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JOURNAL OF THE BANGLADESH SOCIETY OF ANAESTHESIOLOGISTS

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CONTENTS

Monitored anaesthesia care (MAC)

Monitored anaesthesia care (MAC) refers to a clinical service where in an anaesthesiologist provides analgesia and sedation for a diagnostic or therapeutic procedure, and the patient is able to protect his airway for the majority of the procedure.[1] It involves the administration of medication that can potentially lead to loss of consciousness and normal protective reflexes. There is possibility of a deeper plane of sedation compared to 'sedation/analgesia' which is provided by a non-anaesthesiologist.[2] Therefore, the ASA recommends that the standards of care be same as for general or regional anaesthesia, with regard to pre-operative evaluation, intra-operative monitoring of the cardio-respiratory system, the physical presence of an anaesthesiologist at all time, and the administration of oxygen and other medications to keep the patient safe and comfortable.[1] MAC should invoke less physiological disturbance and allow a more rapid recovery compared to a general anaesthetic. Therefore, it is not surprising to note that it is the technique of choice in up to 30% of the surgical procedures.

According to the American Society of Anesthesiologists (ASA), a monitored anesthesia care (MAC) is a planned procedure during which the patient undergoes local anesthesia together with sedation and analgesia. Actually MAC is the first choice in 10-30% of all the surgical procedures. The 3 fundamental elements and purposes of a conscious sedation during a MAC are: a safe sedation, the control of the patient anxiety and the pain control. The patients undergoing conscious sedation are able to answer to orders appropriately and to protect airways. Last but not least, another purpose of any MAC is to get the patient appropriately satisfied, allowing him to get his discharge as faster as possible. There are many surgical procedures which can be performed using a MAC. The patient consciousness evaluation is of extreme importance during the surgical procedure performed with MAC: to this purpose the clinical and electroencephalographic evaluations such as Bispectral Index are very useful. MAC can be obtained with the association of fast half-life drugs or drugs getting a clinical effect which can vary according to the surgical requirements, using an infusion regiment. Apart from the pharmacological choice, this procedure can be performed with patient controlled sedation techniques or with continued intravenous infusion or with target controlled infusion.

Monitored Anesthesia Care (MAC) is a type of sedation that is administered through an IV to make a patient sleepy and calm during a procedure. The patients are typically awake, but groggy, and are able to follow instructions as needed.

The level of sedation provided with this type of anesthesia can range from light, where the patient just feels very relaxed, to heavy, where the patient is unaware of what is happening and only rouses to significant stimulation.

Because the level of sedation varies, the process is monitored, with a anesthesia professional present to continuously monitor the patient's vital signs and maintain or adjust the level of sedation as needed. This type of sedation is frequently used with minor surgical procedures and dental procedures and can be combined with local or regional anesthesia.

Depending on the medications used as the doses given, the patient may or may not remember the procedure. The American College of Gastroenterology (ACG) released a Position Statement (Vargo, 2009) which recommends that "the use of anesthesiologist-administered sedation for healthy, low-risk patients undergoing routine GI endoscopy results in higher costs with no proven benefit with respect to patient safety or procedural efficacy."

Paspatis and colleagues (2011) reported on 520 individuals undergoing colonoscopy for the detection of polyps and were randomized to either deep sedation (n=258) or moderate sedation (n=262) with the hypothesis that deep sedation may increase the rate of polyp detection compared to moderate sedation which would enhance the

quality of the colonoscopy. The degree of sedation was assessed by a research nurse using the modified assessment of alertness/sedation (MOAA/S) scale. Each participant's satisfaction with the sedation was assessed 2 hours after the procedure in the recovery area. The endoscopist's satisfaction concerning the sedation during the procedure was also assessed immediately following the procedure. There was no difference between the two groups in regards to the overall rate of polyps detected. There were no differences in levels of participant satisfaction between the two groups. However, the endoscopist's satisfaction rating was greater in the deep sedation group compared to the moderate sedation group.

Local anesthesia with sedation offers anesthesia personnel and the surgeon great flexibility in tailoring the degree of anesthesia to the needs of the patient. Procedures that once required patients to stay overnight in the hospital are now performed safely in office and outpatient surgical suites.[5] The introduction of new anesthetic applications enables patients to undergo lengthy and complex procedures as outpatients and then promptly and safely be discharged home.[6] The choice and route of anesthesia administration is paramount to the patient's overall surgical experience. If, upon discharge, the patient is alert, has minimal pain, and has no nausea or vomiting, then the surgical experience was a positive one.[7]

The three essential components of MAC are – safe sedation, anxiolysis and analgesia.[3] However, patient comfort, cardio-respiratory stability, good operating conditions and minimal side effects are equally important.

Monitored anesthesia care (MAC) refers to the anesthesia personnel present during a procedure and does not implicitly indicate the level of anesthesia needed. Monitored anesthesia care is a specific anesthesia service for a diagnostic or therapeutic procedure. Indications for monitored anesthesia care include the nature of the procedure, the patient's clinical condition and/or the potential need to convert to a general or regional anesthetic. Monitored anesthesia care includes all aspects of anesthesia care–a pre-procedure visit, intra-procedure care and post-procedure anesthesia management. During monitored anesthesia care, the anesthesiologist provides or medically directs a number of specific services, including but not limited to: Diagnosis and treatment of clinical problems that occur during the procedure; support of vital functions; administration of sedatives, analgesics, hypnotics, anesthetic agents or other medications as necessary for patient safety; psychological support and physical comfort; and provision of other medical services as needed to complete the procedure safely.

MAC may include varying levels of sedation, analgesia, and anxiolysis as necessary. The provider of MAC must be prepared and qualified to convert to general anesthesia when necessary. If the patient loses consciousness and the ability to respond purposefully, the anesthesia care is a general anesthetic, irrespective of whether airway instrumentation is required.

Use of monitored anesthesia care may be considered medically necessary for gastrointestinal endoscopy, bronchoscopy, and interventional pain procedures, when there is documentation by the procedural list and anesthesiologist that specific risk factors or significant medical conditions are present. Those risk factors or significant medical conditions include any of the following:

Increased risk for complications due to severe co-morbidity (ASA P3* or greater); morbid obesity (BMI [body mass index] > 40); documented sleep apnea; inability to follow simple commands (cognitive dysfunction, intoxication, or psychological impairment); spasticity or movement disorder complicating procedure; history or anticipated intolerance to standard sedatives, such as: chronic opioid use, chronic benzodiazepine use; patients with active medical problems related to drug or alcohol abuse; patients younger than 18 years or 70 years or older; patients who are pregnant; patients with increased risk for airway obstruction due to anatomic variation, such as: history of stridor, dysmorphic facial features, oral abnormalities (e.g., macroglossia),neck abnormalities (e.g., neck mass), jaw abnormalities (e.g., micrognathia); Acutely agitated, uncooperative patients; prolonged or therapeutic gastrointestinal endoscopy procedures requiring deep sedation.

Monitored anesthesia care can be provided by qualified anesthesia personnel with training and experience in: patient assessment; continuous evaluation and monitoring of patient physiological functions; diagnosis and treatment (both pharmacological and non-pharmacological) of any and all deviations in physiological function.

Examples of prolonged endoscopy procedures that may require deep sedation include adhesions post-abdominal surgery, endoscopic retrograde cholangiopancreatography, stent placement in the upper GI tract, and complex therapeutic procedures such as plication of the cardioesophageal junction.

The Mallampati score is considered a predictor of difficult tracheal intubation and is routinely used in preoperative anesthesia evaluation.[4] The score is obtained by having the patient extend the neck, open the mouth, and extend the tongue while in a seated position. Patients are scored from Class 1-4 as follows: Class I - the tonsils, uvula and soft palate are fully visible; Class 2 - the hard and soft palate, uvula and upper portion of the tonsils are visible; Class 3 - the hard and soft palate and the uvula base are visible; Class 4 - only the hard palate is visible.

Patients with Class 3 or 4 Mallampati scores are considered to be at higher risk of intubation difficulty. While the Mallampati score does not determine a need for monitored anesthesia care, it may be considered in determining risk for airway obstruction. Other tests to predict difficult tracheal intubation include the upper lip bite test, the intubation difficulty scale, and the Cormack-Lehane grading system.

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Original Article

A comparative study of induction characteristics of thiopentone, midazolam and propofol in elderly patients

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Abstract

Background *Intravenous anaesthetic agents are used commonly to induce anaesthesia, as induction is usually smoother and more rapid than that associated with most of the inhalation agents. Thiopentone is the most widely used intravenous induction agent in current anaesthetic practice. Propofol (2,6 diisopropyl phenol) is a new rapidly acting intravenous anaesthetic. The rapid redistribution and metabolism of propofol, result in a short elimination half life. Midazolam is an imidazobenzodiazepine with relatively rapid onset of action and high metabolic clearance compared to other benzodiazepine.*

Objectives *This prospective study was carried out to compare the induction characteristics of thiopentone, midazolam and propofol in elderly patients.*

Methods *Ninety adult patients, aged between 60-80 years with ASA grade I &II who were scheduled for general surgery in Bangabandhu Sheikh Mujib Medical University, CMH Dhaka and CMH Saidpur were included in this study. The patients were divided into three groups of thirty each according to a randomization table.The overall performance of the drugs were assessed by recording the following parameters: 1) Pain on injection. 2) Induction time (The time from start of injection to the loss of eye lash reflex). 3) Coughing 4. Involuntary motor activity. 5. Apnoea (present/absent). 6. Haemodynamic changes (Heart rate and blood pressure at 2 min before injection, after induction and 1min, 3min and 5min after intubation). 7. Recovery time (From the end of reversal until the patient responded to vocal command(eye opening, tongue protrution).*

Results *The incidence of pain on injection was greater in propofol group(38%), which was statistically significant($p<0.01$). The induction time was significantly longer($p<0.001$) in the midazolam group. Incidence of excitatory effects was more common in propofol group($p<0.05$). Incidence of apnoeic episodes were significantly greater in thiopentone and propofol group than midazolam group($p<0.05$). Propofol caused significant decrease in systolic, diastolic and mean arterial pressure at 3 & 5 minutes after intubation($p<0.001$).Neither Thiopentone, midazolam nor propofol caused significant change in heart rate. Recovery time in midazolam group was significantly longer($p<0.001$).*

Conclusion *Thiopentone is the drug of choice for induction in elderly patients because of rapid induction, recovery and the least effect on arterial pressure. Propofol has no clear advantage over thiopentone and has the additional problem of a significant decrease in blood pressure. Midazolam, although safe, is clearly not the ideal drug for induction in elderly patients because of slow onset of action and delayed recovery.*

Key words *Induction agent, thiopentone, midazolam, propofol*

(JBSA 2013; 26(1): 5-11)

Introduction

Aging is accompanied by unavoidable decline in organ system function and responses to drugs. As part of the normal aging process, most organ system lose approximately 1% of their function per year beginning at around 30 years of age.[1] Optimal anaesthetic management of elderly patients depends on an understanding of the normal changes in physiology, anatomy and response to pharmacologic agents that accompany aging.

Thiopentone is the most widely used intravenous anaesthetic agent in current anaesthetic practice. It has, however, a long half life, which makes it less than ideal for use in ambulatory patients and can result in accumulation when used in repeated incremental doses or as a continuous infusion. A further disadvantage of thiopentone is a tendency to cause hypotension, particularly in patients suffering from cardiovascular disease or hypovolaemia.[2,3] A number of other agents have become available as possible alternatives. Propofol (2,6 diisopropyl phenol) is a new rapidly acting intravenous anaesthetic. The rapid redistribution and metabolism of propofol, resulting in a short elimination half life of approximately one hour suggest that the drug could be suitable for use in short procedure.[2,3,4] Midazolam is a imidazobenzodiazepine. It is water soluble in acid formulation (pH less than 4) but becomes highly lipid soluble at physiological pH. It has a relatively rapid onset of action and high metabolic clearance compared to other benzodiazepines.[5,6,7]

The pharmacokienetic of drugs are frequently defined in groups of healthy , normal, young male volunteers.[8,9,10] The patients to whom the drugs are subsequently administered therapeutically however, are often elderly with perhaps multiple disease processes. As far as the elderly patients are concerned, agents that cause least physiological interference with rapid recovery have to be chosen. It is therefore, important to evaluate the effects of age on drug disposition.

Methods

Ninety adult patients, aged 60 – 80 years with ASA grade I & II who were scheduled for general surgery in Bangabandhu Sheikh Mujib Medical University(BSMMU), Combined Military Hospital(CMH),Dhaka were included in the study. The patients were divided into three groups of thirty each according to a randomization table. In the control group, 30 patients received thiopentone and designated as thiopentone group. Midazolam and propofol were administered to two other groups of patients for induction of anaesthesia and designated as midazolam and propofol group respectively. All the patients were premedicated with diazepam at the dose of 0.2mg/kg body weight. After 3 minutes of preoxygenation anaesthesia was induced. The drugs were given through an 18G cannula in the dorsum of the hand. Thiopentone (intended dose 4mg/kg), midazolam (intended dose .2mg/kg) and propofol (intended dose 2mg/kg body weight) were injected sufficiently slowly to keep the haemodynamic stability by assessing clinically the rate and volume of the radial pulse until loss of eye lash reflexes. A tracheal tube with an internal diameter of 8 mm in male 7 mm in female were inserted with the help of suxamethonium 1.5mg/kg using macintosh size 4 blade. The overall performance of the drugs were assessed by recording the following parameters: 1) Pain on injection. 2) Induction time (time from the start of injection to the loss of eye lash reflex). 3) Coughing 4) Involuntary motor activity. 5) Apnoea (present/ absent). 6. Haemodynamic changes (heart rate and blood pressure at 2 minutes before injection, after injection and 1 minute after intubation for 5 minutes). 7. Recovery time (from the end of reversal until the patient responded to vocal command – eye opening, tongue protrution). Halothane was stopped 15 minutes before reversal and time from the end of reversal until the patient responded to vocal command was recorded.

Results were expressed as mean ± SD. For statistical analysis student's 't' test, analysis of variance (ANOVA) and chi-square tests were applied where appropriate. Differences were considered statistically significant if $P<0.05$.

Results

All the groups were comparable for age, sex, weight and duration of anaesthesia. Subject details are shown in Table I.

Table I *Patient characteristics and duration of anaesthesia*

Group	Weight(kg)	Age(year)	Duration (hour)	Male	Female
Thiopentone(n=30)	54.3(±3.2)	68.3(±6.3)	1.5(±0.4)	23	7
Midazolam(n=30)	55.2(±4.6)	68.1(±5.9)	1.3(±0.6)	25	5
Propofol(n=30)	56.1(±4.3)	67.5(±6.3)	1.6(±0.3)	21	9

The incidence of pain on injection is shown in Table II. The total incidence was greater in the group receiving propofol (38%), than in that receiving thiopentone (7%) and midazolam (3%). This difference was statistically significant.

Table II *Pain on injection*

Group	Mild	Moderate	Severe	Total	X^2 value
Thiopentone	2	0	0	2(7%)	
Midazolam	1	0	0	1(3%)	13.00
Propofol	5	3	3	11(38%)	

P<0.01

The time to induction (time to loss of eye lash reflex) was similar in the propofol and thiopentone group but significantly longer (p<0.001) in the midazolam group. This is shown in Table III.

Table III *Induction time in seconds*

Group	Mean(±SD)	F value	P value
Thiopentone	31.8667(±1.2243)		
Midazolam	44.7000(±4.3164)	167.177	P<0.001
Propofol	31.1667(±1.7633)		

The number of patients showing spontaneous movement and excitatory effects is shown in Table IV. The incidence of spontaneous movement was more common in the group receiving propofol (p<0.05). Three patients all of whom received propofol, showed spontaneous movement and one other complication (twitching, hypertonous, and hiccough).

Seven patients (25%), each in the thiopentone and propofol groups, required assisted ventilation because of apnoeic episodes that lasted more than 15 seconds, 3 patients in the midazolam group had apnoea that lasted longer than 15 seconds. This is shown in Table V.

Table IV *Incidence of excitatory effects*

Group	Spontaneous Movements	Twitching	Hypertonous	Hiccough
Thiopentone	1	0	0	1
Midazolam	2	0	0	1
Propofol	7	1	1	2

Table V *Incidence of apnoea after induction*

	Thiopentone	Midazolam	Propofol	X^2 value	P value
Apnoea>15 sec	7	3	7	6.882	P<0.05

Changes in pulse rate from baseline (i.e before injection) are shown in Table VI. Neither thiopentone, midazolam nor propofol caused a significant change in heart rate.

Table VI *Comparison of heart rate at different reading points*

Group	2 minutes before injection-mean(±SD)	after induction-mean(±SD)	1minute after intubation-mean(±SD)	3minutes after intubation-mean(±SD)	5minutes after intubation-mean(±SD)
Thiopentone	75.0667 (±2.1645)	79.0667 (±2.1645)	85.0000 (±4.4644)	75.5333 (±2.5962)	74.9333 (±2.4202)
Midazolam	74.9000 (±2.0401)	78.8333 (±1.9667)	86.6333 (±6.8253)	75.2667 (±2.0500)	75.1667 (±1.6206)
Propofol	75.1000 (±2.0569)	79.1000 (±2.0569)	84.7000 (±3.0530)	76.1000 (±2.0569)	74.5333 (±1.9070)
	F= .079 N.S	F=.149 N.S	F=.1.285 N.S	F=.1.074 N.S	F=.762 N.S

N.S- not significant

Details of arterial blood pressure values, systolic, diastolic and mean are shown in Table VII,VIII&IX. It can be seen that thiopentone caused some fall in systolic and little fall in diastolic blood pressure; mean arterial pressure consequently fall by an intermediate amount. Midazolam caused a greater decrease in systolic and diastolic blood pressure than thiopentone, but that was not significant. By contrast propofol caused a greater decrease in systolic blood pressure, which at 3 minutes after intubation had fallen by a mean of about 30 mm Hg, and a considerable fall in diastolic blood pressure, with a fall of about 20mm Hg. As a consequence, there was a considerable fall in mean arterial pressure. There was rise of blood pressure 1 minute after intubation in all the cases probably as a result of sympathetic stimulation due to intubation reflex.

