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Day care anaesthesia with Ketamine v/s Fentanyl a comparative study- in short surgical procedures

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Abstract: *International Association of Ambulatory Surgery defines day-care surgery as 'An operation or procedure, an office or outpatient operation/procedure, where the patient is discharged on the same working day'. The rapidly changing financial situation in the world has led to the increase in the incidence of ambulatory surgery. The advances in surgery, anaesthesia and pain management have allowed huge expansion of this modality of care with a consequent reduction in the need for hospitalization. The advantages of day care surgeries are to the patient, hospital and to the insurance companies. Choice of anaesthetic technique, drugs for premedication, induction and maintenance of anaesthesia are all important. Ketamine is an effective analgesic when used as an anaesthetic. It has unique properties that make it useful for anaesthetising patients at risk for hypotension and bronchospasm and for certain paediatric procedures. Fentanyl is a popular anaesthetic because of its relatively short time to peak analgesic effect, rapid termination of effect, and has cardiovascular safety. In a search for better drug, a comparative study of the safety and efficacy of ketamine v/s fentanyl in day care anaesthesia in short surgical procedures was conducted.*

Method: *60 patients were randomly allocated into two groups. 30 patients in group K received Ketamine inj i.v and 30 patients in group F received Fentanyl inj. i.v. preoperatively. Hemodynamic parameters like Pulse, systolic BP (SBP), Diastolic BP (DBP), respiratory rate (RR) and peripheral oxygen saturation (SPO2) monitored pre, intra and post operatively. Recovery parameters like, Visual Analog Score, (VAS score), orientation, first analgesic dose (FAD) and spontaneous eye opening (SEO) were noted. Postoperative complications like nausea, vomiting, salivation, and excitation were observed for. Statistically the data was analysed.*

Results: *All continuous variables were presented by mean ± standard deviation using Z test. But age and sex were presented by frequency and percentage. P value of < 0.01 was considered statistically highly significant. Ketamine was found to offer advantages of better hemodynamic stability, prolonged postoperative analgesia, and without any significant post operative complications like, nausea and vomiting or emergence reactions. Patient compliance was better with patients in group K, as only sub- anaesthetic doses were used. With this dose, hallucinations, unwanted involuntary movements and emergence delirium were not seen.*

Conclusion: *Ketamine was found to be more hemodynamically stable than fentanyl. When used in low doses it caused least complications and patient compliance was good. Cost-effectiveness was also better.*

Keywords: *Ambulatory Surgery, Day care anaesthesia, Ketamine, and Fentanyl.*

I. Introduction

International Association of Ambulatory Surgery defines day-care surgery as 'an operation or procedure, in office or outpatient, where the patient is discharged on the same working day'. The global economic constraints and increasing financial awareness of 1970s led to the increase in the incidence of ambulatory surgery. The ambulatory surgical practice offers several advantages to patients, doctors, and insurance companies, and the cost is expected to be 25–75% lesser than that of a similar inpatient. Recent advances in medical technology, anaesthesia and pain management have allowed a huge expansion of this

modality of care with a consequent reduction in the need for hospitalization. These facilities of ambulatory anaesthesia may be attached to main hospital itself, or office based or free standing. The convenience and low overhead costs continue to attract more surgeries to be conducted in an ambulatory setting. Several experts predict that in the years to come, nearly 80% of all surgeries performed in the United States will be on an ambulatory basis. But the standard of anaesthesia care is the same as that applicable to hospital-based surgeries, even for the most minor surgeries. A backup emergency care, either at same place or at a nearby hospital, must be available. But for the successful conduct of anaesthesia, careful patient selection, type of surgeries based on the facilities available, appropriate preparation of patient and planning are essential. Federated Ambulatory Surgery Association (FASA) has observed that there is no significant relationship between pre-existing diseases and incidence of postoperative complications in an ambulatory setting. Even the extremes of age are not deterrent for ambulatory practice, provided proper attention is paid to discharge planning. Children are excellent candidates for ambulatory surgery as it provides minimal separation from parents and minimal exposure to potentially contaminated hospital environment.

The boundaries of day-care surgery are redefined exponentially with time. The target for day surgeries in the USA and UK are 80% and >75% of the total surgeries, respectively. Even though data are not available for India, there is huge potential in view of a massive population of 1.2 billion and recent huge expansion in the private sector has created an opportunity for expansion in day surgery in India. [1–3]

Day care surgery was started in the early 19th century by James Nicolle, a Glasgow surgeon who performed almost 9000 outpatient operations on children in 1900. Later in 1912 Ralph Waters from Lowe, USA described, "The Down Town Anaesthesia Clinic", where he gave anaesthesia for minor outpatient surgery[4] However, over the next two decades, it lost its momentum. In 1960, the first hospital based ambulatory unit was developed. The formal development of ambulatory anaesthesia as a sub-speciality occurred with establishment of the "Society for ambulatory anaesthesia (SAMBA)" in 1984 and the subsequent development of postgraduate sub-speciality training programs recognized by the American Society of Anaesthesiologists (ASA). Originally, the majority of patients treated in ambulatory surgical facilities were classified as ASA physical status I or II. [5] However, improved anesthesia and surgical care has allowed increasing numbers of medically stable ASA physical status III (and even some IV) patients to undergo operations away from conventional medical centres.

