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CONTENTS

Incidents in Anaesthesia: Past Occurrence and Future Avoidance

"I do not want two diseases- one nature made - One doctor made"*(Napoleon* Bonaparte (1769-1821)[1]

The concept of medical error and iatrogenic injury or adverse events in the healthcare sectors are not a new phenomenon and are increasingly becoming a cause for concern. It has been recognized for thousands of years that attempts to improve health and reduce suffering could themselves be associated with harmful effects to the patients. It constitutes the basis of the Hippocratic Oath "primum non nocere"-or "first do not harm" first enunciated over 2000 years ago. Estimates derived from UK, USA and Australian studies indicate that adverse events are associated with about 10% of all hospital admission and account in direct medical costs for 5% of the total health budget[2]. Incident and accident causation can be seen to arise from complex, dynamic interaction between organizational, workplace and personal factors. Personal factors include slips, lapses, rule - and knowledge-based mistakes and violation. Latent failures in the system also contribute to the generation of organizational and individual accidents. An incident is defined as any event which affected or could have affected the safety of the patient or which either caused harm or if uncorrected might have caused harm to a patient while under anaesthesia care[3]. On most occasions the incident is simple, if not detected and corrected, it can evolve into a critical incident and the potential for a significant negative outcome arises. When accidents occur they must be investigated not with the goal of apportioning blame but as a means of finding the chains of events and contributory factors that lead to it, in order to prevent further occurrences. Such an investigations will reveal gaps and inadequacies in the health care system. Furthermore, because it is a proactive activity not a mortality review, it is more attractive, forward looking and should be encouraged[4].Patient safety has been highlighted more recently by widely publicized investigations at local, national and international levels. It is now obvious that doctors will be held much more accountable for their action in the future than they have been to date.

Critical incident investigation was first used in the 1940s described by Flanagan during World War IIas a technique to improve safety and performance among military pilots[5]. In 1978, Cooper and Colleagues used what they described as a "modified critical incident technique" to interview anesthetists and obtain description of preventable incident[6]. It is now common place for the department of anaesthesia to record and discuss adverse incidents and near misses with a view to learning from the problems encountered and preventing their re-occurence.However the knowledge of and learning from these accidents tend to shared only at a local level and subsequent improvement in patient safety thus remain local. In order to share and expand learning more widely at a national and international level, a number of different critical incident reporting systems have been set up in different countries[7]. In Australia, the Australian Incident Monitoring Study begins in the late 1980s as an anaesthesia specific venture[8]. An anaesthesia-specific on line reporting system has been operating in Switzerland since the mid 1990s[9] and more recently, the German Society of Anaesthesiology and Intensive Care has set up its own Patient Safety Optimisation System[10]. Both these sites offer the opportunity to report incidents and read those posted by others. Denmark also has a nationally conceived Patient Safety Database to which reports can be uploaded, although this is not specific to anaesthesia[11]. In the UK, the Royal College of anaesthestists has consistently encouraged in incident reporting in anaesthesia. The UK National patient Safety Agency, established in 2001, set up a Reporting and Learning system to collect and learn from adverse incidents and near misses[12].Sri Lanka introduced an anaesthetic incident reporting system in 2010. It is the college of anaesthesiologists of Sri Lanka that co-ordinates the incidence reporting[13]. The incidence report technique is very simple; it involves the anonymous reporting of any incident that occurs during an anaesthetic. One would need to design a form on which the incident can be reported. The form used is based to a great extent on the form used in Australian Incident Monitoring System

modified to suit local circumstances. It successfully highlighted weakness where procedural changes have been able to prevent repetition.

Modern anaesthesia is very safe but problems and mistakes do occur often with no consequences for the patient. Anesthesiologists working environment is characterized by high dynamism and uncertainty, time pressure, ill formed problems, complex humans machine interactions and risk. Wherever humans work, failures are inevitably do occur [14]. The errors are often identifiable and repetitive, so they can be analyzed and classified [15]. At present significant problems remain with local and national incident reporting system. These includes the fear of fault finding action, poor safety culture in an organization, lack of understanding among clinicians about what should be reported, lack of awareness of how the reported incidences will be analysed , how will the reports ultimately lead to change which will improve the safety. In lack of systemic analysis of reports and feedback directly to the clinicians are seen as major barriers to the clinical engagement. The success of any new critical incidents reporting and monitoring systems will depend upon making sure that the system is simple, unambiguous, user-friendly, and intuitive[16].

It is our sincere hope that the new venture will bring great benefits to our speciality. We believe that the professions of anaesthesia shoud develop such a culture, where incident reporting is a routine occurrence. The partnership will harness the enthusiasm of the profession for reporting threat to patient safety and acting to eliminate them. Finally, it will not be too optimistic to speculate that, as in many other areas, speciality-specific national incident reporting in anaesthesia will be a model for future initiatives in other specialties. Thus critical incident reporting should be introduced in all anaesthesia departments as a part of quality assurance programs to ensure improved patient care as an educational tool but never as a punitive measure[17].

"It takes a long time to bring excellence to maturity."(Pubilius Syrus ~ 100BC)[7]

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Original Article

Effect of magnesium sulphate on quality of subarachnoid block in terms of onset and duration of motor and sensory block, APGAR score of the neonate and haemodynamic status of the patient

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Abstract

Background *In obstetrics, pregnancy induced hypertension is still a burning question and complicates a large number of pregnancies in developing countries. Chance of hypotension is more in patients getting magnesium sulfate with subarachnoid block but it may be managed with adequate preloading and by pressor agent ephedrine.*

Objectives *This study was designed to observe the effect of magnesium sulphate on quality of subarachnoid block in terms of onset and duration of motor and sensory block, APGAR score of the neonates and haemodynamic status of the patients.*

Methods *Sixty parturients undergoing caesarian sections under subarachnoid block were enrolled for the study. They were divided into two groups. Group-A include normal parturient undergoing caesarian section and group-B include pre-celamptic parturient treated with magnesium sulphate within 1 to 2 hours before block. After recording of base line haemodynamic status (BP, HR, SPO_2) all patients received subarachnoid block with 2 ml (10 mg) hyperbaric bupivacaine at L_{3-4} level. Onset of sensory block was assessed by using pinprick, onset of motor block was assessed by onset time of weakness of lower limb and onset time of complete paralysis of lower limb after SAB. Duration of motor block was assessed by modified bromage scale. Height of the block was assessed by using pin prick at the intercostals space in the mid axillary line after 5 minute of SAB. Neonatal assessment was done by using apgar score in 1 and 5 minutes after delivary of baby. Blood pressure was recorded normally at 2 min interval until 15 minutes then every 5 minutes interval till the surgical procedure is completed.*

Results *Duration of motor block in group B is significantly higher 276 ± 44.92 min compared with group A which was 197.96 ± 24.25 min (P = 0.000). Duration of sensory block in group B also significantly higher with 308.76 ± 61.43 min compared with group A which was 264 ± 30.57 min, and (P = 0.001). Changes in systolic blood pressure in group B patient is more and highly significant (P < .05), for upto 60 min. But changes in diastolic blood pressure in-group B was only highly significant with group A for upto 9 minutes. APGAR score was significantly low both in 1 minute and 5 minutes, in group B patients which was 5.80 ± .61 at 1 minute and 7.73 ± .827 at 5 minutes and in group A which was 6.60 ± .85 at 1 minute and 8.30 ± .595 (mean ± SD) at 5 minutes. Onset of sensory block and onset of motor block revealed on significant difference between groups.*

Conclusions *Chance of hypotension is more in patients getting magnesium sulfate but it may be managed with adequate preloading and by pressor agent ephedrine.. APGAR score of baby of magnesium sulfate getting patient is low but it is acceptable.*

Keywords Subarachnoid block, caesarian section, magnesium sulfate and PIH.

(JBSA 2011; 24(2): 41-47)

Introduction

Magnesium is one of the important and second most common intracellular cation after potassium. Magnesium plays an important role in nearly every physiological system by calcium antagonism. Magnesium is involved in several processes including hormone receptor binding, gating of calcium channels, transmembrane ion flux & regulating adenylate cyclase-muscle contraction, neuronal activity, control of vasomotor tone, cardiac excitability and neurotransmitter release.

Magnesium is used as an anticonvulsant by its depressant effect at synapses[1]. It may decrease catecholamine release[19] and antagonize bronchospasm. In cardiology magnesium decreases frequency of both atrial & ventricular arrhythmia and causes vasodilatation[6].

In obstetrics eclampsia & pre eclampsia is still now a burning question and complicates a large number of pregnancies in developing countries. This two remains a major cause of maternal & foetal mortality, primarily by causing cerebral haemorrhage & heart failure. Mortality directly correlates with the severity of hypertension. So anesthetic management should be directed towards avoidance of exacerbation of maternal hypertension. In this group of patient airway management and intubation may be difficult due to distortion of upper airway anatomy by oedema[7] and chance of life threatening gastric acid aspiration and exaggerated intubation reflex is more[18]. Moreover general anaesthesia may decrease placental blood flow[21]and may increase the risk of maternal stroke and heart failure in severely eclamptic & pre eclamptic patient.