Table VII *Comparison of systolic blood pressure at different reading points*

Group	2minutes before injection-mean(±SD)	after induction-mean(±SD)	1minute after intubation-mean(±SD)	3minutes after intubation-mean(±SD)	5minutes after intubation-mean(±SD)
Thiopentone	142.1000 (±17.0746)	138.1000 (±17.0746)	150.3000 (±17.7009)	129.1000 (±17.0825)	130.1000 (±16.0126)
Midazolam	137.4333 (±14.5096)	132.4333 (±13.1390)	148.1000 (±17.0746)	125.4333 (±14.5096)	127.4333 (±14.1025)
Propofol	145.2000 (±16.5413)	135.2000 (±16.2415)	142.8333 (±17.5501)	115.2000 (±16.5413)	120.2000 (±15.1360)
	F=1.773	F=.932	F=1.451	F=6.021	F=3.045
	N.S	N.S	N.S	P<0.01	P<0.05

N.S- not significant

Table VIII *Comparison of diastolic blood pressure at different reading points*

Group	2minutes before injection-mean(±SD)	after induction-mean(±SD)	1minute after intubation-mean(±SD)	3minutes after intubation-mean(±SD)	5minutes after intubation-mean(±SD)
Thiopentone	78.7667 (±6.8917)	74.5000 (±7.4776)	80.6000 (±8.1351)	75.4333 (±8.1988)	75.3215 (±7.1897)
Midazolam	81.5000 (±7.6010)	72.5000 (±7.3215)	80.5316 (±7.6218)	72.5315 (±8.5369)	72.8132 (±8.6758)
Propofol	80.7000 (±7.3632)	70.5734 (±7.3285)	77.1333 (±6.9418)	58.7210 (±7.3615)	60.7000 (±7.3560)
F=1.937	F=1.114		F=2.036	F=36.980	F=28.246
	N.S	N.S	N.S	P<0.001	P<0.001

N.S- not significant

Table IX *Comparison of mean blood pressure at different reading points*

Group	2minutes before injection-mean(±SD)	after induction-mean(±SD)	1minute after intubation-mean(±SD)	3minutes after intubation-mean(±SD)	5minutes after intubation-mean(±SD)
Thiopentone	99.8778	95.7000	103.7222	93.3222	93.6556
	(±8.0684)	(±8.5390)	(±7.5384)	(±9.3684)	(±9.3285)
Midazolam	100.1444	92.4778	103.0333	88.4778	89.3444
	(±7.5011)	(±7.5210)	(±7.9978)	(±7.4744)	(±7.9565)
Propofol	102.2000	92.2131	96.7444	77.5333	80.5314
	(±7.9344)	(±7.8352)	(±8.5383)	(±7.9339)	(±7.8356)
	F=.789	F=1.773	F=6.870	F=28.502	F=18.812
	N.S	N.S	P<0.01	P<0.001	P<0.001

N.S- not significant

There was no significant difference in the recovery times between thiopentone and propofol groups. However, patients in the midazolam group took much longer to recover (p>0.001). This is shown in Table X.

Table X *Comparison of recovery time in seconds*

Group	Mean (±SD)	F value	P value
Thiopentone	23.0333(±3.2215)		
Midazolam	44.3667(±7.8498)	177.284	P<0.001
Propofol	21.8333(±3.0971)		

Discussion

There has always been a need for an intravenous anaesthetic agent possessing a good induction and recovery characteristics, particularly in elderly patients. Elderly people differ both anatomically and physiologically from normal healthy adults. Moreover, they have got significant pharmacokinetic and pharmacodynamic variability.[1,9,10] Thiopentone is the most commonly used intravenous induction agent in elderly people. There was no significant difference in the time to loss of eye lash reflex in the propofol and thiopentone groups. This supports previous findings that the induction characteristics are similar with two agents.[11,12] But Shah PJ et al found that induction was rapid with propofol as compared to thiopentone which was statistically significant.[4]There was a sigficantly longer induction time with midazolam and this too in accordance with previous findings.[4,5,7]

The incidence of spontaneous movements was greater in the patients who had received propofol than in those who received thiopentone and midazolam. The incidence of movement and excitatory effects after induction with thiopentone and midazolam was insignificant.Previous study by Shah PJ et al found high incidence of gag reflex coughing, tearing, movement of limbs in thiopentone and midazolam groups compared to propofol.[4] But Rahman MH et al showed that incidence of coughing was more in thiopentone group, which was absent with midazolam induction. Movement of limbs was more in midazolam group where as limb movement was seen only in 2 patients (4%) in thiopentone group. Higher incidence of movement of limbs was probably because of slower induction with midazolam or inadequate dose of midazolam used for induction.[5] Suri Y found no excitatory effects with midazolam and thiopentone.[9]

The incidence of pain on injection was significantly greater following propofol than after thiopentone and midazolam which was in consistent with previous findings.[5,13] Shah PJ et al found that 20% of patients complained of pain on injection and 3.33% patients had thrombophlebitis with propofol compared 0% with thiopentone and midazolam.[4] Rahman MH et al found that 14% of

patients with thiopentone complained of pain on injection, where as 2% with midazolam.[5] Suri Y found that no patients with either thiopentone or midazolam experienced any venous intolerance.[9] In cases, where the drug was injected into a vein in the anticubital fossa, the incidence of pain was very low(3%).[12] This feature may prove to be a drawback to its use in ambulatory patients as they are usually unpremedicated and often very anxious.

The incidence of apnoea after induction with thiopentone and propofol was greater than that with midazolam. This was in consistent with previous findings.[5,7,9,11,12] This study has showed that thiopentone causes insignificant decrease in systolic, diastolic and mean blood pressure. There is no remarkable change in heart rate. Although midazolam caused a greater decrease in mean blood pressure compared to thiopentone, that was not clinically significant. Cardiovascular stability was satisfactory during the observation period. Though some study had reported a significant decrease in mean arterial blood pressure 2 minutes after induction with midazolam, it was probably due to relatively higher induction dose.[11] There is however, a large variation in the recommended induction dose for midazolam(0.2 – 0.4mg/kg). In this study propofol was found to have given a considerably greater fall in systolic, diastolic and mean blood pressure than did thiopentone. This persisted during the period under study in the propofol group. Earlier studies with propofol have reported similar results.[12] This persistently low blood pressure is an obvious disadvantage in the use of propofol in patients with a compromised cardiac function as in elderly people and a low initial blood pressure who need to be cardioverted e.g. ventricular tachycardia.[11,13] Singh et al found that in patients with left ventricular dysfunction, there was a significant decrease from the baseline in the heart rate, mean arterial pressure after induction in all three groups of patients. The thiopentone group recorded the least decrease in heart rate (-7%), while the maximum decrease was seen in the midazolam group (-15%). The decrease in mean arterial pressure ranged from -27 to -32% and was similar across the three groups.[3] In hypertensive patients with thiopentone and midazolam co-induction, patients with unstable heart rate and diastolic blood pressure were more likely in thiopentone group and patients with stable heart rate and diastolic blood pressure were more likely in co-induction group.[6]

The recovery times in this study suggested that there is no significant difference between propofol and thiopentone. Earlier study by Coolong KJ et al had similar result where the surgical procedure continued longer than 2 hours.[10] This is in contrast to studies by Shah PJ et al and Henriksson BA et al which showed that propofol has significantly shorter recovery time than thiopentone.[4,12] This could be explained by the very short procedures which they studied. In this study midazolam had a significantly longer recovery time than thiopentone and propofol. This is in consistent with previous findings.[4,8,11] Previous study had showed that flumazenil was used to reverse its effects 15 – 30 minutes after the induction of anaesthesia for cardioversion, and there was however, an acceptably high incidence (50%) of resedation at the time of interview 4 hours later.[11]

Conclusion

Our findings suggest that thiopentone is the drug of choice for induction in elderly patients because of rapid induction, recovery and the least effect on arterial pressure. Propofol has no clear advantage over thiopentone and has the additional problem of a significant decrease in blood pressure. Midazolam, although safe, is clearly not the ideal drug for induction in elderly patients because of slow onset of action and delayed recovery.

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Original Article

Role of intravenous esmolol, fentanyl 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 stimulates the patient's airway reflexes and predictably leads to haemodynamic derangement. Many drugs have been suggested in modifying in haemodynamic responses to laryngoscopy and intubation.*

Objectives *To assess efficacy of three drugs - esmolol, fentanyl and lignocaine and to assess which one is more effective to attenuate haemodynamic response to direct laryngoscopy and endotracheal intubation.*

Methods *A total number of 90 patients ASA class I and II were selected randomly as per inclusion and exclusion criteria in three groups, 30 patients in each group. Group A received esmolol 1.5mg/kg in the volume of 10ml (with distil water) 2min before intubation, group B received fentanyl 1.5mg/kg IV 5min before intubation and group C received lignocaine 1.5mg/kg IV 90 sec before intubation. Per-operative data were recorded at 1min, 2min, 5min and 10min after intubation.*

Results *The mean heart rate, systolic, diastolic,mean arterial pressure before starting anaesthesia were similar in group-A (esmolol), B(fentanyl) and C(lignocaine). The mean values of heart rate and rate pressure product were significantly lower in group A(Esmolol) at 1 and 2 minute than group B(fentanyl) and at 1, 2 and 5 minute than group C(lignocaine). The mean values of systolic, diastolic and mean arterial pressure were slightly lower in group A(esmolol) at 5 minute than group B(fentanyl) and significantly lower at 1, 2 and 5 minute than group C(lignocaine).*

Conclusion *Esmolol 1.5mg/kg is superior to lignocaine 1.5mg/kg for attenuation of haemodynamic response (HR, SBP, DBP, RPP and MAP) to laryngoscopy and endotracheal intubation and also superior to fentanyl for attenuation of HR and RPP.*

Keywords *Esmolol, fentanyl, lignocaine, laryngoscoy, endotracheal intubation.*

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Introduction

Laryngoscopic stimulation of oropharyngeal structures may be an important factor in the haemodynamic stress response associated with tracheal intubation[1]. Instrumentation of pharynx and tracheal intubation may result in tachycardia, hypertension and increased plasma catecholamine concentrations that may evoke life threatening conditions among susceptible individuals especially those with cardiovascular disease[2]. Thus it has been proposed that an abrupt increase in catecholamine may be associated with potentially severe hypertension, tachycardia which may cause cardiac arrhythmias, myocardial ischaemia, left ventricular dysfunction and rupture of cerebral aneurysm, in susceptible individuals[3,4,5] Activation of sympathetic nervous system may cause coronary artery vasoconstriction, reducing the myocardial oxygen supply which in turn predispose to myocardial ischaemia. This condition is also aggravated by hypercoagulable state in the postoperative period-a stress response byADH[6].

Stress may be reduced by modifying or controlling the response to stress[7]. Several agents and regimens have been devised to control this stress induced haemodynamic responses. These are Local anesthetics, Ganglion blocker, Vasodilator, Opioids. But none of these gained wide spread popularity.Esmolol is a short acting beta I selective agent whose sole use is in arrhythmias. Its short duration and beta I selectivity means that it could be considered in some patients with contraindications to other beta blocking drugs[10]. The rapid onset and offset of effect is an advantage in the perioperative period, as any effects such as dose dependent bradycardia or hypotension are short lived. It is effective in preventing or controlling intraoperative tachycardia and hypertension[11]. Esmolol 1.4mg/kg IV was significantly more effective than either ligocaine or nitroglycerine in controlling the increase in HR, and it was also more effective than ligocaine in minimising the increase in MAP following tracheal intubation. In situation where opioid analgesics are contraindicated, esmolol would appear to be the cardiovascular drug of choice in maintaining haemodynamic stability during laryngoscopy and intubation[12]. There are some studies about preventing stress response due to tracheal intubation with either esmolol or fentanyl or lignocaine and there are some comparative studies with esmolol versus fentanyl, esmolol versus lignocaine or fentanyl versus lignocaine. But there are very limited study about comparing the effects of esmolol, fentanyl and lignocaine. So we have taken this study to see the role of intravenous esmolol, fentanyl and lignocaine for attenuation of stress response in tracheal intubation. It will help us to choice the better one to prevent per-operative MI, excessive bleeding & help for better recovery of the patient, ultimately patients good outcome.

Results

Table I *Distribution of the patients by age & body weight of groups*

Mean ± SD	Group-A	Group-B	Group-C	p value*
Age (in years)	29.07 ± 9.38	33.13 ± 8.57	34.37 ± 8.29	0.054
Weight (in kg)	51.17 ± 10.58	54.80 ± 7.52	56.00 ± 8.51	0.100

*ANOVA test was done to measure the level of significance.

Mean ages of the patients of group A, group C and group B were 29.07 ± 9.38, 34.37 ± 8.29, and 33.13 ± 8.57 years respectively. No statistically significant difference was observed among groups at 0.05 level in term of age & mean weights of the patients of group A, group C and group B were 51.17 ± 10.58, 56.00 ± 8.51 and 54.80 ± 7.52 kg respectively. No statistically significant difference was observed among groups in term of body weight at 5% level.

Table II *Comparison of groups in term of heart rate (Heart rate at different follows up period)*

Heart rate	Group			p
	Group-A	Group-B	Group-C	value*
Before induction				
0 minute	94.67 ± 11.88	90.63 ± 12.39	91.93 ± 7.87	0.348
After intubation				
1 minute	98.53 ± 18.81	111.37 ± 25.49	118.57± 12.18	0.001
2 minute	94.37 ± 17.74	100.17±10.69	114.60± 17.52	<0.001
5 minute	91.73 ± 12.86	87.17 ± 11.10	87.17 ± 11.10	<0.001
10 minute	85.70 ± 11.77	83.40 ± 10.00	86.80 ± 8.73	0.426

*One way ANOVA was done to measure the level of significance

Table shows the mean heart rate before induction and after intubation among the patients of different groups in different follows up period. Significance differences were observed among groups in term of heart rate at 1 minute, 2 minute and 5 minute.

Table III *Comparison of groups in term of systolic blood pressure (Systolic blood pressrue at different follows up period)*

Systolic BP	Group			p value*
	Group-A	Group-B	Group-C	
Before induction				
0 minute	123.80 ± 12.85	122.13 ± 8.11	125.47 ± 8.74	0.447
After intubation				
1 minute	143.33 ± 14.69	142.13 ± 11.02	152.90 ± 11.50	0.002
2 minute	138.20 ± 12.38	135.90 ± 8.73	145.07 ± 9.90	0.003
5 minute	118.67 ± 12.21	120.17 ± 8.65	131.13 ± 13.58	0.000
10 minute	115.00 ± 12.77	117.97 ± 10.60	121.50 ± 12.12	0.111

*One way ANOVA was done to measure the level of significance

Table shows the mean systolic blood pressure before induction of anaesthesia and after intubation among the patients of different groups in different follows up period. Significant differences were observed among groups at 1 minute, 2 minute and 5 minute.

Table IV *Comparison of groups in term of diastolic blood pressure (Diastolic blood pressure at different follows up period)*

Diastolic BP	Groups			p value*
	Group-A	Group-C	Group-B	
Before induction				
0 minute	80.50 ± 7.39	80.87 ± 7.24	80.83 ± 9.40	.981
After intubation				
1 minute	103.30 ± 14.85	101.17 ± 6.24	113.60 ± 14.55	.000
2 minute	97.47 ± 11.27	93.37 ± 11.08	104.43 ± 15.68	.005
5 minute	83.50 ± 9.73	86.07 ± 8.86	91.63 ± 12.79	.012
10 minute	81.17 ± 10.83	77.33±7.32	80.53 ± 9.73	.244

*One way ANOVA was done to measure the level of significance

Table shows the mean diastolic blood pressure before induction and after intubation among the patients of different groups in different follows up period. Significance differences were observed among groups at 1 minute, 2 minute and 5 minute.

Table V *Comparison of groups in term of mean arterial pressure (Mean arterial pressure at different follows up period)*

Mean arterial pressure	Groups			p value*
	Group-A	Group-B	Group-C	
Before induction				
0 minute	94.93 ± 8.66	94.62± 5.11	95.71± 7.63	0.837
After intubation				
1 minute	116.64 ± 13.64	114.82 ± 6.41	126.70 ± 12.51	0.000
2 minute	111.04 ± 10.74	107.54 ± 7.82	117.98 ± 12.87	0.001
5 minute	95.22 ± 10.10	97.43 ± 7.86	104.80 ± 12.78	0.002
10 minute	92.44 ± 10.98	90.88 ± 7.38	94.19 ± 8.63	0.376

*One way ANOVA was done to measure the level of significance

Table shows the mean arterial blood pressure before and after induction among the patients of different groups in different follows up period. Significance differences were observed among groups at 1 minute, 2 minute and 5 minute.

Table VI *Comparison of groups in term of rate pressure product (Mean rate pressure product at different follows up period)*

Rate pressure product	Group			p value*
	Group-A	Group-B	Group-C	
Before induction				
0 minute	11729.1±1935.7	11076.0±1741.5	11507.7±966.6	.281
After intubation				
1 minute	14065.2±2986.2	15801.3±3670.1	18134.2±2325.6	.000
2 minute	13000.4±2657.3	13601.0±1605.2	16618.1±2764.7	.000
5 minute	10894.5±1925.3	10508.0±1710.2	12922.8±1640.6	.000
10 minute	9859.1±1787.7	9836.2±1409.0	10548.9±1514.4	.145

*One way ANOVA was done to measure the level of significance

Table shows the mean rate pressure product before and after induction among the patients of different groups in different follows up period. Significance differences were observed among groups at 1 minute, 2 minute and 5 minute.

Table VII *Distribution of assessment of intubation conditions by groups*

Assessment	Group			p value*
	Group-A	Group-B	Group-C	
Excellent	23 (76.7)	27 (90.0)	22 (73.3)	0.233
Good	7 (23.3)	3 (10.0)	8 (26.7)	
Total	30 (100.0)	30 (100.0)	30 (100.0)	

*Chi-square test was done to measure the level of significance.

#Figure within parentheses indicates in percentage.

Table shows the clinical assessment of patients after induction of drugs among groups. Maximum patients of all groups show excellent result. No significant difference was observed in term of assessment results among groups at 5% level.

Discussion

Laryngoscopic stimulation of oropharyngeal structures may be an important factor in hemodynamic stress response associated with tracheal intubation[1]. Instrumentation of pharynx and tracheal intubation may result in tachycardia, hypertension and increased catecholamine concentration that may evoke life threatening condition among susceptible individuals specially those with cardiovascular disease[2]. Intubation is associated with a cardiovascular respose of elevated blood pressure and pulse, occasional dysrrhythmias, cough reflexes, increased intracranial pressure, and increased intraocular pressure. If no specific measures are taken to prevent hemodynamic response, the HR can increase from 26%-66% depending on the method of induction, and SBP can increase from 36%-45%.