Pre Anaesthetic Evaluation (PAE) clinic and have the assessment to avoid last minute cancellations. Pre-anaesthetic evaluation allows the anaesthesiologist to identify potential medical problems in advance, determine their aetiology, and if indicated, initiate appropriate corrective measures. The goals must be to resolve preoperative problems well in advance, thereby minimising the numbers of both cancellations and complications. Basic minimum laboratory investigations can be conducted during the above period and appropriate counselling provided to the patient

The patients are allowed clear liquids up to 2 hours before surgery, without increasing residual gastric volume. Administration of H_2 blockers and metoclopramide can reduce both residual gastric volume and acidity. The intake of oral fluids may actually dilute gastric secretions and stimulate gastric emptying, resulting in lower residual gastric volumes.[3]

Preoperative preparation should attempt to minimize patient anxiety using both pharmacologic (e.g., benzodiazepines) and non-pharmacologic (e.g., relaxation therapies) approaches. Premedication to induce anxiolysis, sedation, analgesia, amnesia and prophylaxis against postoperative emesis and aspiration pneumonia.[5]

Drugs used for premedication are important in day care surgery. Midazolam has become the drug of choice because its shorter elimination half-life and its well-known anxiolytic properties facilitate the recovery process after ambulatory surgery. Use of opioid analgesics for premedication is not recommended unless the patient is experiencing acute pain, as they can increase the incidence of PONV and urinary retention, which can contribute to delay in discharge after ambulatory surgery.[6] When administered as a part of a balanced ("multimodal") analgesic technique in combination with local anaesthetics and acetaminophen, NSAIDS can facilitate early recovery, decrease side effects, and reduce discharge time. For prevention of nausea and vomiting[24] pharmacologic techniques like droperidol, prochlorperazine**,** atropine, glycopyrolate**,** ondensetron, and palanosetron and non- pharmacologic techniques like Acupuncture [25] Acupressure [26] can be used. For the prevention of aspiration pneumonitis H2 receptor antagonists (e.g., ranitidine) and proton pump inhibitors (e.g, pantoprazole),, gastrokinetic agents (e.g., metoclopramide)**.**

Choice of anaesthetic technique depends on both surgery and patient. Quality, safety, efficiency, and the cost of drugs and equipment are all important considerations in choosing an anaesthetic technique for outpatient surgery. The ideal drug to be used as outpatient anaesthetic should have a rapid and smooth onset of action, produce intraoperative amnesia and analgesia, provide optimal good surgical conditions and adequate muscle relaxation with a short recovery period, and have no adverse effects in the post discharge period.

Ketamine is a congener of phencyclidine. It rapidly produces a hypnotic state quite distinct from that of other anaesthetics. Patients have profund analgesia, unresponsiveness to commands, and amnesia, but may have their eyes open, move their limbs involuntarily, and breathe spontaneously, a cataleptic state that has been termed 'dissociative anaesthesia'. It is metabolised in the liver to norketamine which is further metabolised and excreted in urine and bile. Has large volume of distribution and rapid clearance that it makes it suitable for continuous infusion without lengthening in duration of action.
Dose: It can be given by iv, im , oral and rectal routes
For induction of general anesthesia: 0.5 to 2 mg /kg body weight i.v. or 4-6 mg/kg body weight i.m
For maintenance of good analgesia: 0.5 to 1 µg/kg iv - with 50% N20 & 02.
For sedation and analgesia: 0.2-0.8 mg/kg i.v or 2-4 mg/kg i.m

Ketamine induced cataleptic state presents as nystagmus with papillary dilatation, salivation, lacrimation, and spontaneous limb movements with increased overall muscle tone. Emergence delirium characterised with hallucinations is a frequent complication that can result in serious patient dissatisfaction and can complicate post operative management. It increases cerebral blood flow and intra cranial pressure (ICP) and is relatively contraindicated in patient with increased ICP. Unlike other anaesthetics, induction doses of ketamine increase blood pressure, heart rate, and cardiac output, so is useful for patients with risk of hypotension during anaesthesia. It increases myocardial oxygen consumption and is not ideal for patients with myocardial ischemia. It is a potent bronchodilator and is well suited for patients at high risk of bronchospasm. It is also suited for paediatric procedures.[7]