Spinal anaesthesia causes blockade of motor, sensory and sympathetic nervous system by blocking sodium channels in peripheral nerves. At the motor end plate magnesium inhibits neurotransmiter release in peripheral nerves by competitive calcium antagonist for membrane channels on the pre-synaptic terminal[20].Direct neuromascular block has also been suggested as a mechanism of action of magnesium in pre-eclampsia and eclampsia. So motor block due to spinal anaesthesia may be potentiated by magnesium sulphate. Marked Hoemodynamic changes (i.e. ¯B.P) occur after spinal anaesthesia. On the other hand , magnesium sulphate acts by calcium antagonism via calcium channels[16] and it decreases systemic vascular resistance[9] and reverses increase calcium ion mediated vasospasm[17].Magnesium inhibits catecholamine release[19] and basal myogenic and hormone induced smooth muscle contraction and also has direct vasodilator effect. So chance of hypotension is more in magnesium sulphate treated patient getting spinal anaesthesia. Spinal anaesthesia is often discouraged in patients with preeclampsia and eclampsia because of the risk of severe hypotension[10],leading to maternal, foetal and neonatal morbidity. The first study to call this into question was by Wallace et al[2].In a prospective randomized trial of anaesthesia in parturients with severe preeclampsia ,they compared general anaesthesia with epidural and CSE anaesthesia for caesarean section. The need for ephedrine due to hypotension was similar between the spinal and epidural groups. A retrospective study by Hood et al[3] and a prospective study by Sharwood smith et al[4] agreed with this findings.

Kerinen J.et al have studied the neonates born from pre-eclamptic patient under spinal anaesthesia. They did not find any major effect on clinical condition of the neonates assessed by apgar score and umbilical artery pH values[12].

Comparing general and regional anaesthesia, general anaesthesia is neither contraindicated nor regional anaesthesia indicated exclusively in women with severe pre-eclampsia . Some investigator has also concluded that the use of spinal anaesthesia in cases of severe pre-eclampsia should be reconsidered[5]. When caesarean section is indicated in preeclamptic and eclamptic parturient, a large number of patients remain under magnesium sulphate therapy because it is superior to diazepam or phenytoin in controlling seizure[1]. But there is lack of studies on effect of magnesium sulphate therapy on quality of spinal anaesthesia. This study reveals outcome of spinal anaesthesia in patient getting magnesium sulphate therapy by assessing the effect of magnesium sulphate therapy on quality of spinal anaesthesia.

Methods

This randomized prospective study was carried out in the department of Anaesthesiology, Dhaka medical college hospital. With approval from the hospital ethical committee and written informed

consent, a total of 60 parturients undergoing caesarean section with sub arachnoid block were included in the study. Patients aged between 20-30 years, body weight 50-70 kg , ASA class I and II scheduled for caesarean section. Any one who had relative contraindication for regional anaesthesia were dropped from the study. Patients were divided into two groups: Group A, normotensive parturient undergoing C/S and Group B, parturient getting magnesium sulfate undergoing C/S. Volume preloading done with Hartman's solution 15 ml/kg over 20 to 30 minutes in all patients before giving SAB. Normal fluid balance was however maintained at a rate 4-5ml/kg-hr.

Spinal injections were made with a 25 G Quincke Babcock spinal needle with the patient in lateral position through L 2-3 or L3-4 inter space. In both group of patients 2 ml of 0.5% hyperbaric bupivacaine (10 mg) was injected. Following the end of injection skin patch was applied quickly and patients were immediately placed to supine position.

Preoperative and intraoperative pulse rate was monitored by pulse oxymetry. Blood pressure was recorded normally at 2 min interval over the right arm until 25 minutes than every 5 minutes interval till the surgical procedure was completed. Attempt was made to maintain systolic arterial pressure(SAP) > 90 mm Hg. For this purpose if hypotension occurs (SAP<90 mm Hg) intravenous infusion of crystalloid as necessary and injection ephedrine was given 5 mg intravenously(repeated as necessary). Onset of sensory block was assessed by using pinprick and asking question about tingling, onset of motor block was assessed by onset time of weakness of lower limb and onset time of complete paralysis of lower limb after SAB. Duration of motor block was assessed by modified bromage scale. Height of the block was assessed by using pin prick at the intercostals space in the mid axillary line after 5 minute of SAB. Neonatal assessment will be done by using apgar score in 1 and 5 minutes after delivary.

Severe hypo tension following SAB was defined as a fall of Systemic Arterial Pressure to or below 80 mm Hg and bradycardia as heart rate below 60/ minute.If either severe hypotension (even with usual crystalloid infusion, with or without ephedrine) or bradycardia or both ensued, rescue treatment was to be initiated. An additional intravenous channel(18 G canula) was also to be opened for rapid infusion of colloid(500 ml dextran 40 over 15-20 minutes). Bradycardia was treated with atropine(0.3 mg I/V).

Statistical analysis

The results were compiled and analysed using unpaired t-test, Chi-square ??or ANOVA as appropriate. Results are considered statistically significant if $p<0.05$.

Results

Demographic data was statistically matched (Table I) between the groups. There was significant difference of pulse rate (Fig1) between two groups from 3 min to 23 min. ($P < 0.05$). Systolic blood pressure (Fig2) significantly varied($P< 0.05$) during whole period and diastolic blood pressure(Fig3) ($P< 0.05$) during initial period. Onset of sensory and motor block was (Table2 and Table 3) statistically significant (P=0.009). Duration of sensory(Table4) and motor block (Table5) was also significant APGAR score of the neonates in one and five minutes was highly significant (p=0.004).

Table-I: *Demographic data:*

Group/Variable	Group-A	Group-B
n	30	30
Age in years	24.53±3.38	24.43±4.31
Height in cm	156.21±3.12	155.35±3.26
Weight in kg	58.30±7.27	56.66±7.82

Values are expressed as mean± SD. Values are considered statistically significant if $p<0.05$.

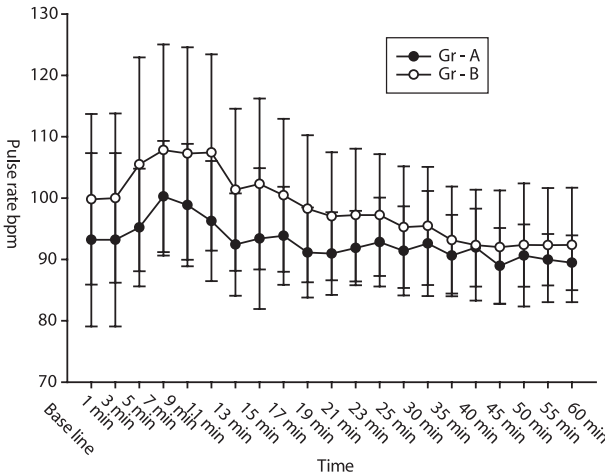

Fig 1 *Changes in pulse rate in different time of two studied groups*

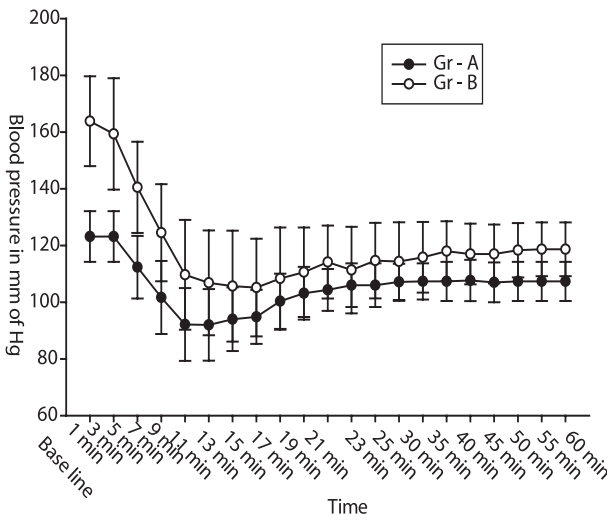

Fig.-2: *Changes of systolic blood pressure in mm of Hg of two studied group*

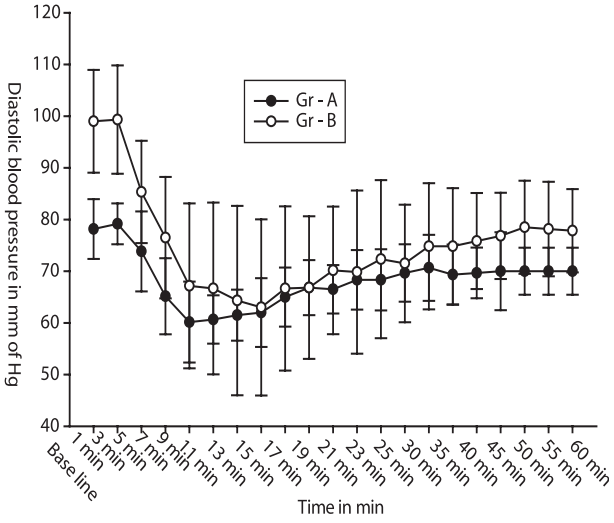

Fig.-3: *Changes of diastolic blood pressure in mm of Hg of two studied group.*

Table II : *Onset of sensory block as indicated by tingling in the leg*

Group / Variable	Group-A	Group-B	p value	Significant level
n=	30	30		
Tingling sensation in the leg in min	1.066±0.25	1.333±0.479	0.009	S

Values are expressed as mean± SD. Between groups analyses were done by student t test (unpaired). Values are expressed as significant if P<0.05 (CI-95%). S- Significant.

Table III : *The onset of motor block as assessed by weakness of lower limb*

Group/Variable	Group-A	Group-B	t	P value	Significant difference
Number of Patient	30	30			
Duration of Motor Block	197.96±24.25	276.26±44.92	-8.40	0.000	S

Values are expressed as mean± SD. Between groups analyses were done by student t test (unpaired). Values are expressed as significant if P<0.05 (CI-95%). S- Significant.