Stress may be reduced by modifying or controlling the response to stress[7]. Premedication is used to provide sedation, anxiolysis and to enhance quality of induction, maintenance and recovery from

anesthesia. A recent study has suggested that different premedication may lead to an alteration in sympathoadrenal stress responses during intubation and surgery[8]. Several agents and regimens have been deviced to control this stress induced hemodynamic responses. These are local anesthetics, ganglion blockers, vasodilator, opioids, deep inhalational anesthesia, Large dose of thiopental sodium. But none of them gained wide spread popularity. Local anesthetic in large dose may cause cardiac depression, Opioid in large doses, fentanyl >50 mcg/kg; morphine >2mg/kg has been shown to produce stress free condition in cardiac surgery[9,] which is inappropriate in noncardiac surgery. Vasodilator and ganglion blocker cause hypotension and reflex tachycardia. Deep inhalational anesthesia cause intracranial hypertension, large dose thiopental causes cardiac depression. These effects are not desirable and limit their usefulness.

A randomized placebo-controlled, double-blind study was carried out by Harbhej Singh et al. to compare the safety and efficacy of lidocaine, esmolol and nitroglycerine in modifying the hemodynamic response to laryngoscopy and intubation on 40 ASA I&II patients undergoing general anesthesia. Patients were divided into 4 groups, group 1 received 5 ml saline, group 2 received lidocaine 1.5 mg/kg, group 3 esmolol 1.4 mg/kg group 4 nitroglycerine 2mcg/kg. MAP and HR were recorded every min for 20 min following induction of anesthesia. Following laryngoscopy and intubation, MAP increased significantly in all 4 groups' control (49% ± 19%), lidocaine, (55% 26%), esmoll (25%±11%), nitroglycerine (45% ± 21%) compared with preinduction baseline values. In the esmoll group, the increase in HR was significantly lower (20%± 3%) compared with nitroglycerine (37%± 8%), lidocaine (52%± 8%), and control (29%±4%) groups. Esmolol 1.4 mg/kg IV was significantly more effective than either lidocaine or nitroglycerine in controlling the HR and MAP in response to laryngoscopy and intubation ($p<0.05$) [12].

A randomized study was done by Ajay Gupta et al. for comparison of esmolol and lidocaine for attenuation of cardiovascular stress response to laryngoscopy and endotracheal intubation on 60 ASA (I&II) patients divided into 3 groups, each group containing 20 patients. Group C received no drug, group L received lignocaine 1.5mg/kg IV, group E 1.5mg/kg IV esmolol 3min before intubation. Immediately after intubation and further on there was statistically significant ($p>0.05$) increase in HR in group C compared to group E and the difference remained significant till 2 min after intubation. The attenuation of HR response in group E was greater than L. After intubation the attenuation of increase in SBP & DBP in group-E was statistically significant as compared to group-C and L. They concluded that IV esmolol 1.5mg/kg as a bolus attenuates the response more effectively without any deleterious effects[13].

A prospective randomized double blind study was performed by Bakiye Ugur et al.[14] to investigate the effects of esmolol, lidocaine, fentanyl, on 120 (ASA I&II), divided into 4 equal groups. Group C received 5% dextrose 5ml, group-E esmolol 1.5mg/kg IV, group-F fentanyl 1mcg/kg IV, and group-L lignocaine 1.5mg/kg IV 2 min before endotracheal intubation. HR, MAP, and RPP were recorded before and after induction of anesthesia, immediately after intubation and 1, 3, 5, 7 and 10 min after intubation. An increase in HR was observed immediately after intubation in all groups except the group-E. The decrease in HR began 3 min after intubation, occurred earliest in group-E, and was significant in all groups 10 min after intubation ($p<0.0083$). MAP increased after intubation in all groups but was lower in fentanyl group. MAP decreased first in the group-E 3 min after intubation and than in other grup 5 min after intubation ($p<0.05$). Calculated RPP increased immediately after intubation in all groups compared with baseline values. Increased RPP values began to decrease first in the group-E 3 min after intubation ($p<0.05$). They concluded that Esmolol 1.5 mg/kg can be given 2 min before laryngoscopy and intubation to prevent RPP and tachycardia and can be beneficial when administered before layngoscopy and tracheal intubation in patients with tachycardia.

Arandomized placebo controlled double-blined study was done by Steven M. et al[15]. to investigate which drug prevents tachycardia and hypertension associated with tracheal intubation: lidocaine, fentanyl, or esmolol? 80 patients (ASA II, III & IV)

divided into 4 groups to receive preintuation dose of either placebo, 200 mg lidocaine, 200 mcg fentanyl, 150mg esmolol. After induction of anesthesia 1-1.5mg/kg succinylcholine was given at 1 min. laryngoscopy and tracheal intubation were performed at 2 min after anesthesia maximum percent increase in HR(mean±SE) during and after intubation were similar in the placebo (44% ± 6%), lidocaine (51% ± 10%), and fentanyl (37% ± 5%) groups, but lower in esmolol (18% ± 5%) group ($p<0.05$). Maximum SBP increases were lower in the lidocaine (20% ± 6%), fentanyl (12% ± 3%), and esmolol (19% ± 4%) groups than in the placebo (36% ± 5%) group ($p<0.05$). They concluded that esmolol 150 mg provides consistent and reliable protection from increases in both HR and SBP during and after intubation. Lidocaine 200 mg and fentanyl 200 mcg fail to protect against increases in HR but do provide protection against increase in SBP equivalent to that provided by esmolol.

Attenuation of cardiovascular response to laryngoscopy and tracheal intubation has been described by Feng CK, and et al[16]. 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.

In this prospective study ninety patients have been randomly selected into one of the three groups by a computer generated random number table and by card sampling. Each patient has been given cards to take any one blindly from three groups. There were no significant differences between three 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($p>0.05$) in three groups.

One minute after intubation, these parameters were significantly raised ($p<0.05$) in all groups. The findings of our study are comparable to those of Bakiye et al[14]. Who found a rise in HR, MAP and RPP, just after and 1 min after intubation and also comparable to those of Steven et al[15] who show an increase in HR and SBP during and 1 min after intubation and comparable to those of King et al[17] who found a rise of HR, SBP, DBP, RPP and MAP 1 min after intubation. They also found gradual return of these parameters to baseline as anaesthesia deepened.

Our study demonstrated highly significant reduction in HR,SBP, DBP, RPP and MAP in groups A and B compared with group C, at 1, 2 and 5 minutes after intubation. The reduction of HR, SBP, DBP, MAP and RPP were significantly more in group A (Esmolo) than those of group C (lignocaine) (fig I-V). The reduction of HR and RPP were significantly more in group A (esmolol) than group B(fentanyl) at 1 and 2 min after intubation which is consistent with the study of Feng et al[16]. Who found that esmolol 2 mg/kg is more effective than fentanyl 3 mcg/kg in preventing HR and RPP and showed that only esmolol could reliably offer protection against the increase in both HR and SBP. In our study five minutes after intubation, HR, SBP, DBP, RPP and MAP returned to almost baseline values in esmolol and fentanyl group but in lignocaine group it took 10 min to return to base line.These findings are in agreement with that of Bakiye Ugur et al., and Steven et al. Bakiye Ugur et al. showed that esmolol 1.5 mg/kg can be given 2 min before laryngoscopy and intubation to prevent RPP and tachycardia. Steven et al. showed that Esmolol 150 mg provides consistent and reliable protection from increases in both HR and SBP during and after intubation.

It is also comparative with that of Ajay Gupta et al[52]. for comparison of esmolol and lidocaine for attenuation of cardiovascular stress response to laryngoscopy and endotracheal intubation who showed that IV lignocaine 1.5mg/kg given 3 min before intubation is not very effective in attenuating hemodynamic response to laryngoscopy and intubation, while esmolol 1.5mg/kg as a bolus attenuates the response more

effectively without any deleterious effects. They showed that there were greater attenuation of HR, SBP and DBP in group E compared to group L from just after intubation to 2 min after intubation.

We observed that esmolol attenuated tachycardia and fentanyl prevented hypertension; RPPdecreased in both the esmolol and fentanyl groups, but the decrease was more marked in esmolol group and lignocaine could not prevent tachycardia and hypertension. The dose of esmolol, fentanyl and lignocaine evaluated in this study did not cause any adverse effects. This study has one limitation-we only tested the 1.5 mg/kg Esmolol, 1.5 mcg/kg Fentanyl and 1.5 mg/kg Lignocaine and administered the anaesthetic agents through the intravenous route. Therefore the results of the study are applicable to the doses tested in combination with the anaesthesia induction technique used.

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Original Article

Prevalence of microorganism and emergence of bacterial resistance in ICU of Bangabandhu Sheikh Mujib Medical University of Bangladesh

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Abstract

Background *Antibiotic resistant bacterial nosocomial infections are a leading problem in intensive care units (ICU).*

Objective *To study the pattern of microorganism and bacterial resistant to antibiotic in ICU of Bangabandhu sheikh Mujib Medical University of Bangladesh.*

Methods *This retrospective study was conducted in ICU of Bangabandhu Sheikh Mujib Medical University, Bangladesh from January 2010 to December 2012. Total number of samples were 448. The samples of tracheal aspirate, blood and urine for culture and sensitivity was collected from the patient admitted in ICU. Analysis of tracheal aspirate, blood and urine culture was done from hospital record. All bacteria was identified by standard microbiological methods, and their antibiotic sensitivity was performed using disk diffusion method.*

Results *Total number of samples 448. Samples of tracheal aspirate was 159, positive culture 121(76%), most frequent identified organism was acenetobacter 45.45%, followed by pseudomonas 32.23%, proteus 11%, klebsiella 10% and E.coli 3%, samples of blood culture was 148, positive culture 22(14.86%), most frequent identified organism was pseudomonas 63.63%, followed by acenetobacter 22.72%, salmonella 4.54% and E.coli 4.54% and samples of urine culture was 141, positive culture 36 (25.53%) most frequent identified organism was enterococcus 22.22%, followed by acenatobacter 19.44%, candida16.66%, klebsiella 13.88% and E.coli 13.88%. Drug resistant organism of tracheal aspirate was 12(20.33%) in 2010, 2(20%) in 2011 and 13(25%) in 2012. only collistin sensitive organism identified was 28(23.14%).*

Conclusion *From this study we concluded that most common site of infection was respiratory tract and most prevailing organism was acinetobacter & pseudomonas and antibiotic resistant infection is increasing and at present around one fourth organisms were resistant to all antibiotics.*

Keywords *Microorganism, drug resistance, respiratory tract, acinetobacter and pseudomonas aeruginosa.*

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Introduction

Increasingly rapid emergence and dissemination of antimicrobial-resistant bacteria has become a world wide problem during the last decades. The intensive care unit often is called the epicenter of infections, due to its extremely vulnerable population of reduced host defences deregulating the immune responses and increased risk of becoming infected through multiple procedures and use of invasive devices distorting the anatomical integrity-protective barriers of patients like-intubation, mechanical ventilation, vascular access, etc. In addition, several drugs may be administered, which also predispose for infections, such as pneumonia, e.g., by reducing the cough and swallow reflexes (sedatives, muscle relaxants)

or by distorting the normal nonpathogenic bacterial flora (e.g., stress ulcer prophylaxis)[1].

Consequently, the ICU population has one of the highest occurrence rates of nosocomial infections (20-30% of all ICU-admissions)[2,3], leading to an enormous impact on morbidity, hospital costs, and often, survival [4-6]. Along with the problem of nosocomial infection goes the burden of "multidrug" antimicrobial resistance (MDR). The ongoing emergence of resistance in the community and hospital is considered a major threat for public health. Antibiotic resistance increases the morbidity and mortality associated with infections and contributes substantially to rising costs of care, resulting from prolonged hospital stays and the need for more expensive drugs.

Both infection and MDR result in a considerable clinical and economic burden. As such, the presence of MDR boosts the deleterious impact of nosocomial infection[7]. Compared with infections not caused by MDR microorganisms, the additional cost of multidrug resistance in hospitalized patients with infections has been estimated at $6,000 to $30,000 (per patient) in Belgium[8]. This burden of resistance, however, is probably more due to the higher rate of inappropriate empiric antimicrobial treatment associated with infections caused by MDR pathogens than with the virulence of particular MDR strains[9].

We are currently faced with (multi drug) resistant bacteria that are difficult and sometimes impossible to treat[10].The tremendous therapeutic advantage afforded by antibiotics is being threatened by the emergence of increasingly resistant strains of microbes[11]. The problem has recently been worsened by the steady increase in multi-resistant strains and by the restriction of antibiotic discovery and development programs[10].

In hospital settings world-wide Intensive care Units are faced with rapid and increasing resistance of bacteria. ICUs are the source and site of development of multidrug resistant (MDR) bacteria.

The widespread use of antibiotics both inside and outside of medicine is playing a significant role in the emergence of resistant bacteria[12]. Antimicrobials have transformed our ability to treat many infectious diseases that were killers only a few decades ago. The increasing use of antimicrobials in humans, animals, and agriculture has resulted in many pathogens developing resistance to these powerful drugs[13]. A number of factors contribute to the emergence of antimicrobial resistance in ICUs, including extended length of hospital stay, and the widespread use of prophylactic and therapeutic anti-infective agents . Bacteria have developed resistance to all different classes of antibiotics discovered to date. The most frequent type of resistance is acquired and transmitted horizontally via the conjugation of a plasmid[14]. In recent times new mechanisms of resistance have resulted in the simultaneous development of resistance to several antibiotic classes creating very dangerous multidrugresistant (MDR) bacterial strains, some also known as "superbugs"[15]. The need for new antimicrobial agents is greater than ever because of the emergence of multidrug resistance in common pathogens, the rapid emergence of new infections, and the potential for use of multidrug-resistant agents in bioweapons[16].

Controlling the spread of resistance requires the collaboration of several participants such as Medical, Veterinary and Public Health Communities[17]. Multidrug resistant organisms (MDROs) are resistant to one or more classes of antimicrobial agents and the knowledge of susceptibility pattern is helpful in selecting the empirical therapy and improving the likelihood of a satisfactory outcome for patient[18]. The objective of this study was to determine bacterial pathogens prevalence and to assess the multi-drug resistant (MDR) strains to different antibiotics in the intensive care unit of Bangabandhu Sheikh Mujib Medical University.

Materials

This retrospective study was carried out in the intensive care unit of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh from 2010-2012. The approval of the University ethical committee was taken before conducting the study. Data of total 448 samples (tracheal aspirate 159, blood culture 148 and urine culture 141) for culture and sensitivity were collected from intensive care unit record. The pattern of microorganism and bacterial resistant to antibiotic was recorded. All bacteria was identified by standard microbiological methods, and their antibiotic sensitivity was performed using disk diffusion method.

Sample Collection: Tracheal aspirate, blood and urine specimens were collected aseptically for bacteriological examination from the patient of Intensive care unit of BSMMU.

Isolation and Identification

Tracheal aspirate, blood and urine specimens were cultured into blood agar and MacConkey agar media. Bacteriological smears were prepared from the growing colonies then stained with gram stain for morphological identification. All the bacterial isolates were preserved on nutrient agar slants at 4ºC and subcultured periodically. The obtained pure cultures were identified biochemically.

Antimicrobial Susceptibility Test

Antimicrobial susceptibility pattern was performed using disk diffusion method on Muller Hinton agar plate. The isolates were tested against amoxicillin, cotrimoxazole, ceftazidime, Cefotaxime, Cefuroxime, Aztreonam, Netilmicin, Ticarcillin, Cephradine, gentamicin, imipenem, ciprofloxacin, ceftriaxone, amikacin, Colistin Sulphate, Tazobactam+ piperacillin.

The proportion of susceptible organisms was calculated as the sum of susceptible isolates relative to the total number of organisms tested. The organism considered as multidrug resistant if it is resistant to three or more antimicrobials.

Results

Table I *Tracheal aspirate-2010, prevalence & pattern of organism, n=74*

Positive c/s	Name of organism	Frequency	Percentage
59(79.7%)	Acenatobacter	32	54.2
	Pseudomonas	24	40.7
	Proteus	2	3.3
	Klebsiella	1	1.69

Table II *Tracheal aspirate-2010, pattern of antibiotic sensitivity, n=59*

Sensitive to none	Sensitive to one			Sensitive to many
12(20.3%)	Total	Antibiotic	Number	29(49.1%)
	18(30.5%)	Colistin	12(66.6%)	
		Tazobactum	2(11.1%)	
		Imepenem	3(16.6%)	
		Netilmicin	1(5.5%)	

Table III *Blood-2010, prevalence & pattern of organism, n=61*

Positive c/s	Name of organism	Frequency	Percentage
13(21.3%)	Pseudomonas	8	61.5
	Acenatobacter	3	23
	E coli	1	7.6
	Salmonella	1	7.6

Table IV *Blood -2010, pattern of antibiotic sensitivity, n=13*

Sensitive to none	Sensitive to one			Sensitive to many
1(7.6%)	Total	Antibiotic	Number	6(46.15%)
	6	Colistin	3(50%)	
		Ceftazidim	3(50%)	

Table V *Urine -2010, pattern of antibiotic sensitivity, n=54*

Positive c/s	Name of organism	Frequency	Percentage
19(35.1%)	Acenatobacter	6	31.5
	Enterococcus	5	26.3
	E coli	3	15.7
	Pseudomonas	2	10.5
	Klebsiella	2	10.5
	Candida	1	5.2

Table-VI *Urine -2010. pattern of antibiotic sensitivity, n=19*

Sensitive to none	Sensitive to one			Sensitive to many
5(26.3%)	Total	Antibiotic	Number	9(47.3%)
	5(26.3%)	Colistin	3(60%)	
		Imipenem	1(20%)	
		Ciprofloxacin	1(20%)	

Table-VII *Tracheal aspirate-2011, prevalence & Pattern of Organism n=14*

Positive c/s	Name of organism	Frequency	Percentage
10(71.4%)	Acenetobacter	5	50
	Proteus	2	20
	Pseudomonas	1	10
	Klebsiella	1	10
	Streptococcus	1	10

Table VIII *Tracheal aspirate-2011, Pattern of antibiotic sensitivity, n=10*

Sensitive to none	Sensitive to one			Sensitive to many
2(20%)	Total	Antibiotic	Number	4(40%)
	4(40%)	Colistin	4(100%)	

Table IX *Blood-2011, prevalence & pattern of organism n=16*

Positive c/s	Name of organism	Frequency	Percentage
3(18.7%)	Pseudomonas	2	66.6
	Salmonella	1	33.3

Table X *Urine-2011, prevalence & pattern of organism n=14*

Positive c/s	Name of organism	Frequency	Percentage
4(28.5%)	Candida	2	50
	Enterococcus	1	25
	Acenetobacter	1	25

Table XI *Tracheal aspirate-2012, prevalence & pattern of organism n=71*

Positive c/s	Name of organism	Frequency	Percentage
52(73.23%)	Acenetobacter	18	34.61
	Pseudomonas	14	26.92
	Klebsiella	8	15.38
	Proteus	7	13.46
	Enterococcus	1	1.92
	E. coli	3	5.76
	Gram +ve cocci	1	1.92

Table XII *Tracheal aspirate-2012,Pattern of antibiotic sensitivity, n=52*

Sensitive to none	Sensitive to one			Sensitive to many
13(25%)	Total 13(25%)	Antibiotic	Number	26(50%)
		Colistin	12(92.7%)	
		Tazobactum	1(7.7%)	

Table XIII *Blood-2012, prevalence & pattern of organism n=71*

Positive c/s	Name of organism	Frequency	Percentage
6(8.45%)	Pseudomonas	4	66.6
	Acinetobacter	2	33.3

Table XIV *Urine-2012, prevalence & pattern of organism n=73*

Positive c/s	Name of organism	Frequency	Percentage
13(17.80%)	Pseudomonas	2	15.38
	Enterococcus	2	15.38
	E.coli	2	15.38
	Klebsiella	3	23.07
	Candida	3	23.07
	Proteus	1	7.06

Table XV *Prevalence of positive culture of trachea, blood and urine- comparison during 2010-2012*

Tracheal aspirate		Blood		Urine	
Total Sample	Positive c/s	Total Sample	Positive c/s	Total Sample	Positive c/s
159	121(80.66%)	148	22(14.86%)	141	36(25.53%)

Discussion

Surveys of the prevalence and antibacterial susceptibility patterns of bacterial isolates are important for determining appropriate empirical therapy for infections in critically-ill patients. Also, epidemiological analysis of patient data can be informative for appropriate management of patients in ICUs.