Fentanyl is a synthetic opiod related to the phenlpiperidine. It acts on u receptors as agonist. Many years of its introduction in 1959, the main use of fentanyl was only as a component of neurolept-analgesia in combination with droperidol. Respiration depression is marked, but predictable. Delayed respiratory depression in the postoperative period has been reported after small intravenous doses of fentanyl given during anesthesia. Heart rate decreases because of stimulation of vagus. Fall in blood pressure is slight and heart is not sensitised to adrenaline. Thus it can exert a protective effect on the heart during periods of ischemia by decreasing myocardial energy demand. Histamine is not released by fentanyl. Tone of thoracic muscles and massetters may increase with rapid injection. Cerebral blood flow and O_2 consumption are slightly decreased. Fentanyl produces lesser sedation with equi-analgesic dose of morphine. It reduces gastrointestinal motility. The volume but not the pH of the gastric secretions is reduced. Nausea and vomiting and itching often occur during recovery. Respiratory depression and mental clouding are common.

Metabolised in the liver and excreted by kidney. Used with BZDs to obviate the need for diagnostic, endoscopic, angiographic and other minor procedures in poor risk patients.[7].
Preparation and Dose: It is commercially available as the citrate salt in an aqueous solution containing 50µg fentanyl base per ml. Generally given iv and the dose being 2-4µg/kg. Supplemental doses are needed every 30 min.

In view of the above a prospective, interventional and comparative study to safety and efficacy of ketamine and fentanyl in Day care anaesthesia in short surgical procedures was done.

II. Aims and Objectives

1. Aim: To compare the safety and efficacy of intravenous ketamine v/s intravenous fentanyl in Day care anaesthesia in short surgical procedures.

2. Objectives
2.1. Intra and post operative hemodynamic stability.
2.2. Time for recovery- Spontaneous eye opening, Orientation to person time and place.
2.3. Post operative complications.
2.4. Duration of pain relief postoperatively.

III. Patients and Methods

This is a prospective, comparative, and interventional study. The study was undertaken at the Department of anaesthesiology, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Chinavutapalli, Gannavaram mandal, Andhra Pradesh, India. The study was approved by the institutional ethical committee and a written informed consent in the local language was obtained from every patient before being included in the study. 60 patients were randomly allocated into two groups.
Group K: 30 patients received i.v. Ketamine inj.
Group F: 30 patients received i.v. Fentanyl inj.

Inclusion criteria: Patients of both sexes aged between 20 and 60 years of ASA I and II were included. Elective short surgeries of 20-30 min duration like lipoma and ganglion excisions, sebaceous cyst and dermoid cyst excisions, tubectomy and vasectomy, dilatation & curettage, suction & evacuation, release of inflamed tendon sheath in dequerveins tenosynovitis wrist and ureteric stent removal were chosen for the study.

Exclusion criteria: Patient's refusal, ASA grade III and IV or more, history of allergy to any of the drugs used in the study, hemodynamically unstable patients, and pregnant patients.

1. Method of study: Pre-anaesthetic assessment to obtain detailed history and complete clinical examination was done a day before the surgery. Routine blood investigations, ECG and chest X-ray were done. The patients were explained in their language about the anaesthetic technique and the possible consequences. The patients were instructed to fast for a period of 8 hrs before the procedure.

Anaesthetic technique: The anaesthetic machine was checked. Appropriate cuffed endotracheal tubes, two working laryngoscope, working suction apparatus and emergency drugs were kept ready before the procedure. After securing intravenous line, a ringer lactate or 5 % dextrose drip was started and monitoring gadgets were attached which included ECG, Pulse-oximeter, non-invasive blood pressure cuff. Base line values were recorded. Inj. glycopyrrolate 0.2 mg i.v and Inj. Ondansetron 4 mg i.v were given as premedication.

Conduct of anaesthesia: Group K – Inj. Ketamine 1 mg/kg iv and Group F – Inj. Fentanyl 1 mcg/kg iv were given. Patients were put on 4 litres/ min oxygen via Hudson mask and vital parameters were recorded intraoperatively. Ventilation was assisted if required. Saturation < 90% was considered desaturation.

Postoperative recovery characteristics noted were – time to spontaneous eye opening, time to orientation (to place and person). VAS scores (0-10) were assessed once the patient was oriented. Analgesics were administrated when the VAS score was > 6 eg; Inj. Diclofenac 75 mg i.m and the time of first rescue analgesic administration were noted. Moreover clinical parameters i.e., pulse rate, systolic blood pressure, diastolic blood pressure, respiratory rate, peripheral oxygen saturation (SPO2) were checked at regular intervals. In both intra-operative and post-operative periods, vigilant observation was kept to notice any complications or undesired events like nausea, vomiting, excitation, salivation, hypotension, bradycardia, desaturation tachycardia.