Table IV : *Duration of sensory block*

Group/Variable	Group-A	Group-B	t	P value	Significant Difference
Number of Patient	30	30			
Duration of Sensory Block	264.16±30.57	308.76±61.43	-3.560	0.001	S

Values are expressed as mean± SD. Between groups analyses were done by student t test (unpaired). Values are expressed as significant if P<0.05 (CI-95%). S- Significant.

Table V : *Duration of motor block .*

Group/Variable	Group-A	Group-B	t	P value	Significant difference
Number Of Patient	30	30			
Duration of Motor Block	197.96±24.25	276.26±44.92	-8.40	0.000	S

Values are expressed as mean± SD. Between groups analyses were done by student t test (unpaired). Values are expressed as significant if P<0.05 (CI-95%). S- Significant.

]

Table VI *APGAR score in one and five minutes*

Group/Variable	Group-A	Group-B	t	P value	Significant difference
Number Of Patient	30	30			
Weakness of Lower Limb	2.033±0.319	2.400±0.770	-2.408	0.019	S

Values are expressed as mean± SD. Between groups analyses were done by student t test (unpaired). Values are expressed as significant if P<0.05 (CI-95%).

Discussion

Pre eclampsia & eclampsia are the most common direct causes of pregnancy related death mainly due to stroke & heart failure. Mortality directly correlated with severity of hypertension. The mortality rate varies 2 to 5 %[8]. They are often treated with magnesium sulphate and antihypertensives. Because sound clinical research has shown beyond doubt that magnesium is superior to either diazepam or phenytoin for the prevention of recurrent convulsions[1]. magnesium sulphate also decreases systemic vascular resistance[9] and is beneficial for controlling acute hypertension.

Anaesthetic management is very critical in pre-eclamptic & eclamptic patients. Because general anaesthesia has several potential adverse effect like difficulties in airway management & intubation due to distortion of upper airway anatomy by edema, increase chance of aspiration, maternal stroke & heart failure & decreases placental blood flow. On the other hand, spinal anaesthesia is discouraged in pre eclamptic & eclamptic patients because of the risk of severe hypotension [10].

Comparing general & regional anaesthesia, general anaesthesia is neither contra indicated nor regional anaesthesia indicated exclusively in women with severe pre eclampsia. Some investigator has also concluded that the use of spinal anaesthesia in cases of severe pre eclampsia should be reconsidered. [5] The first study to call this in to question was by Wallace et al [2] in a prospective randomized trial of anaesthesia in parturients with severe pre eclampsia. They compared general anaesthesia with epidural &CSE anaesthesia for caesarean section. They found that the need for ephedrine was similar between the spinal & epidural groups and there was no significant difference in maternal or neonatal morbidity among the three groups. A retrospective study by Hood et al[3] and a prospective study by sharwood-smith et al [4] agreed with this findings.

In this study it had been shown that changes in both systolic and diastolic blood pressure were significantly higher (P<0.05) in group B patient than group A. So, pressor agent ephedrine was more used in group B patients. The result was similar to the retrospcetive study be Hood and Boese [11]. Although in majority of the patients in group B systolic blood pressure fall below 100 mmHg

,however in no case this was below 80 mmHg and accordingly,none required rescue treatment. As such the present protocol did not exclude any patient from the study.

Adequate pre loading decreases the chance of hypotension. In this study preloading with crystalloid between group A & group B was not significant (P=. 421) but in group B maternal systolic arterial pressure decreased significantly. This finding is consistent with karinen J et al study[12].

Pressor agent epinephrine should not be used in pre eclamptic patient because pre eclamptic has a markedly increased sensitivity to vasopressors [10,13] and in advertent intravascular injection of epinephrine would further exacerbate maternal hypertension and further decreased placental blood flow[14]. So, the most commonly used vasopressor in obstetric anaesthesia are the predominantly b agonist drugs. Ephedrine is widely used because of its predominantly b and mild a sympathominetic action. Ephedrine increases cardiac out put & therefore flow to the maximally dilated utero placental vessels[15]. Incremental I/V bolus dose of ephedrine counteract hypotension. In this study it had been shown that frequercy of systolic hypotension were more in-group B patients which was managed well by I/V ephedrine.

Karinen J. et. al have studied the neonates born from pre eclamptic patient under spinal anaesthesia. They did not find any major effect on clinical condition of the neonates assessed by Apgar score & umbilical artery p^H values[12]. This study did not match with Karinen J. et. al study. In this study APGAR score is significantly low in group B patient both in 1^{st} min and 5^{th} min than group A patient. In both 1^{st} and 5^{th} min P<0.05. This study matched with the research work of Monika Sharma who found that APGAR was more than 7 in 68.75% of babies and NICU admission and foetal loss were significantly less in study group. She concluded that magnesium sulfate is safe for mother and has no adverse effect on babies.

In this study duration of motor and sensory block in Group B was increased and was statistically highly significant (P< 0.05). Onset time of sensory block – Tingling in the leg was more in-group –B patient and was statistically significant (P< 0.05) but in case of pinprick it was not significant (P = 0.084).

Onset time of motor block – weakness of lower limb was more in-group –B patients and was statistically significant (P = 0.019). On the other hand onset of motor block complete paralysis of lower limb in-group –B patients and was not significant (P < .06).

So study concluded that spinal anaesthesia is safe for pre eclamptic parturient, treated with magnesium sulphate. Although chance of hypotention is more in patients getting magnesium sulfate but it may be managed with adequate preloading and by pressor agent ephedrine.. APGAR score of baby of magnesium sulfate getting patient is low but it is acceptable.

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Original Article

Effects of ketamine hydrochloride (preservative free) and fentanyl citrate added to low dose hyperbaric bupivacaine for sub-arachnoid block in lower uterine caesarian section – a comperative study

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Abstract

Background *Caesarian section is one of the most common operations Now a days for delivery of baby sub-arachnoid block is the better choice. World wide Commonly used bupivacaine with fentanile.*

Objective *The present study was designed to observe the effects of intrathecal ketamine hydrochloride with bupivacaine+complne bupivacaine with fentanyl to observe quality of block eioth duration block during caesarian section.*

Methods *Ninety ASA 1 parturients scheduled for elective caesarian section were randomly selected. There are thirty patients in each group. The base line haemodynamic parameters, heart rate, blood pressure respiratory rate SpO_2 and indication of operation were recorded The control group BN (n = 30) received 1.75 ml of 0.5% hyperbaric bupivacaine plus 0.5 ml normal saline intrathecally. While the study group, fentanyl group BF (n = 30) received 1.75 ml of 0.5% hyperbaric bupivacaine plus 0.5 ml (25 mg) injection fentanyl, BK received 1.75 ml of 0.75% hyperbaric bupivacaine plus 0.5 ml (25 mg) of ketamine hydrochloride.*

Results *Duration and quality of sensory and motor block, post-operative analgesia, haemodynamic changes and sedation levels were assessed. There was no significant difference in duration of motor blockade in three groups. Quality of analgesia, sensory block was significant (P<0.05) in BK and BF group than BN group. The quality of block was excellent throughout the surgical procedure in 80% BK group 60% in BF group and 53.3% in control (BN) group. Incidence of hypotension was less in group BF (26.6%) and BK (20%) than group BN (40%). Ketamine had an upper level of sensory block than fentanyl.*

Conclusion *Injection ketamine 25 mg can be used as an adjunct to low dose spinal bupivacaine during caesarian.*

Key words: *SAB, Post-operative analgesia, ketamine, fentanyl.*

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Introduction

Caesarian section is one of the most common operations in the child bearing age of a woman. The choice of anesthetic technique for caesarean section depends on patient preference, coexisting medical conditions, reasons for surgery, the degree of urgency and the anesthesiologist's judgment and experience. Regional anesthesia for caesarean section has become the preferred technique because general anesthesia has been associated with higher maternal mortality. Regional anesthesia is advantageous in terms of less neonatal exposure to potentially depressant drugs, decreased risk of maternal pulmonary aspiration and an awaken mother at the birth of her child[1].Hyperbaric bupivacaine is the most common

local anesthetic used in subarachnoid block for caesarean section adding an adjunct (opioids or non opioids) has allowed reduction in the dose of bupivacaine and provides cardiovascular stability[2]. In the context of "augmentation strategies" a wide variety of opioids and non opioids are used as an adjunct to subarachnoid block to improve the quality of anaesthesia and prolongation of analgesia in the post operative period[3].Opioids added to local anesthetic for subarachnoid block was first introduced into clinical practice in 1979 with morphine sulphate as a forerunner. Morphine is a hydrophilic agent, may not be optimal as intrathecal drug for intraoperative analgesia because of less lipid soluble drug have a slower rate of onset of action and the drug may reach the medulla and cause delayed ventilatory depression[4]. Fentanyl, a lipophilic opioid, has rapid onset of action following intrathecal administration. It does not tend to migrate to fourth ventricle in sufficient concentration to cause delayed respiratory depression[5]. So, fentanyl is suitable as intrathecal drug for intraoperative analgesia and also prolongs analgesia in the early postoperative period[6].Recently, a non-opioid, NMDA receptor antagonist, ketamine (preservative free) is used for central neuraxial block. Ketamine as an analgesic has gained major attention during last few years because it is the most potent blocker of NMDA receptor's available for clinical use[7]. Epidural route for the administration of ketamine has become popular because of its safety and efficacy[8].Using the epidural route would give the highest concentration of ketamine at the spinal segments with the minimum systemic effects. Also, the elimination half life of epidural ketamine is longer than that following I.V administration and its CSF concentration is double that in plasma[7]. There are some concerns about the safety of the intrathecal use of ketamine and its preservative, benzal-konium chloride. A recent case report of a terminally ill cancer patient who received a continuous infusion of intrathecal ketamine with preservative for three weeks reported sub-pial vacuolar myelopathy[9]. Preservative-free ketamine has been shown to be devoid of neurotoxic effects after single and repeated administration[10, 11, 12]. This study was carried out to evaluate and compare the quality of sensory & motor block between intrathecal ketamine Hcl and fentanyl with low dose hyperbaric bupivacaine.