In our study most common site of infection is respiratory tract. Culture of 159 sample of tracheal aspirate was done in 2010 to 2012. Among them 121 culture was positive and most frequent organism *Acinetobacter* was isolated in maximum 55(45.45%)samples followed by Psedomonas in 39 (32.23%) samples, Proteus in 11 (9%) samples, Klebsiella in 10(8.26%) samples, E.Coli in 3 (2.47%) samples and Streptococcus in 1(0.82%) sample. A very high rate 27(22.31%) of resistant organism was identified, sensitive to only one antibiotic was 35(28.92%) and sensitive to many antibiotic was 59(48.76%). Among the antibiotic collistin (polymyxin E) was only sensitive for 23.14%

organism, carbapenem 2.47% and tazobactam-piperacillin combination 2.47%.

In blood culture, among 148 samples 22(14.86%) samples were positive. Among identified organism pseudomonas was 14(63.63%), acenatobacter 5(22.72%), E. coli 1(4.54%) and salmonella 1(4.54%). In urine culture, among 141 samples- 36(25.53%) samples were positive. Among identified organism enterococcus was 8(22.22%), acenatobacter 7(19.44%),Candida 6(16.66%), E.coli 5(13.88%), klebsiella 5(13.88%) and pseudomonas 4(11.11%).

In Asian countries including Indonesia, the most frequent pathogen isolated from infections in the ICU are P. aeruginosa, Klebsiella spp., E. coli, Enterococcus, and Staphylococcus aureus. For example, in 12 ICUs in seven Indian cities, overall 87.5% of all Staphylococcus aureus health care associated infections were caused by methicillin-resistant strains, 71.4% of Enterobacteriaceae were resistant to ceftriaxone and 26.1% to piperacillintazobactam; 28.6% of the P. aeruginosa strains were resistant to ciprofloxacin, 64.9% to ceftazidime and 42.0% to imipenem[19].

In Thailand the predominance causative pathogens in ICU, were the imipenem resistant P. aeruginosa, ceftazidime-resistant Acinetobacter baumannii, third-generation-cephalosporin-resistant K. pneumoniae, and quinolone-resistant E. coli[20]. Another study performed at ICU of a tertiary care center in Saudi Arabia showed that the most frequent pathogens are Acinetobacter baumannii, P. aeruginosa, E. coli, K. pnemoniae[21]. Recently, similar studies were conducted in hospitals and several ICUs in Asian countries including Philippine[22], India[23,24,25,26] Iran[27,28], China[29], Malaysia[30], Singapore[31], and Nepal[32], demonstrated that the most frequent microorganism derived from ICU samples were P. aeruginosa, Klebsiella spp. and Staphylococcus aureus. In Canada, the Canadian National Intensive Care Unit study conducted during 2005-2006, showed that P. aeruginosa, Staphylococcus aureus, Haemophilus influenzae, Enterococcus spp., Staphylococcus pneumoniae, and K. pneumoniae are the most common isolates recovered from clinical specimens in Canadian ICUs. Moreover, P. aeruginosa is the most frequent multi drug-resistant phenotype, which is resistance to three or more of the antibiotics including cefepime, piperacillin-tazobactam, meropenem, amikacin or gentamicin, and ciprofloxacin[33].

In our study showed that the most common pathogens identified from clinical specimen were Acinetobacter baumannii, P. aeruginosa, E. coli, Klebsiella pnemoniae and acenetobacter is the most frequent multidrug resistant phenotype and about 22.31% organisms were resistant to all available antibiotics in market. Ultimate fate of these patients is no need to mentioned. It's a grave situation. As we are being unable to treat many of these infections, so due important is to be given on prevention of infection and prevention of development antimicrobial resistance. Most sensitive antibiotic is polymixin- colistin. About one fourth organisms were resistant to carbanem which is also an alarming sign for us.

The prescribing of antibiotics in the ICU is usually empiric. Therefore, the ongoing surveillance of antibiotic susceptibility patterns of predominant bacteria is a fundamental effort to monitor changes in susceptibility patterns and to guide the clinician in choosing empirical or directed therapy appropriately, especially in ICU setting. Appropriate antibiotic utilization in ICU is crucial not only in ensuring an optimal outcome, but also in preventing the emergence of multi drug resistance bacteria. Therefore developing nation wide antibiotic policy and guidelines is essential to limit multidrug resistance and to maintain low level of resistance to newer antibiotics. Several societies have published guidelines for optimizing antibiotic use and curtailing antibiotic resistance in hospitals. Key components of these guidelines include multidisciplinary coordination between hospital administrators, clinicians, infectious disease specialists, infection control teams, microbiologist and hospital pharmacists.

In order to prevent the emergence and spread of antimicrobial resistance pathogens in ICU, the pattern of antimicrobial use has to be determined. A multidisciplinary approach is required to succeed in combating the problem. Hospital should monitor antimicrobial use to determine whether in ICUs or the entire hospital is overusing antimicrobials.

Introduction of strict and mandatory infection control program in hospital setting like proper hand washing before and after contact with

patients, appropriate isolation of patients, standard guideline for disinfection and sterilization of medical equipment should be introduced.

This study conclude that most common site of infection was respiratory tract. Most prevailing organism was acinetobacter & pseudomonas. Around one fourth organisms were resistant to all antibiotics. Around one fourth organisms are sensitive to only one antibiotic. Most sensitive antibiotic is polymixin- colistin. Around half of the organisms are sensitive to many antibiotics. Positive blood culture reports are lowest in comparison to others.

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Original Article

Effects of pretreatment with magnesium sulphate on suxamethonium induced complications during induction of general anaesthesia-A placebo controlled study

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Abstract

Background *To administer general anaesthesia with controlled ventilation, laryngoscopy and endotracheal intubation is necessary.Suxamethonium is drug of choice but some side effects preclude its use. Pretreatment with Magnesium sulphate reduces suxamethonium induced complications.*

Objective *To see the effects of pretreatment with magnesium sulphate on suxamethonium induced complications during induction of general anaesthesia.*

Methods *A total number of sixty patients of ASA grade I and II were selected randomly as per inclusions and exclusions criteria , thirty in each group. Group- C is the control group and group-M-patients were received magnesium sulphate 60mg per kg. Pulse rate, blood pressure, SPO2, ECG, Serum K^+ concentration, fasciculation, myalgia and side effects of magnesium sulphate were recorded.*

Results *Suxamethnium induced complications like fasciculation, raised potassium concentration, haemodynamic change during intubation and post operative myalgia significantly reduced in patients pre treated with magnesium sulphate.*

Conclusion *Pretreatment with magnesium sulphate reduces incidence of suxamethonium induced complications during induction of general anaesthesia.*

Keywords *Suxamethonium, magnesium sulphate,general anaesthesia, complications.*

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Introduction

General anaesthesia with controlled ventilation through endotracheal tube is an anaesthetic technique used by the anaesthesiologists all over the world. laryngoscopy & endotracheal intubation is necessary to achieve this technique. Traditionally suxamethonium is drug of choice for induction due to its rapid onset of action.

Suxamethonium induced side effects are increased serum potassium concentration, fasciculation, myalgia, arrhythmia, increased intraocular & intragastric pressure, prolonged apnoea, and triggers malignant hyperthermia. Increased serum potassium concentration of about 0.5 mmol/L from the baseline usually do not causes too harm to the patient but in preexisting hyperkalaemia, rise of potassium level may cause life threatening situation especially arrhythmia[1]

Fasciculation is the result of repetitive firing of the motor nerve terminals and antidromic discharges that manifest as uncoordinated muscle contraction[2].The cause of the muscle pain is not known but it may be due to fasciculation[1]. Best method to avoid fasciculation is to avoid suxamethonium. To reduce incidences or prevent fasciculation and myalgia, priming with non-

depolarizing neuromuscular blocking agents may be used.

In anaesthesia magnesium sulphate has a role in reduction of stress associated with catecholamine release during intubation. Prolongation of duration of non depolarizing neuromuscular blocking agent (mivacurium) has been reported where magnesium sulphate (60mg.kg^{-1}) was used[3]. There is no prolongation of duration of depolarizing neuromuscular blocking agent pretreated with magnesium sulphate[4].

Precurarization with nondepolarizing muscle relaxant is commonly used to reduce suxamethonium induced complications during induction of general endotracheal anaesthesia except for arrhythmia[5].

On the other hand, magnesium sulphate ($MgSO_4$) has precurarization effects that reduce suxamethonium induced fasciculation[4] and increases in serum potassium concentration[6,7] without delay of onset and prolongation of suxamethonium induced effects. Furthermore, prior to tracheal intubation $MgSO_4$ decreases the haemodynamic response. Pretreatment with magnesium is more effective to limit suxamethonium induced fasciculation and subsequent tracheal intubation-induced haemodynamic changes in rapid sequence induction compared with vecuronium pretreatment[5]. However, it causes unpleasant warm sensation for conscious patients by rapidly or slowly (2 min) injection of $MgSO_4$[8]. $MgSO_4$ administered between administration of sedatives and suxamethonium to avoid unpleasant sensation, did not suppress hypertension and increases in heart rate (HR) induced by rapid sequence induction[4]. In the present study effect of pretreatment with magnesium sulphate on suxamethonium induced complications like fasciculation, raised potassium level, myalgia and haemodynamic changes during induction of general anaesthesia were undertaken.

Methods

After approval of the ethical committee, 60 patients were selected as per inclusion and exclusion criteria. Informed written consent was obtained from each patient. The patients were divided into 2 (two) groups, 30 (thirty) in each group by card sampling. Group-C(control group) and Group-M(Magnesium sulphate pretreated group). Both the groups received non potassium containing intravenous fluid normal saline (0.9% sodium chloride).Preoxygenation performed with 100% O_2 for 5 minutes to all patients. Only group-M received magnesium sulphate (60 mg. kg^{-1}) before induction as pretreatment, by intravenous route over 30 seconds. Induction done by using, fentanyl (1mg.kg^{-1}), thiopental sodium (2.5%) 5mg.kg^{-1} followed by suxamethonium 1.5 mg.kg^{-1} Iv. During the period of suxamethonium introduction to intubation only O_2 was given through face mask . During this period patient was monitored regarding fasciculations (The degree of muscle fasciculation after administration of suxamethonium was recorded on a scale of 0 to 3; no fasciculations = 0; mild twitches involving face & fingers only =1; fasciculation involving limbs or trunk =2; fasciculation producing gross body movement =3). After 60 seconds of giving suxamethonium, tracheal intubation was done. After intubation patient were ventilated manually by Bain system with O_2 40%, N_2O-60%, and halothane 0.5% and anaesthesia maintained by neuromuscular blocking agent vecuronium (0.1mg.kg^{-1}). Neostigmine 0.04 mg/kg and atropine 0.02 mg/kg used as reversal. Pulse, blood pressure SpO_2 were recorded pre operatively and at 1st, 3rd, 5th, and 7th minutes after intubations; ECG was continuously monitored. Blood sample collected from both group to measure serum potassium concentration before induction and 5 minutes after induction of anaesthesia. In the postoperative room, each patient received inj. pethedine 1.0 mg. kg^{-1} i.m. as initial analgesic then inj. tramadol subsequently. Regarding myalgia, patients were questioned by the investigator about muscle pain at 24th hour after surgery not at the operative site but at their shoulder and neck, trunk and limbs. Data was collected in a prescribed form and analyzed by SPSS (version-15.0). Student's t test, Chi-square test, Fisher's exact test were used to measure level of significance with CL- 95% ($p<0.05$).

Results

The studied groups became statistically matched for age (p=0.274),weight (p=0.295),sex (p=0.787)

Distribution of the patient's fasciculation scale

In table - l The difference at different scale of fasciculation between two groups were tested & found statistically significant (P>0.05) in no fasciculation (p=0.001) & fasciculation involving limbs or trunk group (p=0.004) of fasciculation scale.

Table I *Distribution of the patient's fasciculation*

Fasciculation scale	Score	Groups		p value
		Group-C n=30	Group-M n=30	
No Fasciculation	0	1 (3.3)	11 (36.7) S	0.001
Mild twitches involving face & fingers only	1	11 (36.7)	15 (50.0) NS	0.297
Fasciculation involving limbs or trunk	2	13 (43.3)	3 (10.0) S	0.004
Fasciculation producing gross body movement	3	5 (16.7)	1 (3.3) NS	0.195

Patient's serum potassium concentration at different times

Serum potassium level just before induction was 3.87 ± 0.13 m mol/L and 5 minutes after induction was 4.13 ± 0.27 mmol/L in group-C. In group-M serum potassium level just before induction was 3.90 ± 0.13 mmol/L & 3.72 ± 0.15 mmol/L 5 minutes after induction. The difference of serum potassium in two groups (group-C and group-M) were statistically insignificant (P=0.114) just before induction; but significantly (p=0.001) change occurred in two groups.

Table ll *Patient's serum potassium concentration at different times interval.*

Time interval	Groups		p value
	Group C	Group M	
Just before induction	3.87 ± 0.21	3.90 ± 0.13 NS	0.114
5 minutes after induction	4.13 ± 0.27	3.72 ± 0.15 S	0.001

Postoperative myalgia between two groups

About postoperative myalgia, patients were asked by investigator about muscle pain on their shoulders, neck, trunk and limbs at 24th hours after surgery. 17(56.7) patients in group-C and 9(30) patients in group-M complained about muscle pain which was significant statistically (p=0.037)

Table lll *Postoperative myalgia between two groups*

Myalgia	Groups		p value
	Group-C n=30	Group-M n=30	
Pain	17 (56.7)	9 (30.0)	0.037

Haemodynamic change during induction.

Table lV showed that mean percent change of haemodynamic parameters (pulse, systolic, diastolic and mean blood pressure) observed in two groups just before induction and 1st minute after intubation, less in group-M. Mean percent change between two groups was analyzed by t test to detect any significance and found significant (p=0.038) change in pulse rate, but reduced systolic, diastolic and mean blood pressures in between two groups were insignificant(p>0.05).

Table lV *Mean percent changes between groups*

Haemodynamic parameters	Mean percent change from Just before induction to 1st minute		p value
	Group-C	Group-M	
Pulse (bpm)	17.43 ± 8.05	12.67 ± 9.30	0.038S
SBP (mmHg)	7.25 ± 3.22	5.64 ± 5.25	0.160 NS
DBP (mmHg)	8.84 ± 5.14	6.63 ± 5.21	0.103 NS
MBP (mmHg)	7.98 ± 3.86	6.82 ± 5.89	0.369 NS

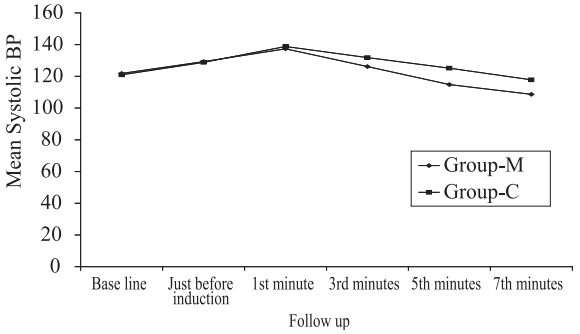

Fig 1 *Line chart of the patients' systolic blood pressure at different times*

Comparison of side effects in two groups

Table V showed 1(3.3) patients in group-C and 9 (30) patients in group-M had sweating; 2 (6.7)

patients in group-C and 5 (16.7) patients in group-M felt palpitation; none in group-C and 9 (30) patients in group-M felt hotness. Sweating was statistically significant (p=0.006); palpitation was statistically insignificant (p=0.424) but hotness was significant (0.002).

Table V *Comparison of side effects in two groups*

Side effect	Groups		P value*
	Group-C n=30	Group-M n=30	
Sweating	1 (3.3)	9 (30.0)	0.006 S
Palpitation	2 (6.7)	5 (16.7)	0.424 NS
Hotness	0 (.0)	9 (30.0)	0.002 NS

Four point rating score

In this study fasciculation was significantly reduced in group-M, serum potassium concentration change was significant in between two groups; myalgia was significantly reduced in group-M. haemodynamic changes occurred during intubation; change of pulse rate was significant, change of systolic and mean blood pressure were insignificant in between two groups. So total score 4 out of 6 indicating that magnesium sulphate pretreatment has a role in reducing suxamethonium induced complications during induction of general anaesthesia.

Table Vl *Four point rating score in between two groups*

Characteristics		Score	
		Insignificant 0	Significant 1
Reduced fasciculation			group-M
Change of serum K^+ concentration			group-M
Myalgia reduced			group-M
Haemodynamic change during intubation	Pulse		group-M
	SBP	group-M	
	MBP	group-M	

Discussion

Suxamethonium is the gold standard against which all other muscle relaxants are compared due to fast and reliable onset of time. It has some side effects around induction; fasciculation, increased serum potassium concentration and life threatening arrhythmia. It also causes postoperative myalgia. Precurarization with nondepolarizing muscle relaxant is commonly used to limit the complications but not all of them.