The patients were given "Home readiness" by anaesthesiologist after 6 hours using following criteria:

1.1. A responsible adult as an escort to the patient.
1.2. Patients vital signs should be stable at least for one hour.
1.3. Patients must have no evidence of respiratory depression or airway obstruction.
1.4. Patients must be oriented to place, time and walk without assistance.
1.5. Patients must not have minimal nausea or vomiting, pain or excessive bleeding.
1.6. Patients should be able to take, fluids orally and simple analgesics should control the pain.
1.7. Patients should be able to walk and maintain balance.

IV. Observation and Results

60 patients aged 20 - 60 yrs of ASA grade I & II posted electively for short surgical procedures of 20-30 duration were included in the study. 30 patients received ketamine 1 mg/kg iv (Group K) and other 30 received Fentanyl 1 µg/kg iv (Group F) iv for induction and maintenance. The parameters studied were:

1. Demographic profile
2. Baseline hemodynamic
3. Intra operative and post operative hemodynamic
4. Time for recovery (Spontaneous eye opening, Orientation to person time and place)
5. Complications like nausea, vomiting, salivation, and emergence reactions
6. Pain VAS scores
7. Time of first analgesic administration.

Table No 1: Distribution of subjects according to their sex and age in two groups

Variables	Ketamine n (%)	Fentanyl n (%)
Sex		
Female	18(60%)	28(76.7%)
Male	12(40%)	7(23.3%)
Age (yrs)		
21-30	6(20%)	7(23.3%)
31-40	9(30%)	10(33.3%)
41-50	12(40%)	7(23.3%)
51-60	3(10%)	6(20.1%)

The number of patients in Group K in the age group of 21-30 yrs was 6(20%), in 31-40 yrs was 9(30%), in 41-50 yrs 12(40%), in 51-60 yrs was 3 (10%) as compared to 7(23.3%), 10(33.3%), 7(23.3%), and 6(20%)

respectively in Group F. The number of males in group K was 12 (40%) and group F were 7(23.3%). The number of females in group K was 18(60%) and group F were 23(76.7%). Demographic data of both the groups were similar for mean age, weight and sex ratio. There was no significant difference in duration of procedure.

The mean weight in group K was 56.67 ±5.97 kg as compared to 53.30± 5.88 kg in group F, difference being statistically Nil significant (P=0.127).

The mean Duration of procedure (DOP) in group K was 25.73± 2.90 min group F it is 25.60 ± 3.02min, the difference being statistically Nil significant (P=0.862). Mean preoperative pulse rates in both the groups were similar, Group K 74.53 ± 8.69 and group F 73.60 ± 6.63 (P=0.642).

There was an increase in Pulse Rate (PR) in group k to 1.87± 8.30, while there was a decrease in group F to 64.97 ± 7.11 intra operatively, the difference being highly significant (p<0.01). Postoperatively, the pulse rate in group K was 80.13 ± 7.85 was compared to 66.57 ± 7.16 in group F, the difference being highly significant (p<0.01).

Pre operative Systolic Blood pressure (SBP) similar in both group K 121.80 ± 7.58 and Group F 121.13 ±7.66 (P=0.736). There was an increase in SBP in group K to 130.00 ± 7.48, while there was a decrease in SBP in group F to 109.671 ±7.97 intra operatively, the difference being highly significant (p<0.01). Post operatively, the SBP in group K was 128.10 ± 6.89 compared to 111.60 ± 7.58 in group F, the difference being highly significant (P<0.0)).

Pre operative Diastolic Blood Pressure (DBP)similar in both Groups, group K 76.73 ± 6.02 and group F 76.87 ± 4.75 (P=0.924). There was an increase in DBP in group K to 79.772 ± 6.62 while there was a decrease in DBP group F to 66.20 ± 5.26 intra operatively, the difference being highly significant (P<0.01). Post operatively, the DBP in group K was 78.67 ± 6.16 compared to 67.33 ± 5.18 in group F, the difference being highly significant (P<0.01).

Table No 2: Intra and post operative hemodynamics and recovery variables in both the groups

