VOLUME 25
NUMBER 1
JANUARY 2012

ISSN 2220-8992

Journal of the Bangladesh Society of Anaesthesiologists

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JOURNAL OF THE BANGLADESH SOCIETY OF ANAESTHESIOLOGISTS

VOLUME - 25 **NUMBER - 1** **JANUARY 2012**

CONTENTS

Medico Legal Issues and Anaesthesia

Practicing medicine now is hazardous & risky. Mutual faith replaced with mutual suspicion. With the gradual increase in number of lawsuits, it seems many more physicians will have to face legal problems in future and understanding this issue has become a need of the time. Practicing defensive medicine has also become inevitabl

Physicians should be aware of their responsibilities, rights and duties including the rights of the patients. What to prioritize in emergency situations not exceed their ability or competence. Immediate aim is to save life. Errors/ mistaken diagnosis / judgment does not amount to negligence. They should know when, why and where to refer. In which cases the police should be informed. All acts must be recorded or documented. All records must be clear, chronological, correct, complete and contemporary.[1]

According to the GMC, Medical Council Code of Conduct Section 1.1.2 "The quality of medical records is a direct reflection of the quality of medical practice. To achieve and maintain a high standard of medical practice, proper medical documentation is essential. All doctors have a responsibility to maintain a clear, accurate, adequate and contemporaneous medical records of their patients."

Medico legal considerations are a significant part of the process of making many patient care decisions and policies for the treatment of mentally incompetent people and minors, the performance of sterilization or therapeutic abortion, and the care of terminally ill patients. Medico legal policies provide the framework for informed consent, professional liability and many other aspects of current practice in the health care field.[2]

The law establishes the right of the individual to make personal decisions concerning any physical act to which his body is subjected. Personal rights are absolute and the sane individual may refuse medical treatment even such refusal is associated with the hazard of death. In the event of a surgical operation the law requires that a written consent be obtained. An unmarried patient under the age of 18 is considered to be a minor in our country. He /She is therefore not allowed to give consent for surgery on himself/herself. Written consents obtained after administration of pre-medications have on occasion been designated as null and void by the courts.[3] In the event of an operative mishap it is the duty of the court to consider the duties of those involved, to identify their responsibilities the surgeon, the anaesthetist, and the hospital may all be named as defendants. The Penal Code in Bangladesh allows a victim of negligence to file a case if the doctor involved did not possess the educational or professional degrees he claimed he had, or if he failed to take the patient's consent before operating on him.[4] Awareness during anaesthesia are a common cause of litigation in the west. The operating room is the highest spot of litigation. Deaths due to anaesthesia are uncommon with an estimated incidence 1 in 56,000. We are all likely to be associated with an intra-operative death at some point in our careers. Most are expected or understood. When death or serious injury is unexpected, the experience can be extremely traumatic for all concerned.[5] How we as anesthesiologists address peri-operative risk will define the future of our profession. The definitions of anesthesia's contribution to peri-operative risk have expanded from "anesthesia-only" to "anesthesia-contributory" to "anesthesia-related".

Medico-legal issues are a continuing concern for the anesthesiologists. Taken too seriously they can alter our practice so that legal concerns rather than medical principles are in control. Taken too lightly these concerns can materialize into an "adverse outcome" disaster.[6]

The best way of averting disasters is to prevent them and the first step in this regard is proper documentation and to report anaesthetic incidents. Regular medical audit and implementing their recommendation shall also play and important role in reducing anaesthetic incidents.

(JBSA 2012; 25(1): 1-2)

Prof. Wahiuddin Mahmood
DA, FCPS

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Original Article

Effects of preemptive ketamine on postoperative analgesia after total abdominal hysterectomy (TAH) under general anaesthesia

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Abstract

Background *The concept of 'Pre-emptive analgesia' suggest that the best post operative pain management begins preoperatively. Preemptive low dose ketamine is effective in treating post operative pain after total abdominal hysterectomy.*

Objectives *This study was designed to evaluate the analgesic efficacy of preemptive low dose ketamine in treating moderate to severe acute post operative pain in total abdominal hysterectomy surgery under general anesthesia.*

Methods *Sixty patients aged between 35-50 years, weight between 45-65 kg with ASA physical status I & II underwent elective total abdominal hysterectomy under general anesthesia were randomly divided into two groups. In group A, patients received 10 ml of normal saline I/V over 60-90 second before surgical incision. In group B, patients received 0.15 mg/kg ketamine (mixed with 10 ml normal saline) I/V over 60-90 second before surgical incision. Anesthetic technique was standardized & patients were interviewed regularly. Pain score, analgesic consumption, side effects & quality of recovery score were recorded for 24 hours.*

Results *Patient received preemptive ketamine had a statistically significant lower pain score in first 24 hours after operation compared with placebo group. Mean value of first analgesic demand in group A was 25.67±1.60 & group B was 57.33±2.97 & p = 0.00. Mean value of total opioids consumption in group A was 290.00±9.09 & group B was 210.67±7.01 & p = 0.00. Significant differences were observed between two groups regarding first analgesic demand & total analgesic consumption. There were no significant differences between these two groups in respect to haemodynamic variable or side effects.*

Conclusion *Preemptive low dose intra venous ketamine offer a safe, non opioid, well-tolerated analgesia with efficacy in moderate to severe post operative pain & spare opioid consumption in the post operative pain management.*

Key words *Pre-emptive analgesia, ketamine, abdominal hysterectomy*

(JBSA 2012; 25(1): 3-8)

Introduction

Pain is a common experience, frequently encountered in clinical practice that is usually associated with actual or impending tissue damage[1]. Surgical procedure causes local tissue damage with consequent release of pain producing substances like prostaglandins, histamine, serotonin, bradykinin, 5-HT, Substance-P & generation of noxious stimuli. Post operative pain, which is a form of acute pain caused by noxious stimulation due to injury, is typically associated with neuro-endocrine stress response that is proportional to pain intensity[2].

The concept of 'Preemptive analgesia' suggests that the best post operative pain management begins preoperatively[3]. So this concept is based on the

assumption that the administration of an analgesic drug before the occurrence of nociceptive input can prevent sensitization and thus improve post operative analgesia. This can be achieved by infiltration of the wound with local anesthetic, central neuronal blocked, or the administration of effective dose of opioids, ketamine or NSAIDs[3].

Sensory neurons are more sensitive to peripheral inputs after activation of C-fibers by a noxious stimuli, a process called "Central sensitization"[4, 5]. Another mechanism activating spinal sensory neurone, 'Wind-up'[6] is observed after repeated stimulation of C- fibers. These sensitization induce c-fos expression in sensory neurons[7] & are associated with the activation of N-methyl-D-aspartate (NMDA) receptors[5-7]. Ketamine is a NMDA receptor antagonist with analgesic properties that may include intercepting nociceptive input, increasing the threshold for nociception and blocking NMDA receptor activation[7].

Opioids are the potent analgesics but has some complications like sedation, respiratory depression, nausea, vomiting and also its cost limit the widely use. NSAIDs also provide good analgesia with absent of side effects like opioids but have side effects like postoperative G.I.T bleeding, depression of platelet function, increased in bleeding time and decreased in renal perfusion. So we choose the drug ketamine which is readily available and inexpensive , used as a preemptive analgesic agent, administered just before skin incision and may reduce analgesic consumption and at the same time reduces the complication of opioids & NSAIDs.

In the present study, preemptive low dose (0.15mg/kg) I.V. ketamine was used to evaluate patient request for first analgesic demand, total pethidine consumption in 24 hours, pain intensity, haemodynamic status, sedation score, recovery status, any complications like nausea, vomiting, hallucination and delirium etc.

Methods

This clinical study was carried out in the Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. The purpose of the study were clearly explained to each of the subjects and recruited only after they had given written consent. The approval of the University Ethical Clearance Committee of BSMMU was duly taken before carrying out the study. Sixty patients aged between 35-50 years, weight between 45-65 kg with ASA physical status I & II underwent elective total abdominal hysterectomy under general anesthesia were randomly divided into two groups (30 in each group). Randomizations were done using card sampling.

Patients were excluded if they refuses to take part in the study, history of hypertension (HTN), ischemic heart disease (IHD), valvular heart diseases, neurological & psychiatric disorders, history of hypersensitivity of ketamine, had taken chronic analgesic medication due to chronic pain syndrome, or were active substance abusers.

100mm (10cm) visual analogue scale (VAS) & verbal rating score (VRS) was introduced to every patient to assess the level of postoperative pain. All patients preoperative baseline data like pulse rate, blood pressure, respiratory rate & arterial oxygen saturation (SPO_2) were measured & recorded.

In group A, patients received 10 ml of normal saline I/V over 60-90 second before surgical incision. In group B, patients received 0.15 mg/kg ketamine (mixed with 10 ml normal saline) I/V over 60-90 second before surgical incision.

In the operating room, I/V channel for routine infusion was started & routine monitor attached for measuring pulse, blood pressure and arterial oxygen saturation (SPO_2). All patients received same general anesthesia. After pre oxygenation for 3 min with 100% O_2 induction was done by thiopental sodium 5mg/kg & fentanyl 2μg/kg IV. vecuronium bromide 0.1mg/kg was used to facilitate tracheal intubation. Anesthesia was maintained with nitrous oxide , oxygen (70:30) & halothane as required. The lungs were mechanically ventilated. Blood pressure & heart rate was recorded immediately before & every 3 minute during operation. Dosages of vecuronium were repeated as required to maintain muscle relaxation. At the end of surgery, anesthesia was discontinued & residual neuromuscular blockade was antagonized by neostigmine (40μg/kg) &

atropine 20µg/kg. Extubation was done when patient became fully awake.

After complete recovery from anesthesia, the patient was shifted to postoperative ward or recovery room. In postoperative ward, all patients were treated with inj. pethedine 1.5mg/kg IM on demand. As rescue analgesic 10mg IV inj. pethedine was given each time when the pain intensity exceeded the level of 20mm on VAS. The time of first requested analgesic medication (TFA) was recorded. Total pethedine requirements in 24 hours in both groups were also recorded. Postoperatively all patients were interviewed in a standardized fashion by trained nurses who were blind to the study drug. The severity of pain was assessed by VAS at 15 minutes interval for the first hour & then at 2^{nd}, 4^{th}, 6^{th}, 12^{th}, 18^{th} & 24^{th} hours after arrival in the post operative ward. Sedation score as 1-alert, 2-asleep, alert after arousal, 3- asleep, drowsy after arousal, 4-asleep, difficult to arouse & 5-unarousable, was also assessed in same time interval. Respiratory rate, pulse rate, systolic & diastolic blood pressure & arterial oxygen saturation (SPO_2) were recorded in the post operative period in same interval for 24 hours. The incidence of nausea, vomiting, hallucination, bad dream or any other side effects were recorded.All results were expressed as mean ± standard error of mean (SEM) or in frequencies as applicable. The result were compiled and analyzed using Unpaired 't' test, Chi- square (x^2) or ANOVA as appropriate. Results were considered statistically significant if $p < 0.05$ (Confidence Interval CI- 95%).

Results

The studied groups were statistically matched for age (p=0.928) & weight (p=0.477).Mean value of first analgesic demand in group A was 25.67±1.60 and group B was 57.33±2.97 . Mean value of total opioids consumption in group A was 290.00±9.09 & group B was 210.67±7.01. Significant differences were observed between two groups regarding first analgesic demand(p=0.00) & total analgesic consumption(p=0.00). Complication like nausea, vomiting, delirium & hallucination between the studied groups were not significant in post operative period. There was no significant difference of pulse rate (Table IV) at different hours between two groups except at 1 hour after extubation in post operative period; p was 0.008 at that time. Regarding systolic blood pressure (Table V), there was no significant difference at different hours between two groups except during incision where p value was 0.016. There was no significant difference of diastolic blood pressure(Table VI) at different hours between two groups.

There was significantly difference in VAS at different hours(Fig-1) after extubation between two groups ($p < 0.05$), except in the 4^{th} hour after extubation when it was not significant. ($p = 0.375$). Regarding VRS (Fig 2), there was highly significant difference in VRS at different hours after extubation between two groups($p < 0.05$), except in the 12^{th} hour after extubation when it was not significant. ($p = 0.713$). Regarding Sedation score (Table VII), there was no significant difference in sedation score ($p > 0.05$), except in the 18^{th} hour after extubation when it was significant. ($p = 0.018$).

Table I *Demographic data*

Group/ Variable	Group-A (n =30)	Group-B (n =30)	P-value
Age (Years)	41.37±0.84	41.47±0.70	0.928
Weight (Kg)	55.47±1.09	54.30±1.21	0.477

Values are expressed as Mean ± SEM. Between groups analyses were done by t-test. Values are expressed as significant if p<0.05 (CI -95%).

Table II *First analgesic demand & total pethidine consumption*

Background Characteristics	Group-A (n =30)	Group-B (n =30)	P-value
First analgesic demand (min)	25.67±1.60	57.33±2.97	0.000
Total opioids consumption (mg) in 24 hours	290.00± 9.09	210.67± 7.01	0.000

Values are expressed as Mean ± SEM. Between groups analyses were done by t-test. Values are expressed as significant if p<0.05 (CI -95 %).

Table III *Complications (nausea, vomiting, delirium, hallucination) of the studied groups:*

Complication	Group-A	Group-B	P- value
Nausea	3	4	1.00
Vomiting	3	2	1.00
Delirium	0	0	-
Hallucination	0	0	-

Values are expressed as Mean ± SEM. Between groups analyses were done by t-test. Values are Expressed as significant if p<0.05 (CI -95 %).

Table IV *Changes in Pulse rate (beat / min) at different period of the studied groups*

Group	Baseline	During induction	During incision	During incision	1 hr after extubation	4 hrs after extubation	8 hrs after extubation	12 hrs after extubation	18 hrs after extubation	24 hrs after extubation
Group- A	74.47	102.00	100.37	104.70	90.83	82.07	79.40	80.37	79.20	79.07
	±1.24	±1.23	±1.00	±1.30	±0.98	±1.00	±1.23	±1.16	±1.17	±1.10
Group- B	72.83	99.67	99.00	104.37	86.93	83.07	81.63	82.43	78.77	78.33
	±1.13	±1.01	±0.90	±1.06	±1.02	±1.03	±1.34	±0.99	±1.36	±1.04
P value	0.333	0.148	0.313	0.844	0.008	0.489	0.225	0.182	0.810	0.630

Values are expressed as mean ± SEM. Between groups analysis was done by t-test. Analysis between group, time interaction was done by ANOVA. Values are significant when p<0.05 (CI-95%).

Table V *Changes in Systolic blood pressure (mmHg) at different period of the studied groups:*

Group	Baseline	During induction	During incision	During extubation	1 hr after extubation	4 hrs after extubation	8 hrs after extubation	12 hrs after extubation	18 hrs after extubation	24 hrs after extubation
A	120.33	147.00	112.33	143.67	128.83	125.17	124.00	125.00	121.33	123.83
	±1.89	±2.26	±1.85	±1.82	±1.53	±1.54	±1.65	±1.75	±1.90	±1.28
B	120.50	150.00	119.33	148.33	128.50	123.67	122.67	126.00	117.33	124.83
	±1.65	±1.84	±2.11	±2.14	±1.76	±1.40	±1.45	±1.39	±1.22	±1.19
P	0.947	0.307	0.016	0.102	0.887	0.474	0.547	0.655	0.082	0.569

Values are expressed as mean ± SEM. Between groups analysis was done by t-test. Analysis between group, time interaction was done by ANOVA. Values are significant when p<0.05 (CI-95%).