Methods

This study was conducted after obtaining approval from the institutional ethical committee. ASA physical status 1 parturient at term undergoing elective caesarean section willing to be included in the study. History of allergy to these drugs, bleeding diathesis, Pregnancy induced hypertension, COPD, history of taking tricyclic antidepressant drugs were excluded from the study. Patients were randomly selected into three groups by card sampling, 30 in each group. BN, BF & BK. Group BN received 0.5% hyperbaric bupivacaine 1.75 ml (8.75mg) + 0.5 ml normal saline, group BF received 0.5% hyperbaric bupivacaine 1.75ml (8.75mg) + 0.5ml Fentanyl (25μg) & group BK received 0.5% hyperbaric bupivacaine 1.75ml (8.75mg) + 0.5 ml Ketamine (preservative free) Hcl (25mg). After taking informed consent from parturient during preoperative visit she was instructed for overnight fasting and Inj. metoclopramide 10mg intramuscularly 1 hour before operation. In the operating room an intravenous canula of 18G was inserted and (pre-operative note was taken regarding pulse, blood pressure, heart, lungs, respiratory rate and SpO_2). Pre-loaded with 15ml kg^{-1} Ringer's lactate solution. Under all aseptic precaution lumbar puncture was performed with 25 gauge Quincke's spinal needle in L_{3-4} space in sitting position and study drugs were injected. After noting the time of injection, patient was immediately placed in supine position. A wedge was placed under the right hip. All patients were received supplementation of O_2 (3 liter per minute) via facemask. Immediately after administration of spinal anesthesia pulse rate, blood pressure and rate of respiration was recorded. Then Pulse rate, blood pressure, rate of respiration, SpO_2 was recorded every 3 minute for first 20 minutes, at 10 minutes interval for remainder of operation and thereafter at 30 minutes interval until the patient complains of pain. The occurrence of discomfort and side effects likes pruritus, nausea or vomiting, shivering, chest pain, restlessness, nystigmus etc. were recorded upto 24 hours. Hypotension defined as a decrease in systolic BP to less than20% from the baseline, was treated with bolus of IV Ephedrine 6mg as required. In any patient intensity of pruritus was assessed as mild (itching was only a minor concern), moderate (itching was a primary concern although bearable) or severe (unbearable,

patient requiring treatments). Sedation was assessed by Ramsay Sedation scale. Incidence of any other discomfort and side effects were also recorded. Height of the sensory block was assessed by pin prick method at 20 minutes after administration of spinal anesthesia. The quality of motor block was assessed by bromage scale. The quality of anesthesia was assessed depending on quality of motor block (onset time, bromage scale) and quality of sensory block (onset time, level of block) and on incidence of side effects, and by interviewing the parturient for their satisfaction, Verbal Rating Scale (VRS). Accordingly quality of anesthesia was categorized as excellent / good / fair / poor. Duration of effective analgesia (time from subarachnoid injection to first dose of rescue analgesic) was recorded as the patients request for first dose of analgesic. APGAR score was recorded at 1 and 5 minute after delivery of the baby.

Mean±SD was calculated for the variable at observation time in each group. The data yielded from this study were compiled and analyzed using chi-square ($\chi 2$) and one way ANOVA test. P value less than 0.05 was considered significant. Analysis was done by using statistical package for social science (SPSS); version 12.0.

Results

Patients in three groups were homogeneous regarding demographic characteristics.

In Table - I In sensory block, 20%, 40%, 33.3% and 6.7% of the patients in Group-BN had block at T_5, T_6, T_7 and T_8 level respectively. In Group-BF 13.3%, 50%, 20% and 16.7% of the patients had block at T_4, T_5, T_6 and T_7 level respectively. In Group-BK, 26.7%, 66.7% and 6.7% of the patients had block at T_4, T_5, and T_6 level respectively.

Table-I : *Sensory block and quality of motor block in three group*

Parameters	Group-BN	Group-BF	Group-BK	P value	
Level of sensory block at 20 min.					
T_4		4 (13.3)	8 (26.7)		
T_5	6 (20.0)	15 (50.0)	20 (66.7)	9.48	0.029
T_6	12 (40.0)	6 (20.0)	2 (6.7)		
T_7	10 (33.3)	5 (16.7)			
T_8	2 (6.7)				
Quality of motor block (Bromage scale)					
Grade-2	8 (26.7)	8 (26.7)	5 (16.7)	0.884	0.347
Grade-1	22 (73.3)	22 (73.3)	25 (83.3)		

Regarding quality of motor block, in Group-BN 26.7% and 73.3% of the patients had block of grade-2 and grade-1 respectively in Bromage Scale. In Group-BF 26.7% and 73.3% patients had block of grade-2 and grade-1 respectively. While in Group-BK 16.7% and 83.3 of the patients had block of grade-2 and grade-1 respectively.

Table-II On set time of motor block were 7± 1.80, 6± 1.11 and 4± 1.01 in group BN, BF and BK respectively. The mean on set time of sensory block was 6± 1.01, 5± .80 and 3± .90 in group BN, BF and BK respectively & there was statistically significant difference in mean on set time of motor block and mean on set time of sensory block among three groups.

Table II : *Onset time of motor block and sensory block*

Parameter	Group-BN	Group-BF	Group-BK	Sources of variation	SS	df	P-value
On set time of motor block	7± 1.80	6± 1.11	4± 1.01	Between Groups	126.422	2	.000*
				Within Groups	160.200	87	
				Total	286.622	89	
On set time of sensory block	6± 1.01	5± .80	3± .90	Between Groups	64.939	2	.000*
				Within Groups	71.908	87	
				Total	136.847	89	

P<0.05 is significant.

Table III shows the mean duration of motor and sensory block in three groups.

Duration of motor block was 98 ± 10.40, 109 ± 16.42 and 104 ± 14.86 in group BN, BF and BK respectively. The mean duration of sensory block was 111 ± 14.62, 160 ± 31.85 and 147 ± 20.91 in group BN, BF and BK respectively& there was statistically significant difference in mean duration of motor block and mean duration of sensory block among three group

Table IV shows duration of motor and sensory block in BF and BK groups.

Pruritus (46.7%) was the only side effect observed in patients belonging to Group-BF.

The incidence of Nystigmus & strange feeling was 20% & 10% of the patients in Group BK only.

In Table IV shown quality of anesthesia was categorized as excellent, good, fair and poor depending on quality of motor and sensory block, per-operative anesthesia and parturient satisfaction on verbal rating scale (VRS) and also on the incidence of side effects. In Group-BN 53.3% had excellent anesthesia, 30% and 16.7% of the patients had good and fair scale of anesthesia respectively. In Group-BF 60% of the patients had excellent and 40% of the patients had good scale of anesthesia. In Group-BK 80% of patients had excellent scale of anesthesia and 20% of the patients had good scale of anesthesia.

Quality of anesthesia in two groups- BF and BK was statistically insignificant (P= 0.091).

Table V shows that the V.R. of duration of effective Analgesia (P = 0.000) is greater than the critical value of $F_{0.05,2,87}$ (3.10), then it may be concluded that the mean duration of effective analgesia compared in three groups had statistically significant difference.

Table III

Duration of motor block and sensory block

Parameter	Group-BN	Group-BF	Group-BK	Sources of variation	SS	df	P-value
Duration of	98± 10.40	109± 16.42	104± 14.86	Between Groups	1927.222	2	0.010*
motor block				Within Groups	17364.167	87	
				Total	19291.389	89	
Duration of	111± 14.62	160± 31.85	147±20.91	Between Groups	38301.667	2	0.000*
sensory block				Within Groups	48300.833	87	
				Total	86602.500	89	

Data were expressed as mean ± SD, p<0.05 = significant, * = significant.

Table IV

Quality of Anesthesia in three groups

Parameters	Group-BN	Group-BF	Group-BK	c^2 value	P value
Excellent	16 (53.3)	18 (60.0)	24 (80.0)	2.857	0.091
Good	9 (30.0)	12 (40.0)	6 (20.0)		
Fair	5 (16.7)	0	0		

Table V : *APGAR score in three groups:*

APGAR	Group-BN	Group-BF	Group-BK	χ^2 value	P value
After 1 minute					
7	1 (3.3)				
8	8 (26.7)	8 (26.7)	7 (23.3)	2.843	0.828
9	5 (16.7)	7 (23.3)	5 (16.7)		
10	16 (53.3)	15 (50.0)	18 (60.0)		
After 5 minute					
8	1 (3.3)	0	0		
9	3 (10.0)	4 (13.3)	3 (10.0)	2.225	0.694
10	26 (86.7)	26 (86.7)	27 (90.0)		

Comparison among three groups had statistically insignificant difference in APGAR Score at 1 minute (P=0.828) after delivery and at 5 minutes (P=0.694) after delivery.

Table VI : *Duration of effective Analgesia*

Sources	SS	df	MS	V.R.	P-value
Between Groups	45743.901	2	22871.950	44.027	0.000*
Within Groups	44676.908	86	519.499		
Total	90420.809	88			

Table VII : *Incidence of hypotension in three groups*

Parameters	Group-BN (n=30)	Group-BF (n=30)	Group-BK (n=30)	P value
Ephedrine given	12 (40.0)	8 (26.7)	6 (20.0)	0.220

Data are presented as frequencies. Values within parentheses are expressed as percentage over column total.