Parameter	Ketamine		Fentanyl		P - Value	Inference
	Mean	SD	Mean	SD		
Weight	55.67	5.97	53.3	5.88	0.127	NS
DOP	25.73	2.90	25.60	3.02	0.862	NS
Pulse						
Pre-operative	74.53	8.67	73.60	6.63	0.642	NS
Intra- operative	81.87	8.30	64.97	7.11	< 0.01	HS
Post- operative	80.13	7.85	66.57	7.16	< 0.01	HS
SBP						
Pre- operative	121.80	7.58	121.13	7.66	0.736	NS
Intra operative	130.00	7.48	109.67	7.97	< 0.01	HS
Post- operative	128.00	6.89	111.60	7.58	< 0.01	HS
DBP						
Pre- operative	76.73	6.02	76.87	4.75	0.924	NS
Intra- operative	79.77	6.62	66.20	5.26	< 0.01	HS
Post- operative	78.67	6.16	67.33	5.18	< 0.01	HS
Resiratory rate						
Pre- operative	16.87	1.07	16.83	0.99	0.901	NS
Intra- operative	16.27	1.26	11.73	1.34	< 0.01	HS
Post- operative	16.67	1.18	13.23	0.86	< 0.01	HS
SPO2						
Pre- operative	99.03	0.62	98.83	0.59	0,205	NS
Intra- operative	97.43	1.55	95.67	1.75	< 0,01	HS
Post- operative	98.70	0.75	96.50	0,82	< 0.01	HS
VAS Score	2.63	0.62	3.17	0.87	< 0.01	HS
Orientation	14.03	1.26	11.83	1.117	< 0.01	HS
SEO	6.53	0.819	4.83	0.913	< 0.01	HS
FAD	51.57	4.66	35.93	2.778	< 0.01	HS

Pre operative Respiratory Rate (RR) similar in group K 16.87 ± 1.07 and group F 16.83 ± 0.99 (P=0.901).There was a slightly decrease in RR in group K to 16.27 ± 1.26 while there was a drastic decrease in RR in group F to 11.73 ± 1.34 intra-operatively, the difference being highly significant (P<0.01). Post operatively, the RR in group K was 16.67 ± 1.18 compared to 13.23 ± 0.86 in group F, the difference being highly significant (P<0.01).

Preoperatively SPO2 similar in both groups group K 99.03 ± 0.62 and group F 98.83 ± 0.59 (P= 0.205). Intra-operatively, a decrease in SPO2 in both groups, group K 97.43 ± 1.55 and group 95.67 ± 1.75, the difference being highly significant (P< 0.05). Post operatively, the SPO2 in group K was 98.70 ± 0.75 compared to 96.50± 0.82 in group F, the difference being highly significant (P< 0.01).

The mean VAS Score in group K was 2.63 ± 0.67 and in group F it was 3.17 ± 0.87 with highly significant P value (<0.01). The mean time of spontaneous eye opening (SEO) in group K was 6.53 ± 0.819 min and in group F it was 4.83 ± 0.913 with highly significant P value (<0.01). The mean time of orientation in group K was 14.03 ± 1.426 min and 11.83 ± 1.117 min in group F. The difference was statistically highly significant (P<0.01).

The mean time of giving first analgesic dose (FAD) in group K was 51.57 ± 4.666 min, while in group F it was 35.93 ± 2.778 min, the difference being statistically highly significant (P<0.01).

Table No 3: Intra and post operative complications

Complications	Ketamine(n%)	Fentanyl (n%)
Excitation	N= 1(33%)	Nil
Salivation	N=1(33%)	Nil
Nausea	NIL	N=3(10%)
Nil	N=28(93.3%)	N=27(90%)

Excitation: One patient (3.3%) from group K had excitation post operatively and none from group F.
Salivation: One patient (3.3%) from group K had increased Oral secretions post operatively and none from group F.
Nausea and vomiting: Three patients (10%) form group F had nausea post operatively while none from group K had nausea. None of the patients form either group had vomiting. Nil emergence reactions are seen N=28(93.3%) in group K and N=27(90%) in group F.

Table No 4: Surgical procedures in both ketamine and fentanyl groups

Procedure	Ketamine(n%)	Fentanyl (n%)
Ganglion	1 (3.3%)	1 (3.3%)
Dermoid cyst	2 (6.7%)	2 (6.7%)
Lipoma	6 (20%)	6 (20%)
Sebaceous cyst	4 (13.3%)	4 (13.3%)
Dequervein's tenosynovitis	5 (16.7%)	5 (16.7%)
Suction & Evacuation	2 (6.7%)	2 (6.7%)
Tubectomy	2 (6.7%)	2 (6.7%)
Dilatation & Curettage	6 (20%)	6 (20%)
Vasectomy	1 (3.3%)	1 (3.3%)
Ureteric stent removal	1 (3.3%)	1 (3.3%)
Total	30 (100%)	30 (100%)

V. Discussion

Day Care Anesthesia is a continually evolving speciality across different units. In recent years, the complexity of procedures has increased with a wider range of patients now considered suitable for day care surgery. The continued growth in ambulatory surgery is related to expansion in minimally invasive surgical techniques and office based procedures. Procedures appropriate for ambulatory surgery are those associated with postoperative care unit is easily managed at home and with low rates of postoperative complication. Success of day care surgery can be attributed to recent innovations in surgical techniques and recent advances in anaesthesia. Effective pre-operative preparation, nurse-led discharge is fundamental to safe and effective day and short stay surgeries. The ideal anaesthetic for outpatient surgeries, should have a rapid and smooth onset of action, produce intra-operative amnesia and analgesia, and provide optimal surgical conditions and adequate muscle relaxation with a short recovery period. Ambulatory surgery requires the same basic equipment as for inpatient surgery. The choice of anaesthetic technique depends on both surgical and patient factors. For many ambulatory procedures, general anaesthesia remains the most popular technique. Local anaesthesia and peripheral nerve blocks facilitate the recovery process by reducing post- operative pain and minimizing the need for opioid analgesics. Therefore, an increasing number of ambulatory cases are being performed using local anaesthetic infiltration and never blocks in combination with intravenous sedation – analgesia (so called monitored anesthesia care [MAC], is associated with the fewest side effects and shortest time to discharge home.