Table VI *Changes in Diastolic Blood pressure (mmHg) at different period of the studied groups:*

Group	Baseline	During induction	During incision	During extubation	1 hr after extubation	4 hrs after extubation	8 hrs after extubation	12 hrs after extubation	18 hrs after extubation	24 hrs after extubation
A	74.67	94.83	72.17	91.50	79.17	75.83	75.33	77.00	74.33	75.50
	±1.20	±1.28	±0.98	±1.27	±0.99	±0.87	±1.42	±1.03	±1.57	±0.84
B	75.67	95.00	75.83	94.33	78.83	74.50	76.00	79.50	72.67	76.17
	±0.95	±1.17	±1.92	±0.95	±1.28	±1.13	±1.36	±0.97	±0.95	±0.89
P	0.516	0.924	0.094	0.080	0.838	0.354	0.736	0.083	0.367	0.588

Values are expressed as mean ± SEM. Between groups analysis was done by t-test. Analysis between group, time interaction was done by ANOVA. Values are significant when p<0.05 (CI-95%).

Table VII *Changes in Sedation score at different period of the studied groups*

Group	After arrival	1 hour after extubation	4 hour after extubation	8 hour after extubation	12 hour after extubation	18 hour after extubation	24 hour after extubation	F	P
A	2.33	1.87	1.40	1.53	1.33	1.53	1.20	15.10	0.000
	±0.11	±0.11	±0.09	±0.09	±0.09	±0.11	±0.07		
B	2.67	1.93	1.60	1.40	1.47	1.20	1.07	31.10	0.000
	±0.13	±0.13	±0.09	±0.09	±0.09	±0.07	±0.05		
t	1.953	0.391	1.555	1.027	1.046	2.438	1.523		
P	0.056	0.697	0.125	0.309	0.300	0.018	0.133		

Values are expressed as mean ± SEM. Between groups analysis was done by t-test. Analysis between group, time interaction was done by ANOVA. Values are significant when p<0.05 (CI-95%).

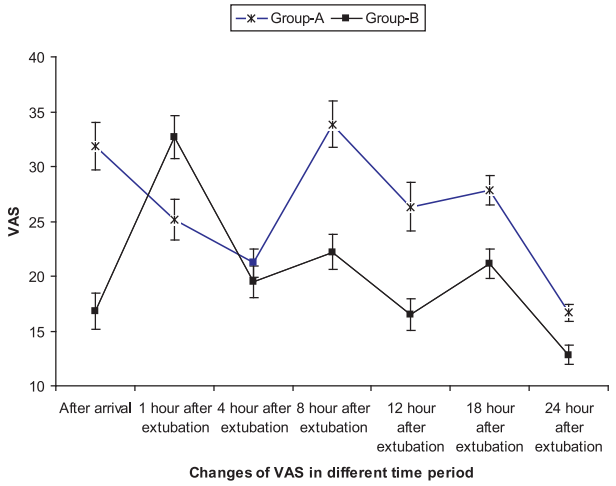

Fig 1 *Changes of VAS in different time period.*
** Statistically significant – (p< 0.05)*

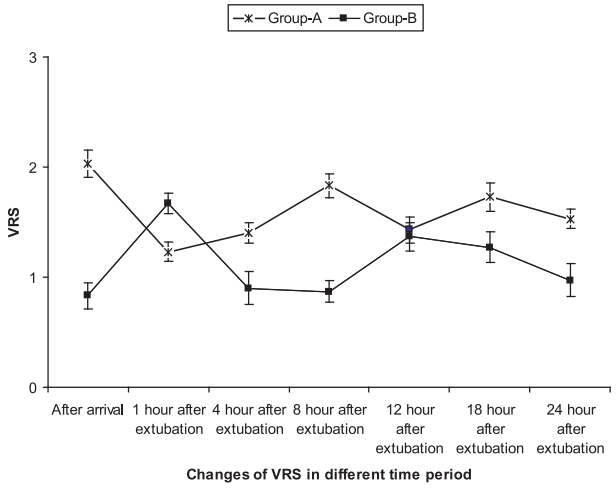

Fig 2 *Change of VRS in different time period.*
** Statistically significant – (p< 0.05)*

Discussion

Pain which is often inadequately treated, accompanies more than 23 million surgical procedures performed each year and may persist long time after tissue heals. Preemptive analgesia an evolving clinical concept, involves the introduction of an analgesic regimen before the onset of noxious stimuli, with the goal of preventing sensitization of the nervous system to subsequent stimuli that could amplify pain. Surgery offers the most promising setting for preemptive analgesia because the timing of noxious stimuli is known. When adequate drug doses are administered to appropriately selected patients before surgery, intravenous opiates, local anesthetic infiltration, nerve block, subarachnoid block and epidural block offer benefits that can be observed as long as one year after surgery. The most effective preemptive analgesic regimens are those that are capable of limiting sensitization of the nervous system throughout the entire perioperative period[8].

Low dose preemptive ketamine (0.15mg/kg) when administered I/V just before (60-90 sec) surgical incision as an adjuvant to opioids, have an important role to play in the treatment of acute postoperative pain and this could be explained by prevention of central sensitization prior to tissue injury. The results of the study demonstrate that addition of low dose ketamine to general anaesthesia before surgical incision in total abdominal hysterectomy patients, delays the first request for pethidine (group A 25.67±1.60 min, Group B 57.33±2.97 min) in the immediate postoperative period. P value of first analgesic demand was 0.000.During the first 24hours, total pethidine consumption was 290.00±9.09 mg in group A and 210.67±7.01 mg in group B, which was about 27% lower than group A. It proved that, ketamine acts as preemptive analgesic with also showed significant opioid sparing effects.

Roytblas et al.[9], who used low dose Ketamine (0.15mg/kg) in addition to general anaesthesia in cholecystectomy patients and observed that the cumulative dose of morphine reduced by about 40% in the Ketamine group. Tvers Koy et al.[10] found a decrease in wound hyperalgesia in patient undergoing inguinal herniorraphy with a preemptive ketamine regimen consisting of 20 ìg/kg initial dose followed by a continuous infusion rate of 20 ìg/kg/min. Elia et al. found that with Ketamine giving a clear decrease in 24 hours cumulative morphine consumption with a WMD (weighted mean difference) of -15.7 mg. He also found that Ketamine treatment did not reduce morphine related adverse effect.

Results of pain scores (VAS/VRS) in the post operative room indicated that patient in the control group (group A) had much more pain than in the study group (group B) throughout the 24 hours of assessment. The group B had significantly lower pain score compared with group A (P<0.05). Twenty one of 30 trails found that preemptive Ketamine reduced rescue analgesic requirements or pain intensity, Ketamine was reported to give

a 30-40% reduction of rescue analgesics. Acute pain results in sympathetic over activity which is manifested by increase in heart rate, blood pressure, peripheral resistance and cardiac output[11]. In the present study, heart rate and blood pressure remained stable throughout the study period between two groups and there were no significant different between two groups. Respiratory rate, sedation score, arterial oxygen saturation (SPO_2) in both groups also remained within safe range and were not statistically significant.

Elia 2005 found no decrease in PONV on analysis data from 391 patients treated with Ketamine and 284 patients receiving control. R.F. Bell 5 et al.[12] analyzed on 705 patients treated with Ketamine and 578 patient receiving control, showed a significant reduction of nausea and vomiting in Ketamine treated patient. The observed reduction in PONV may be due to pethedine- sparing effect.In the present study there was no significant difference in the incidence of PONV between two groups.

We also found that no patient in either group had signs or symptoms of psychomimetic phenomenon or incidence of hallucination delirium or bad dream. This findings supports the finding of Roytblat L, et al.[57]. Several investigations have reported a decrease in the incidence of psychomimetic phenomenon when ketamine is used in conjunction with sedative-hypnotic (thiopental), general anaesthetics (halothane, N_2O) and benodiazepines[13] . All factors were observed in this study.

This study demonstrated that low dose Ketamine (0.15mg/kg) given before surgical incision in elective total abdominal hysterectomy patients under general anesthesia, has a preemptive analgesic effect that cause much reduction in the postoperative analgesic requirements.

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Original Article

Effect of propofol or oral midazolam and thiopental sodium as induction agent for day care surgery- a comparative study

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Abstract

Background *Day care surgery is widely acceptable and gaining popularity for more than a decade. Early recovery and cost effectiveness is an integral part of day care surgery in developing country.*

Objective *To compare the cost effectiveness & recovery score after oral midazolam and thiopental sodium or propofol induction in day care surgery.*

Methods *A total number of sixty patients, thirty in each group of ASA grade I & II were selected. In group -A patient receiving propofol 2mg/kg for induction and group B were given oral midazolam 0.25mg/kg thirty minutes before induction with thiopental sodium 2.5mg/kg. Perioperative heart rate, BP, recovery score and time to ready to go home were monitored. Average cost of induction was calculated in both groups.*

Result *Recovery scores in group A & B were 8.8 ±1.75 and 8.01 ±1.03 respectively after thirty minutes of reversal. The cost of group B (BDT 37.88±1.37) was significantly lower (P<0.05) than that of group A (BDT 142.00 ± 6.00).*

Conclusion *Preoperative oral midazolam & low dose thiopental sodium induction is relatively cost effective than propofol induction in day care surgery.*

Key word: *Day care surgery, Oral midazolam, thiopental sodium, propofol.*

(JBSA 2012; 25(1): 9-13)

Introduction

Surgical day-cases are admitted for operations or investigations on a planned, non-resident basis and occupy beds for a period of time in a unit set aside the operation theatre complex and go back home on the same day, also called 'out-patient ambulatory surgical cases[1]. It is one of the most dramatic transformations in health care delivery in the recent past. The primary impetus for this change is the economic saving afforded by not admitting patients the night before surgery or keeping them in hospital over night after surgery. Other advantages include earlier ambulation, patients' convenience and a lessened risk of nosocomial infections[2].

Prerequisites for this are agents having characteristics of rapid efficient action with quick elimination without hang-over effect and of course cost effective. None of the currently available anaesthetic agents have duration of action short enough to leave the patient with no residual effects within a few hours of surgery[3]. Commonly used induction agent, Thiopentone is having elimination half-life of 5 to 10 hours and up to 30% may remain in the body after 24 hours. It does not provide a clear-headed recovery in day-case anaesthesia. On the other hand, Propofol has distribution and elimination half-lives of 1 to 2 minutes and 1 to 5 hours respectively and provides rapid recovery

with minimal residual effect which is suitable for day-cases[4]. But high price of Propofol and also chance of contamination of vials are major hindrance to its use for day-cases in the underprivileged population[2,4].

Midazolam is a potent sedative, adjuvant to hypnotics, with a flat cardio-vascular profile, readily absorbable with an onset of effects within 10 to 15 minutes after oral administration[5]. Even at 30 mg oral dose does not accumulate in plasma (<2ng/ml) with less chance of any adverse effects and prolonged action, thereby renders a quick and clear-headed recovery[6].

This study was carried out to compare the quality of recovery from Propofol induction with thiopentone along with oral midazolam. The cost effectiveness of these induction agents were also evaluated to observe the benefit of the patient.

Methods

This study was conducted in Department of Anaesthesia, Analgesia and Intensive Care Medicine, BSMMU, Dhaka from July to September 2005. Sixty gynaecological patients within 18 to 35 years of age, belonging to ASA (American Society of Anaesthesiologists) status I and II, scheduled for routine laparoscopic procedure on day-case basis. Patients were randomly selected by card sampling method and grouped equally into two with thirty in each group. After pre-oxygenation, Group-A received propofol 2 mg/kg for induction and Group-B were given midazolam 0.25 mg/kg orally 30 minutes before induction by thiopentone 2.5 mg/kg. Medium-acting vecuronium was used for endotracheal intubation and muscle relaxation. analgesia and maintenance were managed by fentanyl 1mgm/kg and 0.5% halothane respectively. Per-operative vital parameters were observed and recorded at 5 min interval. Recovery quality was assessed by SOCA (S-Sedation, O-Orientation, C-Comprehension, and A-Amnesia) scores and time required for fitness to go home were monitored & recorded. After completion of surgery, total cost of induction agents was calculated and recorded.

Data were collected in a pre-design 'data collection sheet'. Data were complied and statistical analysis were done using student's 't' test with the help of SPSS version 11. Values are regarded as significant if $p < 0.05$.

SOCA Score[7]

Sedation:	
Awake and alert or tense	4
Awake and not alert or tense	3
Drowsy	2
Sleepy or asleep but rousable	1
Asleep and not rousable	0
Orientation:	
Full orientation	2
Partial disorientation	1
Total disorientation	0
Comprehension:	
Execution of order	2
Execution of order only by initiation	1
No execution of order	0
Amnesia:	
No amnesia	3
Slight amnesia	2
Moderate amnesia	1
Severe amnesia	0

* 10 out of 11 must be scored before discharge under normal circumstances.

Fitness to go home[8]

1) Orientation to person, place and time.
2) Stable vital signs for 30-60 minutes.
3) Ability to ambulate unassisted.
4) Ability to tolerate oral fluids.
5) Ability to void.
6) Absence of significant pain or bleeding.

Results:

Patient's characteristics are shown in table-I and there were no significant differences among both groups.

Patient's vital parameters like heart rate, systolic and diastolic blood pressure were recorded at various timing. There was not much variation regarding those vital parameters among both groups (Table II and Figure 1).

Recovery score at different timing is shown in Table-III. Immediately after reversal recovery score for group A and group B were 5.98±2.00 and 5.26±1.84 respectively. Score were recorded after 5, 10, 15, 20, 25 and 30 minutes of reversal. Thirty minutes after reversal this score was 8.86±1.75 and 8.01±1.03 for group A and group B respectively.

Time for fitness to go home was recorded when patients were fulfilled the criteria for fitness to go home. It was 281±44 and 321±53 minutes for group A and group B respectively (Table-IV).

Cost of induction agents was relatively higher in group A (142.00±6.00) than that of in group B (37.88±1.37) [Table-V].

Table I *Patients characteristics like age, body weight, height and ASA grading.*

Characteristics	Group A (n=30)	Group B (n=30)	P value
Age (years)	27.20±3.14	25.95±3.80	0.546^{NS}
Body wt (kg)	63.80±4.37	61.50±3.46	0.071^{NS}
Height (cm)	156.25±3.49	152.65±4.04	0.063^{NS}
ASA- I	86.66%	93.33%	0.181^{NS}
ASA- II	13.34%	6.67%	0.512^{NS}

Values are expressed as mean ± SD.NS: not significant p > 0.05 (among two groups) for age, body weight, height, ASA grade-I & II; Student's't' test was done to find out the difference between groups.

Table II *Heart rate changes in both groups in pre, per and post operative period.*

Timing	Group-A (n=30)	Group-B (n=30)	P value
Pre-operative	78±4	76±6	0.039
At induction	82±8	84±9	
At reversal	84±8	81±13	
After 5 min	81±12	82±9	
After 10 min	80±8	81±8	
After 15 min	77±5	84±7	
After 20 min	76±6	77±8	
After 25 min	77±7	78±6	
After 30 min	76±6	79±8	

Values are expressed as mean ± SD.Sig: Significant p < 0.05 (among two groups) for heart rate changes in both groups in pre, per and post operative period; Student's't' test was done to find out the difference between groups.