In our study no significant difference (P>0.05) were found in demographic characteristics (age, weight & sex distribution) between two groups.

Regarding fasciculation, 50% population scored fasciculation score-2 in group-M in the study of Sakuraba S. et al (2006) [5]. In the study of Stacey MRW et al (1995) [4] muscle fasciculation occurred in all patients in control group & only six out of ten patients in magnesium group, which was statistically significant (P<0.01); fasciculation score-3, that was observed in 3 patients in control group & 2 patients in the magnesium group. Similarly in our study fasciculation score observed higher in group-C. Fasciculation score-3 was observed in 16.7% population in group-C whereas 3.3% in group-M. 43.3% and 10% population in group-C & M respectively scored fasciculation score-2 (p=0.004). Fasciculation score-0 (no fasciculation) occurred in 36.7% population in group-M and 3.3% in group-C (p=0.001). 50% patients scored 1 in group-M which was not statistically significant (p=0.297).

In our study, serum potassium concentration just before induction of anaesthesia in between two groups were statistically not significant (p=0.14). Change of serum potassium concentration occurred significantly in between two groups (p=0.001) after 5 minutes of induction of anaesthesia. In the study James MF et al.(1986) showed, in control group potassium level increase in an average of 0.57 ± 0.2 m mol/L; no patient in the magnesium group had an increase in serum potassium (mean change -0.05± 0.02 mmol/L). The difference between the two groups was statistically significant (P<0.01). Danladi KY et al (2006) [9] showed that magnesium sulphate pretreatment significantly reduce suxamethonium induced hyperkalaemia by an average of 0.3mmol/L which was statistically significant and has similarity with our study. James MF & Danladi KY both of them used magnesium sulphate ($60mg.kg^{-1}$) in pretreated group.

Aldrate JA et al (1970) [7] study showed that in magnesium sulphate (1 gm) pretreated group

serum calcium & potassium concentration reduced but there is increase in serum magnesium level after 5 minutes of induction of anaesthesia. Study of Sakuraba S. et al (2006) [5] and Stacey MRW et al (1995) [4] failed to establish significant change of serum potassium concentration in two groups. Sakuraba S & Stacey MRW et al (1995) both of them used magnesium sulphate 40 mg.kg $^{-1}$ as pretreatment but in our study, we used 60mg.kg^{-1} of $MgSO_4$.

In our study myalgia was tested by asking questions at 24th hour after surgery in the postoperative ward and found 30% population in group-M whereas 56.7% in group-C complained about muscle pain, which was significantly less (p=0.037) in group-M. This result has similarity with Aldrate JA study. But Stacey MRW study showed that magnesium sulphate group had no statistically significant reduction of myalgia in correlation with control group. Stacey MRW study differs with our study because they used magnesium sulphate in a dose of 40mg.kg^{-1}.

Haemodynamic parameters (Pulse, SBP, DBP, and MBP) were evaluated in between just before induction of anaesthesia and 1st minute after intubation. Only mean percent change of pulse rate in between two groups were significant but mean percent change of systolic (SBP), diastolic (DBP) and mean (MBP) blood pressure increased in group-M but lower than group-C. The administration of $MgSO_4$ produces vasodilatation by direct effect on blood vessels and by indirectly sympathetic blockade and inhibition of catecholamine release.

In this study, pulse rate were measured at different times (just before induction of anaesthesia, 1st, 3rd, 5th & 7th minutes after intubation). There was no significant change of pulse rate between group-M and group-C (control) just before induction & at 1st & 3rd min after intubation but statistically significant reduction occurred in group-M after 5th and 7th minutes of intubation. Yap LC. et al. (1994) [10] study showed that tachycardic response at 1st min after intubation could not be reduced by pretreatment of magnesium sulphate (60 mg.kg^{-1}). In our study, it was found that increase in pulse rate was not prevented by magnesium sulphate pretreatment, but significantly reduction of pulse rate occurred in comparison with group-C.

Systolic, diastolic blood pressure & mean blood pressure were measured at different times in between group-C and group-M. It was found that no statistically significant change occurred just before induction & 1st minute after intubation but significantly reduced (P<0.05) in 3rd, 5th & 7th minutes after intubation inbetween two groups. In relation to blood pressure, Yap LC et al (1994) [9] showed that magnesium sulphate (60mg.kg^{-1}) could attenuate the hypertensive response at 1 minute following suxamethonium facilitated intubation.

Regarding side effects like sweating, palpitation & warmness; sweating (p=0.006) and warmness (p=0.002) were statistically significant in group-M and palpitation (p=0.424) was statistically insignificant. Similarly in the study of Chestnutt W.N. et al (1985) [7] patients experienced unpleasant warm sensation significantly in $MgSO_4$ pretreated group.

Regarding complications of suxamethonium induced general anaesthesia, with or without pretreatment with $MgSO_4$ a 4 point rating score was done. Total score was 0 to 6, the more score indicate more effectiveness of magnesium sulphate. In this study score was 4 which was in favor of magnesium sulphate pretreatment in case of reducing suxamethonium induced complications in general anaesthesia. So, our study showed that magnesium sulphate pretreatment has a role in reduction of suxamethonium induced complications in general anaesthesia.

Conclusion

Under the circumstances from the present study we can conclude that, suxamethonium induced complications like fasciculation, raised serum potassium concentration; haemodynamic change during induction of general anaesthesia and post operative myalgia reduced by pre treatment with magnesium sulphate 60mg.kg^{-1}.

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Original Article

Preemptive oral paracetamol in laparoscopic cholecystectomy surgery-a comparative study

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Abstract

Background *Laparoscopic cholecystectomy causes a considerable pain in the post operative period. Preemptive use of oral paracetamol decreases the intensity of pain and subsequently reduces the dose of opioid as well as nausea and vomiting.*

Objective *The study was designed to observe the effect of preemptive oral paracetamol reduces the dose of postoperative opioid and nausea and vomiting.*

Methods *Fifty patients of ASA physical status I and II, age range 16-50 years and BMI 18.5-24.9 were randomly selected by cards sampling method. They were equally divided into two groups of 25 patients in each group.* ***Group I*** *received vitamin,* ***Group-II*** *received 1 g oral paracetamol 60 min before surgery. In the recovery room dose of opioid was measured in 1, 6, 12, 24 hours and frequency of nausea, vomiting were assessed.*

Results *The total amount of pethidine needed significantly lower in the case group than that in the control group (p = 0.012). The pain scores were comparatively low in case group than that in the control group from beginning to endpoint of evaluation following operation (p = 0.027). The complaint of nausea at 6 and 12 hours was much less in the case group than that in the control group. Majority (80%) of patients in control group demanded analgesic (pethidine) 10 minutes earlier after operation as opposed to only 8% of the control group (p = 0.014).*

Conclusion *Preemptive paracetamol reduces the intensity of postoperative pain and requirements of pethidine to a large extent with no significant side effects.*

Key words *preemptive, paracetamol, laparoscopic cholecystectomy*

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Introduction

Preemptive analgesia could be defined as analgesia that prevents the development of pathological pain[1]. With this concept, referred to as preventive analgesia, it is believed that through application of an analgesic medicine or technique, pain will either subside or be prevented prior to the painful stimulus [2,3,4].

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage[5]. Postoperative pain, which is a form of acute pain caused by noxious stimulation due to injury. It is typically associated with neuro-endocrine stress response that is proportional to pain intensity[6].

It differs from other types of pain in that it is usually, but by no means always, transitory with progressive improvement over a relatively short time course. Four physiological processes are involved: transduction, transmission, modulation and perception [5].

Systemic response to different organ system includes cardiovascular, respiratory, gastrointestinal, urinary endocrine, hematological and immune system[5].

Sensory signal generated by damaged tissue during surgery can generate a prolonged state of increased excitability in CNS. This has encouraged testing whether pre-operative regional, local anaesthetic or pre-medication can preempt postoperative pain by preventing the establishment central or peripheral sensitization.

The importance of peripheral and central modulation in nociception has forced the concept of 'pre-emptive analgesia' in patient undergoing surgery. This type of management pharmacologically induces an effective analgesic state prior to surgical trauma. Preemptive analgesia can effectively attenuate peripheral and central sensitization to pain[3].

In recent editorial, Armitage encouraged the anaesthesiologist to make changes in thought and terminology so that pain management is pre-emptive rather than retrospective. He suggested abolishing the use of the term pain relief in the context of postoperative analgesia and recommends that analgesic techniques should targeted at prevention of pain rather than relief of pain[7].

For the treatment of postoperative pain in the conventional of prescribing intermittent doses of analgesic in response to patient's demand is often ineffective[8]. Breakthrough pain is accepted as normal by many patient, doctors and nurses after surgical procedure[9]. The delivery of opioid nalgesic can be improved using patient control analgesia (PCA)[10].

Preemptive analgesia can be directed at central neurons by using NSAIDs, paracetamol, ketamine, local anaesthetics and opioids either alone or in combination[11].

Although laparoscopic cholecystectomy is less invasive procedure than classical open surgical approach, many laparoscopic patients suffer considerable postoperative pain[12]. One of the main causes of the pain after laparoscopic cholecystectomy is the peritoneal and visceral irritation caused by the pneumoperitonium[13]. Opioid commonly used in post operative has considerable side effect like nausea and vomiting.

Preemptive analgesia with oral Paracetamol reduces the opioid requirement, thus reducing the nausea and vomiting. Paracetamol inhibits also release of prostaglandin in the spinal cord has effect on serotonin mechanism for spinal pain inhibition. It also reduces nitric oxide production in CNS [14]

Methods

After obtaining written informed consent, fifty patients aged between 16-50 years with ASA physical status I & II scheduled for elective laparoscopic cholecystectomy under general anaesthesia were recruited in a double blind, placebo-controlled study. The protocol was approved by the ethical committee of Bangabandhu Seikh Mujib Medical University. The patients with history of hypertension, diabetes, neurological, renal impairment and chronic obstructive airway disease were excluded. The patients were oriented about the Visual Analogue Scale (VAS). The patients were randomly divided into 2 equal groups by cards sampling. In Group-I received one tab of vit-B complex and Group-II received oral paracetamol 1 gm 60 min before surgery. The colour of the paracetamol and vit-B complex were white and yellowish respectively. These drugs were taken orally with half a cup of water one hour before operation. On arrival of the patients in the operation theatre intravenous line was inserted. Before intravenous Induction by thiopental 3-5/mg/kg body weight all patients were pre-oxygenated with 100% oxygen for 2 minutes after receiving a pre-induction dose of fentanyl 1µg/kg body weight. Endotracheal intubation was facilitated by succinylcholine 1.5mg/kg body weight, Vecuronium 0.1 mg/kg body weight was given for muscle relaxation and anaesthesia was maintained with a combination of oxygen 33%, N_2O 66% and halothane 0.5-1%. Ventilation was controlled to maintain $ETCO_2$ between 35 to 40 mmHg. Intra-operative proper hydration was maintained with normal saline or Hartman's solution. Tracheal extubation was performed after reversal of neuromuscular blocking agent by neostigmine 0.04-0.05 mg/kg b.w and atropine 0.02 mg/kg b.w. After completion of operation all patients were taken to postoperative ward and nursed for 24 hours. Both groups received opioid (Pethedine) through patient control analgesia (PCA) in postoperative ward and postoperative pain assessed by means of Visual Analogue scale (VAS). Total opioid dose measured in both groups and Post operative complications like nausea and vomiting were recorded at 1, 6, 12, and 24 hours.

Data was collected in a prescribed form and analyzed by using SPSS (Statistical Package for Social Sciences). The test statistics used to analyze the data were Student's t-Test, Fisher's Exact Test and repeated measure ANOVA. For all analytical tests, the level of significance was set at 0.05 and $p < 0.05$ was considered significant. The summarized data were presented in the form tables and charts.

Results

The present study intended to determine the role of pre-emptive oral paracetamol in laparoscopic cholecystectomy surgery provisionally included 60 subjects. Of them 10 patients withdrew themselves from the study leaving 50 patients to complete the study. Out of 50 patients, 25 treated by oral paracetamol 1 gm 60 min before surgery considered as case and another 25 treated by one tablet of Vit-B complex considered as control. All the clinical variables were followed up at 1, 6, 12 and 24 hours of intervals following intervention. The findings of the study derived from data analysis are presented below:

Age of the patients

Table I *Comparison of age between two groups*

Age (years)	Group		p-value
	Control (n = 25)	Case (n = 25)	
<35	3(12.0)	8(32.0)	
35 – 40	14(56.0)	11(44.0)	
>40	8(32.0)	6(24.0)	
Mean ± SD	39.3 ± 4.3	37.4 ± 4.4	0.133

#Student's t Test was employed to analyse the data and the data presented as **Mean ± SD.**

Gender distribution of the patients:

Figure 1 shows that the female to male ratio was roughly 2:1.

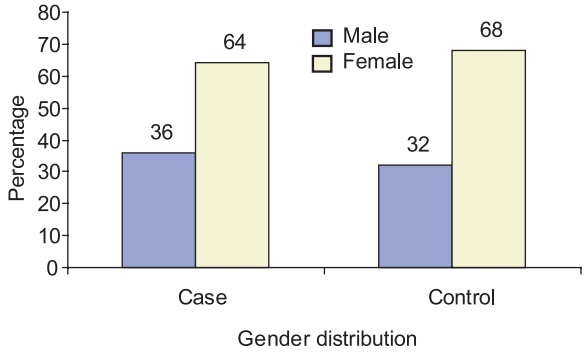

Fig 1 *Comparison of gender between groups*

Body Mass Index (BMI):

Table II *Comparison of BMI between two groups*

BMI (kg/m^2)	Group		p-value
	Control (n = 25)	Case (n = 25)	
Normal weight	(18.5-24.9)	24(96.0)	22(88.0)
Over weight (≥25)	1(4.0)	3(12.0)	
Mean ± SD	23.7 ± 0.8	23.8 ± 1.4	0.908

Figure in the parenthesis denoted corresponding percentage.

#Student's t Test was employed to analyse the data.

Duration of operation

Table III *Comparison of duration of operation between groups*

Operation time (min)	Group		p-value
	Control (n = 25)	Case (n = 25)	
≤60	15(60.0)	17(68)	
>60	10(40.0)	5(32.0)	
Mean ± SD	61.7 ± 8.8	56.5 ± 9.4	0.066

Figure in the parenthesis denoted corresponding percentage.

#Student's t Test was employed to analyse the data.

Pain score:

Table IV *Comparison of pain score between groups*

Pain score	Group		p-value
	Control (n = 25)	Case (n = 25)	
Pain score at 1 hr	4.7 ± 0.3	4.4 ± 0.3	
Pain score at 6 hrs	2.9 ± 0.2	2.7 ± 0.3	0.027
Pain score at 12 hrs	1.8 ± 0.2	1.7 ± 0.2	
Pain score at 24 hrs	1.1 ± 0.2	1.0 ± 0.1	

 # Repetitive Measure ANOVA was used to analyse the data and presented as mean ± SD.

The pain scores were comparatively low in case group than that in the control group from beginning to endpoint of evaluation following operation ($p = 0.027$).

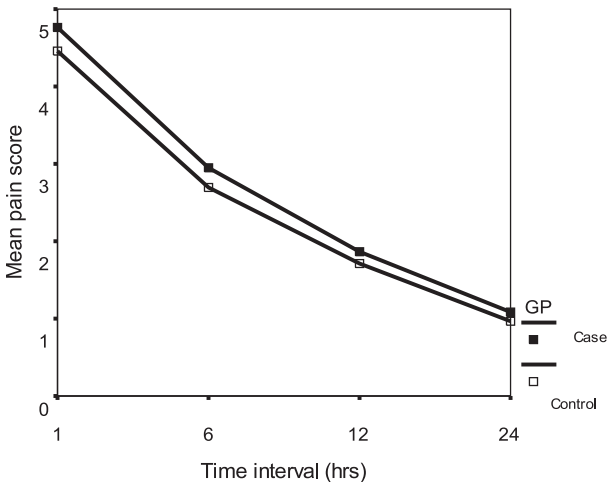

Fig 2 *Pain score at different time interval between groups where*

Amount of pethedine required:

Table V *Comparison of amount of pethedine required between groups*

Required pethedine (mg)	Group		p-value
	Control (n = 25)	Case (n = 25)	
Different time interval (hrs)*			
At 1 hr	36.6 ± 5.0	34.8 ± 5.4	
At 6 hrs	92.1 ± 8.5	77.3 ± 10.7	< 0.001
At 12 hrs	28.1 ± 4.7	29.4 ± 5.4	
Total amount needed#	139.6 ± 9.5	126.8 ± 14.4	0.012

*Repetitive Measure ANOVA was used to analyse the data and presented as mean ± SD.

Data were analysed using Student's t-Test and presented as mean ± SD.

First analgesic demand:

Table VI *Comparison of first analgesic demand between groups*

Duration (min)	Group		p-value
	Control (n = 25)	Case (n = 25)	
<10	20 (80.0)	2(8.0)	
10-20	5 (20.0)	10(40.0)	<0.001
>20	00	13(52.0)	

Data were analysed using χ^2 Test;
Figures in the parenthesis denoted corresponding percentage.

Postoperative complications:

Table VII *Comparison of postoperative complications between groups*

Complications	Group		p-value
	Control (n = 25)	Case (n = 25)	
Nausea			
At 1 hr*	8(32.0)	8(32.0)	0.986
At 6 hr*	14(56.0)	9(36.0)	0.156
At 12 hr#	4(16.0)	2(8.0)	0.334
Vomiting			
At 6 hr#	1(4.0)	00	0.500
At 12 hr#	00	3(12.0)	0.117

* Data were analysed using χ^2 Test;
# Fisher's Exact Test was done to analyse the Data.

Discussion

Preemptive analgesia means that an analgesic intervention is started before the noxious stimulus arises in order to block peripheral and central nociception[3,15,16]. NSAIDs when given before tissue damage (preemptive) may play an important role in peroperative pain management by reducing the inflammatory response in the periphery and thereby decreasing sensitization of the peripheral nociceptors [3,17,18]. Many trials have been able to demonstrate preemptive effect of NSAIDs on the reduction of postoperative pain in laparoscopic cholecystectomy [19]. In our study, pain was less intense in patients who received preemptive paracetamol than those who did not receive the same throughout the whole period of observation (from 1st hour to 24th hour following operation).

In the present study the patients who received preemptive paracetamol were relatively younger than the controls (39.3 ± 4.3 and 37.4 ± 4.4 years respectively). A female preponderance was observed in both groups. Majority of the patients in either group was of normal weight for their height. The mean operation time was a bit higher in control group than that in the case group.

