rd}, 5^{th}, 10^{th}, 15^{th}, 20^{th} 25^{th}, 30^{th} and then 15minutes once till the end of surgery.



COMPARISON OF MEAN HEART RATE AT VARIOUS INTERVAL BETWEEN GROUPS

There is no statistical significant difference among the two groups with regard to the basal mean heart rate. After premedication, the decrease in HR in group D (fall in HR around 10-13bpm from basal line) is significant compared to group F (fall in HR remained same or decreased by 2-3 bpm), which is statistically highly significant with P value of <0.00001. At all regular intervals variations in mean HR was

found to be lower in group D, with p value <0.001 showing highly significant. But in Group F, HR was statistically on the higher side than Group D till end of surgery



COMPARISON OF 0-10 VAPS AFTER EXTUBATION BETWEEN TWO GROUPS

VAP score after extubation showing maximum number of patients with score 1 and 2 in group D whereas with score of 3 and 4 in group F. Also no patient had least VAP score of 0 and 1 in group F, indicating that drugs used in group D were effective in controlling pain than group F with a p value of <0.001.

At 6th hour in postoperative period, in group D, 18 patients showed lowest score of VAPS 1 followed by 11 patients with VAPS 2, whereas in group F, 13 patients showed VAPS 3 and 11 patients showed VAPS 2, with p value <0.0002, indicating that group D drugs is more efficacious than that of group F.

VAP score at 12th hour in the postoperative period, showing maximum number of patients i.e., 7 and 16 patients with score 2 and 1 in group D respectively whereas with score of 2 and 1 in 19 and 8 patients in group F respectively. Also no patient had least VAP score of 0 in group F. Analysed p value of <0.004, statistically significant.

VAP score at 24th hour in the postoperative period, showing maximum number of patients i.e., 14 and 13 patients with score 0 and 1 in group D respectively whereas with score of 2 and 1 in 20 and 10 patients in group F respectively. Analysed p value of <0.001, statistically significant.

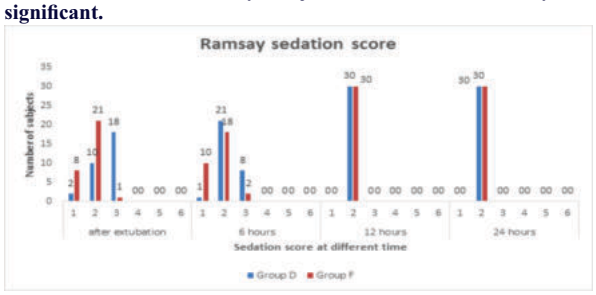
DISTRIBUTION OF SUBJECTS ACCORDING TO SEDATION SCORE 10 MINUTES AFTER THE ADMINISTRATION OF MULTIMODAL DRUGS AND PREMEDICANTS

After study drug administration, in group F, 10 patients had got the sedation score-2 and 20 patients had sedation score -1 where as in group D, 14 patients had got score-2, 12 patients with score-3 and only 4 patients with minimum sedation score-1, which signifies that group D had better sedation with P value of <0.001 compared to group F.

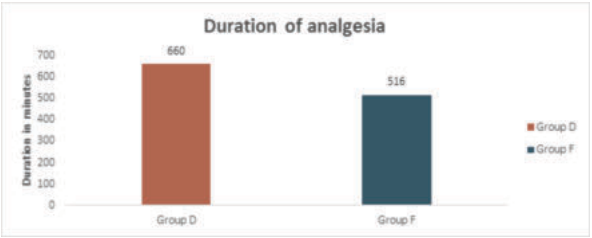
Distribution of 1 – 6 Ramsay sedation score after extubation. In group D, score 1 was documented in 2 (7%) patients, score 2 in 10 (33%), score 3 in 18 (60%) patients, whereas group F shows scores 1, 2, 3 in 8 (27%), 21(70%) and 1 (3%) patients respectively, with p value = 0.001 indicating statistically significant.

Distribution of 1 – 6 Ramsay sedation score at 6th hour in postoperative period. In group D, score 1 was documented in 1 (3%) patients, score 2 in 21 (70%), score 3 in 8 (27%) patients, whereas group F shows scores 1, 2, 3 in 10 (33%), 18 (60%) and 2 (7%) patients respectively, with p value = 0.003 indicating statistically significant.