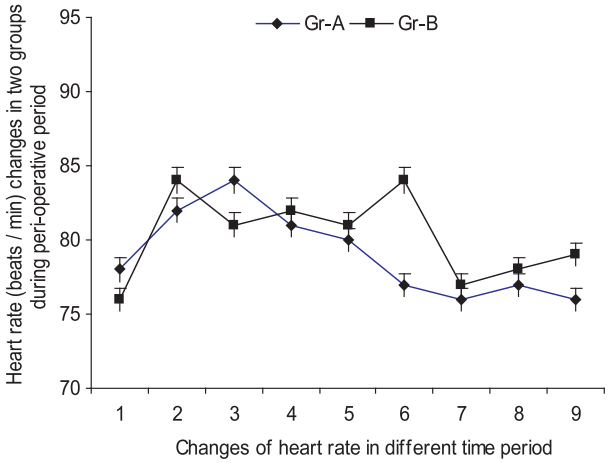

Fig 1 *Heart rate changes in both groups in pre, per and post operative period.*

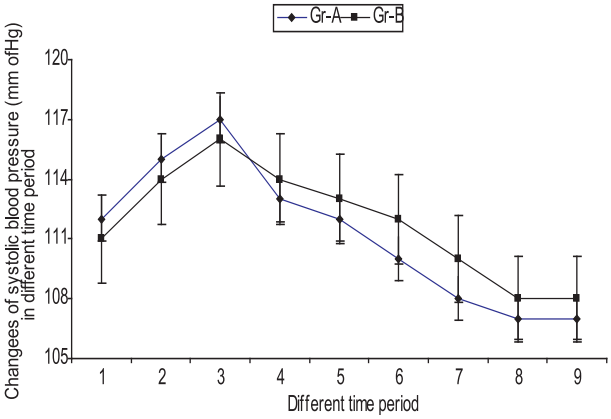

Fig 2 *Systolic blood pressure variations between two groups in different time period.*

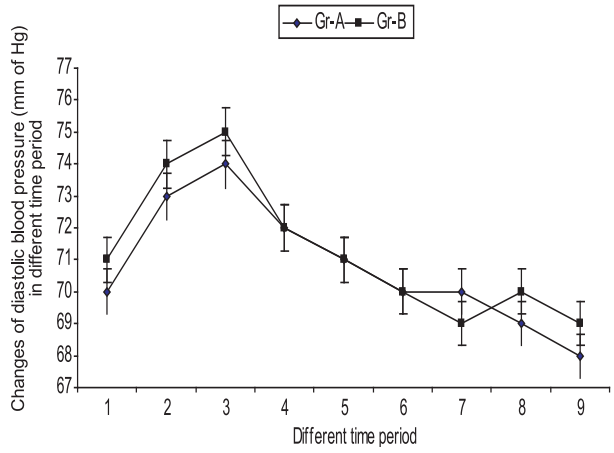

Fig 3 *Diastolic blood pressure variations between two groups in different time period.*

Table III *Recovery score (SOCA) in both group.*

Timing	Group-A (n = 30)	Group-B (n=30)	P value
At reversal	5.98 ± 2.0	5.26±1.84	<0.047[S]
After 5 min	6.00±1.79	5.66±1.62	
After 10 min	7.02±1.72	6.10±1.08	
After 15 min	7.26±2.01	6.46±1.24	
After 20 min	7.78±2.82	6.86±1.27	
After 25 min	8.10±2.25	7.08±1.24	
After 30 min	8.86±1.75	8.01±1.03	

Values are expressed as mean ± SD.Sig: Significant p < 0.05 (among two groups) for recovery score (SOCA) in both group; Student's't' test was done to find out the difference between groups.

Table-IV *Time for fitness to go home in both groups.*

Group	Fitness to go home (time in minutes)	P value
Group-A (n=30)	281 ± 44	0.98[NS]
Group-B (n=30)	321±53	

Values are expressed as mean ± SD.NS: not significant p > 0.05 (among two groups) for fitness to go home; Student's't' test was done to find out the difference between groups.

Table V *Cost of induction agents in both group.*

Group	Cost of induction agents in Taka	P value
Group-A (n=30)	142.00±6.00	0.027[s]
Group-B (n=30)	37.88±1.37	

Values are expressed as mean ± SD.Sig: significant p < 0.05 (among two groups) for cost of induction agents; analysis was done by Student's't' test.

Discussion

Proper selection, planning & uneventful clear-headed anaesthetic recovery are the hallmarks of fruitful day-case surgery. Many operations are performed at one-fifth cost of inpatient surgery if carried out on a day-case basis[9]. These are economical when they come-out safely with an early discharge. This study was to find-out a cost-effective recipe of induction agent, alternative to propofol which is the choice in day-cases but quite expensive. Co-induction with oral midazolam (0.25 mg/kg) and a reduced dose (2.5 mg/kg) of conventional intravenous thiopentone revealed the recovery status nearly closed to that of propofol. The variation in recovery scores (Table-III) and time for fitness to go home (Table-IV) between the two groups were almost similar. Moreover, the peri-operative parameters like heart rate, systolic and diastolic blood pressure (Table-II and Figure-1) deviations between the groups were also similar.

One study showed that after receiving 10 mg of i.v. midazolam the recovery in relation to orientation of time and place occurs within 15 minutes. Pharmacokinetics of midazolam after both i.v. and oral administration to healthy volunteers are broadly similar[10]. When patients are induced with thiopentone, awakening ranges from 1½ to 2½ times prolonged with midazolam[11]. So, to avoid that delay, a reduced dose of thiopentone was used and supplemented with low-dose volatile to maintain adequate depth of anaesthesia. The addition of potent opioids tends to prolong the recovery, but fentanyl up to 1.5 μgm/kg does not delay emergence when given immediately before induction[12].

In all the poor countries like ours, cost-effectiveness is an influential consideration related to the health-care consumers along with other aspects. In this study, it is found that the expense for propofol is Tk-142.00±6.00/= per patient. One ampoule costing Tk-260/= contains 200 mg of propofol while the average requirement is 140±12 mg for induction; rest of the drug has to discard for its higher risk of contamination[13]. So, actual expenditure per case goes high due to system loss. On the other hand, in group-B, the average cost of induction agents is Tk-37.88±1.37/ per case, i.e. 26.66% of that of group-A (Table-V). Moreover, thiopentone remains stable for 24-36 hours after mixing and is permitted to use in several patients from multi-dose vials[14] and thereby seems more economic. Tab midazolam (7.5 mg) charges simply Tk-10/= and most of the patients require 15 mg

which costs Tk-20/= only. So, the cost of these co-induction agents is significantly less than that of injection propofol.

Under the condition of present study, we could conclude that oral midazolam and intravenous thiopental sodium induction in day care surgery is highly cost effective than propofol alone induction agent without any significant changes in hemodynamics, recovery scores as well as time to ready to go home.

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Original Article

Hypothyroidism in type 2 diabetic patients: a tertiary care hospital experience

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Abstract

Background *Hypothyroidism is one of the most common endocrine disorders encountered in endocrine practice worldwide which is more prevalent in elderly and women and its prevalence varies according to population studied. Both type 1 and type 2 Diabetic patients have higher prevalence of hypothyroidism than normal population not for direct etiology rather due to autoimmune association and increasing age. Co-existing hypothyroidism may impose co-morbid effects of dyslipidemia, atherosclerosis, hypertension and renal impairment on diabetic patients.*

Objective *This study was designed to find out frequency and association of clinical and sub-clinical hypothyroidism in adult type 2 diabetic subjects.*

Method *This was a cross sectional study conducted during the period of December 2009 to November 2010 in a tertiary care specialized hospital, (BIRDEM). Thyroid hormone (FT_4 and TSH) was studied among 227 adult type 2 diabetic subjects.*

Results *Among 227 study subjects, female respondents were 67%. Age (in years) was as mean± SD (SE) and (95% CI): 53.95±11.6 (.77) and (52.44-55.47). Thyroid hormone (FT4 and TSH) was assayed. FT4 (in pmol/L) of this population was as mean± SD (SE) and (95% CI): 13.05±2.66 (.18) and (12.71-13.4) and TSH was (in μIU/ml) as mean± SD(SE) and (95% CI): 4.12±7.03(.47) and (3.2-5.04). Sixty nine (30.4%) of them were hypothyroid and rest 158 (69.6%) were euthyroid. Among the hypothyroid cases, 17.6% were cases of sub-clinical hypothyroidism and 12.8% were of clinical hypothyroidism.*

Conclusion *Diabetic population have higher prevalence of hypothyroidism. While planning therapeutic approaches for diabetic patients, clinical and sub clinical hypothyroidism always should be taken into consideration. Diabetic patients with or without complication particularly with poor glycemic control, should be routinely screened for hypothyroidism.*

Key words: *Hypothyroidism, type 2 Diabetes mellitus, Euthyroid*

(JBSA 2012; 25(1): 14-20)

Introduction

Hypothyroidism is one of the most common endocrine disorders encountered in endocrine practice worldwide. It is a clinical syndrome resulting from deficient production of thyroid hormones or a defect in thyroid receptor activity which may manifest from birth or be acquired, which in turn results in generalized slowing down of metabolic process. The condition is nearly 10 times more common in females than males and the incidence is also higher in the elderly, and in some racial and ethnic groups[1]. Prevalence of hypothyroidism varies depending on the population studied. In the Unites States 0.3% population have

overt hypothyroidism[2,3]. According to etiology, hypothyroidism can be divided into primary hypothyroidism and central hypothyroidism. Primary hypothyroidism is the etiology in majority of cases of hypothyroidism[1]. Common causes of primary hypothyroidism are iodine deficiency, chronic autoimmune thyroiditis (Hashimoto's thyroiditis), subacute thyroiditis, silent thyroidits, postpartum thyroiditis, iodine excess, thyroid surgery, I ^{131}therapy, external irradiation, infiltrative disorders, drugs, agenesis and dysgenesis of thyroid gland. Among these, iodine deficiency is the most common cause worldwide[4]. Chronic autoimmune thyroiditis (Hashimoto's) is the leading cause in iodine-sufficient area. This condition is several times more prevalent in women than men. Up to 15% of elderly women may have positive anti-thyroid autoantibodies[2]. Sub-clinical hypothyroidism (SCH) is the term used to define a state in which serum T4 and T3 levels are within normal limits, but there is underlying mild thyroid failure, as evidenced by a mild increase in serum TSH (4.5-10 μIU/ml)[5]. Overall prevalence of subclinical hypothyroidism ranges from 4% to as high as 10%[6]. The etiology of subclinical hypothyroidism (SCH) is similar to that of overt clinical hypothyroidism. In one study, approximately 55% of patients who had mild thyroid failure had chronic autoimmune thyroiditis [7]. There are potential risks that progression of SCH to overt hypothyroidism. Increased incidence of aortic atherosclerosis (odds ratio, 1.7) and myocardial infarction (odds ratio, 2.3) were revealed in women with subclinical hypothyroidism[8]. This condition is also consistently associated with elevation of total and low density cholesterol [9].

Diabetes mellitus is one of the most common non-communicable diseases globally. Number of people with diabetes was estimated to be 285 millions in the year 2010 and has been projected to rise to 438 million in the 2030 [10]. Estimated national prevalence of diabetes mellitus of Bangladesh is 6.1% for the year 2010[10]. Type 2 diabetes is by far the commonest form globally, accounting for more than 85% of cases. In Bangladesh, the crude prevalence of type 2 diabetes is 4.3% and IFG is 12.4%[11]. Diabetic patients have a higher prevalence of thyroid disease compared with normal population[12]. Among the thyroid diseases prevalent in diabetes, hypothyroidism (clinical and sub-clinical) is the commonest disorder. In addition to the autoimmune link between thyroid disease and type 1 diabetes, prevalence of thyroid diseases are also higher than normal in type 2 diabetes, with hypothyroidism being the most common disorder[12]. Hypothyroidism is not a direct etiology for development of diabetes mellitus but both are more commonly found in the elderly, contributing to a high association[13]. Hypothyroidism is commonly accompanied by hypertension, dyslipidemia including elevated total cholesterol, LDL cholesterol and triglyceride which increases the risk of cardiovascular diseases in diabetic patients. Recently ADA has recommended that TSH should be measured as a component of comprehensive diabetes evaluation in type 1 diabetes, diabetes with dyslipidemia or women over age of 50 years [14].

Whether in our population, hypothyroidism is more frequent and associated with type 2 diabetes has not also been well studied. Hence, this study was designed to find out frequency and association of clinical and sub-clinical hypothyroidism in adult type 2 diabetic patients.

Methods:

This cross sectional study was to determine the frequency and association of clinical and sub-clinical hypothyroidism in Type 2 diabetic patients. Sample was selected purposively from inpatient department of BIRDEM on the basis of availability according to following selection criteria: diagnosed cases of type 2 diabetic patients of both sex, age more than 18 years and patients not having co-morbid condition. Following diabetic patients were excluded from the study: age below 18 years, pregnant or lactating women with diabetes mellitus or GDM, type 2 diabetic patients with known history of thyroid diseases with or without treatment (medical, surgical, radio-iodine etc), patients receiving any medicine that may alter thyroid function, suffering from severe co-morbid conditions, type 1 diabetic patient, and patient with endocrine disorders other than diabetes and hypothyroidism were excluded. After initial screening, 227 adult diabetic patients (20 to 79 years) were selected in this study according to selection criteria. The purpose of the study was explained to each subject in detail. The data were collected in a pre-formed standard printed data

collection form after taking written informed consent of the patient. The study was conducted in full record with ethical principle.

After primary selection a detailed clinical history regarding age, sex, socioeconomic condition etc. was taken from the patient by interview. Every patient was examined thoroughly regarding height, weight, BMI. Standing height was measured using appropriate scales (detect-medic, detect scales INC, USA) with minimal clothes. Height was recorded to the nearest 5 mm. Weight was recorded to the nearest 0.5. BMI of the subjects were calculated using standard formula, BMI=Weight (kg) / Height (m2). Sitting BP was measured in both arms after at least 15 minutes of rest with an appropriate sphygmomanometer using phase-1 and phase-5 Korotkoff sounds. A second measurement was made at least after 3 minutes in the arms with the highest measurement. The mean of two measurements was used for systolic and diastolic blood pressure. Laboratory tests reports of Hb%, FPG, HBA1c%, fasting lipid profile, resting ECG, urine for protein, serum creatinine, CCR, 24 hour UTP, urine for microalbumin were collected. Available previous medical documents were also thoroughly reviewed.

Study subjects were then tested with FT4 and TSH to evaluate the status for hypothyroidism. Serum FT4, TSH measurement was made by Abbott AXSYM system device by using Microparticle Enzyme Immunoassay (MEIA) method. A high serum TSH level (4.5-10 μIU/ml) and a normal free thyroxine level was required for the diagnosis of SCH . A high TSH (>4.5μIU/ml) and low FT4 (<10.3 pmol/L) was required for diagnosis of clinical (primary) hypothyroidism (Surks et al 2004). All the data were checked and edited. Then data were entered into computer with the help of software SPSS for windows programmed version 15. After frequency run, data were cleaned and frequencies were checked. An analysis plan was developed keeping in view with the objectives of the study.