Figure 1 shows that the changes in pulse rate of group BK was lower than that of group BN and group BF. It also shows that the gap of pulse rate was high among the three groups after 90 min. of per operative period (group BK was max. and group BF was min.), though the gap was comparatively low in the baseline period.

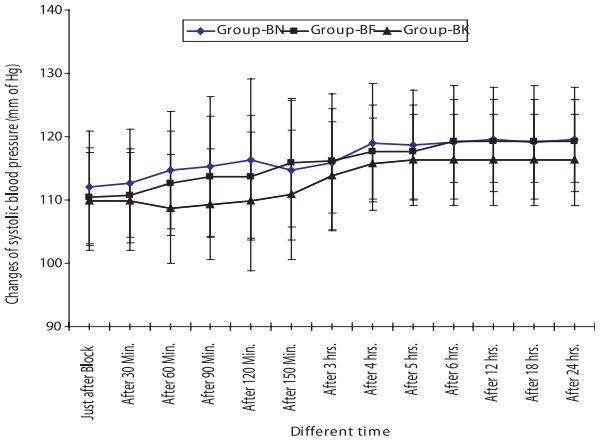

Fig 2 *Changes of systolic blood pressure (mm Hg) (per operative)*

Figure 2 shows that the changes of systolic blood pressure of group BK was lower than that of group BN and group BF after 90 min. of per operative period (group BK was max. and group BF was min.).

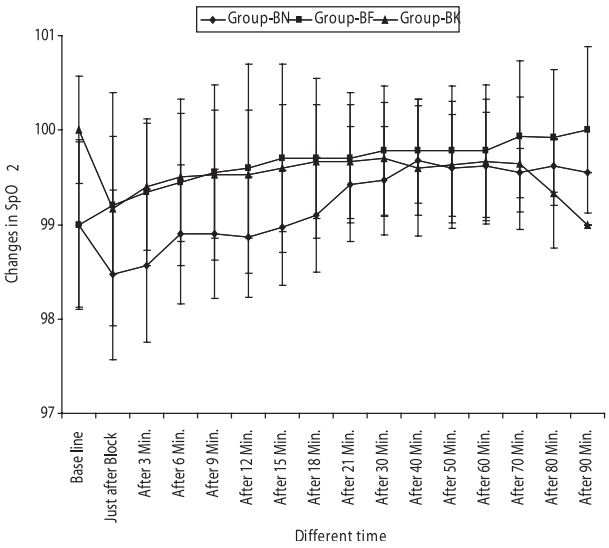

Fig- 2: *Changes in SpO_2 (per operative)*

Figure 3 shows that the changes in SpO_2 of group BK was lower than that of group BN and group BF after 90 min. period, though the SpO_2 was comparatively high in the baseline period.

Incidence of post operative side effects: pruritus (43.3%) was the only side effect observed in patients belonging to Group-BF. Incidence of nausea was 16.7% in Group BF only. Incidence of vomiting was also 3.3% in Group BF only. Dizziness was observed in 20% of the patients only in Group BN. Incidence of strange feeling was 13% in Group BK only. Incidence of shivering was 20% and 16.6% in Group BN and BF respectively.

Discussion

In the present study, patients were randomly allocated in three groups-BN, BF and BK, in group BN 0.5 ml normal saline + 1.75 ml 0.5% hyperbaric bupivacaine, in group BF 0.5 ml (25ìg) fentanyl + 1.75 ml 0.5% hyperbaric bupivacaine, and in group BK 0.5 ml (25 mg) ketamine (preservative free) + 1.75 ml 0.5% hyperbaric bupivacaine were used for induction of subarachnoid block. Final height of the block was assessed by pin prick in 20 min. after block, because bupivacaine fixed at this time and no further progression of the block occurred.

In BK group 26.7% patients had sensory block at T_4 and in BF group 13.3% patients had sensory block at T_4 while in BN group (Control) no patients had sensory block at T_4 level. So, ketamine (preservative free) and fentanyl had higher level of sensory block than control group which was statistically significant (P=.000). Again ketamine (preservative free) group had higher level of sensory block than fentanyl group which was statistically significant (P=.029). There was no statistically significant difference (P=0.347) in assessment motor block among three groups observed by bromage Scale. This result is consistent in terms of level of sensory block with the study conducted by Kathirvel et al [13] and Biswash et al. [6].

Cardiovascular effect of spinal block was measured in terms of number of patients developed hypotension and required treatment with Inj. ephedrine. Hypotension was defined as reduction systolic blood pressure to 20% or more than the base line. In group BK 20% and in group BF 26.7% while 40% of patients in group BN developed hypotension. The incidence of hypotension among three groups was statistically insignificant (P = 0.220). In BK & BF group, though dose of the bupivacaine was not reduced, cardiovascular stability in respect of hypotension was found insignificant.

There have been reports of respiratory depression when intrathecal lipophilic opioid has been used for labour analgesia byLu et al.[14] & Hays & Pabner[15]. But during caesarean delivery significant respiratory depression has not been observed by Dahlgren et al.[16] & Hunt et al[17]. Intrathecal ketamine (preservative free) didn't induce respiratory depression reported by Kathirvel & Shadasivam [13] even after massive dose of 250 mg Mankowitz et al.[18]. In our study no patient in any groups experienced respiratory depression.

The incidence of discomfort and side effects observed during the study was less in BK & BF groups than BN group (Control Group).

Quality of anesthesia was categorized as excellent, good, fair and poor depending on assessment of motor block, level of sensory block and the incidence of side effects. Quality of anesthesia was better in BF & BK than control group BN which was statistically significant (P = 0.008). On the other hand BK group had better quality of anesthesia than group BF which was statistically insignificant (P = 0.091).

Neonatal APGAR score was similar among three groups.

Mean duration of effective analgesia in group BN, BF & BK were 128±13.78, 181±30.17 and 169 ± 21.14 minute respectively which was statistically highly significant (P = 0.000). On the other hand, there were small difference in postoperative analgesia in group BF & BK which was not statistically significant (P = 0.072).

There were two important observations in the study. One was in BK group there was no nausea and vomiting in peroperative and postoperative period. And another observation was that there was less incidence of hypotension in BF and BK group than BN group with same dose of bupivacaine. These two observations may be further evaluated.

Limitation of this study is that only one dose of ketamine (preservative free) was used. Dose-

response study was not carried out because previous study has already shown that ketamine (preservative free) dose-dependency potentiates the local anesthetic effect. Similar dose response relationship in study where 20, 40 or 60 ìg of fentanyl was administered and prolongation of effect was found in higher doses but with increased pruritus reported by Belzrena et al.[21] Sample size was also small in this study.

Concluded that subarachnoid ketamine (25 mg) with low dose hyperbaric bupivacaine is an alternative to subarachnoid fentanyl with low dose hyperbaric bupivacaine for elective caesarean section in terms of quality of block, haemodynamic stability, incidence of side effects, quality of anesthesia, duration of post operative analgesia and foetal outcome.

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Original Article

Outcome of General Anaesthesia by Laryngeal Mask Airway (LMA) in Ophthalmic Surgery in the National Institute of Ophthalmology and Hospital,

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Abstract:

Background: *The hazards of endotracheal intubation during general anaesthesia avoided by using laryngeal. Patient is very safe under general anaesthesia with laryngeal mask airway intra and post operatively in ophthalmic surgery.*

Objective: To observe the haemodynamic stati ofother status nd other parameter during operation post operative recovery period. By using laryngeal mask.

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

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

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

Keyword: *General anaesthesia, laryngeal mask airway, ophthalmic surgery.*

(JBSA 2011; 24(2): ....)

Introduction:

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

Table-I

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

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

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

Fig. 1: *Laryngeal Mask Airway.*

Methods

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

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

Results

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

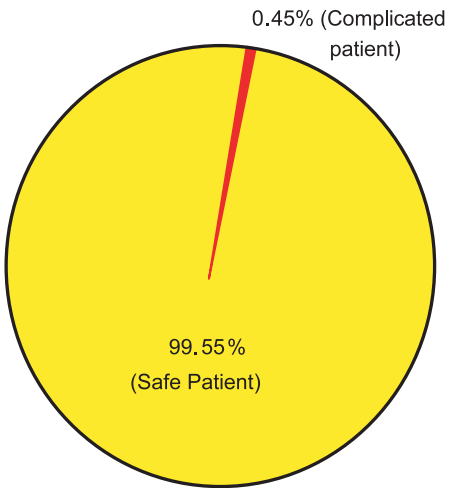

Fig.-2: *Percentage of safe and complicated Patients under general anaesthesia by L.M.A Insertion*

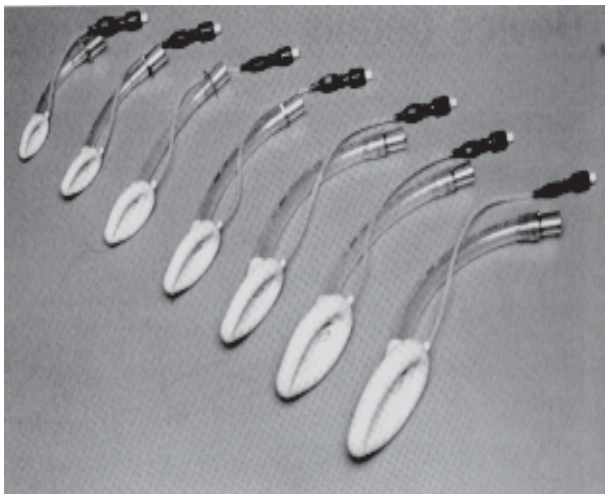

Fig.-3: *Different sizes[2] of Laryngeal Mask Airway.*

Table-II

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

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

Discussion:

The LMA provides[3] an alternative to ventilation through a face mask or endotracheal tube. because it is not placed in the trachea, use of an LMA is associated with less bronchospasm than an endotracheal tube. Insertion of LMA is very easy and success rate is 95-99% in case of patients with difficult airways. The LMA partially protects the larynx from pharyngeal secretions (but not gastric regurgitation) and it should remain in place until the patient has regains airway reflexes. Haemodynamic stability[4] is an integral and essential goal of any anaesthetic management plan but haemodynamic changes during intubation especially in case of heart disease and hypertension, increase of IOP and ICP are a great problem for anaesthesiologist and patient. So, the anaesthesiologist always try to reduce these haemodynamic changes by applying methods or drugs. Many drugs have been suggested in modifying haemodynamic responses to laryngoscopic intubation. This may prolong recovery time and may lead to cardiovascular complications. We observe that LMA insertion has no significant haemodynamic effect. There is no use of laryngoscope. Small amount of drugs are needed. Only by using fingers we can insert it. LMA removal too does not change haemodynamic parameter significantly. After LMA insertion there is no significant change on heart rate, systolic blood pressure, diastolic blood pressure, no rise of intraocular pressure during operation. Patient can be put in spontanious respiration for short term procedure or IPPV with muscle relaxant (small amount) can be done for a longer procedure. The larynx has the greatest afferent nerve[5] supply of all the airways being largely supplied by fibers from the internal branch of the superior laryngeal nerve. Reflex responses to a number of mechanical

and chemical stimuli are also mediated by the superior laryngeal nerve and lead to sympathetic stimulation and rises blood pressure and heart rate. Laryngoscopy and subsequent tracheal intubation are associated with a 25-50% rise in blood pressure and a similar increase in heart rate. Insertion of the LMA is associated with only a 0-20% rise in blood pressure and heart rate in both adults and children. Sympathetic responses due to laryngoscopy and intubation cause a 25% in intraocular pressure (IOP) compared with only 5-10% for the LMA when anesthesia is induced with thiopentone and Halothane. But when propofol is used in patient with normal eyes or in patient with glucoma no rise of IOP occurs.

Conclusion:

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

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Review Article

Paediatric procedural sedation for radiological imaging

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Abstract

Sedation is frequently undertaken for radiological imaging procedures in paediatric patients. Movement during procedure degrades all images of a particular sequence. A deeper level of sedation is needed. The sedation of children is different from the sedation of adult. The safe sedation of children for imaging procedure requires a systematic approach that includes the followings. Careful presedation health evaluation of the child with ASA classification. Appropriate fasting guidelines for sedation procedure. Detailed airway examination for any airway abnormalities that might increase the potential for airway obstruction. Adequqte training and skills of sedating personnel in paediatric airway management. Age and size appropriate equipment for airway management and venous access. Adequate medications to combat adverse events. Monitoring of vital parameters during and after the procedure. A properly equipped and staffed recovery area. Recovery to presedation level of consciousnessof patient before discharge from medical supervision and appropriate discharge instructions. The whole procedure should be well documented. Childrens who has contraindications to sedation should be selected for general Anaesthesia.

This review article has been made to discuss the need for sedation of children during radiological imaging, currently practiced different regimens of sedation, safe guidelines for sedation and also covers the debate between need for GA versus sedation.

Keywords : *Procedural sedation, Paediatric, Radiological Imaging.*

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Introduction

Sedation is usually a need for radiological imaging procedures in paediatric populations. Among them magnetic resonance imaging (MRI) takes a longer duration than other radiological imaging procedures and any movement usually degrades all images of a particular sequence. Mild and moderate sedation is unable to guarantee patients compliance and therefore a deeper level of sedation is required. Sedation in children is often administered to control behavior to allow safe completion of procedure. Children younger than 7 Years and those with developmental delay often require deep level of sedation to gain control their behavior.[1] Children in this group are particularly vulnerable to sedating medications due to effect on respiration, and protective reflexes. [2] However, general anaesthesia cannot be organized routinely due to need for special, costly equipments, monitors and personnel as well as general anaesthesia is not without risk.

In practice, anaesthesiologists have to deal with these patients with request from radiologist, paediatricians and other clinical staff. There are various general protocols and standard operating procedures, [3] made by medical and nursing organizations and societies. They are often general in nature, and thus the anaesthesiologists should design specific protocols to use in their own hospitals for their personnel.

The Need for Deep Sedation

As movement interferes with effective MRI, patients unable to lie still, provide a challenging problem. Moderate sedation is unable to guarantee patient compliance and therefore a deeper level of sedation is required. Infants may go to sleep with a feed and children older than 7 years can comply with instructions to remain still. [4,5-14] Intravenous deep sedation is thus required for many of those between one and 7 years, and some older children with learning difficulties or claustrophobia. [15]

Intravenous sedation is more predictable in this group as it has an immediate effect and is much less reliant on other factors such as absorption. However, it has also been suggested that there are varying levels of deep sedation at the end, which is an overlap with general anaesthesia. [16-20]

Sedation Regimens for Children

There has been debate over appropriate drugs and their dosage, and those who sedate children have their favorite regimens. It is important that persons administering the drug are familiar with them and cocktails of more than two drugs are to be avoided because of unpredictability of drug interactions and the increased incidence of important side effects. [3,21,22]

Table I : *Different sedation regimens with dose and route of administration*

Drug Regimen		Dose/route of administration
1.	Chloral hydrate	50-100 mg/kg PO
2.	Pentobarbital	4-6 mg/kg IV or PO
3.	Midazolam	0.5-0.75 mg/kg PO 0.025-0.5 mg/kg IV 0.2 mg/kg intranasal
4.	Propofol	100-200 µg/kg/min IV
5.	Methohexital	0.25-0.50 mg/kg IV 20-25 mg/kg rectal
6.	Ketamine	3-4 mg/kg IM 1-2 mg/kg IV
7.	Propofol with fentanyl	Propofol 50-150 µg /kg IV Fentanyl 1- 2 µg /kg IV
8.	Midazolam with fentanyl	Midazolam 0.02 mg/kg IV Fentanyl 1-2 µg /kg IV

PO - Per Os (Oral)
IV - Intravenous
IM - Intramuscular

Chloral hydrate is an extremely useful and safe and can be used with good effect in children upto 10 kg.[24] Pentobarbital has a long history of effective use but emergence can be prolonged. Midazolam has track record of safe use both oral and intravenous, paradoxical reactions are not frequent. Intranasal route should not be recommended due to irritation. [25] Propofol is an ideal agent for nonpainful diagnostic procedures but only for use by expert airway managers with good backup systems. [23] Methohexital gives effective sedation in intravenous route and rectal route is not recommended because of high frequency of apnoea and desatuation events.[26] Ketamine is a very popular drug for effective sedation and analgesia for painful procedures, nausea and vomiting is relatively common after procedure and there are reports of laryngospasm. [28] Propofol combined with fentanyl is best for deep sedation to anaesthesia, but risk of requiring advanced airway management is high.[27] Midazolam with fentanyl is another common combination for painful procedures but risk of apnoea and hypoxia is significant. [29]

Sedating Personnel

Present American Pediatric Guidelines [16] augmented by a literature suggests that if deep sedation is required then it should be performed by someone. [30,31]

a. Who is working to an acceptable guideline.
b. With sole responsibility for the sedation.
c. Who has been trained to an acceptable level (Such as, advanced paediatric life support provider status).
d. Who is familiar with the drugs, dosages, monitoring equipment, and requirement of the procedure.
e. Who is supported by other skilled staff such as a children's nurse.

Preparation of Patient

Children should be prepared in a similar way to child undergoing general anaesthesia.

a. Informed consent for sedation taken.
b. Children fasted by withhelding milk and solids as per direction.
c. Reliable intravenous access essential before, during, after the procedure if intravenous drugs are used, in addition, for administration of resuscitation drugs if required.

d. The paediatric patient should be accompanied to and from the scanning department by a parent, legal guardian or other responsible person.

Monitoring of Patient

Monitoring of the patient during and following procedure is the cornerstone of safe practice.[16,21] There must be one person available whose only responsibility is to constantly observe the patient's vital signs, airway potency, and adequacy of ventilation and administration of drugs. Pulse oximetry is essential during sedation and recovery; oxygen saturation should stay above 93%. Vital signs such as level of consciousness, pulse, respiratory rate and oxygen saturation readings should be taken at given minute's intervals during the procedure and any adverse events must be recorded. Non-ferromagnetic monitoring systems are available and therefore compatible with use in the MRI. [32]

Post Sedation Care

After completion of imaging procedure, monitoring and observations should be continued and recorded until recovery of consciousness. All the resuscitation equipment should be readily available in the recovery area. Post anaesthesia recovery nurses with paediatric education and experience are required. Nurses providing such care should be capable managing the paediatric airway and skilled in basic resuscitation techniques.

Recommended Discharge Criteria[33]

a. Cardiovascular function and airway patency are satisfactory and stable.
b. The patient is easily arousable, and protective reflexes are intact.
c. The patient can talk (if age appropriate).
d. The patient can sit up unaided (if age appropriate).
e. For a very young or handicapped child incapable of the usually expected responses, the presedation level of responsiveness or a level as close as possible to the normal level for that child should be achieved.
f. The state of hydration is adequate.