Group D and F having same Ramsay sedation score of 2 at 12 hours and 24 hours in all study subjects, which is statistically not significant.



DURATION OF ANALGESIA AMONG GROUP D AND GROUP F



When duration of analgesia was compared between group D and group F, maximum analgesic duration (660±45 minutes) was seen with group D. Analgesic duration in group F was found to lesser (516±42 minutes) than that of group D. Analysed p value < 0.0001, indicating statistically significant.

DISTRIBUTION OF VARIOUS ADVERSE EVENTS AMONG STUDY SUBJECTS IN TWO GROUPS

Bradycardia was noted in 3 (10%) patients in group D and 2 (7%) patients in group F, with p value 0.640, statistically not significant.

Hypotension was noted in 4 (13%) patients in group D and 3 (10%) patients in group F, with p value 0.688, statistically not significant.

Nausea / Vomiting was noted in 2 (7%) patients in group D and 5(17%) patients in group F, with p value 0.424, statistically not significant

No patient in any group showed respiratory depression.

DISCUSSION

Inadequate acute pain management has substantial consequences for patients. Intra-operatively it causes hypertension, tachycardia, arrhythmias and myocardial ischemia. It increases the hospital stay, reduces the quality of life, and causes impaired sleep and physical function post-operatively. There are chances of readmission due to impaired pain management. Intraop pain (50%) may remain as chronic pain if not treated properly.

Current perioperative pain management relies strongly on the use of opioid analgesics, at lower doses, analgesic ceilings and escalating or sustained use of opioids may contribute to an opioid induced hyperalgesia.

No single analgesic is fool-proof, or free from potential side effects or complications.

A multimodal approach in the perioperative period is therefore crucial to the overall success of long term pain control.

Multimodal analgesia is the combination of different analgesics that act by different mechanisms and at different sites in the nervous system, resulting in additive or synergistic analgesia with lowered adverse effects of sole administration of individual analgesics[4].

Multimodal analgesia (MMA) delays the onset of postoperative pain. It decreases analgesic requirements, dose of muscle relaxants and inhalational agents and facilitates early discharge. The effectiveness of individual analgesics is enhanced by the additive or synergistic effect of two or more drugs that relieve pain by different mechanisms[6,7]. It provides hypotensive anaesthesia which was very much needed in ENT surgeries.

Multimodal regime needs to be tailored towards the particular type of surgery and it is not a blanket treatment that will work for all kinds of surgical trauma. Hence we conducted a prospective randomized controlled trial with the following multimodal regimes of analgesia to establish which combinations achieve the goals of superior analgesia with lesser side effects when compared to our conventional regime.

It is important to discriminate between the effects of multimodal analgesic (non-opioid) approach versus traditional techniques of opioid analgesic intervention. Since fewer studies [8,9,10,11] are available, there is a continuing need to explore new drug combinations to achieve all the purported goals of multimodal analgesia.

Hence, we selected this study to compare the pre-emptive effects of

multimodal opioid versus non-opioid drugs in elective Functional Endoscopic Sinus Surgery cases where procedure lasts for one-and-a-half to two hours and needs hypotensive anaesthesia.

Nguyen KB et al in 2019[11] conducted a study on "Perioperative Analgesia for Patients Undergoing Septoplasty and Rhinoplasty: An Evidence-Based Review". A preponderance of evidence showed reduced perioperative pain scores and rescue analgesic requirements, supporting the use of local anesthetics for analgesic control. Nonsteroidal anti-inflammatory drugs (NSAIDs) demonstrated similar decreased visual analog scores and postoperative analgesic demand. **Author concluded that** contemporary literature supports the use of NSAIDs, gabapentin, local anesthetics, and α-agonists as effective perioperative analgesic opioid alternatives for septoplasty and septorhinoplasty. Local anesthetic use is a cost-effective option resulting in decreased postoperative pain scores and rescue analgesic requirements.

Eipe N et al in 2016 conducted a study on "Intravenous lidocaine for acute pain: an evidence-based clinical update". Author concluded that identification of acute hyperalgesia is an important concept that improves the safety and efficacy of acute pain management. I.V. lidocaine is a useful option in the prevention and/or treatment of acute hyperalgesia. The benefits of perioperative i.v. lidocaine infusions have been confirmed with good quality evidence; these include decreases in pain scores, analgesic consumption, and side-effects with improvements in ERAS outcomes [12].