Results

Thyroid hormone (FT4 and TSH) was assayed for 227 diabetic subjects admitted in BIRDEM Hospital. FT4 (in pmol/L) of this population was as mean± SD (SE) and (95% CI): 13.05±2.66 (.18) and (12.71-13.4) and TSH (in μUl/ml) was as mean± SD(SE) and (95% CI): 4.12±7.03(.47) and (3.2-5.04). (Table-I)

Sixty nine (30.4%) of them were hypothyroid and rest 158 (69.6%) were euthyroid. Among the hypothyroid cases, forty (17.6%) of them were cases of sub-clinical hypothyroidism and rest (n=29, 12.8%,) were of clinical hypothyroidism. Hypothyroid cases had FT4 (in pmol/L) as mean± SD (SE) and (95% CI): 10.82±2.71 (.32) and (10.17-11.47) and TSH (uIU/ml) as mean± SD (SE) and (95% CI): 9.16±1.11 (1.34) and (6.47-11.84) and euthyroid subject had FT4 (in pmol/L) as mean± SD (SE) and (95% CI): 14.03±1.95 (.15) and (13.72-14.34) and TSH (uIU/ml) as mean± SD (SE) and (95% CI): 1.91±1.03 (.08) and (1.75-2.08). (Table I). Other variables of the study were - Age, BMI, SBP, DBP, Hb%, FBG, HbA1c%, serum creatinine, CCR, Serum total cholesterol, TG,, HDL and LDL. The results were as follows: (Table II)

Age (in years) as mean± SD (SE) and (95% CI): 53.95±11.6 (.77) and (52.44-55.47), BMI kg/m2 as mean± SD (SE) and (95% CI): 25.5±4.16 (.28) and (24.92-26.02), SBP mmHg as mean± SD (SE) and (95% CI): 129.14±17.25 (1.14) and (127.0-131.39), DBP mm Hg as mean± SD (SE) and (95% CI): 78.91±8.93 (.59) and (77.71-80.05), Hb in gm/dl as mean± SD (SE) and (95% CI): 11.20±1.5 (.1) and (11.0-11.4), FBG in mmol/l as mean± SD (SE) and (95% CI): 10.26±7.35 (.49) and (9.3-11.23), HbA1c % as mean± SD (SE) and (95% CI): 9.71±2.2 (.15) and (9.42-10.0), serum creatinine mg/dl as mean± SD (SE) and (95% CI): 1.36±.45 (.05) and (1.26-1.45), CCR ml/min as mean± SD (SE) and (95% CI): 66.8±34.4 (2.29) and (62.3-71.3), serum total cholesterol as mean± SD (SE) and (95% CI): 187.97±50.24 (3.33) and (181.4-194.54), TG in mg/dl as mean± SD (SE) and (95% CI): 212.22±124.86(8.28) and (195.40-228.55), HDL in mg/dl as mean± SD (SE) and (95% CI): 34.14±11.95 (.79) and (32.5-35.7), LDL in mg/dl as mean± SD (SE) and (95% CI): 100.9±36.71 (2.44) and (96.1-105.73).

Logistic analysis documented as a group Hypothyroid subjects (69) were different from the euthyroid subjects (158(sig. 0.000) when age , BMI, systolic BP, diastolic BP, Hb%, fasting blood glucose, HbA1c,FT4,TSH, CCR, Cholesterol, TG, HDL and LDL were considered as co-variates. Among the covariates only - FT4 and TSH had significant influence (sig. 0.000) on the grouping. (Table III)

Socio-demographic analysis showed, female respondents were 67% and rest were males (n= 75, 33%) and 99.1% were married. Among the total study subjects 30.8% completed their graduation. Only 9.3% % were found illiterate. Most of them were from upper and middle class socio-economic condition (42.7% and 45.5%).

Table I *Thyroid hormone (FT_4 and TSH) in diabetic subjects (n=227).*

Population	FT4 pmol/L As Mean ±SD(SE) (95% CI)	TSHμIU/ml As Mean ±SD(SE) (95% CI)
Diabetic Subject (N227)	13.05±2.66 (.18) (12.71-13.4)	4.12±7.03 (.47) (3.2-5.04)
DM Hypothyroid (69)	10.82±2.71 (.327) (10.17-11.47)	9.16±1.11 (1.34) (6.47-11.84)
DM Euthyriod (158)	14.03±1.95 (.15) (13.72-14.34)	1.91±1.03 (.08) (1.75-2.08)

NB: Among 227 diabetic subjects 69 had hypothyroidism and rests (158) were euthyroid.
DM= Diabetes Mellitus
$FT_{4=}$ serum free thyroxine
TSH= Thyroid Stimulating Hormone.

Table II *Clinical and biochemical characteristics of diabetic subjects (n=227).*

	Total population (n=227)	
	Mean±SD (SE)	95% CI
Age (years)	53.95±11.6(.77)	52.44-55.47
BMI kg/m^2	25.5±4.16(.28)	24.92-26.02
SBP(mmHg)	129.14±17.25(1.14)	127-131.39
DBP (mmHg)	78.91±8.93(.59)	77.71-80.05
Hb gm/dl	11.20±1.5(.1)	11-11.4
FPG (mmol/l)	10.26±7.35(.49)	9.3-11.23
HBA1c%	9.71±2.2(.15)	9.42-10.0
FT4(pmol/L)	13.05±2.66(.18)	12.71-13.40
TSH (μ IU/ml)	4.12±7.03(.47)	3.2-5.04
S. Creatinine(mg/dl)	1.36±.45(.05)	1.26-1.45
CCR ml/min	66.8±34.4(2.29)	62.3-71.3
T.Cholesterol (mg/dl)	187.97±50.24(3.33)	181.4-194.54
Triglyceride (mg/dl)	212.22±124.86(8.28)	195.40-228.55
HDL (mg/dl)	34.14±11.95(.79)	32.5-35.7
LDL(mg/dl)	100.9±36.71(2.44)	96.1-105.73

NB: Table shows clinical and biochemical variables of the study population in mean±SD(SE) and 95% CI.
SD= standard deviation, SE= standard error, CI= confidence interval

Table III

Logistic regression analysis between Hypothyroid subjects (69) and Euthyroid subjects (158)

A linear logistic regression analysis was done with thyroid status (hypothyroid vs euthyroid) of 227 diabetic cases as the dependent variable with 14 co-varieties (independent variable) namely age , BMI, systolic BP, diastolic BP, Hb, fasting blood glucose, HbA1c,FT4,TSH, CCR, Cholesterol, TG, HDL and LDL.

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.060	.463		4.453	.000
	Age in years	-.002	.002	-.041	-.667	.506
	BMI of the respondents	.002	.006	.015	.261	.794
	Systolic BP	.002	.002	.077	1.093	.275
	Diastolic BP	.000	.004	-.009	-.128	.898
	Hb (gm/dl)	-.022	.018	-.072	-1.209	.228
	FBS (mmol/L)	.000	.003	-.002	-.039	.969
	Total Cholesterol	.000	.001	.021	.245	.807
	Triglyceride	.000	.000	.034	.531	.596
	HDL	.004	.002	.107	1.850	.066
	LDL	2.407E-05	.001	.002	.025	.980
	Hba1C%	.008	.013	.037	.606	.545
	S. Creatinine	-.003	.048	-.004	-.057	.954
	CCR	-.001	.001	-.072	-.884	.378
	FT4	-.074	.011	-.426	-6.662	.000
	TSH	.015	.004	.232	3.631	.000

a Dependent Variable: thyroid group.

NB: Logistic analysis documented that 69 Hypothyroid subjects are significantly different from the 158 euthyroid subjects (sig. 0.000) when 14 variables namely age , BMI, systolic BP, diastolic BP, Hb, fasting blood glucose, HbA1c,FT4,TSH, CCR, Cholesterol, TG, HDL and LDL considered as co-varieties. Among the covariates of only thyroid hormones (T4 and TSH) had significant influence (sig. 0.000) on the grouping.

Discussion

The prevalence of thyroid disease in patients with diabetes is significantly higher than that in the general population. In a reported study, the prevalence of hypothyroidism in diabetic patients was 4% [15]. An outpatient diabetes clinic in Scotland randomly screened 1,310 adult patients with diabetes for thyroid disease. The prevalence of thyroid disease was found to be 13.4%, of which 6.8% were diagnosed during the screening, with the highest in patients with type 1 diabetes (31.4%) and lowest in patients with type 2 diabetes (6.9%).The most common thyroid dysfunction was sub-clinical hypothyroidism (4.8%) followed by hypothyroidism (0.9%) [16]. A study conducted upon elderly (aged 65-92 years) population, prevalence of hypothyroidism was found to be 14% (9.7% in males and 18.2% in females) and that of DM was

11.5% (12.1% in males and 11.1% in females). In the study, 74% of the diabetics the diagnosis was made after the age of 60 years. Sub-clinical hypothyroidism was detected in 38% of all the hypothyroid subjects. The findings suggested that diabetes mellitus and primary hypothyroidism are common disorders in elderly subjects [17].

The association between Type 2 diabetes mellitus and sub-clinical hypothyroidism is well recognized, with the reported prevalence in diabetes varying from 2.2 to 17% [15, 18]. In a hospital based study, in type 2 diabetes mellitus who had abnormal TSH levels, subclinical hypothyroidism was most common (48.3%), followed by subclinical hyperthyroidism (24.2%), hypothyroidism (23.1%) [19]. In another study conducted upon 420 adult type 2 diabetic women, the prevalence of subclinical hypothyroidism was found to be 8·6%. Authors concluded that, in women with type 2 diabetes without known thyroid disease, subclinical hypothyroidism is a common but incidental finding and the routine screening of thyroid function in type 2 diabetes is questionable [20].

This was a hospital based cross sectional study carried out to find out frequency of clinical and sub-clinical hypothyroidism in type 2 diabetic patients. Clinical and sub-clinical hypothyroidism defined by assessing FT4 and TSH level. Among the study subject (n=227), 67% (n=152) were female and 33% (n=75) were male. The mean age of the study subjects in years was 53.95±11.6 SD(.77 SE) and 95% CI(52.44-55.47). In a report, mean age of type 2 diabetic patients who underwent thyroid function tests was 66.7 years which is higher than this study population [21].

In a study, overall hospital frequency of hypothyroidism was 10.3%, (clinical hypothyroidism 4% and SCH 6.3%) [21]. In this study, the hospital frequency of overall hypothyroidism among the type 2 diabetic patients was 30.4%% (n=69) with SCH 17.6% (n=40) and 12.8% (n=29) with clinical hypothyroidism which is higher than previous study. The Fremantle Diabetes Study found a 8.6% prevalence of SCH among women with type 2 diabetes [8].

In this study, hypothyroid cases had FT4(pmol/L): 10.82±2.71 (.32) and (10.17-11.47) and TSH(uIU/ml): 9.16±1.11 (1.34) and (6.47-11.84) and euthyroid subject had FT4(pmol/L): 14.03±1.95 (.15) and (13.72-14.34) and TSH(uIU/ml): 1.91±1.03 (.08) and (1.75-2.08). Mean TSH in euthyroid and in SCH subjects were 1.34(.41-3.99) and 5.61(4.03-12.50) respectively in the study conducted by Chen et al. [21]. Other study variables were- age, BMI, SBP, DBP,Hb%, FBG, HbA1c%, serum creatinine, CCR, serum total cholesterol, TG, HDL and LDL.

So this study concluded that hypothyroidism associated with it among type 2 diabetic patients the frequency of hypothyroidism among the total diabetic subjects was 30.4% with SCH 17.6% (n=40) and 12.8% (n=29) with clinical hypothyroidism. Logistic analysis documented that 69 Hypothyroid subjects were significantly different from the 158 euthyroid subjects (sig. 0.000) when 14 variables namely age , BMI, systolic BP, diastolic BP, Hb, fasting blood glucose, HbA1c,FT4,TSH, CCR, Cholesterol, TG, HDL and LDL considered as co-varietes. Among the covariates of only thyroid hormones (T4 and TSH) had significant influence (sig. 0.000) on the grouping.

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Original Article

Submental intubation in oral maxillofacial surgery

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Abstract

Background: *Oral and maxillofacial surgical procedures present a unique set of problems for both the anaesthesists and the surgeons. Simultaneous access to the oral or nasal cavities and dental occlusion is required for the surgical treatment of some craniofacial deformities. Generally, airway is maintained by orotracheal or nasotracheal intubation and some instances by tracheostomy however, nasotracheal intubation is contraindicated in skull base or midface fracture. Tracheostomy has inherent complications ranging from surgical emphysema to disfiguration where as orotracheal route prevents free access to oral cavity. In these circumstances, submento-tracheal intubation may provide a better option to overcome these problems.*

Objective: *The aim of this study was to evaluate outcome of conversion of orotracheal route to submentotracheal route for surgical correction of maxillofacial trauma & deformity and time required to change from oral to submental route, accidental extubation, postoperative complications, and the healing of intraoral and submental scars were evaluated.*

Patients and Methods:

Method: *A total of 23 patients were selected from maxillofacial department of BSMMU and other institutions from December 2007 to March 2011 to use this technique. After standard orotracheal intubation, a 2 cm incision was made lateral to the midline in the submentum and a blunt dissection opposite to the skin incision on the lingual aspect of the mandible provides access to the floor of the mouth, the orotracheal tube is disconnected and pulled through the floor of the mouth then to the submental incision, the tube is then sutured to the skin. Surgery was completed without interference from flexometallic endotracheal tube. Following surgery the sequence is reversed and the patients extubated in the conventional manner.*

Results *The technique was used in 13 patients with multiple facial fractures & 10 patients with facial deformity. The mean age of the group was 30 (20-50) years .The submental orotracheal intubation was completed successfully in all patients. No accidental extubations or tube injuries occurred. The mean time required for intubation was 6 minutes. All patients were extubated in the operating theatre. The intraoral and submental accesses healed with minimal scarring in all patients .There were no incidence of intra- or postoperative complications related to submental intubation.*

Conclusions *Submental intubation is a simple, safe, and predictable approach without significant morbidity that facilated safe airway and enhances meticulous surgical procedure of fractured skull base and midface.*

Keywords *Airway management, Panfacial fractures, Orthognathic surgery, Submental intubation.*

(JBSA 2012; 25(1): 21-27)

Introduction

Corrections of fractured craniomaxillofacial skeleton usually involve open reduction and precise rigid fixation by the mini- and microplate osteosynthesis. An important consideration during surgical procedure is the maintenance of airway without interfering to the reconstruction of fractured segments. Essentially the anaesthesiologist and the surgeon are competing for the same space. The surgeon needs access to an unobstructed field; and in most instances for accurate functional reconstruction of facial fractures involving tooth-bearing segments of bone, a period of intraoperative Maxillomandibur fixation (MMF)

is essential to check for restoration of pretraumatic occlusion [1,2]. Wear facets must be carefully checked against the corresponding dental elements and the teeth brought into normal intercuspation in centric relation. It is not possible without bringing the dentition together. Intraoperative MMF generally precludes the use of an orotracheal tube. Therefore, in these type of injuries and patient requiring orthognathic surgery the mode of intubation is controversial, with many anaesthesiologists arguing against nasal intubation. Nasotracheal intubation prohibits the midfacial degloving approach for LeFort II, LeFort III, nasoseptal, naso-orbito-ethmoid complex fractures and in orthognathic surgeries. Naso-tracheal intubation is contraindicated in nasal fractures, fracture of cribriform plate of ethmoid, mid and pan-facial fractures where surgical reconstruction of fractures of the naso-orbital-ethmoidal complex is required [3].Furthermore, nasal intubation may lead to complications in cases of skull base fracture, with the risk of creating a communication between nasal cavity and anterior cranial fossa, causing brain damage, leakage of cerebrospinal fluid, and meningitis[4,5] while an orotracheal tube interferes with the maxillomandibular fixation, compromising the reduction and stabilization of fractured segment of the maxilla and mandible[6].In situations where maxillomandibular fixation is required and nasoendotracheal intubation is contraindicated, a cricothyrotomy or tracheostomy has been the traditional method of airway control [7].This procedure may involve a significant risk of iatrogenic complications such as tracheal stenosis, internal emphysema, damage to the laryngeal nerves, tracheoesophageal fistula and scarring [8,9]. An alternative to the classic methods is the submental route for tracheal intubation. The technique consists of diverting the proximal end of an orotracheal tube through the floor of the mouth and submental region. This allows free intraoperative access to the dental occlusion and nasal pyramid without endangering patients with skull base trauma, and at the same time avoids transtracheal dissection [10, 11, 12.] The objective of this study was to present the results of submental intubation in a case series of maxillofacial trauma and facial deformity patients and to evaluate the outcomes of this procedure for the anesthetic management of the patients.