Of the non-opioid analgesics, acetaminophen (also known as paracetamol) is perhaps the safest and most cost-effective non-opioid analgesic when it is administered in analgesic dosages. Although both parenteral and rectal paracetamol produce analgesic effects in the postoperative period, concurrent use with a NSAID is superior to acetaminophen alone (Issioui et al. 2002; Issioui et al. 2002). [20]

The addition of paracetamol, 1 g every 4 h, to patient controlled analgesia (PCA), morphine improved the quality of pain relief and patient satisfaction after major orthopaedic procedures .[21]

In adults, acetaminophen 2 g orally was equivalent to celecoxib 200 mg but less effective than celecoxib 400 mg, rofecoxib 50 mg, or ketoprofen 150 mg in preventing pain after ambulatory surgery [20]. An IV formulation of a prodrug of acetaminophen, propacetamol, has been administered to adults as an alternative to ketorolac in the perioperative period [22]. Propacetamol reduced PCA morphine consumption by 22–46% in patients undergoing major orthopedic surgery [22] which bears consistency with findings of the present study.

Propacetamol has become a popular adjuvant to opioid analgesics for postoperative pain control in Europe; however, this drug may soon be replaced when an investigational IV formulation of acetaminophen becomes available for clinical use [24]. Rectal acetaminophen (1.3 g) has also been successfully used as an adjuvant to NSAIDs and local anesthetics as part of a multimodal fast-tracking surgery recovery protocol [25]. Given the adverse effects associated with both NSAIDs and COX-2 inhibitors in patients with preexisting cardiovascular disease, acetaminophen may assume a greater role in postoperative pain management in the future [26].

In the present study about one-third (32%) of the patients in each group experienced nausea at 1 hour after operation. However, the complaints of nausea at 6 and 12 hours of observation were much less in the preemptive paracetamol group than that in the control group. Vomiting was negligible in either group. The preemptive paracetamol did not cause irritation of stomach or induce allergic reaction. In a study by O'Hanlon in 1996 shown that half-life of NSAID is important for the preemptive effect because of shorter acting analgesics do not have a sufficiently long time of action to provide analgesia. Although etofenamate has a long half-life (8-10 hours), its preemptive effect of VAS scores and meperidine consumptions diminished late postoperative period. VAS scores at 1 and 6 hours in the etofenamate group were significantly lower, VAS scores at 12 and 24 hours were also lower but the differences between etofenamate and placebo group were not found significant.

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Original Article

A clinical study on risk- factors and feto-maternal outcome of pre-eclampsia in Bangladesh

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Abstract

Background *Preeclampsia (PE) is a major cause of maternal and foetal mortality and morbidity.*

Aim *The purpose of the present study was to identify the risk factors, prognosis, maternal and foetal outcome of pre eclampsia patients.*

Methods *This descriptive type of cross sectional hospital based study was conducted in the Department of Obstetrics & Gynecology at Bangabandhu Sheikh Mujib Medical University (BSMMU) & Dhaka Medical College Hospital (DMCH), Dhaka for a period of 6 months. All admitted cases of pre-eclampsia patients who were given the consent were included in the study. Then a thorough history was taken followed by relevant clinical examination and some base line investigation done. For renal function urine for protein, blood for urea, creatinine and uric acid estimation were done. All the information were recorded in a predesigned data collection sheet. Fetal monitoring was done by observing foetal movement, foetal heart sound 6 hourly, ultrasonography of lower abdomen to see foetal well-being and amniotic fluid volume. Maternal and fetal complications were monitored.*

Results *The incidence of preeclampsia was found in 3.4% in this study. Among the studied patients highest percentage had complaints of swelling of legs and abdominal pain (38%). In this study 46% pregnancies were terminated in 29-34 weeks of gestation. Obstetric examination revealed that 42% fundal height 29-34 weeks. Among the study population 4% patients developed abruptio placenta, 2% patients developed post partum eclampsia and 2% patients developed disseminated intravascular coagulation. In the developing countries the perinatal mortality in pre-eclampsia remains to the extent of about 20%, about 50% of which is being still born. In this study 80%, pregnancies gave live born foetus, 6% pregnancies still born babies and Intra uterine death occurred in 6% pregnancies, 8% pregnancies ended in abortion, before the age of viability of foetus. In the study population intrauterine growth retardation was present in 50% babies, 52% babies were premature, still birth was 6%, Intra uterine death was in 6% cases, and abortion was 6%. The IUGR babies also were premature. In this study 28% pregnancies had no foetal or maternal complication. Only foetal complication was present in 60% pregnancies. Only maternal complication was present in 2% pregnancies. Both maternal and foetal complication was present in 10% pregnancies.*

Conclusion *In this study concluded that the abruptio placenta, post partum eclampsia and DIC are common complications of pre-eclampsia patients. Perinatal mortality and still born are also found though live born foetus are the most common.*

Keywords: *Pre-Eclampsia, feto-maternal Outcome, Risk- Factors*

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Introduction

Preeclampsia (PE) is a pregnancy speciûc, heterogeneous, multisystem disorder, which has the classic clinical features of pregnancy-induced hypertension and proteinuria and may lead to eclampsia[1,2,3]. It is a major cause of maternal and fetal mortality and morbidity[4].

The incidence of pre-eclampsia is 2-10%, depending on the population studied and definitions of pre-eclampsia[5]. The National Institute for Clinical Excellence guidelines on antenatal care have reduced the number of antenatal visits recommended for healthy woman at low risk[6]. The presence of pregnancy-induced hemolysis, elevated liver enzymes, and low Platelets which is known as HELLP syndrome may also be classiûed as a form of preeclampsia[7].

Preeclampsia, eclampsia, and HELLP syndrome are a signiûcant cause of maternal and perinatal morbidity, mortality, and iatrogenic premature delivery[8], with long-term health effects for both mother and child[9,10]. Considerable research efforts have resulted in improved understanding of the genetic basis of preeclampsia[11], exploration of numerous possible predictors of the disorder[12] and resulted in the use or nonuse of diverse treatments[13,14,15,16]. Of these possible treatments, antihypertensive medications and magnesium sulphate are widely used in developed countries and in some developing countries[17]. Delivery of the baby, placenta, and membranes, indicated for maternal or fetal reasons, remains the only method for resolving preeclampsia, although it does not immediately remove all risks of mortality and morbidity, particularly in the early postpartum period[18]. Thus, there is not yet any considerable understanding of the genetic, pathophysiological, and clinical manifestations of PE, efective treatments, and long-term physical efects[18].

In addition to that, there is a paucity of published research on risk- factors and feto-maternal outcome of Pre-Eclampsia in Bangladesh. The purpose of the present study was to identify the risk factors, prognosis, maternal and foetal outcome of pre eclampsia patients.

Methods

This descriptive type of cross sectional hospital based study was conducted in the department of Obstetrics & Gynecology at Bangabandhu Sheikh Mujib Medical University (BSMMU) & Dhaka Medical College Hospital (DMCH), Dhaka from February 2008 to July 2008 for a period of 6 months. All admitted cases of pre-eclampsia patients who were given the consent were included in the study. After admission, an informed verbal consent was taken from each patient. Then a thorough history was taken followed by relevant clinical examination and some base line investigation done. For renal function urine for protein, blood for urea, creatinine and uric acid estimation were done. All the informations were recorded in a predesigned data collection sheet. Ethical clearance was taken from the ethical committee of Department of Obstetrics and Gynecology of BSMMU and DMCH. In this study socio-economic status was considered by per month income of the family. Poor, middle and high socio-economic conditions were considered for those who had monthly income taka 5,000 to 15,000 and >15,000. Fetal monitoring was done by observing fetal movement, fetal heart sound 6 hourly, ultrasonography of lower abdomen to see fetal well-being and amniotic fluid volume. The patients were treated by rest, anit-hypertensive drugs and by termination of pregnancy, when indicated. The drugs which were chosen for the treatment of patient were methyldopa, nifedipine, hydralazine and sometimes with injection magnesium sulphate. Maternal and fetal complications were indentified and follow up of the mother and infants were done until their discharge from hospital. The entire collected data were compiled on a master chart first and then statistical analysis of the results were obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-17) (SPSS Inc, Chicago, IL, USA).

Results

During the study period, a total of 4725 pregnant women were admitted for delivery of which 162 pregnancies were terminated for preeclampsia. Thus the hospital based incidence of preeclampsia was 3.4%.

Table I *Age distribution pre-eclampsia mother (n = 50)*

Age in year	Number of patients	Percent
15-20	4	8
21-25	20	40
26-30	19	38
31-35	4	8
36-40	3	6
>40	0	0
Total	50	100

The incidence of pre eclampsia in different age group has been measured and has been found that there is a highest incidence of pre-eclampsia in age group of 21-25 years (40%) followed by 26-30 years (38%) age group, 15-20 year (8%) in age group and 31-35 year (8%) age.

Table II *Clinical findings of the pre-eclampsia mother (n = 50)*

Complaints	Number of patients	Percent
Headache	7	14
No fetal movement	2	4
Abdominal pain	19	38
Blurring of vision	4	8
Swelling of legs	19	38
Vomiting	4	8
Watery vaginal discharge	7	14
Swelling of vulva	5	10
P/V bleeding	4	8
Swelling of face	9	18
Pallor	6	12
Respiratory distress	3	6

Among the studied patients highest percentage had complaints of swelling of legs and abdominal pain (38%). Then swelling efface (18%), headache (14%), watery vaginal discharge (14%) Blurring of vision and vomiting (8%)

Table III *Distribution of pre-eclamptic mother by gestational age at the time of delivery / abortion (n =50)*

Gestational age during delivery (weeks)	Frequency	Percent
20-28	6	12
29-34	23	46
35-40	21	42
Total	50	100

There is 46% delivery occurred at 29-34 week gestational age period and 42% delivery is occurred at 35-40 weeks gestation. However it is found 12% of termination of pregnancy occurred in 20-28 weeks gestation.

Table IV *Distribution of pre-eclamptic mother by obstetric examination findings (n = 50)*

Parameters	Frequency	Percent
Fundal height (weeks)		
20-28 weeks	16	32
29-34	21	42
35-40	13	26
Lie		
Longitudinal	50	100
Presentation		
Cephalic	42	84
Breech	8	16
Foetal movement		
Present	44	88
Absent	6	12
Foetal heart sound		
Present	44	88
Absent	6	12

Obstetric examination revealed that 32% pregnant women had fundal height 20-28 weeks 42% fundal height 29-34 weeks, 26%, fundal height 35-40 weeks. All the patients had longitudinal lie of the foetus with 84% cephalic and 16% beech. It was also found that 88% patients had foetal movement and foetal heart rate (Table - IV).

Table V *Distribution of complications of foetal outcome (n = 50)*

Foetal out come	Frequency	Percent
No complications	15	30
IUGR	25	50
Prematurity	25	52
Still birth	3	6
IUD	3	6
Abortion	3	6

Table V shows that out of 50 pre-eclamptic pregnancy outcome there was no foetal complication in 30%cases, IUGR was present in 50% cases and prematurity was present in 52% cases. There was still birth in 6% cases, IUD in 6% cases, abortion in 6% cases.

Table VI *Distribution of complication of mother in pre eclampsia (n = 7)*

Maternal complication	Frequency	Percent
Eclampsia	1	14.28
Abruptio placenta	2	28.58
Heart failure	1	14.28
DIC	1	14.28
HELLP syndrome	2	28.58
Total	7	100

Out of total 7 patients complicated by preeclampsia 28.58% had abruptio placenta, 28.58% had HELLP syndrome, 14.28% had eclampsia, 14.28% heart failure, 14.28% had DIC (Table VI).

Table VII *Distribution of study patients by pregnancy outcome (n = 50)*

Pregnancy out come	Frequency	Percent
No complication of mother and foetus	14	28
Foetal complication only	30	60
Maternal complication only	1	2
Both maternal and foetal complication	5	10
Total	50	100

Table VII revealed that out of 50 patients 28% had no complication of mother and foetus, 60% patients had only foetal complication, 2% patients had only maternal complication, but 10% cases had both maternal and foetal complication.

Discussion

Pre-eclampsia complicates about 2-8% of all pregnancies[19]. Pre eclampsia remains a major cause of maternal and preinatal mortality and morbidity and is particularly devastating in developing countries. Despite recent progress towards under standing the cause of pre eclampsia and/or its phenotypes, the aetiology of this serious disorder remains elusive.

In this study a total number of 50 patients with pre eclampsia up to termination of their pregnancies were studied and was recorded their foetal and maternal outcome as well as risk factors of pre eclampsia. The incidence of preeclampsia was found in 3.4% in this study. Similar result was reported by Anderson[9]. In this study 40% patients were from 21-25 years of age and 38% patients were from 26-30 years of age. Among the studied patients highest percentage had complaints of swelling of legs and abdominal pain (38%). Then swelling of face (18%), headache (14%), watery vaginal discharge (14%), blurring of vision and vomiting (8%) In this study 4% Patients had chronic hypertension, 8% patients had Gestational diabetes mellitus, 8% patients had twin pregnancy, 2% patients had history of stroke. These results are correlated with the result of Naher[20] performed in Bangladesh. Common clinical findings of pre-eclampsia are reported by Anderson[9] which are consistent with the present study. Chronic hypertension, glucose intolerance, multiple pregnancy and cardio vascular disease are all known risk factors of pre eclampsia. In many studies 24% patients were obese and 8% patients had gestational diabetes mellitus. Obesity has a strong link with insulin resistance and pre disposes for type II diabetes and gestational diabetes. Both obesity and diabetes are associated with a higher risk of cardiovascular diseases and hence pre-eclampsia. Hyperinsulinaemia may directly predispose to hypertension by increased renal sodium reabsorption and stimulation of the sympathetic nervous system. Another possible explanation is that insulin resistance or associated hyperglycaemia impairs endothelial function[21]. However addition risks factors are also play

important role for the causation of pre-eclapmsia like obesity, hypertension, glucose intolerance, teen age and late pregnancies, cardiovascular disease, renal disease, antiphospholipid syndrome, thrombophilia, pregnancies complicated by trisomy or multiple pregnancy[22].

In this study 46% pregnancies were terminated in 29-34 weeks of gestation 42% pregnancies were terminated in 35-40 weeks gestation. 12% pregnancies were terminated before the age of viability. In Bangladesh this is <28 weeks of gestation. It is interesting that 90% mothers did not have any complication and 4% pre-eclamptic mothers developed HELLP syndrome. It correlates with the overall 10% occurrence of HELLP syndrome as a complication of severe pre-eclampsia. The reason is that among 56% of study population with severe pre-eclampsia and 7.14% is developed HELLP syndrome. This result correlates with the result of Naher[20]. Meher and Duley[23] are found similar result.

Obstetric examination revealed that 32% pregnant women had fundal height 20-28 weeks, 42% fundal height 29-34 weeks, 26%, fundal height 35-40 weeks. All the patients had longitudinal lie of the foetus with 84% cephalic and 16% beech. It was also found that 88% patients had foetal movement and foetal heart rate. Levine et al[24] has mentioned that preeclampsia is commonly occurred before completing the full term pregnancy which is consistent with the present study.

Among the study population 4% patients developed abruptio placenta, 2% patients developed post partum eclampsia, 2% patients developed heart failure, 2% patients developed disseminated intravascular coagulation. All are life threatening complications. Similar result was reported by Conde-Agudelo et al[25]. In this study there was no maternal death.

In the developing countries the perinatal mortality in pre eclampsia remains to the extent of about 20%, about 50% of which is being still born. In this study 80%, pregnancies gave live born foetus, 6% pregnancies still born babies and Intra uterine death occurred in 6% pregnancies, 8% pregnancies ended in abortion, before the age of viability of foetus which is 28 weeks of gestation in Bangladesh. Conde-Agudelo et al[25] reported similar findings. Pre-eclampsia is a grave condition. Developing country like Bangladesh is still fighting against these serious conditions.

In the study population intrauterine growth retardation was present in 50% babies, 52% babies were premature, still birth was 6%, Intra uterine death was in 6% cases, and abortion was 6%. The IUGR babies also were premature. Paruk and Moodley[26] have found the similar result. In this study 28% pregnancies had no foetal or maternal complication. Only foetal complication was present in 60% pregnancies. Only maternal complication was present in 2% pregnancies. Both maternal and foetal complication was present in 10% pregnancies. The incidence of small for gestational age infants and perinatal mortality is markedly increased in patients with pre-clampsia[27].

Conclusion

In conclusion the abruptio placenta, post partum eclampsia, heart failure and disseminated intravascular coagulation are common complications of pre-eclampsia patients. Perinatal mortality and still born are also found though live born foetus are the most common.

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Original Article

Peri operative diabetic management using subcutaneous regular insulin as sliding scale and alberti regimen of glucose insulin potassium infusion - comparative study

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Abstract

Background *The management of diabetic patient during the peri-operative period can be a problem to the anaesthesiologist. Many of worker have used short acting regular insulin using sliding scale which starts before operation and continue in post operatively. Alberti and Thomas proposed a simple regimen using a cotinuous intravenous infusion of an glucose insulin potassium (GIK) solution which is administered during the prei-operative period.*

Objectives *The aim of the study is to observe the rise of blood sugar in diabetic patients per and post operatively and to detrermine the more acceptable method of controlling blood sugar amongst two predetermined methods.*

Methods *A total of 80 patients of ASA II & III were randomly selected. They were divided into the following groups.* ***Group A****. forty patients were randomly allocated to the treatment of thrice daily subcutaneous injections of short acting regular insulin by sliding scale.* ***Group B****. Forty patients were randomly allocated to continuous glucose insulin potassium treatment (GIK). Pre-operative blood glucose was controlled with thrice daily subcutaneous injection of short acting regular insulin.*

Result *The two groups were comparable in demographic data. The blood glucose of group A was raised at mid operation, after 8 hours, 16 hours and 24 hours of operation more than the group B and it were statistically significant. Serum potassium level of the two group did not show any significant difference. The study showed that group B can produce satisfactory blood sugar and serum potassium control than group A. It is safe, simple and less expensive and can be apply in any situation.*

Conclusion *Due to the large number of diabetic patients undergoing surgery and probable complications associated with diabetes, careful perioperave evaluations and management are required in these patients. To select an appropriate interventional strategy depends on the patient, the associated diabetic complications and type of surgery. Chronic diabetic complications can influence surgery and anesthetic conditions. Hence, appropriate risk stratification, optimal blood glucose and suitable interventional strategy are necessary. Glucose insulin potassium infusion can minimize metabolic disturbances during surgery.*

Key words *Alberti Regimen, Sliding Scale, Regular Insulin.*

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Introduction

Blood glucose levels increase during operation in both diabetic and non-diabetic patients. Surgery accompanies by high mortality and morbidity rates in diabetic patient Blood glucose control in diabetic patients during the peri-operative period can be problem to the anaesthesiologist. Many authors have described different regimens for the management of these groups of patients. But Alberti and Thomas found many of the

recommended techniques which are complicated and open to error. Alberti and Thomas proposed a simple regimen using a continuous intravenous infusion of glucose insulin potassium (GIK) solution which is administered during the peri-operative period at constant rate of 100 ml/hrs[1]. For diabetic patients regular insulin is given in various methods. Many of workers have used subcutaneous injection of regular insulin using sliding scale which starts before operation and is continued in post operatively. As this disease affects numerous systems diabetic patients require to be approached systemically and carefully[2].