Documentation

As like any anaesthetic proper documentation should be done throughout the whole procedure of sedation. [34-37]

a. Documentation before sedation
   (i) Informed consent for sedation.
   (ii) Patients detail particulars.
   (iii) A complete health evaluation with ASA classification as discussed.
   (iv) Instructions and information's about fasting and sedation provided to the responsible person.
   (v) Any special instructions for individual case.
b. Documentation at the time of sedation.
   (i) Previous health evaluation will be thoroughly reviewed by sedation team.
   (ii) Baseline vital parameters of child including patients level of consciousness and responsiveness, heart rate, blood pressure, respiratory rate and oxygen saturation.
c. Documentation during sedation.
   (i) The patients chart shall contain a time based record that includes the name, route, site, time, dosage and patient effect of administered drugs.
   (ii) The patients chart shall contain documentation during sedation the patients level of consciousness, heart rate, blood pressure, respiratory rate, and oxygen saturation at regular interval. This documentation will be continued until the patient attained predetermined discharge criteria.
   (iii) Any adverse event and treatment of that shall be documented.
d. Documentation after sedation. The time and condition of the child at discharge form the sedation area or facility shall be documented; this should include documentation that the child's level of consciousness and oxygen saturation in room air have returned to a state that is safe for discharge by recognized criteria.

Resuscitation Equipment

Following resuscitation equipment should be available during procedure and recovery and should include. [16,21]

a. Suction apparatus - size appropriate suction catheters and a functioning suction apparatus.
b. Oxygen - adequate oxygen supply and functioning flow meters/other devices to allow its delivery.
c. Airway – size appropriate airway equipment, nasopharyngeal and oropharyngeal airways, laryngoscope blades, endotracheal tubes, stylets, facemask, bag-valve-mask or equivalent device (functioning).
d. Monitors – functioning pulse oximeter with size appropriate oximeter probes and other monitors as appropriate for the procedure (e.g. non-invasive blood pressure, end tidal carbon dioxide, ECG and stethoscope).
e. Special equipment or drugs for a particular case (e.g. defibrillator).

Resuscitation Drugs[16,21]

Sulbutamol for nebuliztion and inhalation, Suxamethonium, Atropine, Diazepam, Adrenaline (1:1000, 1:10,000), Flumazenil, Glucose (25% or 50 %), Lignocaine (cardiac lignocaine, local infiltration), Midazolam, Hydrocortisone, Methyl-prednisolone, Naloxone, Oxygen, Vecuronium, Sodium bicarbonate,

Contraindications of Sedation

a. Potential airway obstructions for example, sleep apnoea, anatomic airway abnormalities or extreme tonsillar hypertrophy.
b. Respiratory centre abnormalities for example, brain stem tumours.
c. Respiratory centre desensitized to carbon dioxide for example, conditions with chronically raised $PaCo_2$.
d. Renal or hepatic dysfunction leading to altered drug kinetics.
e. Conditions in which a rise in $PaCo_2$ would be detrimental for example raised intracranial pressure.
f. Conditions with high risk of pulmonary aspiration of gastric content.

These candidates should be exclusively selected for general anaesthesia.

Adverse Events with Sedation in Children[38-53]

Sedation of pediatric patients has serious associated risks, such as

a. Hypoventilation.
b. Apnoea.
c. Airway obstruction.
d. Hypothermia.
e. Reaction to contrast agent.
f. Cardiopulmonary impairment.

Common Causes of Adverse Events

a. Drug overdose.
b. Inadequate monitoring.
c. Premature discharge.
d. Inadequate help.
e. Drug interaction.
f. Drug error.

These adverse responses during and after sedation can be minimized. Careful pre-procedure assessment, appropriate drug selection,appropriate monitoring, as well as the presence of a skilled individual needed to rescue a patient from an adverse responses are essential. [2,43,44,54]

Ketamine-The Most Common and Effective Paediatric Sedation Agent for Radiological Imaging

The phencyclidine derivative ketamine has been described as a safe and effective paediatric sedation agent in the developed as well as developing world.[55] Ketamine produces a dissociative state, combination of analgesia, amnesia and sedation at subanaesthetic doses, with minimal effects on the airway and vital reflexes. It is best if combined with an anticholinergic to control secretion and with a benzodiazepine like diazepam to prevent agitation and nightmares.[56]Ketamine is a safe, useful procedure sedation agent but it delays recovery when used with long acting benzodiazepine like diazepam.[57-59] Ketamine does not fit easily into standard drug classification. At low doses full general anaesthesia is not achieved rather a dissociative state in which airway and respiratory tone are maintained. The specific dangers of airway compromise and cardio respiratory instability are suggested to be less with ketamine.

In developing country like Bangladesh, cost of drug is a matter of consideration during sedation procedure. Ketamine is easily available in Bangladesh and more cost effective than other sedation agents and can safely administered for paediatric sedation during radiological imaging.

Sedation versus General Anaesthesia

MRI investigations in children can be done by safe sedation providing previously stated guidelines were followed. Newer short acting drugs like propofol, midazolam, fentanyl etc can be safely employed to provide sedation. Deep sedation has been found to cause respiratory adverse events in ASA III or IV paediatric patients. [60] Early identification of patients who are at risk of failing sedation or experiencing adverse events may help in choosing patients for whom general anaesthesia would be a safer or successful alternative. [61]Advantages may be achieved by using general anaesthesia instead of deep sedation. There should be less failure and there may be faster turn around. The disadvantages of general anaesthesia include need for costly dedicated equipment, and a greater availability of paediatric anesthesiologists.[62]

Conclusion

Providing sedation to children during radiological imaging procedures is an area of rapid change marked by evolving standards. It is possible to use deep sedation to produce satisfactory conditions for children having scans unless there is any contraindication for sedation. Anaesthesiologists have played a critical role in establishing guidelines for safe sedation, considerable work remains in defining what represents effective and safe practice. It is the time that anaesthesiologists should establish the identity as the ultimate experts in this field with a proven track record of practice improvement to assure that clinical practice, training, and safety in this field.

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Original Article

Post operative nausea and vomiting after laparoscopic cholecystectomy: comparison of prophylactic effect of dexamethasone with ondansetron

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Abstract

Background *Postoperative nausea and vomiting after laparoscopic cholecystectomy under general anaesthesia are an unpleasant,distressing effects. Prophylactic use of dexamethesone reducing this effects.*

Objective *This study was designed to compare of dexamethasone and ondansetron for prevention of postoperative nausea and vomiting after laparoscopic cholecystectomy.*

Methods *Sixty patients who underwent laparoscopic cholesystectomy were randomly allocated into two groups. Group A(n=30) patients received 8mg dexamehtasone intravenously and Group B(n=30) patients received 8mg ondansetron intravenously one minute before induction of anaesthesia. All patients received standard general anaesthesia.Perioperative vital signs and postoperative nausea and vomiting were recorded.**Results** The incidence of nausea was 13.4% in group A, 16.7% in group B(p>0.05) and vomiting was 6.6% in Group A, 13.4% in group B(p>0.05). The difference among the groups was not statistically significant.*

Conclusion *Intravenous dexamethasone was better to ondansetron in prevention of postoperative nausea and vomiting after laparoscopic cholecystectomy.*

Keywords *Dexamethasone, ondansetron,laparoscopy,cholecystectomy, postoperative.*

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Introduction

The postoperative nausea and vomiting are one of the common cause of the morbidity after anaesthesia and surgery. It is unpleasant, distressing and potentially dangerous adverse effect after anesthesia. The availability of an emesis basin for every patient in post anaesthesia recovery unit is a reflection of the limited success with the available therapeutic technique. The common factors associated with postoperative nausea vomiting are the type of surgery, anesthetic technique and the patient itself. The incidence of postoperative nausea and vomiting after anaesthesia and surgery varies from 14% to 82%. The wide variations of these results are partly due to differences in design of studies[1]. Many drugs have so far been tried to prevent or alleviate these problems. The antiemetics that are currently being used for treatment in our country are prochlorperazine, metochlopramide and promethazine. But these drugs have varying effectiveness and their use is limited because of delayed recovery, sedation and sometimes distressing side effects of extra pyramidal symptoms. Ondensetron, a 5-HT3 antagonist, has a.good safety profile but is too expensive for routine use. Recently the antiemetic effect of Dexamethasone alone was demonstrated successfully in the patient of paediatric tonsillectomy[9] and ambulatory Gynecological

procedure[7]. Dexamethasone is also found to reduce pain and swelling following extraction of third molar tooth[10].Recently a lot of patients are undergoing laparoscopic cholecystectomy in routine theatre list. Most of them are female patients who are more prone to cause postoperative nausea and vomiting. The incidence of postoperative nausea and vomiting after laparoscopic cholecystectomy is 40% to 70%[2]. Pneumoperitonium needed for Laparoscopy has got direct effect on postoperative nausea and vomiting due to retention of CO_2, which acts both centrally and peripherally[2]. Laparoscopy is a keyhole technique which causes less pain and can be done as a day case surgery[8] but their discharge from hospital is sometimes delayed due to postoperative nausea and vomiting[3]. Routine prophylactic antiemetic is not justified in each and every patient but only in those patients who are at high risk for postoperative nausea and vomiting. Ondansetron is time tested anti-emetic, it selectively blocks serotonin 5-HT_3 receptors, which are located peripherally (abdominal vagal afferents) and centrally (chemoreceptor trigger zone of the area postrema and the nucleus tractus solitarius), appear to play important role in the initiation of the vagal reflex. But only demerits is expensive. Dexamethasone is considered as one of the important anti-emetic. Adverse effects with a single dose of dexamethasone are extremely rare and generally minor. It is relatively inexpensive and easily available. The mechanism of dexamethasone-induced antiemesis is not fully understood, but central inhibition of prostaglandin synthesis and decrease in 5HT turnover in the central nervous system or changes in the permeability of the blood CSF barrier to serum proteins may be involved[6]. Surgery causes injury to the nerve endings. Pain sensitivity of the nociceptive neuron is further activated by certain peripheral chemical mediators. Among the mediators, the sensory nociceptors are mainly sensitized by prostaglandin, so drugs such as dexamethasone, which inhibit prostaglandin synthesis, may reduce inflammatory and sensory responses[11].Considering the above factors we wanted to study the effect of dexamethasone and ondansetron on postoperative nausea and vomiting after laparoscopic cholecystectomy to reduce the morbidity and improve the quality of service to this group of patients.