Methods

This clinical study was conducted from October 2008 to March 2010. 15 male & 8 female patients of mean age 30 years (range, 20-50 years) who had midfacial fractures, including Le Fort I, II& III, along with naso-orbital ethmoidal (NOE), mandibular or panfacial fracture requiring surgical corrections and manipulation of both mandible & maxilla were selected for this study. The technique of submental intubation was adapted from the general principles published by Hernandez Altemir [11] The following variables was evaluated to assess the results of Altemir's intubation technique:

1) Time required for intubation
2) Accidental extubation
3) Postoperative complications (hemorrhage; injury to the sublingual glands, wharton's duct, or lingual nerve; orotracheal fistula; and infection) and
4) Healing of intraoral and submental scars.

The time required for submental intubation is the time from the fixation of the endotracheal tube after orotracheal intubation to the fixation of the endotracheal tube at submentum.

In addition, ages, sex, type of facial trauma were recorded. Patients with severe neurological damage, polytrauma and patients who need repeated operation anticipated were excluded from the study.

Intubation Technique

All the subjects were intubated orally either awake or after induction of general anaesthesia with a flexometallic cuffed endotracheal tube having an internal diameter of 7.0, 7.5 or 8.0. mm with a detachable connector. The oral part of the intubated endotracheal tube was pulled through the submental incision by the following steps.

After aseptic painting and draping of chin and mouth, 2% lignocaine with 1:100,000 adrenaline was infiltrated before skin incision was made in the paramedian plane of the submentum and about 1 cm from the lower mandibular margin.

A curved haemostat was passed to the floor of the mouth through the incision after piercing subcutaneous tissue, platysma, and deep cervical fascia mylohyoid muscle (Fig 1).

The tongue was lifted upward and pushed backward and the tip of the hemostat would visible just below the mucosa of the floor of the mouth, anterior to Wharton's duct papillae.

A blunt dissection of about 1.5 cm was made parallel to the gingival margin, at the junction of the attached lingual alveolar mucosa and the free mucosa of the floor of the mouth (Fig 2).

The breathing circuit was separated from the endotracheal tube and its connector to facilitate easy passage through the submental incision.

The proximal part of the intubated endotracheal tube was hold by the curved hemostat to bring it out from mouth cavity to the exterior through submental incision. During this step, endotracheal tube kept fixed in the trachea by anesthetist while surgeon pulls the free end of that endotracheal tube in to the submentam. Three minutes ventilation with 100% oxygen is mandatory to avoid hypoxaemia.

Finally endotracheal tube fixed by suture, connected to the breathing circuit and resume maintenance of anaesthesia as usual. And surgery started in an obstructed field where free access to the oral or nasal cavity and occlusal test could be preformed for precise functional correction of midface or skull base fracture.

It is important to ensure that the tube has not been displaced during its passage through the tunnel. The tube was reconnected and secured to the skin with 2-0 silk sutures in a similar fashion like drain tube (Fig 3). The tube should freely be movable for intraoral manipulation. A pharyngeal pack was then inserted to seal the pharynx from & debris during surgery. Anatomical reduction, pretraumatic occlusion (Fig 5) and rigid internal fixation of the maxillofacial fractures were achieved by using miniplates osteosynthesis. Facial deformity was corrected by osteotomy and fixed with mini & microplate.

Temporary maxillomandibular fixation was used in all cases to achieve optimal maxillomandibular occlusion.

Absence of nasotracheal tube allowed the reduction of naso-orbital ethmoidal (NOE) fractures to be completed easily without distorting nasal anatomy.

At the end of the surgery, the maxillomandibular fixation was released and submental intubation converted to oral intubation. The endotracheal tube was pulled back intraorally in the reverse order (first the flexometallic tube, then the pilot tube cuff). The submental skin incision was closed with interrupted prolene sutures and the intraoral incision left to heal secondarily. The patients were followed up on regular basis at 1 week, 1 month and 6 months. Assessment was based on postoperative morbidity in terms of function and aesthetics.

Results

Most of the facial injuries were a combination of fractures affecting the dental occlusion (mandibular, maxillary, and dentoalveolar) and fractures of the midface (involving the nose region). Patients' demographic and clinical data are presented in Table I. Submental orotracheal intubation was completed successfully in all 23 patients. In all the subjects, submental intubation allowed simultaneous treatment of all the fractures without changing the method of intubation and without any interference from the tube during the operation. There was no difficulty in passing the tube through the floor of mouth, and the total duration of submental intubation procedure ranged from 5 to 9 minutes (mean,6 minutes).

Disconnection of the standard connector from the tube was done easily. During this manoeuvre, there was no incidence of complications such as accidental extubation, exposure of the wires or loosening of the connector after re-attachment. Time period for disconnection from the ventilator ranged from 1 to 2 minutes (mean, 1.5 minutes), and there was no significant oxygen desaturation in any subject during the procedure. None of the subjects in the present study required postoperative ventilation. All 23 subjects were extubated in the operating theatre without postoperative-assisted ventilation.

Subjects were evaluated in the postoperative period at 1 week, 1 month and 6 months. No motor or sensory deficit was found. There was no complication regarding salivary gland or duct damage, Normal healing in the mucosa of the floor of the mouth was observed. No bleeding or infection in the area was noted. The scar has been well accepted by the subjects without any hypertrophic scarring or keloid.

Table I *Patients managed by submental intubation*

Age	Sex	Type of Patients
21	M	Class II open bite deformity
30	M	Mandible-Maxilla Le Fort III fracture
30	F	Mandible-Maxilla Le Fort II fracture
20	M	Facial asymmetry
40	M	Mandible- Maxilla Le Fort II-NOE* fracture
50	M	Pan facial fracture
24	F	Class III open bite deformity
22	F	Skeletal Class II malocclusion
35	F	Maxilla Le Fort II fracture
22	M	Facial Asymmetry
45	F	Mandible-Maxilla Le Fort III fracture
33	M	Pan facial fracture
26	M	Mandible-Maxilla Le Fort II-NOE* fracture
36	F	Le Fort II-NOE* fracture
23	F	Skeletal Class II malocclusion
48	M	Mandible- Maxilla-Nasal Bone fracture
20	F	Bi-Maxillary Proclination
42	M	Pan facial fracture
24	M	Mandible-Maxilla Le Fort II fracture
20	M	Skeletal Class III Malocclusion
35	M	Skeletal Class II Malocclusion
21	M	Class II Open bite deformity
23	M	Mandible-Maxilla Le Fort III fracture

*NOE- Naso ethmoid fracture

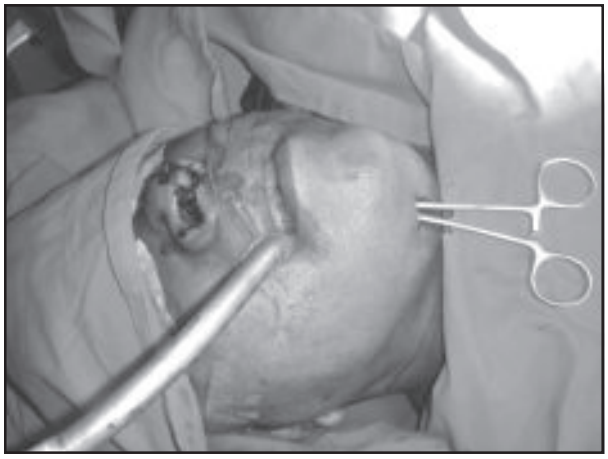

Fig 1 *Oral intubation and blunt dissection*

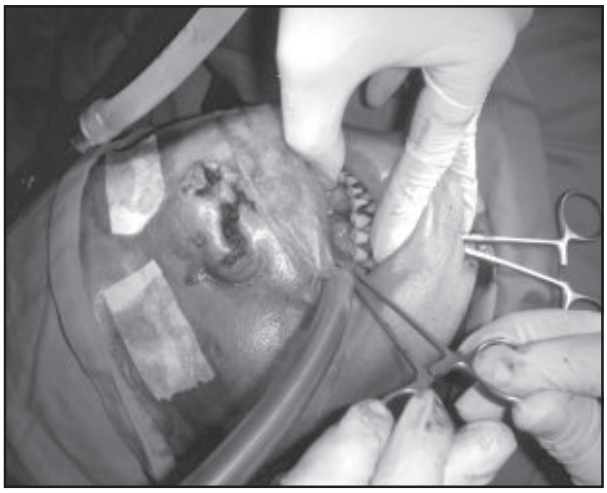

Fig 2 *Artery forcep in oral cavity*

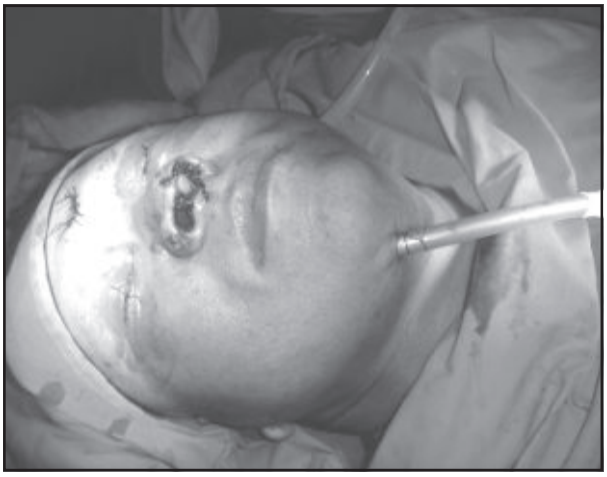

Fig 3 *Submental endotracheal tube in situ*

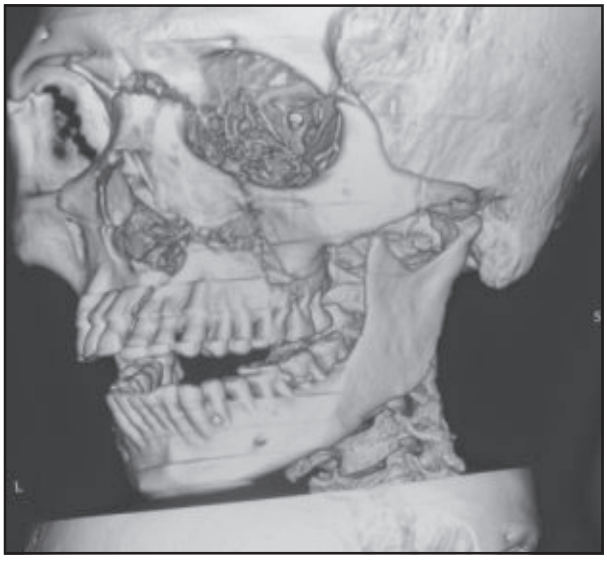

Fig 4 *3D CT scan of Midfacial Fracture*

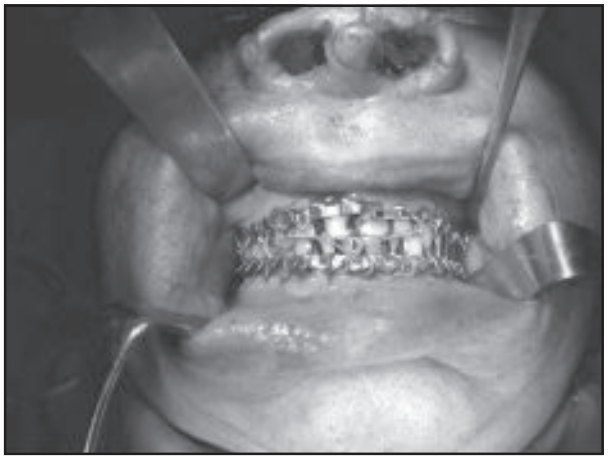

Fig 5 *Final occlusion after reduction*

Discussion

Maintaining safe airway is the primary concern during any maxillofacial surgery while unobscured freely accessible surgical field is necessary for accurate fixation of fractured facial skeleton. The alternative to orotracheal intubation significantly facilitates manoeuvres for reduction and stabilization of the jaws, which often requires immobilization with arch bars and wires. In orthognathic surgery oral intubations preclude checking occlusion during surgical procedure and nasal intubation distorts normal nasal anatomy. According to literature, retromolar intubation has been reported to have disadvantages like being more traumatic, obtrusive, costly and requiring more operating time[13]. Another alternative nasal tube switch technique was not performed due to problems associated with the intraoperative re-intubation, like risk of aspiration due to posterior nasal bleeding, potential airway compromise with need for emergency tracheostomy/ cricothyroidotomy, unfavorable manipulation of an unstable cervical spine, excessive stress on fixations with possible loosening of plates and screws [14].

Since the first description the submental intubation has undergone various modifications and found new indications [12] .The main changes in the original technique by Hernandez [11] was avoidance of subperiosteal dissection on the lingual aspect of the mandible. Injury to the important structures in the floor of the mouth could be avoided by careful supraperiosteal blunt dissection of the passage as close as possible to the inner side of the mandible. It could be safely used in patients with midfacial or panfacial fractures with possible base of skull fractures, as well as in patients undergoing elective Le Fort osteotomies or simultaneous elective mandibular orthognathic surgery and rhinoplasty procedure [15]. In our present series, submental intubations were possible in all the patients without any major complications, allowing unimpeded manipulation of the fractured fragments, satisfactory achievement of occlusion, establishment of maxillomandibular fixation and complete assessment of facial symmetry, as well as easy access to endotracheal tube for the anaesthesiologist. Average duration of technique was 6 minute. Moreover, extubation was found to be simple and took only 1,5 minutes(mean) and the cosmetic results were acceptable, with no long-term morbidity. In our series, no episodes of compromised airway or arterial desaturation occurred during the procedure. Other possible potential complications such as orocutaneous fistula, trauma to the submandibular and sublingual glands or canals, damage to the lingual nerve, and hypertrophic scar were also not observed. Antonio Figueiredo Caubi et al [16] in 2008 studied on submental intubation in oral & maxillofacial surgery and they also found the same result. In another study done by Federico Biglioli et al [17] in 2003 reported the same result except one case with superficial infection which is also consistent with our result. Another crucial decision during the management of patients with maxillofacial trauma is when to remove the endotracheal tube. Tracheal extubation of these patients must be done only after adequate evaluation. It is based on the patient's ability to maintain airway reflexes, the potential for residual respiratory depression, and airway edema. MacInnis and Baig [18] proposed a midline approach for submental intubation. We agree with other authors that this approach can traumatize the Wharton's ducts, interferes with attachment of the genioglossi and geniohyoid muscles,[19] and can cause injury to mandibular lingual perforating vessels, which are present in the midline in 98% of instances, [20] leading to bleeding and sublingual hematoma. We used a size 8 surgical glove finger covering the distal end of the tube, which facilitated tube passage through submental access and

protected from blood from entering. The present study reported excellent results with the use of submental endotracheal intubation for surgical treatment of 13 patients with panfacial fractures and 10 patients with facial deformity. In all cases, the planned surgery was completed without interference from the artificial airway and, most importantly, without compromising the airway. There are no incidence of complications related to submental intubation i.e. cuff leakage, infection or abscess in the wound and floor of the mouth, salivary fistula or mucocele, and hypertrophic scarring. All these complications are relatively rare and avoidable with meticulous technique.[19] Submental intubation is a simple, safe, effective technique and bears very low morbidity for maxillofacial trauma patients and is suitable to replace tracheostomy where long-term ventilation is not required.

So this study concluded that Submental intubation ensures comfortibility for the surgical team by keeping the artificial air way from the surgical field and by doing so; make the surgical field unobstructed. Submental intubation is a useful alternative to airway management in patients with pan facial fractures and deformity. It provides a safe and reliable route for the endotracheal intubation while staying away of the surgical field, therefore, permitting intraoperative checking of the dental occlusion. Moreover, it is easy to adapt for the anaesthetist and surgeon to transfer the orotracheal route to submentotracheal route. In addition it doesn't need any special equipment. The simplicity of the technique with no specialized equipment or technical expertise required and quicker execution makes it especially advantageous. This technique therefore, when used in appropriate cases, allows both the surgeon and the anesthetist deliver a better quality of patient care.