General anaesthesia in Day care surgical procedures should provide quick and pleasant induction, predictable loss of consciousness, stable operating conditions, minimal adverse effects, rapid and smooth recovery of protective reflexes and psychomotor function, Till recently, inhalational agents have remained the routine choice for maintenance of anaesthesia. One of the principal reasons is the availability of sophisticated delivery systems for volatile anaesthetics, which allows the anaesthetists, to have a fine degree of control on the concentration administered to the patient. Moreover, monitoring systems that permit nearly accurate measurement of end-tidal concentration of the volatile anaesthetics as well as the introduction of new potent

volatile agents provide a wider choice of drugs. In spite of all these advantages, inhalational agents have their own draw backs and short comings that are cost factor, different specific vaporizers, require repeated maintenance and scavenging system is necessary, to avoid pollution of operation room environment which is a big hazard. Newer airway devices like laryngeal airway (LMA)'s have revolutionized the airway management in the outpatient surgical set up.

Total intravenous anesthesia (TIVA) has many advantages over inhalational anesthesia. There were no operating room pollutions, minimal cardiac depression, lesser neuro -humoral response, decrease oxygen consumption, avoids post operative diffusion hypoxemia, and decreased the incidence of post operative nausea and vomiting. Moreover TIVA can be used not only in well – equipped hospital setting but at remote location also with only oxygen and ventilation facilities.

In the lookout for an ideal intravenous anaesthetic agent in clinical practice, Kay and Rolly [8] introduced propofol in 1977. Its advantages in short surgical procedures relates to its rapid elimination from the blood (half life 1-3 hours due to high hepatic clearance) leading to rapid recovery, a very low incidence of PONV. It is primarily a hypnotic and in sub-hypnotic doses provides sedation and amnesia. Lack of analgesic properties of propofol has necessitated the need for supplementary analgesic agents during TIVA. Ketamine in sub anaesthetic doses has gained more attention as an analgesic for Total intravenous anesthesia.[9] Ketamine has got advantage of low cost and offers a single all – purpose drug in settings of limited resources.[91] Ketamine is traditionally associated with slower emergence and some incidence of unpleasant hallucinations when given in moderate doses for sedation.[10] However, Friedber et al have repeatedly reported a high success rate for ketamine sedation during plastic surgery under local anesthesia. Fentanyl is used extensively in TIVA now a days as a part of balanced anesthesia as it relieves pain, reduces somatic and autonomic response to airway manipulation provides hemodynamic stability and lesser respiratory depression in day care setting.[11]

Keeping in consideration the merits of TIVA in Day care anesthesia a comparative study was conducted on 60 patients with ketamine versus fenanyl in short surgical procedures in Department of Anaesthesiology and Critical care, Dr. Pinnamenaneni Siddhartha Institute of Medical Sciences & Research foundation chinavutapalli (village), Gannavaram (Mandal), Krishna District.

VI. Statistical Analysis

Statistical software Epi info was used for data storage and analysis. Ratio (Male, female) was computed to present gender distribution. All continuous variables i.e, weight, pulse rate, systolic blood pressure, diastolic blood pressure, RR, SPO2, SEO, Orientation, VAS, FAD, complications and duration of procedure were presented by mean ± standard deviation using Z test. But age and sex were presented by frequency and percentage. P value of < 0.01 was considered statistically highly significant.

Hemodynamics: Intra operatively there was an increase in mean pulse rate, systolic and diastolic blood pressure in group K and a fall in group F. Post operatively the values neared preoperative values in group K, whereas in group F the values increased but still remained lower than the pre operative value. These results obtained were consistent with those obtained by Pierre et al. (2002) [12].