Perioperative assessments can help us to find the high risk diabetic patients and the patients need extra- management. Some diabetic patients need to improve blood glycemic control before surgery. A simple protocol can help anaesthesiologist to develop a safe perioperative management[3]. Diabetic patients constitute 12.4%-25% of the hospitalized patients. According to the fact that a significant hyperglycemia can influence surgical outcome, studies suggest a good pre-operation glycemic control to prepare a better outcome and an accelerated wound healing. On the other hand, avoiding hypoglycemia is very important in the patients undergoing surgery[4].

Aim of the study is to compare blood glucose control in peri-operative period by two predetermined methods. As far as blood sugar measurement is concerned we have used both conventional laboratory method and with glucometer.

Materials and Methods

This prospective study was performed at Border Guard Hospital Peelkhana, Dhaka from Jun 2009 to Dec 2011. After departmental approval and obtaining written informed consent from the patients, 80 patients were divided into 2 groups. All patients were selected from weekly operating lists.

Blood glucose level was estimated by glucometer and laboratory method. Serum potassium level was also measured. Blood glucose level was controlled by soluble insulin pre-operatively. Free flowing venous blood was taken before operation (designated time F), at approximate mid-time of operation (designated time 0 hrs.), then 8 hourly for 24 hours.

The object of this study was to compare peri-operative blood glucose control using two different methods.

Group - A

Forty subjects (Table-1) were randomly allocated to this group. Pre-operative blood glucose control was attained with thrice daily injections of short acting soluble insulin. On the morning of operation, short acting soluble insulin was given subcutaneously according to sliding scale as followed Border Guard Hospital Peelkhana Dhaka. The same method was followed in the postoperative period for next 24 hours.

The sliding scale method based on the blood glucose level. Insulin was given by the following way :

Table I *Patients of Group A*

RBS (mmol)	Insulin dose (IU) S/C route
6-8	02
8-10	04
10-12	06
12-14	08
14-16	10
16-18	12
18-20	14
20-22	16

Sl	Name of operation	No
1.	Dissectomy for PLID L_4 & L_5	4
2.	Excision of fibro adenoma of breast	8
3.	Open cholecystectomy	8
4.	Vaginal hysterectomy	8
5.	Abdominal hysterectomy	12

Group - B

Forty patients (Table-II) were randomly allocated to continuous glucose insulin potassium treatment (GIK). Pre-operative blood glucose controlled was attained with thrice daily injection of short acting insulin.

Table II *Patients with GIK infusion*

Sl	Name of operation	No
1.	Abdominal hysterectomy	20
2.	Inguinal herniorrhaphy	4
3.	Dissectomy for PLID $L_{3/4}$	4
4.	Repair of incissional hernia	4
5.	Open cholecystectomy	4
6.	Sub-total thyroidectomy.	4

An infusion (GIK) containing 500 ml 5 % D/A, 10 mmol/1 of potassium chloride to which 10 units of soluble insulin was started 30 min before induction of anaesthesia. Subsequent dose of insulin was adjusted according to blood glucose levels as indicated in Alberti's regimen as given below. The infusion was continued for 24 hours [5]:

Blood glucose (mmol/L)	Insulin dose (U)
<4	No insulin
4-6	5
6-10	10
10-20	15
>20	20

Results

Observation of the present study was analysed in the light of comparison among two groups. Each group having **n**=40, all results are expressed as SD and compared by students 'T' testvalues were considered significant if P<0.05.

Table-III *Demographic data of the study*

Group	Age in years Mean (S.D.)	Body weight in kg Mean (S.D.)	Sex M:F
*A	43.8 (±7.46)	55 (±5.2)	1:9
**B	50 (±11.2)	53 (±4.9)	3:7

* P > 0.05

** P > 0.05

Demographic data of Table-3 were statistically not significant and Duration of anaesthesia in Table-4 were also statistically no significant :

Table IV *Duration of Anaesthesia*

Group Mean	Mean (min)	S.D.
*A	87	±53.75
**B	84.5	±36.5
*	P > 0.05	
**	P > 0.05	

Group - A (Table-V)

Plasma glucose level rise during surgery from 8.87 (±3.37) mmol/l to 17.9 (±8.31) mmol/l by laboratory method and 17.4 (±2.69) mmol/l by glucometer. The concentration elevated mainly at 8 hours (p<0.02) and at 16 hours (p<0.01) post operatively. Reached peak at 16 hrs. 17.9 (±8.31) mmol/l by laboratory method and 17.4 (±2.69) mmol/l by glucometer method and came down to lowest level at 24 hrs. Post operatively 9.31 (±4.67) mmol/l by laboratory method and 8.84 (±3.73) mmol/l by glucose method.

There was no significant change of serum potassium level from pre-operative value to post operative (Table-6).

Table V *Blood glucose level*
Group - A

Group-A	Time hrs.	Lab. Method mmol/l	Glucometer mmol/l
	0	13.63 (±7.44)	11.17 (±2.86)
	8	17.57 (±9.02)**	17.0 (±2.75)
	16	17.9 (±8.31)***	17.4 (±2.69)
	24	9.31 (±4.67)	8.84 (±3.73)
	F	8.87 (±3.37)	8.84 (±3.73)

** P 0.02
*** P 0.01

Table VI *Serum potassium Level*
Group-A (N = 40)

Time. hrs.	Value (mmol/I)
0	4.26 (±0.29)
8	3.64 (±.38)
16	3.82 (±.35)
24	4.13 (±.34)
F	3.75 (± .29)

Group-B (with GIK infusion, diabetic) (Table-VII)

Plasma glucose concentration started to rise slowly, than Group A. Blood glucose level rose peak level at 8 hours 9.23 (±2.20) mmol/l by laboratory method and 9.09 (±2.15) mmol/l by glucometer method.

That is subsequent post operative levels for diabetic patients were lower in the glucose insulin potassium infusion treated subject. The peak level marked at 8 hours after operation (p.0.05). There was also no significant difference between the serum potassium level pre and post operatively (Table-VIII)

Table VII *Blood glucose level*

Group - B

Group – B N = 40	Time hrs.	Labo. method mmol/l	Glucometer mmol/l
	0	7.53 (±2.96)	7.36 (±2.5)
	8	9.23 (±2.20)	9.07 (±2.15)
	16	8.94 (±2.99)	8.69 (±2.36)
	24	6.69 (±2.01)	6.69 (±1.9)
	F	7.2 (±2)	6.69 (±1.9)

* $p < 0.05$

Discussion

Diabetes mellitus (DM) is becoming a pandemic worldwide. The highest percentages of increases in disease prevalence are likely to be in developing nations. WHO listed 10 countries to have the highest numbers of people with diabetes in 2000 and 2030. According to this report, Bangladesh has 3.2 million of diabetic subjects in 2000 and the number is expected to increase to a staggering 11.1 million by 2030 placing her among the top 10 countries with diabetes[6]. Diabetes offers a serious bar to any kind of operation and injuries involving open wounds, haemorrhage or damage to the blood vessels are exceedingly grave in subjects. The management goal is to optimize metabolic control through close monitoring, adequate fluid and caloric repletion, and judicious use of insulin. Patients with diabetes undergo surgical procedures at a higher rate than do nondiabetic people[7].

The stress response may precipitate diabetic crises (diabetic ketoacidosis, hyperglycemic hyperosmolar syndrome [HHS]) during surgery or postoperatively, with negative prognostic consequences. The invariant features of the metabolic stress response include release of the catabolic hormones epinephrine, norepinephrine, cortisol, glucagons, and growth hormone and inhibition of insulin secretion and action. These anti-insulin effects of the metabolic stress response essentially reverse the physiological anabolic and anti-catabolic actions of insulin.. The neuroendocrine response to the stress of general anesthesia and surgery leads to activation of potent counterregulatory hormones[7,8].

Sliding scale regular insulin (SSI) in the management of patients with diabetes was the standard practice as early as 1934 and was also used in the hyperglycemic emergency diabetic ketoacidosis. SSI is widely used in health institutions because it is easy and convenient, but it has the disadvantage of not delivering insulin in a physiologic manner, thereby leading to fluctuations in glycemic levels. The usual regimen of sliding scale subcutaneous insulin for perioperative glycemic control may be a less preferable method because it can have unreliable absorption and lead to erratic blood glucose levels [9].

There is no internationally recommended sliding scale, none for any one country or state, none for the same individual during a life time. The insulin regimen should be periodically evaluated and changed to meet the needs of the patient. As per Gill and Mac Farlane sliding scale is illogical in that it responds to hyperglycemia after it has happened, rather then preventing it and sliding scale depends on the clearly inaccurate assumption. That insulin sensitivity is uniform among all patients[10].

In a sliding scale system, insulin administration is based on the preprandial blood glucose reading and/ or the expected caloric or carbohydrate intake. The wide fluctuations and excessive spikes in blood glucose levels associated with sliding scale management may cause reactive oxidative stress a trigger for vascular damage, especially in patients with type 2 diabetes .A premeal blood glucose level is not an accurate predictor of the insulin needed at that time,it is simply a reflection of the insulin previously administered. Insulin given in response

to the current blood glucose, then, may compound a prior dosing error, leading to serious drops or spikes in blood sugar. Pharmacodynamically, short-acting insulin lasts 6 to 8 hours. It should be given every 6 hours, in 4 equal doses, without ever skipping a dose[11,12].

Retrospective and prospective cohort studies, have concluded that SSI should be discouraged because it has not been shown to be an effective means of achieving much-needed optimal glycemic control in hospitalized patients[13]. However, the issue of SSI has never been settled because of the lack of data on prospective, randomized, controlled studies. Subcutaneous insulin injection can be fraught with problems, however. Unpredictable absorption, a difficulty under normal circumstances, may be worse because of changes in tissue perfusion that occur in the perioperative period and may be of particular concern in obese patients [14].

The best method of providing insulin during surgery is debatable. Few data clearly demonstrate the superiority of one regimen over another. Any regimen should (1) maintain good glycemic control to avoid hyperglycemia and hypoglycemia; (2) prevent other metabolic disturbances; (3) be relatively easy to understand; and (4) be applicable to a variety of situations (operating room, recovery room, and general medical and surgical wards)[15].

In 1979, the British Journal of Anaesthesia published an article by Alberti and Thomas in which they introduced the i.v. infusion of a premixed bag of glucose insulin potassium for the metabolic management of diabetic patients in the perioperative period. Intravenous infusion of insulin, glucose, and potassium is now standard therapy and has replaced subcutaneous insulin therapy for the perioperative management of diabetes, especially in type 1 diabetic patients and patients with type 2 diabetes undergoing major procedures. Several reports have emphasized the advantages of the insulin infusion regimen over subcutaneous delivery[1,16].

The combined GIK infusion is efficient, safe, and effective in many patients but does not permit selective adjustment of insulin delivery without changing the bag.. Adequate glucose should be provided to prevent catabolism, starvation ketosis, and insulin-induced hypoglycemia. The physiological amount of glucose required to prevent catabolism in an average nondiabetic adult is 120 g/day (or 5 g/h). This can be given as 5 or 10% dextrose. An infusion rate of 100 ml/h with 5% dextrose delivers 5 g/h glucose. Intravenous insulin infusion offers advantages because of the more predictable absorption rates and ability to rapidly titrate insulin delivery up or down to maintain proper glycemic control[1,17].

The goal is to maintain blood glucose levels within a target range 120 to 180 mg per dL . Alberti and co-workers represents a substantial improvement in the management of diabetic patients undergoing major surgery. However, this method does not allow rapid and independent modification of the respective amounts of glucose and insulin being infused, thus possibly delaying correction of impending hypoglycemia or increasing hyperglycemia. Problem with this method is the inability to independently adjust the insulin and glucose delivery rates as may be required. A new concentration of solution must be prepared if the ratio of insulin to glucose has to be changed[18,19].

Historically, the debate regarding perioperative insulin therapy for patients with diabetes has revolved around SC vs. IV administration the occurrence of hypoglycemia than hyperglycemia. In the past 2 decades, most authors have come to support the IV route of insulin administration because it avoids the less predictable absorption of SC insulin that is exacerbated by the fluid shifts that are common in patients during the perioperative period[20,21,22].

Regardless of whether separate or combined infusions are given, close monitoring is required to avoid catastrophe during these infusion regimens. Although the separate infusions offer greater flexibility, they lack the inherent safety of the combined regimen. Alberti and Thomas emphasized that during starvation in type 1 diabetics, the restraining effects of basal insulin on catabolism are lost and that catabolism 'runs riot' when catabolic hormone secretion increased during surgery.. The recommendations for type 1 diabetic patients were to use the Alberti regimen in all patients undergoing surgery and to continue the infusion until the patient was eating[23,24,25].

There is a need for a simple but effective method for insulin delivery during the prei-operative

period. Adsorption of insulin to plastic does occur this was not a significant clinical problem, hypoglycemia did not occur. The results show that infusion of GIK in diabetic patient patients improved control of plasma glucose during and after the infusion period compared to sliding scale method. The 24 hours glucose, insulin and potassium infusions resulted in reasonable control of the blood glucose. The need to make changes in the insulin dose was based on laboratory and Glucometer analysis. We also attempted to be meticulous in our study for estimating the blood glucose levels with Glucometer by visual estimation. This also showed no significant difference from the conventional laboratory method to measure the blood glucose. Our study also showed no sigificant difference in the serum potassium level in both groups. By GIK tends to give us most smoother post operative period as the level rises concern, although we can not give any cause for this our limited study, but nevertheless, it allows one to continue further study in this particular area.

Conclusion

It should be emphasized that successful peri operative management of diabetic patients is a big challenge and requires a simple protocol. It was noticed that glucose insulin potassium group (GIK) had a relatively smother peri operative diabetic control, although the study of the serum potassium level did not show any significant difference, neither there was any difference of estimation of blood glucose level between the glucometer and laboratory method in our study.

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Review Article

Safe Circumcision Anaesthesia – A Review

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Abstract

Circumcision of Neonate, Infant, Children as well as adult is done for many purposes of them religious, disease process and to prevent some diseases. Pain is the main problem of circumcision. Infant and Children will not allow local analgesia. General anaesthesia needed for them. Neonate and adult may allow local anaesthesia. So, local anaesthesia, general anaesthesia, combination of local and general anaesthesia can be given. It is a minor procedure but anaesthesia for circumcision is not easy and should not be taken lightly. Complications related to circumcision anaesthesia can be minimized by proper selection of patient and type of anaesthesia. In our country circumcision done for religious purpose so a large number of circumcisions done by professional hazzam (non doctor). Doctors including general practitioners and surgeons are also doing this procedure. Complications related to anaesthesia are mainly laryngospasm and hypoxia and ultimately cardiac and cerebral complications. Some of them are highlighted in the media and newspapers but unknown cases are not less. If we can prevent and manage the complications like laryngospasm then this procedure can be done safely.

(JBSA 2013; 26(1): 52-53)

Introduction

Circumcision is the surgical removal of a simple fold of skin that covers the head (glans) of the unerect penis. This can be done by local anaesthesia early in infancy where the neonate is less mobile after that time it must be done under general anaesthesia. General anaesthesia present unnecessary risk including neurotoxicity that may affect the development of neuronal structures. So circumcision is best done using local anaesthesia early in infancy. In past anaesthesia was not advocated for infant circumcision because[1] fear of side effect of anaesthetics[2] belief that procedure caused little or no pain in this age group[3] belief that pain from injection of anaesthesia was as bad as the pain of surgery.

Objectives

- To identify the common and safe anaesthesia techniques for Peadiatric circumcision.
- To appreciate the importance of anaesthesia in pain control for peadiatric circumcision.

Patient selection

1. Patient should be in empty stomach.
2. Patient should not have upper airway infection or irritation.

Different type of anaesthesia for circumcision

a) Without any anaesthesia: Cruel method not practiced by doctors.

b) Local anaesthesia circumferential subcutaneous ring block with infiltration of local anaesthetic drug at the base of the penis. Patient may response during separation of prepuce skin from the glans. EMLA cream may be use topical anaesthesia for glans penis[2].

c) Penile block: Two dorsal nerve of the penis is blocked infiltrating local anaesthetics under Buck's fascia in 10-0' Clock and 2-0' Clock Position at the base of the penis[3]. Small amount (2cc) of local injected in the ventral aspect subcutaneously near peno scrotal junction. Penile block is better than ring block as the patient does not have any pain during separation of prepuce skin.

d) Subarachnoid block: It is more effective block but usually not done for children for this minor procedure as an OPD basis.

e) Caudal epidural block: Can be done with combination of sedative or analgesic. Large doses of local anaesthetic drug needed. Lower

limb become weak, so early ambulation not possible. Caudal block in more effective and well accepted for small Children. Risk of caudal block should be kept in mind.

General anaesthesia

With endo-tracheal tube using nitrous oxide, oxygen, halothane or other volatile agent and intravenous narcotic analgesic and muscle relaxant. This technique is safe in expert hand but this is not done frequently for circumcision.

Intravenous anaesthesia with other combinations like inhalation of gases

a) Ketamine plus sedative: If only intravenous Ketamine and sedative is used as anaesthesia for circumcision some patient may develop laryngospasm upon clamping and incision of the skin and difficult to manage. So if this kind of anaesthesia given then all type of equipment and drugs should be available to manage the patient.

b) Ketamine plus narcotic analgesic plus gas inhalation: Patient should be adequately deep before clamping and incision, chance of laryngospasm if patient is not adequately deep.

c) Gas inhalation plus narcotic analgesic: Patient should be adequately deep before Clamping and incision.

d) Ketamine plus sedative plus local or penile block or caudal epidural block.

In this technique small doses of Ketamine (1mg/kg) i/v and sedative should be given and local penile block or caudal block given before clamping and incision, if caudal block is given then adequate time (5-10 mm) should be allowed to relieve pain on incision.

e) Gas inhalation plus local or caudal block: Caudal block with light G/A reduces bleeding prevent erection does not cause laryngospasm and provide prolonged post operative analgesia alternative to penile block[5].