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Special Article

Outcome of general anaesthesia by laryngeal mask airway (LMA) in ophthalmic surgery in the national institute of ophthalmology and hospital, Dhaka

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Abstract:

Background *Patient is very safe under general anaesthesia with laryngeal mask airway intra and post operatively in ophthalmic surgery.*

Methods *Different ophthalmic procedures and surgery were done on different age group from five months to fifty years with ASA grade I and II under general anaesthesia by laryngeal mask airway (LMA) to see the haemodynamic status and other parameters during operation and post operative recovery period.*

Results *Total number of ophthalmic surgery under G/A was 1814. General anaesthesia by orothracheal intubation was given only in twenty five (25) patients and general aneasthesia was given by Laryngeal mask airway insertion in 1789 patients. Complications occur in Laryngeal mask airway group patients only in 8 patients. Percentage of safe LMA insertion was 99.55% and percentage of complication was only 0.45%. Operation time ranges from few minutes to two hours. General aneasthesia through laryngeal mask airway insertion make the procedures easy and safe for the patients except minimum percentage of complications.*

Conclusion *Laryngeal mask airway causes less changes of haemodynamic parameter. LMA is very effective in the spontaneously breathing patient. During operation patients become stable and no rise of intraocular pressure and on reverse the patient become smooth with less secretion, no spasm, no cough and no vomiting.*

Keywords: General anaesthesia, laryngeal mask airway, ophthalmic surgery, minimum complication, smooth reverse

(JBSA 2012; 25(1): 28-31)

Introduction

Different operations are being done on different ophthalmic patients of different age group in the National Institute of Ophthalmology and Hospital, Dhaka. Following the intubation by endotracheal tube, different hazards like difficulty of intubation, laryngeal spasm, secretion, vomiting, regurgitation, reversal hazard like laryngeal spasm, straining, coughing, excitement and delirium are the most common morbidities which need medical attention. But insertion of laryngeal mask airway of different sizes for different aged patient make the whole anaesthesia so easy, smooth and convenient and mostly complication free and need less drugs in cataract surgery and in other ophthalmic cases.

Total number of General anaesthesia was given from the month of October, 2008 to April, 2010 = 1814 (Total number of Patient).

Laryngeal Mask Airway (LMA) is a device[1] which is designed in 1981 by Archie Brain, a British Anaesthetist. It makes an airtight seal around the glottis (Occupies the entire hypopharynx).

Methods

We had done different ophthalmic procedures and surgery of different age group from five months to fifty years with ASA grade I and II under general

Fig 1 *Laryngeal Mask Airway.*

anaesthesia from the month of October, 2008 to April, 2010. Total number of surgery was 1814. Amongst them general anaesthesia by laryngeal mask airway insertion was 1789. Before going to operation pre-anaesthetic checkup was done. Patients with any co-existing diseases (like hypertension, diabetis, bronchial asthma, RTI etc) were being treated before operation by appropriate drugs. Premedication was not used. Insertion of laryngeal mask airway was done only by lubricating the devise with 2% lignocaine jelly without using laryngoscope.

Insertion and maintenance of anesthesia for smaller paediatric patients were done only with deep inhalational anaesthesia, I/V channel for longer operation must be maintained. Older children and adult patients need I/V induction agents like thiopental sodium or propofol for insertion of L.M.A and for maintenance small doses of muscle relaxants needed followed by inhalation of O_2, N_2O and halothane. Assisted ventilation or spontaneous ventilation was allowed to run operation. For smooth respiration or for deep anaesthesia adjuvant was used like fentanyl or pethidine, NSAID or small doses of diazepam and others. Reversal may not be needed. If muscle relaxant was used for longer time reversal drugs may be needed. Maximum time no need of suction during reverse. Only by making off the N_2O, halothane and put out the LMA by taking out air by holding face mask with O_2 for few minutes and made sure that the patient is taking spontaneous respiration with sufficient tidal volume and other parameters of the patient were normal like pulse, blood pressure, reflex, respond to command and others. Less anaesthetic is required to tolerate the LMA than endotracheal tube. The patient for short surgery with insertion of LMA may remain spontaneously ventilating with O_2, N_2O and halothane anaesthesia. Once the LMA is placed in situ respiration was supported initially by gentle manual ventilation and the patient allowed gradually to take over their own breathing. When using the LMA with IPPV reversal of neuromuscular block is best carried out under a continued level of anaesthesia. LMA was removed either in deep plane of anaesthesia or in awake condition either in supine or lateral position.

Result

Total number of surgery under general anaesthesia was 1814. Amongst them general anaesthesia by intubation was given only in twenty five (25) patients. General Anaesthesia by LMA insertion was 1789. Percentage of GA by endotracheal intubation was only 1.38% Percentage of G/A with LMA insertion was 98.62% Table-I. Complications occur only in 8 patients. Percentage of safe LMA insertion as 99.55% complication was only 0.45%. Three patients become cyanosed due to dislodgement of LMA, one patient become cyanosed due to respiratory tract infection, vomiting occured in three patients due to wrong information from patient party regarding empty stomach. Cardiac arrest occured in one patient. But patient was managed properly and recovery was good. Although the operation time was few minutes to two hours, G/A through laryngeal mask airway (LMA) insertion make the procedures easy and safe for the patient except minimum percentage of complications. There was no complication in adult patients. Pulse, Blood pressure, respiratory rate and Oxygen saturation were normal in the adult group of patients. 40.46% patents were in paediatric group. Few percentage of complication occured only in the paediatric group of patients.

Table I

	Number of Patient	Percentage
General Anaesthesia by endotrachial tube intubation	25	1.38%
General Anaesthesia with larygeal mask airway (LMA) insertion	1789	98.62%

Table II

Parameter of paediatric patient

Age	Number of Patients	Pulse	IOP (mmllg)	Vomiting	Respiratory Spasm	Reverse
1 month to	342	140 +20	10 – 15	Occur only in	Cyanosis occur	
1 ½ Years		(Cardiac arrest occur in 1 patient)	3 patients	in 4 patients	Good	
2 years to 5 ½ Years	235	120 + 20	10 – 15	No	No	Good
6 years to 12 Years	147	100 + 20	10 – 15	No	No	Good

Different parameters of cataract surgery of pediatric group of patents under LMA insertion from the month of October' 2008 to April, 2010 in NIO&H, Dhaka

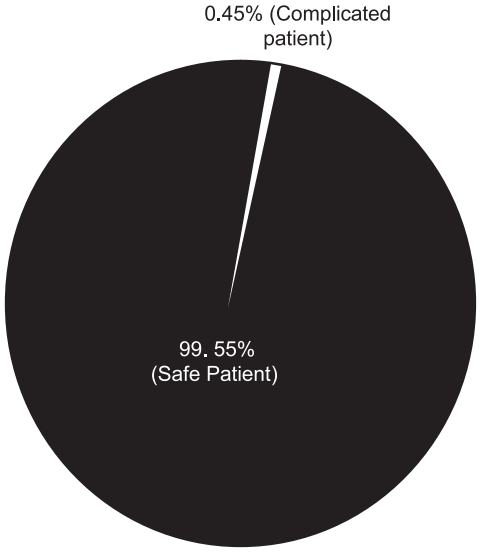

Fig 2 *Percentage of safe and complicated Patients under general anaesthesia by L.M.A Insertion*

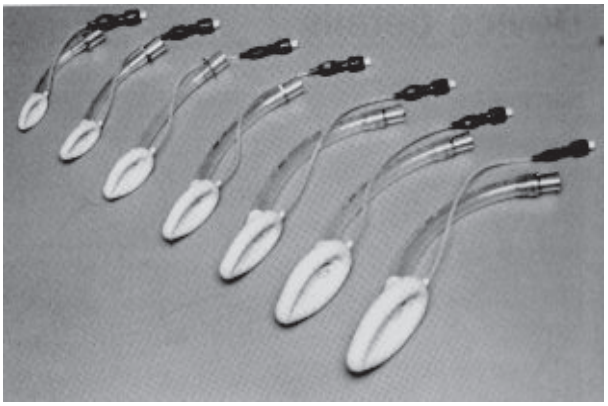

Fig 3 *Different sizes[2] of Laryngeal Mask Airway.*

Discussion:

The LMA provides[3] an alternative to ventilation through a face mask or endotracheal tube. Because it is not placed in the trachea, use of an LMA is associated with less bronchospasm than an endotracheal tube. Insertion of LMA is very easy and success rate is 95-99% in case of patients with difficult airways. The LMA partially protects the larynx from pharyngeal secretions (but not gastric regurgitation) and it should remain in place until the patient has regains airway reflexes. haemodynamic stability[4] is an integral and essential goal of any anaesthetic management plan but haemodynamic changes during intubation especially in case of heart disease and hypertension, increase of IOP and ICP are a great problem for anaesthesiologist and patient. So, the anaesthesiologist always try to reduce these haemodynamic changes by applying methods or drugs. Many drugs have been suggested in modifying haemodynamic responses to laryngoscopic intubation. This may prolong recovery time and may lead to cardiovascular complications. We observe that LMA insertion has no significant haemodynamic effect. There is no use of laryngoscope. Small amount of drugs are needed. Only by using fingers we can insert it. LMA removal too does not change haemodynamic parameter significantly. After LMA insertion there is no significant change on heart rate, systolic blood pressure, diastolic blood pressure, no rise of intraocular pressure during operation. Patient can be put in spontanious respiration for short term procedure or IPPV with muscle relaxant (small

amount) can be done for a longer procedure. The larynx has the greatest afferent nerve[5] supply of all the airways being largely supplied by fibers from the internal branch of the superior laryngeal nerve. Reflex responses to a number of mechanical and chemical stimuli are also mediated by the superior laryngeal nerve and leads to sympathetic stimulation and rises blood pressure and heart rate. Laryngoscopy and subsequent tracheal intubation are associated with a 25-50% rise in blood pressure and a similar increase in heart rate. Insertion of the LMA is associated with only a 0-20% rise in blood pressure and heart rate in both adults and children. Sympathetic responses due to laryngoscopy and intubation cause a 25% in intraocular pressure (IOP) compared with only 5-10% for the LMA when anesthesia is induced with thiopental and halothane. But when propofol is used in patient with normal eyes or in patient with glucoma no rise of IOP occur.

We can conclude that LMA insertion causes less changes of haemodynamic parameter. The LMA is very effective[6] in maintaining airway in the spontaneously breathing patient. The mask is not suitable for patients who are at risk from regurgitation of gastric contents. During operation patients become stable and no rise of intraocular pressure. On reverse the patient become smooth with less secretion, no spasm, no cough and no vomiting. So, under general anaesthesia by LMA insertion in opthalmic surgery especially in glaucoma, cataract surgery, corneal injury and other ophthalmic procedures, patients are safe and complication free.

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Review Article

Ozone disc nucleolysis as an alternative to open disc surgery for slip disc

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Abstract

Back pain associated with herniated disks has become an important and increasing general health problem, both in Bangladesh and across the world. After all methods of conservative treatment have been exhausted, nucleolysis may be a minimally invasive alternative to surgery. In nucleolysis, chondrolytic substances, or other substances which reduce the pressure within the disk by other means, are injected into the nucleus pulposus under CT or C-arm guidance. Among various substances, which have been employed for nucleolysis, an ozone-oxygen mixture appears to be very promising. The water-binding capacity of ozone results in a reduction of pain. Moreover, it has an anti-inflammatory effects and results in an increase of perfusion to the affected area. Ozone is converted into pure oxygen in the body and has a low allergic potential. Recent minimally invasive therapeutic methods such as percutaneous nucleotomy or laser treatment have not been shown to result in superior results compared with ozone nucleolysis.

Key words: Ozone, disc prolapsed, pain management

(JBSA 2012; 25(1): 32-35)

Introduction

Studies as early as 1934 drew attention to the role of herniated nucleus pulposus as an important cause of low back and leg pain.[1] Apart from conservative therapy, all other forms of treatment aim at decompressing the nerve roots, which are the cause of the patient's discomfort. These can be done by taking the disc out by surgery or by decompressing the foramen and disc by different interventions. The various treatment options have confused clinicians due to significant failure rate associated with different kinds of surgeries as well as with different interventions. Outcome studies of lumbar disc surgeries document a success rate between 49% to 95%.[2] Good to very good results are achieved in over 90 % in patients with simple, acute disc herniation, and in more complicated cases it is achieved 80 to 85 % of the time.

Traditional open back Surgery for slip disc

In traditional open back surgery, a five- to six-inches incision may be needed in order to see the affected nerve root. In creating such a sizeable incision, a large area of muscle also has to be cut to make an opening of three to five centimeters, leading to risks of substantial blood loss.

Complications of back surgery also include the use of general anesthesia, which, depending on age and overall health, could be a significant risk factor. In addition to the invasiveness of the surgery, back surgery side effects that need to be considered are the length of the stay in the hospital, the painful weeks/months of recuperation time, the heavy use of pain medications afterwards, and the time you will have to spend away from work.

Another important complication after back surgery is the likelihood of scar tissue formation. In many cases, the amount of back surgery scar tissue formation leads to additional spine conditions, which could eventually lead the patient to need another surgical procedure. Unfortunately, there is 60% success rate of full recovery of symptoms with open back surgery. This poor success rate

appears to be due to complications from back surgery.

Scar tissue formation caused by back surgery can be extremely painful, limit mobility and flexibility, and greatly diminish quality of life. Extensive scar tissue build-up is typically associated with the long incisions and other tissue damage experienced during traditional open-back surgery. While scar tissue itself is typically not painful, excessive formation of scar tissue can trigger pain if it binds to or impinges on nerve roots.

Patients with failed back surgery often live in significant pain and disability. This is a loop in which patients are caught: good pain relief brings the illusion of improved physical ability. But for many patients with failed back surgery, after a brief honeymoon period, pain, spasm, and weakness reappear at a low activity level. Although the nerve roots were not damaged directly by the failed back surgeries, the nerves are now encased in a web of scar tissue, which causes pain and spasm every time there are movements of the spine and legs.

Reasons for failure of surgery

Causes of failed back surgery for herniated nucleus pulposis includes: Dural fibrosis, arachnoidal adhesions, muscle & fascial fibrosis, mechanical instability resulting from the partial removal of bony and ligamentous structures required for surgical exposure and decompression leading to facet & sacro-iliac joint dysfunctions, radiculopathy and recurrent disc herniation.

Newer ozone disc nucleolysis

Without the necessity of a surgical procedure, disc herniations can be treated with a minimally-invasive procedure using ozone. Muto suggested intradiscal injection of ozone for disc hernia in 1998 under CT guidance, and Leonardi popularized fluoroscopy guided ozone injection into the intervertebral disc[13]. Ozone modifies the core of the intervertebral disc in such a way that the disc herniation resolves. The treatment is carried out under local anaesthesia, and ozone is introduced through a fine needle into the intervertebral disc without the need to open the spinal canal. The micro-therapy is carried out under the precise guidance afforded by computed tomography or C arm. Under a skilled practitioner's hand, scar formation is minimal or non-existant. The procedure takes between 20 and 30 minutes. A hospital stay and postoperative physiotherapy are not necessary.

How does ozone nucleolysis work?

The effects of ozone therapy are due to the action of active, free radical oxygen atoms being liberated during the breakdown of ozone molecules, a process which occurs within the nucleus pulposis. In the disc, this oxygen free radical (also called the singlet oxygen) attaches to the proteo-glycan bridges in the jelly-like material of the nucleus pulposus[13]. This results in the destruction of these proteoglycan bridges. Water is released from the breakdown of this matrix, which casues the disc to solidify and shrink back into the annulus fibrosis[13]. The result is the decompression of nerve roots, and the elimination of radicular pain.

Other positive effects have been attributed to ozone nucleolysis. It has been suggested to have an anti-inflammatory action due to inhibitions on the formation of inflammation-producing substances[15]. In addition, as the anatomy of the disc changes, tissue oxygenation may increased[15]. All these effects would have a positive impact on the extent of nucleus puplosis damage, as well as the amount of pain experienced by the patient.