Mean pre operative pulse rates (PR) in both the groups were similar, Group K 74.53 ± 8.69 and Group F 73.60 ± 6.63 (P = 0.642) There was an increase in pulse rate in Group K to 81.87 ± 8.30, while there was a decrease in Group F to 64.97 ± 7.11, intra operatively, the difference being highly significant (P<0.01). Post operatively, the pulse rate in group K was 80.13 ± 7.85 was compared to 66.57 ± 7.16 in group F, the difference being highly significant (P<0.01).The results obtained in this study are consistent with those obtained by Sicignano and Bellato V et al (1990). [13]

Pre operative systolic blood pressure (SBP) was similar in both the groups. Intra operatively, there was an increase in SBP in group K to 130.00 ± 7.48, while there was a decrease in SBP in group F to 109.67 ± 7.97, the difference being highly significant (P < 0.01). Post operatively, the SBP in group K was 128.10 ± 6.89 compared to 111.60 ± 7.58 in group F, the difference being highly significant (P<0.01). The results obtained in this study are consistent with those obtained by David W Messenger et al (2008).[14]

Pre operative Diastolic Blood pressure (DBP) similar both the groups, group K 76.73 ± 6.02 and group F 76.87 ± 4.75 (P = 0.924). Intra operatively, there was an increase in DBP in group K to 79.77 ± 6.62, while there was a decrease in DBP in group F to 66.20 ± 5.26, the difference being highly significant (P <0.01). Post operatively, the DBP in group K was 78.67 ± 6.16 compared to 67.33 ± 5.18 in group F, the difference being highly significant (P <0.01). The results obtained in this study, are consistent with those obtained b Kamalipour H et al (2009). [15]

Recovery: The mean time of spontaneous eye opening (SEO) and Orientation were shorter in group F compared to group K. Early recovery in group F may be due to shorter duration of action of fentanyl as compared to Ketamine. The mean time of spontaneous eye opening to group K was 6.53 ± 0.819 min and in group F it was 4.83 ± 0.913 with highly significant P value (<0.01). The mean time of Orientation in group K was 14.03 ± 1.426 min and 11.83 ± 1.117 min in group F. The difference was statistically highly significant (P<0.01). The results obtained in this study are consistent with those obtained by Pierre etal (2002). [12] Hernandez C et al (1999) also found shorter awakening time in ketamine-midazolam group compared to propofol ketamine group [16] . Godambe et al (2003) also found shorter recovery times with propofol-fentanyl group compared to ketamine-midazolam group.[17]

Post operative analgesia: Group K had lower mean VAS scores for pain postoperatively compared to the group F. The Mean time for recovering first analgesic dose was longer in group K compared to group F. The mean VAS score in group

K was 2.63 ± 0.67 and in group F it was 3.17 ± 0.87 with highly significant P value (<0.01). The mean time of giving first analgesic dose (FAD) in group K was 51.57 ± 4.666 min, while in group F it was 35.93 ± 2.778 min, the difference being statistically highly significant (P <0.01). Mayer M et al (1990) also found fewer patients in ketamine group required rescue doses of analgesics (1 of 10) post operatively, than fentanyl group (7 of 10) and concluded that propofol - ketamine had better pain relief post operatively, while in propofol - fentanyl group analgesic effect was still inadequate.[18] The results obtained in this study are consistent with those obtained by David M Messenger (2008) et al and Sicignano A et al 1990.[13,14]

V. Complications

1. Salivation: One patient (3.3%) from group K had increased oral secretions post operatively compared to none in group F. Sukhminder et al (2010), found increased incidence of oral secretions in four patients of propofol-ketamine group compared to none in propofol-fentanyl group. This difference can be attributed to the use of inj. glycopyrrolate 0.2 mg i.v. as a premedication in this study counteracted the salivary effects of ketamine.[19]

2. Nausea and vomiting: Three patients (10%) from group F had nausea post operatively compared to none in group K. No patient from either group had vomiting. Higher incidence of nausea in group F may due to central emetic effects of fentanyl. But, as a whole, lower incidence of nausea and no incidence of vomiting in group F may be attribute to the use of inj. Ondansetron 4 mg i.v. as premedication in this study which counteracted the emetic effects of Fentanyl. The results obtained in this study are consistent with those obtained by Vallejo Mc et al 2002.[20]

3. Excitation: One patient (3.3%) from group K had excitation post operatively compared to none from group F. No patient experienced hallucinations and all reported satisfaction with the anaesthetic technique used and described it as pleasant. This can be explained on the basis of lower dosage of Ketamine used (1 mg/kg). Hernandez et al (2002) concluded that neither midazolam nor propofol completely prevented the psycho mimetic effects of ketamine but such effects were not so severe that patients rejected the anaesthetic technique used.[16]

IV. Summary and Conclusion

After this comparative study was conducted with ketamine and fentanyl in Day care anesthesia in short surgical procedures, ketamine was found to offer advantages of better hemodynamic stability, prolonged postoperative analgesia, and without any significant post operative complications like, nausea and vomiting or emergence reactions. Patient compliance was better with patients in group K, as only sub- anaesthetic doses were used. With this dose, hallucinations, unwanted involuntary movements and emergence delirium were not seen. Ketamine was cheaper than fentanyl, so it was cost-effective. So Ketamine in sub-anaesthetic doses has recently gained more attention as an analgesic in Day Care Anesthesia. Its excellent area of application being short surgical procedures that are carried out routinely in large numbers in the day care units. The essential prerequisites for a safe outcome in these procedures include stable hemodynamics, pain free postoperative period with minimal postoperative sequelae thus increasing the patient's compliance.