Panchgar V et al in 2017 conducted a study on "The Effectiveness of Intravenous Dexmedetomidine on Perioperative Hemodynamics, Analgesic Requirement, and Side Effects Profile in Patients Undergoing Laparoscopic Surgery under General Anesthesia". Patient received either normal saline or dexmedetomidine in group NS and group dexmedetomidine, respectively, depending upon the allocation. **Results showed that the** significant hemodynamic changes are observed in NS group during laryngoscopy, intubation, during pneumoperitoneum formation, and during extubation. Hemodynamic stress response in dexmedetomidine group was significantly attenuated. Analgesic requirement during postoperative 24 h were much less in dexmedetomidine group when compared to NS group[13].

The results of above studies give quality evidence to conclude that multimodal analgesic regimen is superior to give prolonged hours of analgesia without any untoward effects. Thus we could conclude that group D is superior than group F in prolonging duration of analgesia.

The overall study of 2 groups with respect to sedation measured by 1 – 6 Ramsay sedation score signifies that group D had better sedation with P value of <0.001 compared to group F.

Kim SY et al in 2013 conducted a study on "Efficacy of Intraoperative Dexmedetomidine Infusion on Emergence Agitation and Quality of Recovery After Nasal Surgery". The dexmedetomidine group (Group D, n=50) received dexmedetomidine infusion at a μg/kg/h from rate of 0.4 induction of anaesthesia until extubation, while the control group (Group C, n=50) received volume-matched normal saline infusion as placebo. **Results showed that** the incidence of agitation was lower in Group D than Group C (28 vs 52%). Mean arterial pressure and heart rate were more stable in Group D than in Group C during emergence. Author concluded that the **i**ntraoperative infusion of dexmedetomidine provided smooth and haemodynamically stable emergence. It also improved quality of recovery after nasal surgery [14].

Gupta N et al in 2013 conducted a study on "Effect of Intraoperative Dexmedetomidine on Postoperative Recovery Profile of Children Undergoing Surgery for Spinal Dysraphism". Thirty-six children with spinal dysraphism at lumbosacral area, aged 8 to 12 years, undergoing corrective surgery were randomized to receive either dexmedetomidine or volume-matched saline (placebo) after positioned prone until beginning of skin closure. Perioperative hemodynamics, intraoperative fentanyl and sevoflurane consumption, and postoperative recovery profile and fentanyl consumption was observed by blinded observers. Postoperative pain, emergence agitation (EA), and discharge readiness from post anesthesia care unit was evaluated using the modified objective pain score, agitation Cole score, and modified Aldrete score, respectively. Fentanyl 0.5-1 μg/kg was administered for pain (objective pain score ≥4) or severe EA (agitation Cole score ≥4) lasting for >5 minutes**. Results showed that** the intraoperative consumption of sevoflurane and fentanyl was significantly less in dexmedetomidine group along with a lower mean heart rate. Postoperatively, the children in dexmedetomidine group had significantly lower pain scores, agitation scores, and time to achieve full modified Aldrete score. The postoperative consumption of fentanyl was significantly less in dexmedetomidine group, along with a longer time of first analgesic requirement**. Author concluded that Intraoperative** use of dexmedetomidine in children undergoing spinal surgery results in a favorable recovery profile with reduced postoperative pain and EA, without adverse perioperative hemodynamic effects [15].

By comparing our results with the above study, we could conclude that group D patients were less agitated and more comfortable than group F. Special observations drawn from our study are consumption of inhalational anaesthetic agent in multimodal group D is lesser than that of group F. Since we donot have monitors to measure the depth of anaesthesia in our institution we couldnot include that parameter as an objective in this present study and the requirement of neuromuscular blocking agent during surgery was significantly reduced in group D than group F.