Indications of ozone nucleolysis

Ozone nucleolysis may be done in most disc-related pain. The following are possible situations in which this therapy may be efficacious. It can be done in degenerated disc without any prolapse or nerve root irritation. This category is called discogenic back pain, or back pain due to internal disc disruption. Axial dull ache in the low back which increases with the flexion of the spine is the main clinical feature. Leg pain is not a feature, and there should not be any dermatomal pattern of radiation. Provocative discogram should be performed for diagnosis. Positive discogram (provocation of similar pain more than 7/10 at a pressure below 15 psi) proves the presence of sensitized nociceptors and suggests that ozone therapy may be efficacious. It can be done in contained disc prolapse or disc bulge with root irritation. It may be done in non-contained disc (extruded or sequestrated disc).

Contraindications of ozone nucleolysis

There are few conditions when ozone therapy should not be performed. These are active bleeding from any site, pregnancy, G6PD deficiency, active hyperthyroidism, loss of control of urination & defecation, and progressive sensory & motor loss

Complications

Complications of ozone therapy are very rare. They include post-procedural muscle spasm, burning pain (which is transient), and discitis (very rare due to the bactericidal effect of ozone). Other complications are similar to a discographic procedure. On the other hand, surgical discectomy has much higher side effects compared to remarkably few side effects of ozone discectomy. Ozone therapy is usually a day procedure and general anesthesia is not usually required. Ozone therapy is gaining popularity in different countries, including India, due to low cost, shorter hospital stays, less post-procedural discomfort, and good side effect profile.

Comparative studies

There has been surge of interest in search of safer alternative methods of decompressing the nerve roots while maintaining the structural stability. Epidural steroid injection, transforaminal epidural procedures has a high success rate (up to 84%) but chances of recurrences are also high.[5-7] Chemonucleolysis using chymopapain has moderate success rate (approximately 66% at one year).[8,9] It has also the chances of anaphylaxis following intradiscal chymopapain injection**.**

Injection of ozone for discogenic radiculopathy (low back pain with radiation to legs) has developed as an alternative to chemonucleolysis and disc surgery. Bonetti et al. also reported excellent results in 74.4% patients after six months.[10] Andruela et. Al. had similar results (70.3% at 6 months). Lu et al. showed "excellent" or "good" results of over 90%. However, ozone disc nucleolysis is a fairly new technology, and there are few (if any) randomized, controlled trials concerning this procedure. Further clinical research will be required to elucidate its efficacy. On an anecdotal level, however, ozone disc nucleolysis (performed by the first author on this article) has lead to significantly improved pain and function in a number of patients in Bangladesh, and improved results have been tracked over many months. In addition, the relatively low cost of the technology means that it can be purchased and used in areas of poor financial resources, such as hospitals in the developing world.

Owing to its fairly high success rate, less invasiveness, and remarkably fewer side effects, ozone therapy for slip disc is becoming very popular in certain areas.[11-13] After that, successful outcomes of ozone therapy have been reported from various European centers. It is very important to note from those reports that complications of ozone therapy are remarkably rare.

Conclusion

Ozone nucleolysis is a new procedure which offers the promise of excellent pain relief and the avoidance of surgery in patients with prolapsed nucleus pulposus. In addition, it has the benefits of being a safe, cheap procedure which does not require highly expensive equipment. For these reasons, it appears to be an excellent option in the setting of Bangladesh, where the practice of pain management is still in its infancy.

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Case Report

Management of a post hypophysectomy patient undergoing CABG - A case report

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Abstract

A 56 yrs old male patient of 96 kg, with ASA physical status-III, a known case of Diabetes mellitus, hypertension & acromegaly (s/p hypophysectomy) was admitted in Ibrahim Cardiac Hospital Research Institute (ICHRI) with the history of severe chest pain (compressive) associated with nausea and sweating in cardiology ward. He was diagnosed as a case of NSTEMI. He was treated medically and after stabilization his CAG was done which revealed CAD (TVD) & transferred to cardiac surgery unit for CABG.

(JBSA 2012; 25(1): 36-38)

Introduction

Acromegaly was first described by Saucerotte in 1801 and by Pierre Marie in 1886. It is seen in both men and women and occurs most frequently in the middle age. It is uncommon, with an estimated prevalence of 50-60 cases per million and an incidence of 3 to 4 cases per million per year[1]. And, acromegaly patient with history of hypophysectomy undergoing CABG is very rare. Acromegaly is characterized by thickening of the subcutaneous tissues of the scalp, lips, tongue, face, hands, feet, overgrowth of the frontal sinuses, jaw and distal phalanges. The soft tissue and bony changes develop slowly over decades. There is also overgrowth of hair and sebaceous glands. But, this disorder is more than cosmetically disfiguring and may involve nearly all the systems. The patients often complain of weakness and tiredness. Asthenia causes slackening of ligaments with kyphosis, scoliosis and occasionally lordosis, so that the enlarged hands hang below the knees. This combined with the atavistic appearance produced by the beetling brows, prognathous jaw, and overgrowth of hair on the chest, produces the 'ape man' of the circus[2]. The acromegalic involvement of the upper airway is the prime cause of concern for the anaesthesiologist. It occurs due to overgrowth of the upper airway, increased length of the mandible, epiglottis and cords[3]. Polypoid masses in pharynx makes them prone for sleep apnea, which can be central, obstructive or mixed. In addition, laryngeal stenosis and cricoid narrowing is often present. The basal metabolic rate is high. Most individuals have neurological and musculoskeletal symptoms, including headache, nerve entrapment and paraesthesia (often due to carpal tunnel syndrome), muscle weakness and arthralgia. The cartilage hypertrophy and osseous overgrowth often leads to degenerative arthritis, or even spinal stenosis[4].

Case report

He was diabetic for last 23 yrs and was on oral hypoglycemic agent (dimerol) & was on oral anti-hypertensive drug. He was also diagnosed as a case of acromegaly secondary to pituitary adenoma on 1993 with bitemporal hemianopia & bilateral loss of olfactory function. His pituitary adenoma was operated on 30/09/1993 through transsphenoidal approach in the Aga Khan University Hospital, Karachi. After hypophysectomy, he regain his olfaction & vision. He had history of right ulnar fracture 2 yrs back (2005) and was known hypersensitive to penicillin, tetracycline, sulphonamide, β-lactum group cephalosporin & doxicycline. He was on long standing steroids &

thyroxine. On hospital he was on glycerine trinitrate, ACE inhibitor, atorvastatine, omeprazole & injectable short acting insulin. An endocrinologist was consulted pre-operatively and his advice was to check blood glucose, electrolyte, fasting lipid profile & serum cortisol & thyroxin level. The morning dose of thyroxin & steroid was increased on the day of surgery.

His Chest X-ray & other laboratory Investigations were within normal limit. ECG finding was anterolateral old MI. Echo revealed- Aortic sclerosis, asymmetrical septal hypertrophy, mid segment of anterior & inferior septum, apical segment of interventricular septum were hypokinetic, mild mitral regurgitation, LVEF 50%. Basal cortisol level 36.74nmol/L, FT4- 14.64 pmol/L, TSH- 0.34μIU/ml. Duplex study of arterial & venous system of lower limb were normal. Carotid duplex imazing showed- heterogenous calcified plaque situated in right carotid bifurcation (20-30% ICA, 10-15% ECA) & in left carotid bifurcation (10-15% ICA, 20-30% ECA).

The patient underwent CABG on 13/01/2007. Induction of anesthesia was done by thiopental sodium 200mg & fentanyl 500μgm. Orotracheal intubation was performed by pancuronium bromide 10mg & anesthesia was maintained with 50% oxygen in 50% air with halothane (0.5%). Morphine 9mg was given before skin incision. The patient went on cardiopulmonary bypass 2hrs after induction. During bypass fentanyl 50μgm & pancuronium 2mg was given on pump. The patient went back from pump smoothly 3hrs after induction. Time taken from off bypass to the transfer of patient to ICU was 55minutes. During this period 2 doses of fentanyl 50 μgm was given 30 minutes apart & propofol continued at 25-30 μgm/kg/min.

From induction of anesthesia upto the transfer to ICU it was a period of 4hrs. On arrival in ICU, patient was haemodynamically stable with moderate inotropic support. The patient was extubated two & half hours after shifting in ICU with mild to moderate inotropic support. Doses of inotropic support was tapered gradually. Pethedine 25mg IV was given for analgesia. ABG was corrected accordingly & tight glycemic control was maintained using short acting insulin. Patient was haemodynamically stable post-operatively. Normal diet was allowed from first post operative day & use of Spirometry was encouraged. Chest drain was removed & routine medication (thyroxine, hydrocortisone, digoxin & antibiotic) was started from 1st post operative day morning. For analgesia tramadol hydrochloride 50mg orally was given in 1st post operative day & paracetamol 1gm TDS continued for subsequent days. On 3rd POD he was shifted to general ward & on 5th POD was transferred to BIRDEM for endocrine evaluation. From there, he was discharged for home on 7th POD.

Discussion

Acromegaly is a chronic, insidious, debilitating disease, which occurs due to acidophillic, or chromophobe adenoma of the pituitary resulting in excess secretion of growth hormone in an adult[5]. These patients often have multi system involvement including respiratory, neuroendocrine, neuromuscular and skeletal systems. Anaesthetic implication of this disorder is particularly significant in terms of changes in the upper airway and increased chances of pulmonary and cardiovascular complications[6]. Acromegaly patient with history of hypophysectomy undergoing coronary artery bypass grafting (CABG) is very rare and seeks extra attention for complex multi system involvement of two different disease pathology.

Cardiac complication in acromegaly patients is well described[7-9]. Acromegaly usually involves cardiac tissue and can occur with coexisting hypertension. The incidence and severity of cardiac hypertrophy relates to the duration of the disease. Cardiomegaly was found to be disproportionateto the other organ hypertrophy. There is little evidence to support that there is accelerated atherosclerosis in this population. Oversecretion of GH with acromegaly produces resistence to the effects of insulin, which leads to glucose intolerance. This was noted in our patient, with blood sugar concentration being significantly higher. This is important, as hyperglycemia worsen some type of cerebral ischaemia[10]. Our patient was on short acting insulin and a tight glycemic control was ensured per & postoperatively. Once it is suspected, ideally, advance tests like basal or random growth hormone (GH) assay should be employed to confirm the diagnosis. GH concentration are

measured and failure of hormone concentration to decrease 1-2 hours after the ingestion of 75-100g of glucose is presumptive evidence of acromegaly. This patient was on thyroxine & steroid replacement therapy pre-operatively and continued after surgery. According to Agastas, systemic involvement should always be kept in mind while giving anaesthesia to these patients. Hypertension occurs in 1/3 cases, half of which have increased left ventricular mass or left ventricular wall thickness. Although, it is not established, whether cardiomyopathy occurs, acromegalics may develop congestive cardiac failure in the absence of another known underlying heart disease[11].

Management of anaesthesia for these patients is to be considered in the backdrop of safety and appropriateness as also available logistic and infrastructural support. Effort was to minimize mechanical trauma to the upper airway and vocal cords, as additional edema would have resulted in more postoperative edema. Etomidate inhibits the synthesis of cortisol transiently should be avoided. There is also no evidence that hemodynamic instability or alteration in pulmonary gas exchange accompany anesthesia in acromegalic patients.

Concluded, no specific anesthetic technique is recommended for acromegalic patient undergoing CABG. In acromegalic patients airway difficulty occur most frequently. Severe haemodynamic instability do not typically occur during surgery. Pulmonary gas exchange was not altered during surgery; glucose intolerance may be an intraoperative problem and fluid regulation may be altered. These patients should be managed aggressively with invasive monitoring , intravenous corticosteroids, and fluid electrolyte resuscitation. Minimum doses of anesthetic agents and drugs are recommended since myocardial depression and skeletal muscle weakness are frequently part of clinical scenario.

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Original Article

Role of intravenous esmolol and lignocaine for attenuation of stress response in tracheal intubation-A comparative study

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Abstract

Background*: Endotracheal intubation is an essential part of safe airway management but this is stimulates the patient's airway reflexes and predictably lead to haemodynamic derangement. Many drugs have been suggested in modifying in haemodynamic responses to laryngoscopic intubation.*

Objective: *To compare the effects of esmolol with that of lignocaine to attenuate the detrimental rise in heart rate and blood pressure during laryngoscopy and tracheal intubation.*

Methods: *A total number of 120 patients ASA grade I & II were selected randomly as per inclusion and exclusion criteria in two groups. 60 patients in each group. In group-L received lignocaine 1.5 mg/kg in the volume of 10 ml (with distil water) and group-E received esmolol 1.5 mg/kg l.V. slowly. Both of these drugs were given slowly within 15-20 second in same volume (10 ml) just 3 min before intubation. The same cardiovascular parameters have been recorded at 1 minute intervals for a total of 10 minutes after intubation.*

Result: *The mean heart rate, systolic, diastolic, and mean blood pressure, and rate-pressure product before starting anesthesia were similar in group-L (lignocaine group) and in group-E (esmolol group) ($p>0.05$). The mean values of heart rate, systolic, diastolic, and mean blood pressure, and rate-pressure product at 2, 3 and 4 minutes after intubation were significantly lower in group-E than group-L ($p<0.05$).*

Conclusion: *Esmolol (1.5 mg/kg) is superior to lingocaine (1.5 mg/kg) for attenuation of haemodynamic response to laryngoscopy and endotracheal intubation.*

Keywords: *esmolol,lignocaine,laryngoscope,endotracheal, intubation.*

(JBSA 2012; 25(1): ....)

Introduction

Safe airway management is an essential skill for an anaesthesiologist. Laryngoscopy and endotracheal intubation are required to control and maintain a safe airway. Haemodynamic stability is an integral and essential goal of any anaesthetic management plan. Hypertension and tachycardia have been reported since 1950 during intubation under light anaesthesia complicated by hypoxia, hypercapnia or cough[13-14]. Laryngoscopy and intubation can cause striking changes in haemodynamic[2-3]. Increase in blood pressure and heart rate occur most commonly from reflex sympathetic response to laryngotracheal stimulation, which in turn leads to increase plasma norepinephrmne concentration[15]. Endorphin release also occurs on intubation. These reflexes are of little significance in healthy patients but these changes may be fatal in patients with heart diseases and high blood pressure. Sudden death has also been reported[16].

Many attempts have been made in modifying these haemodynamic responses e.g. premedication, deep anaesthesia, topical anaesthesia, use of ganglion

blockers, beta blockers[16], antihypertensive agents like phentolamine[17], vasodilators magnesium etc. Sodium nitropruside and nitroglycerine[18] are effective but require continuous intra-arterial blood pressure monitoring. Ca-channel blockers are also preferred because myocardial depression produced by it is minimized by reduction in afterload so that cardiac output remains unchanged, but they have no effect on increase in heart rate[19-20].But unfortunately none of these pharmacological interventions can consistently and effectively attenuate these adverse responses and associated with lot of complications. Comparison of anaesthetic technique to determine which drugs is more potent to attenuate or prevent harmful cardiovascular responses due to laryngoscopy and intubation requires beat-to-beat measurement of cardiovascular parameters. Moreover, it is important to realize that patients have interpersonal variations in their individual responses to anaesthetic drugs.

Various studies have been shown that intravenous Lignocaine administration prior to induction of anaesthesia is effective in preventing or attenuating the arterial hypertension and tachycardia in response to endotracheal intubation[21-22]. A few publications have shown the lack of effect of intravenous lignocaine on haemodynamic response[23-25].