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References

[1]. Chilvers CR, Goodwin A, Vaghadia H, Mitchell GW. Selective spinal anesthesia for outpatient laparoscopy: Pharmacoeconomic comparison vs general anesthesia. Can J Anaesth. 2001; 48:279–83.[PubMed]
[2]. Stierer TL, Wright C, George A, Thompson RE, Wu CL, Collop N. Risk assessment of obstructive sleep apnea in a population of patients undergoing ambulatory surgery. J Clin Sleep Med. 2010; 6:467–72.[PMC free article] [PubMed]
[3]. Hutchison A, Malltby JR, Reid CR. Gastric fluid volume and pH in elective patients. Part 1: Coffee or orange juice versus overnight fast. Can J Anaesth.1998; 3; 512–5. [PubMed]
[4]. Waters RM.The down- town anaesthesia clinics. Am J surg 1919; 33:71-73.
[5]. Arvidson S: Preperation of adult patients for anesthesia and surgery. Acta Anesthesiol Scand 40:962, 1996.
[6]. Shafer A, White PF, Urquhart ML, et al: Outpatient premedication: Use of midazolam and opiod analgesics. Anesthesiology 71:495, 1989.
[7]. Goodman and Gilman's Manual of Pharmacology and therapeutics2007, 227-231
[8]. Kay B, Rolly G. ICI 35868 a new intravenous induction agent, Acta belgica 1977, 28:303-16.
[9]. Slogoff S, Allen GW.The role of baroreceptors in the cardiovascular response to ketamine. Anesth Analg 1974; 53: 704.
[10]. Strayer RJ, Nelson LS. Adverse events associated with ketamine for procedural sedation in adults. Am J Emerg Med2008, 26: 985-1028.
[11]. Murat I,Levron JC, Berg A, Saint-Maurice C. Effects of fentanyl on Baroreceptor reflex control of heart rate in newton infants.Anesthesiology1988,68:712-22.
[12]. St Pierre M, Kessebohm K, Schmid M, Kundt HJ, Hering W. Recovery from anesthesia and incidence and intensity of postoperative nausea and vomiting following a total intravenous anesthesia (TIVA) with S-(+)- Ketamine / Propofol compared to alfentanil / propofol. Anesthesist 2002; 51: 973-9.
[13]. Sicignano A, Bellato V, Cancellieri F, Foroni C, Giubelli D, Latis G, et al. Propofol – Ketamine vs Propofol – Fentanyl in short gynecologic surgery. Minerva anesthesiol 1990; 56: 61- 6.
[14]. Messenger DW, Murray HE, Dungey PE, Van Vlymen J, Sivilotti ML. Subdissociative –dose ketamine versus fentanyl for analgesia during propofol procedure sedation: a randomized clinical trial. Acad emerg Med 2008- 15:877-86.
[15]. Kamalipour H, Joghatai P, Kamali K: Comparing the combination effect of propofol – ketamine and propofol – Alfentanil on hemodynamic stability during Induction of general anesthesia in the Elderly. Iranian Red crescent Medical Journal 2009, 11 (2): 176- 80.

[16]. Hernandez C, Parramon F, Garcia-Velasco P, Vilaplana J, Garcia C, Villalonga A. Comparative study of 3 techniques for total intravenous anesthesia: midazolam-ketamine, propofol-ketamine and propofol-fentanyl Rev Esp Anestesiol Reanim 1999;46:154 -8.
[17]. Godambe SA, Elliot V, Matheny D, Pershad J. Comparison of propofol /fentanyl versus ketamine / midazolam for brief orthopedic procedural sedation in a pediatric emergency department. Pediatrics 2003; 112: 116-23.
[18]. Mayer M, Ochman O, Doenicke A, Angster R, Suttmann H. The effect of propofol-ketamine anesthesia on hemodynamics and analgesia in comparison with propofol-fentanyl, Anaesthesist 1990; 39: 609-16.
[19]. Sukhminder Jit Singh Bajwa, Sukhwinder Kaur Bajwa, Jashir Kaur: Comparison of two drug combinations in total intravenous anesthesia: Porpofol – Ketamine and Propofol – Fentanyl. Saudi J. Anaesth 2010; 4: 72-9.
[20]. Vallejo MC, Romeo RC, Davis DJ, Ramanathan S. Propofol –ketamine versus propofol –fentanyl for outpatient laparoscopy: comparison of postoperative nausea , emesis, analgesia and recovery. J Clin Anesth 2002; 14; 4 26-31.