Laryngospasm is prone to occur under halothane inhalation during incision and clamping, children are very distressed on awakening from G/A[6]. So light G/A with combination of penile or caudal block is preferred[7]. Regional anaesthesia in combination of light G/A is preferred because it provide excellent analgesia extending well in to the post operative period[8]. Blockade of noxious reflexes particularly upon clamping the foreskin and quicker woke up due to decrease requirement of G/A[9]. High doges of Ketamine and repeated doges of Ketamine may cause respiratory depression and increases the chance of laryngospasm in the post operative period. Many other combinations can be made for circumcision anaesthesia there are advantage and disadvantage of all techniques but our aim should go in favour of patient's safety.

Adequate post operative care including monitoring and resuscitative equipment and drug should be available in the post operative ward.

Circumcision is minor surgical procedure patients are healthy male child so any morbidity and mortality related to anaesthesia is sad for anaesthesia and the family. So highest level of care should be taken to prevent complications.

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Case Report

Submental endotracheal intubation in patient with panfacial fracture: a useful altrenative to tracheostomy

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Abstract:

Submental intubation is a simple safe and useful technique for air way management during maxillofacial surgery when both nasal and oral tracheal intubation are deemed unsuitable. This technique offers an optimal operating field and an opportunity to check the dental occlusion. It avoids the need for tracheostomy and its consequent morbidity. We present a case of multiple facial fractures where we avoided tracheostomy by the use of submental endotracheal intubation.

Key words: *Submental endotracheal intubation, maxillofacial trauma.*

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Introduction

The anaesthetic management of maxillofacial surgical patients present a specific challenge to the anaesthetist in the perioperative period.

Nasal intubation is often contraindicated in the presence of fracture of the base of the skull [1]or Nasal bone.[2,3] Surgical reconstruction often involves maxillo-mandibular fixation in the intraoperative period to restore patient's dental occlusion. This precludes the use of standard oral endotracheal intubation in such cases. The standard solution in these situation is to perform an elective short-term tracheostomy before the operation, but it carries a significant morbidity.[4,5-9] Submental endotracheal intubation in these conditions has been described as an useful alternative to tracheostomy with minimal complications [10-13.]

Case Report

A 25 year old male (60 kg, ASA physical status-1) met with a road traffic accident and was admitted to the maxillo-facial surgical department of Dhaka Dental College & Hospital for reconstruction of faciomaxillary injuries sustained 1 week earlier in road traffic-accident.

On examination, there was multiple cut injury over left lateral nose and depression of nasal bridge, facial swelling, bilateral periorbital oedema, subconjunctival haemorrhage and loss of teeth. Radiological examination confirmed the presence of fracture, right parasymphysis of mandible, right zygomatic body, right zygomatic arch, left infraorbital rim.

The patient was scheduled for surgical correction of multiple facial (panfacial) fractures. Nasal endotracheal intubation was contraindicated due to depressed nasal bridge. Oral intubation was not suitable because the surgical procedure involved intra operative maxillo mandibular fixation to check dental occlusion. So, to avoid tracheostomy submental endotracheal intubation was planned. Then after detailed discussion, informed consent obtained from the patient and mouth opening was checked.

The first step in performing the technique was preparing an appropriate size armoured tracheal tube by careful removal of its universal fixed connector to transform it into a removable but fitting connector. (Fig. 1,2)

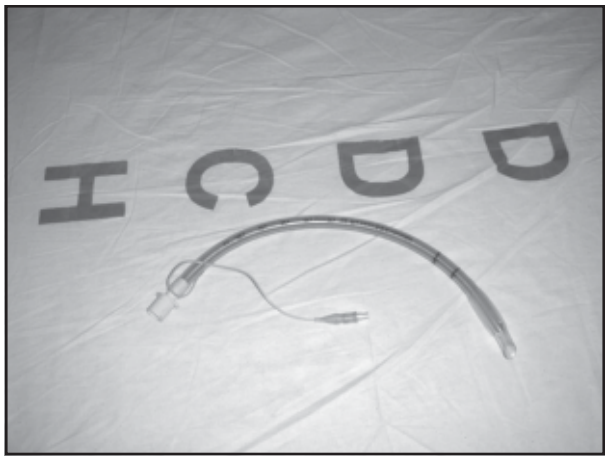

Fig 1 *Appropriate size armoured tracheal tube*

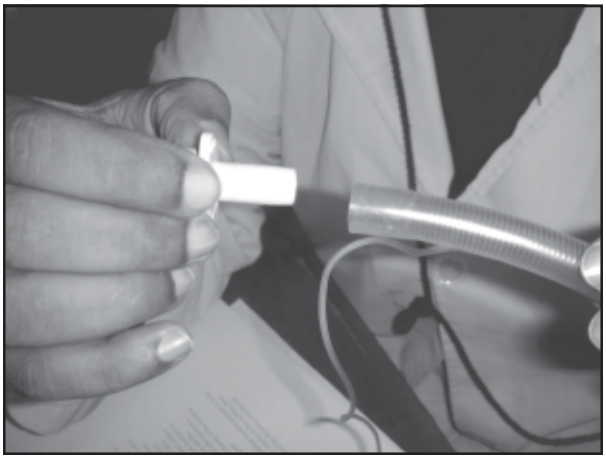

Fig 2 *Tube preparations (removable but fitting connector)*

Patient was kept fasting for 6 hours. He was premedicated with ranitidine 150mg Hs, and 1 hours before surgery injection metaclopramide 10mg and injection hydrocortisone 100mg was given intravenously.

In the operation theatre patient was preoxygenated with 100% oxygen for three minutes after which anaesthesia was induced with injection thiopentone 5 mg/kg intravenously. After induction mask ventilation was checked and found to be adequate. Then injection suxamethonium 1.5mg/kg intravenously was administered. Oral endotracheal intubation then was performed with prepared armoured tube by direct laryngoscopy. Anaesthesia was maintained with 33% oxygen in nitrous oxide and halothane. Intraoperative analgesia was maintained with injection fentanyl 1µg/kg intravenously and muscle relaxation was maintained by vecorunium 0.1 mg/kg intravenously.

After ordinary orotracheal intubation using the prepared armoured tracheal tube a temporary draping of the mouth and the submandibular area was carried out. A 2 cm incision was then made in left sub mental region parallel and medial to inferior border of mandible by the surgeon. It was extended intraorally through the mylohyoid muscle by blunt dissection. The endotracheal tube was briefly disconnected from the breathing circuit and the tube connector was removed from the tube. The pilot balloon followed by endotracheal tube were gently pulled out through the incision. (Fig: 3)

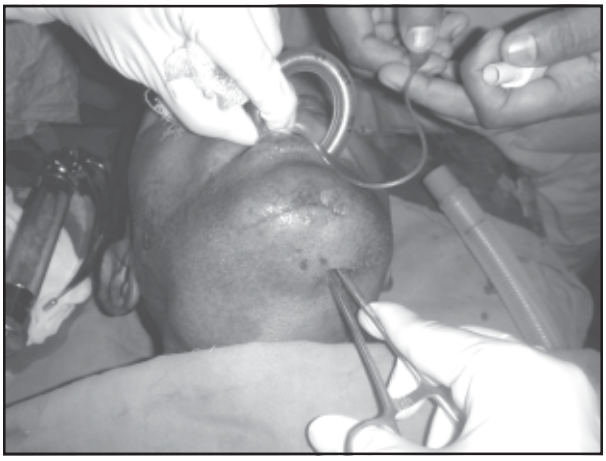

Fig 3 *Transforming oral intubation to submental intubation*

The tube connector was reattached and the endotrachal tube reconnected to anaesthesia breathing circuit. Bilateral air entry was rechecked and found to be equal and the tube was fixed with silk suture. Intraoperatively the endo tracheal tube was away from the surgical field and the surgeons could easily do the intermaxillary fixation to check dental occlusion. The total duration of surgery was six hours. At the end of the surgery, submental intubation was converted to oral intubation. First the pilot balloon and then the endotrachental tube were pulled intraorally. The submental incision was closed not so tightly with two skin sutures so as to allow certain degree of drainage. Direct laryngoscopy was performed again routinely and showed no bleeding or airway edema. So neuromuscular blockade was reversed with injection atropine 0.02mg/kg and injection

neostigmine 0.05mg/kg intravenously. Patient was allowed to regain consciousness and endotracheal tube was extubated after the return of protective reflexes.

Intraoperative and postoperative period was uneventful. There was no episode of arterial desaturation while converting oral intubation to submental intubation and vice-versa. Care was taken not to damage the pilot balloon. Endotracheal suction could be easily done through the submental route .Perioperatively the patient received routine antibiotic and oral hygiene was maintained. No any other complication was noted.

Discussion

The method of tracheal intubation, via the submental route was first described by Hernandez altemir is 1686.[10] This technique provide a secure airway, an unobstructed intraoral surgical field and allowed maxillomandibular fixation while avoiding the complications of nasotracheal intubation and tracheostomy[4,5]. Nasotracheal intubation is usually contraindicated in the presence of nasal bone fractures seen either in isolation or as a component of Lefort maxillary fractures[2,14-16]. Achieving dental occlusion is one of the fundamental aims of most oromaxillo-facial surgery. Oral intubation precludes this surgical prerequisite of checking dental occlusion. Our patient had fracture nasal bone and requires to establish the dental occlusion, all of which precluded both nasotracheal and oral intubation.

Tracheostomy, an alternate technique preferred by some surgeons and anaesthesiologists has many inherent complications like haemorrhage, subcutaneous emphysema, pneumomediastinum, pneumothorax, recurrent laryngeal nerve damage, stomal and respiratory tract infection, tracheal stenosis, tracheal erosions, dysphasia and excessive scarring. [7-9.] The significant morbidity that can result after tracheostomy necessitates that it should not be used indiscriminately.

Submental intubation is a solution for most of these problems. The advantages of this technique are manifold and it is appreciated by all members of the team. To the anaesthetist it offers a secure airway, to the surgeon, an optimal operating field and the opportunity to check the dental occlusion and to the patient, minimal morbidity.

But submental intubation is not completely free of adverse events and complications. Adverse events can occur while the endotracheal tube is passed through the incision from interior to exterior.It may be difficult to pass the tube through the incision or reattaching the connector to endotracheal tube. These adverse events can be overcome by Green and Moore's modification to the original technique. They used two endotracheal tubes in their technique. They first secured the airway with conventionally placed oral tracheal tube, reinforced endotracheal tube was then drawn in from exterior to interior through the submental incision. The original oral tube was withdrawn and reinforced tube substituted. At The end of the procedure, the process may be reversed. This technique is also useful when manufacturers design specifically prevents the removal of tube connector.[17] However, grasping and drawing in the tracheal end of the endotracheal tube can damage the cuff.

Accidental extubation, tube obstruction and damaged tube (leaking cuff) are more difficult to manage in submental route. Endotracheal tube exchanger has been used successfully to replace the damaged tracheal tube by the sub mental approach. [18] Other potential complications are superficial infection of the submental wound, trauma to submandibular and sublingual glands or ducts, damage to lingual nerve, orocutaneous fistula and hypertrophic scar[10].However, no complication occurred in our patient. Perioperative antibiotic cover, good oral hygiene and not so tight closure of submental incision resulted in prevention of infectious complications.

When submental tracheal tube has been kept in situ for short period then it is mandatory that an immediate access to oral airway is ensured at all times and maxillomandibular fixation should not be used until after extubation and confirmation of secure airway[11,12].In our patient we did not keep the endotracheal tube in situ.

So, with severe maxillofacial trauma, Submental endotracheal intubation is a useful and relatively harmless alternative to tracheostomy for securing airway in selected group of patients.

Conclusion

We conclude that submental endotracheal intubation technique is a useful option in severe

maxillofacial trauma patients for securing the airway .This technique should not only be limited to trauma patients but extended to a wide spectrum of patients and may avoid some of the problems inherent with a tracheostomy.

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Case Report

Acrocyanosis - An uncommon event at post anaesthesia recovery room- A case report

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Abstract

A healthy patient of aged 26 years underwent left ureter-lithotomy and cystostomy under general anesthesia. In post-operative ward, both extremities were cold & nailed were cyanosed. This cyanosis persisted for as long as 8-10 hours. No abnormality was detected in arterial blood gas analysis. This is not a simple peripheral cyanosis induced by cold environment of operation theatre, as warming usually reverses the phenomenon within a short period. But in this case, peripheral cyanosis persisted for as long as 8-10 hours. Therefore, this is a case of acrocyanosis.

(JBSA 2013; 26(1): 58-60)

Introduction

Acro-cyanosis is a condition of peripheral circulation characterized by symmetrical cyanosis and coldness of hands and feet. The cause is unknown but the patho physiological changes are constriction of skin arterioles and venous dilatation, causing reduction of blood flow. This is followed by increased oxygen extraction by the tissue and increased unsaturated oxygen in venous blood resulting cyanosis and reduced skin temperature. This acro-cyanosis phenomenon was typically observed in the following case report. The objectives of this report are:

i) To describe such type of complication that may occur in post-operative period.

ii) To find out the factors responsible behind it.

Case-report

A healthy patient, aged 26 years, weight 65kg, ASA-1 was operated for left uretero-lithotomy and cystostomy. Clinical history, physical examination, chest- Xray, ECG were normal. In laboratory investigations, all were within normal limit except Hb% -17.6 gm and Hct-53.1%. Ultra-sonography report showed dilatation of ureter, pelvis and kidney on left side.

Anaesthesia was induced with thiopentone sodium 350mg and suxamethonium 100mg. Orotracheal intubation was done and anaesthesia was maintained with oxygen (50%), nitrous oxide (50%), halothane (0.5%) and morphine (10mg). Ventilation was controlled by SCCS (Semi-closed- circuit system) with muscle relaxant pancuronium bromide in loading dose 1st and then divided doses as required.

Intra operative monitoring was performed by oesophageal stethoscope, continuous ECG monitoring, pulse oxymetry and manual bold pressure measurement. Patient was haemodynamically stable throughout the operation. Total fluid administration during operative period was about 2000 cc. Four hours were needed to complete the surgery. Muscle relaxation was reversed by neostigmine 2.5mg mixed with 1.2 mg atropine. Reverse from anaesthesia was uneventful.

In post operative ward, patient was conscious, responded on command. His both extremities were cool in comparison to other parts of the body. Nail beds were bluish in colour. Fine tremor was observed whole over the body. Pulse oxymetry failed to respond after attachment of sensor with fingers & toes. Arterial blood gas analysis showed PaO_2-139 mm of Hg, $PaCO_2$-33mm of Hg, HCO_3-20mm of Hg, Ph -7.41,O_2 saturation- 97%. By use of blanket, we tried to warm the patient. Via M.C mask, oxygen 4L/ minute flow was maintained. But cyanosis of the nail beds of extremities did not recovered.

In the meantime, consultation from cardiologist and internal medicine specialist was taken. According to internal medicine, this is a case of Acro-cyanosis & to reach the definitive diagnosis, the following provisional diagnosis were suggested:

- Dysfibrinogenemia
- cold agglutianation syndrome
- meth haemogloinaemia
- cryo globulinemia

Investigations performed to rule out above suggestions were as follows:-

1. Hb-electrophoresis – A2-3.6, A-96.4, No abnormal haemoglobin
2. Fibronogen level-300 mg% (172%-310 normal)
3. PT-13.8 sec, PTT-34.2 sec.
4. Factor-VIII activity 80% (50%- 150% normal)
5. cold agglutination-negative
6. Anti-DNA-2.7 I.U/.cc (upto 7 I.U./cc normal)

Discussion

As consultation given by internal medicine specialist, this is a case of acrocyanosis. But the causes behind this phenomenon could not be established as all the investigations done were within normal values as reported.

In operation theatre, there was a cool environment. That particular operation took about four hours. After the end of operation, Patient was transferred to the recovery room. Here, pulse oxymetry sensor failed to record the oxygen saturation, that indicates peripheral vasoconstriction; a thermo regulatory response indicating the adverent hypothermia during operative period[1]. Stress or spurious polycythemia[2] is another condition present in this particular case. Because patient's Haematocrit was 53% but total red bold cell count was 5.74×10^6 /mm^3. Left hydronephrosis may be another cause of relative polycythemia in this case[3]. The amount of fluid administration during operation was 2000 cc. But fluid requirement was 3180cc[4]. This inadequate fluid replacement may be an iatrogenic factor to accelerate polycythemic environment of this patient[5].

Intra-operative hypothermia made various affects on body physiology. Viscosity in arteriolar and peri-arteriolar blood increases by 2-3% per 1^0c drop in temperature[6]. Hypothermia further creates reduced plasma volume due to transcapillary fluid loss from cold induced sympathetic stimulation[7] and also from extremities to splanchnic areas[8] . Intra-operative hypothermia results post operative shivering that causes increased metabolism, resulting osmotically entrance of water into cells and so creates heamoconcentration[9]. Increase in haematocrit above 50% unequivocally raises the viscosity of blood[10]. This blood viscosity is an important determinant of peripheral vascular resistance and adequacy of micro –circulatory flow. All these factors are responsible for increasing viscosity of blood. Therefore peripheral blood flow becomes sluggish. Peripheral vasoconstriction is a thermoregulatory response due to hypothermia, which in turn causes coldness and cyanosis peripherally.

This in not a simple peripheral cyanosis induced by cold. Because warming usually reverses the phenomenon within a short period. But in this particular case, peripheral cyanosis persisted for as long as 8-10 hours. Primary Raynaud's disease can't be a diagnosis due to absence of three phases of colour changes. Generalized hypoxia can not be described here owing to absence of central cyanosis and presence of normal arterial blood gas report. Therefore, this is a case of Acrocyanosis, leading causes of which are intra-operative hypothermia, stress poly-cythemia and iatrogenic hypovolumia.In the post operative recovery room, when patient got sufficient amount of intravenous fluid and body temperature returned to normal, cyanosis slowly disappeared.

So. this is a case of post-operative acro-cyanosis which may be an extreme form of heat-saving mechanism in the body physiology.

Conclusion

Acrocyanosis is a post operative event occurring after general anaesthesia is a major case of urological surgery. This operation took about four hours. During the procedure, hypothermic environment of the operation theatre, stress or spurious polycythemia and iatrogenic hypovolaemia were responsible behind the incident. This cyanosis persisted for as long as 8-10 hours. By the influence of normal temperature at the post operative ward and adequate intravenous fluid volume replacement in recovery room, cyanosis slowly disappeared.

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