Esmolol is effective in attenuating sympathetic responses to laryngoscopy and intubation[26], to sternotomy and to emergence from anaesthesia and extubtion[27]. It has been claimed to be more effective than sodium nitroprusside in controlling postoperative hypertension following coronary artery surgery, causing less of a fall in diastolic pressure. There is also a reduction in heart rate (nitroprusside tending to cause a reflex tachycardia) and minimal effects on PaO_2 and oxygen saturation[28]. Esmolol is potentially safer to use than longer-acting antagonist in critically ill patient who require â -adrenoceptor antagonists[29].

Comparison of anaesthetic technique to determine which drug is more potent to attenuate or prevent harmful cardiovascular response due to laryngoscopy and intubation requires beat to beat measurement of cardio vascular parameters. Moreover, it is important to realise that each patient have interpersonal variation in response to anaesthetic drugs.

Methods

After obtaining the informed consent of the patient, this single blind prospective study was carried out. The patients were explained in details about the procedure, benefits and complications of the study on the preoperative day. The study was approved by the ethical committee. 120 patients of ASA class I & II was selected as per inclusion and exclusion criteria. The patient was divided into 2 (two) groups, 60 (sixty) in each group. Each patient was given cards to take any one blindly from two groups. Both groups were treated with tab. diazepum 5 mg orally at night before operation. In both the groups after arrival at the operation theater, base-line parameters like heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) measured non-invasively by sphygmomanometer. Rate pressure product (RPP) was also calculated. The same parameters recorded during pre-oxygenation and before induction of anaesthesia as control value. Then premedication was given with midazolam 0.1 mg/kg intravenously. After 5 (five) minutes of premedication the patient was induced with thiopentone (25%) 5 mg/kg I.V. Then the group--L patient received lignocaine 1.5 mg/kg in the volume of 10 ml and group-E patients received esmolol 1.5 mg/kg l.V. slowly. Both of this drug was given slowly. Vecuronium bromide 0.1mg/kg was given for intubation. Intubation condition assessed clinically. After 3 minutes of injection esmolol or lignocaine endotracheal intubation was done with the aid of standard Macintosh laryngoscope blade. Patient of both groups was maintained with 30% O_2, 70% N_2O and 0.5% halothane. The same cardiovascular parameters recorded at 1 minute interval for a total of 10 minutes after intubation. All relevant data collected from each patient by a pre designed datasheet. Heart rate and blood pressure in each minutes for the 10 minutes after intubation was recorded. Time span around intubation up to 4 minutes was looked specifically to isolate the effect of the study drugs at the time of intubation. Data was analyzed by computer-based statistical program SPSS (Statistical Package for Social Science) for Window (version 12). Results have been expressed as

frequency, percentage, and mean SD. For statistical analysis Student's-'t' test has been used for comparing means of quantitative data and chi-square test has been used for qualitative data. Differences are considered statistically significant if $p<0.05$ (Cl-95%).

Results

Observation of the present study was analyzed in the light of comparison among the subject groups. The mean age of Group-L was higher (32.42±11.35 years) than that of group-E (32.1±11.77 years) although the difference did not reach the level of significance (p= 0.881). The mean weight of the subjects of two groups were almost homogenous (p=.359). The groups were also homogenous in terms of sex distribution and ASA class (p=0.092, p=0.729 respectively).

Table I

Demographic characteristics in two groups

Demographic characteristics	Group -E (n=60)	Group-L (n=60)	P value
Age (yrs)	32.42±11.35	32.1±11.77	0.881
Weight (kg)	51.34±8.41	49.88±8.8	0.359
Sex (M:F)	28/32	19/41	0.092
ASA class(I:II)	55/5	56/4	0.729

Data were presented as mean ±SD and were analyzed by Student's 't' test. Data were presented as ratio and were analyzed with the help of Pearson chi- square ($\times^2$) test.

Table II

Heart rate changes in two groups

Heart rate (Beat/minute)	Group -E (n=60)	Group-L (n=60)	P value
Before starting anesthesia	79.03±8.97	80.40±7.92	.378
2minute after intubation	90.90±8.11	94.93±8.47	.012
3 minute after intubation	85.10±9.13	89.77±7.22	.012
4 minute after intubation	82.70±8.64	87.03±6.58	.002

Values are expressed as mean±SD. Data are analyzed by student's 't' test.

Table III

Systolic blood pressure changes in two groups

Systolic blood pressure (mmHg)	Group –E (n=60)	Group-L (n=60)	P value
Before starting anesthesia	117.92±10.55	115.58±9.53	.206
2 minute after intubation	127.92±10.55	133.67±8.18	<.01
3 minute after intubation	123.08±10.58	128.83±8.15	<.01
4 minute after intubation	117.83±10.39	123.67±8.28	<.01

Values are expressed as mean±SD. Data are analyzed by Student's 't' test.

Table IV

Diastolic blood pressure changes in two groups

	Group –E (n=60)	Group-L (n=60)	P value
Before starting anesthesia	74.92±6.80	74.00±6.10	.468
2 minute after intubation	89.50±6.55	93.33±6.68	<.01
3 minute after intubation	84.916±6.79554	88.67±7.06	<.01
4 minute after intubation	79.08±6.54	83.08±6.32	<.01

Values are expressed as mean±SD. Data are analyzed by Student's 't' test.

Table V

Mean arterial pressure changes in two groups

Mean arterial pressure (mmHg)	Group –E (n=60)	Group-L (n=60)	P value
Before starting anesthesia	89.25±7.04	87.86±7.15	.286
2 minute after intubation	102.31±6.90	106.78±6.46	<.001
3 minute after intubation	97.64±7.05	102.06±6.70	<.01
4 minute after intubation	92.00±6.87	96.61±6.21	<.001

Values are expressed as mean±SD. Data are analyzed by Student's 't' test.·

Table-VI

Rate pressure product changes in two groups

Rate pressure product (RPP)	Group –E (n=60)	Group-L (n=60)	P value
Before starting anesthesia	7077.50±1141.93	7070.11±952.10	.969
2 minute after intubation	9317.94±1186.18	10136.50±1189.78	<.001
3 minute after intubation	8322.06±1163.17	9164.72±980.94	<.001
4 minute after intubation	7623.78±1085.42	8412.00±865.92	<.001

Values are expressed as mean±SD. Data are analyzed by Student's 't' test. ·

Discussion

Laryngoscopy and endotracheal intubation can cause striking changes in haemodynamic and intracranial pressure probably as a result of intense sympathetic nervous system stimulation[16]. In patients who are at risk of developing increased intracranial pressure, arterial hypertension, myocardial ischemia, these changes may be life threatening. They may lead to cerebral haemorrhage, left ventricular failure and life threatening cardiac arrhythmias. Various techniques were tried to attenuate these cardiovascular responses, one of them being deep inhalational anaesthesia which may cause intracranial hypertension. The other technique being the administration of a large dose of thiopental sodium which can effectively prevent arterial and intracranial hypertension but in which case there is a risk of severe cardiac depression. Potent vasodilator drugs need larger doses to attenuate arterial blood pressure and fail to prevent tachycardia caused by laryngoscopy and endotracheal intubation. Vasodilators drugs cause cerebral hypertension. Some of them cause rebound hypertension with reflex tachycardia and others depress the myocardium severely in patients with preexisting left ventricular dysfunction or those receiving beta-adrenergic antagonist. These effects are not desirable and limit their usefulness.

One study have shown that intravenous lignocaine is effective in preventing or attenuating the arterial hypertension and tachycardia in response to endotracheal intubation[30]. A few publications have shown the attenuated haemodynamic responses on intubation with intravenous lignocaine[31-32]. Some investigators carried out several randomized open studies on adult surgical patients to assess the effect of intravenous lignocaine. They also found reduced haemodynamic stimulation during intubation[33-36]

Esmolol has much beneficial effect on the human cardiovascular system. The effects of Esmolol on the cardiovascular system in controling both heart rate and blood pressure responses to laryngoscopy and intubation[1,3] has been proved.

Attenuation of cardiovascular response to laryngoscopy and tracheal intubation has been described by Feng CK, and et al consists of administering 2 mg/kg lidocaine and 2 mg/kg esmolol. All patients were premedicated with diazepam 0.1 mg/kg 30 min before induction of general anaesthesia. Each designated drug was given upon induction of anaesthesia. There was no difference in the demographic data between the two groups. After intubation, the incidence of hypertension (SBP>180 mmHg) was found in 20% patients in esmolol group than 70% patients in lidocaine group. The results of this study showed that only esmolol could reliably offer protection against the increase in both HR and SBP and 2 mg/kg lidocaine had no effect to blunt adverse haemodynamic responses during laryngoscopy and tracheal infubation[37].

A multicentre trial was designed by DR Miller et al to determine the dose-response and side effects of esmolol when administered as a single iv bolus prior to induction of anaesthesia for controlling the haemodynamic response to tracheal intubation. Patients who received placebo and no narcotic had greater HR and SBP values after tracheal intubation than patients who received either El00 or E200 (P less than 0.005). The proportion of patients whose maximum HR exceeded 110/min

was also greater in the PLAC group (22/180) than in either the El00 (10/187) or E200 (9/181) groups (P less than 0.05) but was not different when comparing El00 with E200. Esmolol was less effective in controlling blood pressure, but in combination with low-dose narcotic, esmolol suppressed the SBP response to tracheal intubation. In the presence of moderate dose narcotic, however, a decrease in SBP occurred in all three groups following induction of anaesthesia (P less than 0.003), with the largest decrease (17 +/ - 4%) occurring in patients who had received E200. The overall incidence of hypotension (SBP less than 90 mm/Hg) was greater in the E200 group (33%) than either the El00 (25%) or PLAC (16%) groups (P less than 0.05). Other side-effects, such as bradycardia, bronchospasm or pain on injection, occurred no more frequently in either esmolol group than with placebo. It is concluded that a 100 mg bolus of esmolol is safe and effective for controlling the haemodynamic response to tracheal intubation. This dose of esmolol combined with a low dose of narcotic (fentanyl 2-3 micrograms/kg or equivalent) results in effective control of both heart rate and blood pressure, while avoiding important side-effects[38].

A randomly assigned in a double- blind, p1acebo-controlled study was done by Steven M. Martin I., et al to find out the drug which can prevents tachycardia and hypertension associated with tracheal intubation. Eighty patients, ASA physical status II-IV, scheduled for noncardiac surgery was given a preintubation dose of either placebo, 200 mg lidocaine, 200 mg fentanyl, or 150 mg esmolol. Induction of anesthesia was accomplished with 4-6 mg/kg thiopental IV followed immediately by the study drug; 1-1.5 mg/kg succinyicholine was given at minute I. Laryngoscopy and intubation were performed at minute 2 with anesthesia thereafter maintained with I MAC ($\pm$ 10%) isoflurane in 60% nitrous oxide in oxygen at a 5 L/min flow for 10 min. Heart rate was recorded every 15 s and blood pressure every minute from induction until 10 min after intubation. Maximum percent increases in heart rate (mean ± SE) during and after intubation were similar in the placebo (44% ± 6%), lidocaine (51% ± 10%), and fentanyl (37% $\pm$ 5%) groups, but lower in the esmolol (18% ± 5%) group (P<0.05). Maximum systolic blood pressure percent increases were lower in the lidocaine (20%± 6%), fentanyl (12% ± 3%), and esmolol (19% ±4%) groups than in the placebo (36% ±5%) group (P<0.05), but not different from each other (P>0.05). Only esmolol provided consistent and reliable protection against increases in both heart rate and systolic blood pressure accompanying laryngoscopy and intubation[23].

Another study was done to compare the effectiveness of single bolus dose for esmolol or fentanyl in attenuating the haemodynamic responses during laryngoscopy and endotracheal intibution by Hussain AM, Sultan ST. They have shown that the rise in heart rate was minimal in esmolol group and was statistically significant. Following intubation, blood pressure was increased in all groups but was least in esmolol group. This study showed that bolus injection of fentanyl 2 mg/kg 2 minutes prior to laryngoscopy and intubation failed to protect against elevation of both the heart rate and systolic blood pressure, whereas esmolol at 2 mg/kg provided consistent and reliable protection against the increase of heart rate but not arterial blood pressure[39].

Another prospective, randomised, double-blind study has shown that HR decreased significantly in Esmolol group after induction, immediately after intubation and 1 minute after intubation (p<0.0083). In Fentanyl group there was an increase in MAP immediately after intubation, but the increase was less than in other groups. Compared with control, RPP decreased significantly in Esmolol and Fentanyl groups after induction, immediately after intubation and 1 minute after intubation (p<0.0083). RPP was significantly lower in Esmolol group than in controls and lignocaine group 3 minutes after intubation p<0.0083), and it was significantly lower in Fentanyl group than in controls 10 minutes after intubation (p< 0.0083). It was concluded that administration of esmolol 1.5 mg/kg 2 minutes before intubation prevents tachycardia and an increase in RPP caused by laryngoscopy and tracheal intubation and can be beneficial when administered before laryngoscopy and tracheal intubation in patients with tachycardia[40].

In this prospective study sixty patients has been randomly selected into one of the two groups by

as computer generated random number table and by card sampling. Each patient has been given cards to take any one blindly from two groups. There were no significant differences between two groups in age, body weight, gender and ASA grading. Before induction of anaesthesia heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), rate pressure product (RPP) and mean arterial pressure (MAP) were not statistically significant >0.05) in both groups.

One minute after intubation, these parameters were significantly raised ($p<0.05$) in two groups. The findings of our study are comparable to those of King et al[35] who found a rise of HR, SBP, DBP, RPP and MAP 1 min after intubation. He also found gradual return of these parameters to baseline as anaesthesia deepened. Our study demonstrated highly significant reduction in HR, DBP, RPP and MAP in both groups ($p<0.0l$), 2 and 4 minutes after induction. But the SBP reduction was only statistically significant ($p<0.05$) [Table- III, IV, V & VI]. In group-E patients, these reductions were more than that of in group-L patients. Four minutes after intubation, HR, SBP, DBP, RPP and MAP returned to almost baseline values in esmolol group. These findings are in agreement with that of Ugur B, Ogurlu M, et al who showed attenuated haemodynamie response due to sympathetic stimulation associated with tracheal intubation. It is also comparative with that of Feng CK, Chan KH et al who showed that only esmolol could reliably offer protection against the increase in both HR and SBP, low dose of fentanyl (3 micrograms/ kg) prevented hypertension but not tachycardia and 2 mg/kg lidocaine had no effect to blunt adverse hemodynamic responses during laryngoscopy and tracheal intubation. Singh H, Vichitvejpaisal P, et al compared the effects of the lidocaine, esmolol, and nitroglycerin and showed lidocaine 1.5 mg/kg i.v. and nitroglycerin 2 micrograms/kg i.v. were ineffective in controlling the acute hemodynamic response following laryngoscopy and intubation. Esmolol 1.4 mg/kg i.v. was significantly more effective than either lidocaine or nitroglycerin in controlling the HR response to laryngoscopy and intubation ($p<0.05$). Esmolol also was singnificantly more effective than lidocaine in minimizing the increase in MAP (25% vs. 55%).

In our study maximum attenuating effects was observed by intravenous esmolol on cardiovascular system in response to laryngoscopy and endotracheal intubation. We also observed that intravenous esmolol did attenuate the sympathetic responses to laryngoscopy and endo-tracheal intubation which come down to base line at 5 minute after intubation. But the groups of patient which had been treated with lignocaine, their sympathetic responses did not come down to base line at 5 minute after laryngoscopy and endo-tracheal intubation. Now it may be concluded that esmolol 1.5 mg/kg is superior to lingocaine (1.5 mg/kg) for attenuation of haemodynamic response to laryngoscopy and endotracheal intubation. Therefore we can conclude that patients with hypertension, ischaemic heart disease, and brain tumour will be benefited by giving intravenous esmolol preoperatively before laryngoscopy and èndotracheal intubation.

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