These observations were supported with studies done by many researchers as follows:
Gupta P et al in 2015 conducted a study on "Use of Dexmedetomidine for Multimodal Analgesia in Head and Neck Cancer Surgeries- a Prospective Randomized Double Blind Control Study". Group D received infusion of inj. dexmedetomidine 0.2mcg/kg/hr started just after premedication .Group S received inj. normal saline in similar doses. Hemodynamic variables were continuously monitored and recorded at regular intervals. Pain and sedation scores were studied in postoperative period. Author concluded that Dexmedetomidine infusion at 0.2 μg/kg/hr is useful adjuvant for multimodal analgesia and sedation; reduces the requirement of isoflurane and neuromuscular blocking agents (p=0). It provides hemodynamic stability and reduces bleeding in patients undergoing radical neck dissection[16].

Waleed M. Abdelmageed et al in 2013 conducted a study on "Preoperative paracetamol infusion reduces sevoflurane consumption during thyroidectomy under general anesthesia with spectral entropy monitoring". The patients were randomized to receive a slow infusion of either 1 g paracetamol or saline just before induction of anesthesia. Sevoflurane concentration was titrated to keep the state entropy value between 40 and 50. End-tidal sevoflurane concentration, sevoflurane consumption, recovery characteristics, time to first analgesic request and meperidine consumption during the first 6 postoperative hours were recorded. In concluding, the mean±SD estimated sevoflurane consumption was significantly lower in the paracetamol treated patients. Patients receiving paracetamol had a faster post-anesthetic recovery profile (extubation time, time to eye opening to command and time to state name and mention his/her home address) than the other[17].

With respect to hemodynamic monitoring, our study showed that there is no statistical difference among the two groups with regard to the basal heart rate, systolic blood pressure, diastolic blood pressue and mean arterial pressure. But there is statistical significant difference among the two groups after administration of premedication and at regular intervals later to it, the results were found to be highly significant p value <0.001. This variations in mean SBP values in group D compared to group F is maintained till the end of surgery. Thus it can be concluded that hemodynamic stress response was significantly attenuated and intraoperatively it was more stable with multimodal group D than that of group F.

With all the above results and substantial evidences, we could justify that multimodal analgesia not only reduces pain, opioid use but also enhances postoperative recovery and function, and increases patient satisfaction.

From our randomized controlled trial with the regimes tailored to this particular surgery we have found highly significant results. Hence we recommend multicentric studies with different combination of drugs for different surgeries in large number of study population.

Limitations Of Our Study

1. We did not study the amount of neuromuscular blocking agent required in each group.
2. We did not use any special monitoring to measure the depth of

anaesthesia.
3. We did not measure the minimal alveolar concentration of inhalational anaesthetic agent used.
4. We did not compare the effect of study drugs in large number of population.

CONCLUSION

Pain is one of the primary concerns because it influences the clinical outcome and patient well-being in the postoperative period. Analgesia is an integral part of balanced anaesthesia. Though the term multimodal analgesia was coined in the early 1990s, but even now it doesnot have a standard protocol to be followed. Multimodal regimes of analgesia need to be carried out to establish which combinations achieve the goals of superior analgesia with fewer side effects. No regime is a blanket treatment that will work for all kinds of surgical trauma. Each regime needs to be tailored towards the particular type of surgery. The rationale for this strategy is the achievement of sufficient analgesia with different classes (two or more) of analgesics with its additive or synergistic effects. It can be achieved by individually tailored smaller dosage of drugs with different mechanisms. With the above concerns studies on multimodal analgesia has to be escalated to suggest which combination of drugs provide intense analgesia with minimal side effects.

Multimodal analgesia is a rational way to treat acute pain and preemptive analgesia is an effective proactive approach to treat pain before it is initiated to obtain the maximum clinical benefit of analgesics administered. Keeping this as basis, we conducted a study to discriminate between the effects of multimodal analgesic (non-opioid) approach versus traditional techniques of opioid analgesic intervention. Since there is a continuing need to explore new drug combinations to achieve all the purported goals of multimodal analgesia. Hence, we selected this study to compare the pre-emptive effects of multimodal opioid versus non-opioid drugs in elective Functional Endoscopic Sinus Surgery.

From the results of our study we could conclude that multimodal analgesia not only reduces pain, opioid use but also enhances intraoperative hemodynamic stability, postoperative recovery and function, and increases patient satisfaction. Hence we recommend multicentric studies with different combination of drugs for different surgeries in large number of study population.

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