Methods

This prospective study was done on 60 patients of both sexes, those who were undergo routine laparoscopic cholecystectomy under general anaesthesia. The procedure of work were explained to the patient and written informed consent was obtained from each of the 60 patients. Preoperatively patients were allocated randomly into one of the two groups. Group A: 30 patients was received intravenous dexamethasone 8 mg and in Group B: remaining 30 patients was received intravenous ondansetron 8mg before induction of anaesthesia.On arrival of the patient in the operation theatre- heart rate, blood pressure, respiratory rate and oxygen saturation was recorded. Then intravenous access was obtained and Hartman's saline was started. One minute before induction, patients of group A, was received 8mg intravenous dexamethasone and group B was received 8mg intravenous ondansetron. Then the patient was premedicated with intravenous fentanyl 2 μgm/kg. The patient was preoxygenated for three minutes and induction of anaesthesia was done with thiopentone 3-5 mg/kg, tracheal intubation was facilated with suxamathonum 1.5 mg/kg. Anaesthesia was maintained with halothane 0.5% and No_2 60% in O_2. Then neuromuscular blockade was maintained with intravenous vecuronium. During surgery patients was in the reverse trendelenburg position keeping right side of the bed elevated. The abdomen was insufflated with carbon-di-oxide, maintaining intra abdominal pressure between 10-16 mm Hg. Laparoscopic cholecystectomy was performed under video guide after performing four puntures on the abdomenal wall. During operation injection ranitidine 50 mg and ketorolac tromethamine 30 mg was given intravenously. At the end of operation neuromuscular block was antagonized with injection neostigmine 0.04 mg/kg plus injection atropine 0.02 mg/kg and the endotracheal tube was extubated. During extubation adequate pharyngeal suction was completed when the patient is deeply anaesthetized.

After operation vital sign such as heart rate, blood pressure, respiratory rate and oxygen saturation

was recorded. In the post operative recovery room, post operative analgesia was provided with diclofenac suppository 50 mg twice daily for 24 hours. The incidence of nausea or vomiting and the number and time of rescue anti emetic treatment was recorded at 1 hourly interval over the first 4 hours and then 2 hourly for the next 8 hours. Intravenous metoclopramide 10 mg was given if vomiting occurs or when the patient was nauseated for 10 minutes. Nausea and vomiting was evaluated on a three point ordinal scale (scale is in data sheet). Then post operative data was collected in a prescribed data collection schedule for each patient (Data sheet is attached). Patients was carefully observed for any adverse effect like sedation (sedation score is in data sheet), drowsiness, flushing or any extrapyramidal symptoms and measures was taken accordingly. Result was expressed as mean SD. For statistical analysis students 't' test and chi square test was used where appropriate. Difference was considered statistically significant if P<0.05 (CI-95%).

Results

A total of 60 patients were enrolled for laparoscopic cholecystectomy, out of which 20 (16 in group I and 4 in group II) were male and the rest of them were female (14 in group I and 26 in group II). The mean(±SEM) age were 38.8±2.8 years and 33.5±1.4 years in group A and group B respectively. The mean(±SEM) body weight were 58.1±1.4 Kg in group A and 61.2±2.0 kg in group B. No significant difference were found between group A and group B.

Table I : *Demographic data of study groups.*

	Group A Dexamethason Mean ± SEM		Group B Ondansetron Mean ± SEM		P value
Age(yrs)	38.8 ± 2.8		33.5 ± 1.4		0.051
Weight(Kg)	58.1 ± 1.4		61.2 ± 2.0		0.203
Sex	No.	%	No.	%	P value
Male	16	53.3	4	13.3	0.001
Female	14	46.7	26	86.7	

P value considered significant p<0.05

Table II : *Changes of heart rate between study groups*

Heart rate	Group A Dexamethason Mean± SEM	Group B Ondansetron Mean± SEM	P Value
Preoperative	83.5±1.4	82.2± 1.1	0.149
Post operative	87.2±2.1	86.5± 1.8	0.859

P value considered significant p<0.05

Table shows the heart rate during preoperative and post operative and found that the preoperative mean(±SEM) heart rate was 83.5±1.4 bpm in group A and 82.2±1.1 bpm in group B. The postoperative mean(±SEM) heart rate was 87.2±2.1 bpm in group A and 86.5±1.8 bpm in group B. The mean difference were not statistically significant (p>0.05) in unpaired t-test.

Table III : Changes of systolic blood pressure between study groups**.**

	Group A Dexamethason Mean ± SEM	Group B Ondansetron Mean ± SEM	P value
Preoperative	111.4 ± 1.7	110.0 ± 3.70.74	
Post operative	122.4 ± 3.8	126.1± 2.8	0.18

P value considered significant p<0.05

Table shows the systolic BP during pre and post operative and found that the preoperative mean(±SEM) heart rate was 111.4±1.7 mmHg in group A and 110.0±3.7 mmHg in group B. The postoperative mean(±SEM) systolic BP was 122.4±3.8 mmHg in group A and 126.1±2.8 mmHg in group B.. The mean difference were not statistically significant (p>0.05) in unpaired t-test.

Table IV : *Changes of diastolic blood pressure between study groups*

	Group A Dexamethason Mean ± SEM	Group B Ondansetron Mean ± SEM	P value
Preoperative	74.7 ± 1.2	72.3 ±1.8	0.868
Post operative	75.1 ± 1.3	72.1 ±1.5	0.473

P value considered significant p<0.05

Tables shows the diastolic BP during pre and post operative period and found that the preoperative mean(±SEM) heart rate was 74.1±1.2 mmHg in

group A and 72.3±1.8 mmHg in group B. The postoperative mean(±SEM) diastolic BP was 75.1±1.3 mmHg in group A and 72.1±1.5 mmHg in group B.. The mean difference were not statistically significant (p>0.05) in unpaired t-test.

Table V : *Comparison of nausea and vomiting during post operative period between study groups.*

	Group A Dexamethason		Group B Ondansetron		P value
	No.	%	No.	%	
Nausea	4	13.4	5	16.7	0.447
Vomiting	2	6.6	4	13.4	0.553

P value considered significant p<0.05

Tables shows the nausea and vomiting during post operative period and found that 4(13.4%) and 5(16.7%) had nausea in group A and group B respectively. Vomiting was found 2(6.6%) in group A and 4(13.4%) in group B and the difference was not statistically significant (p>0.05) in chi square test.

Discussion

Nausea and vomiting are common and sometimes dangerous side effects following surgery under general anaesthesia. Most of the incidence of nausea vomiting occur during the first two hours of recovery from anaesthesia[3]. The etiology of postoperative nausea and vomiting is multifactorial, mainly associated with type of surgery (laparoscopic cholecystectomy), female patient and abdominal surgery. Incidence of nausea and vomiting is two to three times more in female due to changing endocrine environment, which sensitize the brain stem emetic mechanism[3]. During laparoscopic cholecystectomy the effect of traction gut may release of humoral substance include 5 hydroxytryptamine (5-HT). which may stimulate 5 HT3 receptor in the afferent vagus nerves triggering the emetic reflex of chemoreceptor trigger zone and pneumoperitonum are needed for laparoscopy has direct effect on postoperative nausea and vomiting play role in triggering emesis[3]. The reported overall incidence of nausea, vomiting after laparoscopic surgery is between 40% to 70%[5]. The consequences of prolonged postoperative nausea and vomiting (PONV) range from unexpected admission of day patients, with its economic implications, to physical, metabolic and psychological effects on the patients which slow their recovery and reduce their confidence in future surgery and anaesthesia. Persistent nausea and vomiting may result in dehydration, electrolytes imbalance and delayed discharge, which was described by Kapur, PONV as 'the big, little problem'[3].

In the present study, incidence of nausea and vomiting in group-A (those received dexamethasone) were 13.4% and 6.6% and in group-B (those received ondansetron) were 16.7% and 13.4%, which was statistically not significant (p>0.05). In this study patients received no rescue anti-emetic treatment as there was no intractable vomiting. So it signifies that the incidence of nausea and vomiting was less in dexamethasone group than the ondansetron group. The exact mechanism of the antiemetic action of dexamethasone is not known. However, there have been some suggestions, such as central or peripheral inhabitation of the production or secretion of serotonin[12]. Central inhabitation of the synthesis of prostaglandins[13] or changes in the permeability of the blood brain barrier to serum proteins[14]. Besides this dexamethasone has a potent anti inflammatory effect and must be beneficial for post operative pain. We know pain is also related with nausea and vomiting. Result of our study was probably related with the mechanism of action of the dexamethasone. Previous work also suggest the justification of using dexamethasone with better outcome. Adverse effects with a single dose of dexamethasone are extremely rare and generally minor. It is relatively inexpensive and easily available.

The anti-emetic effect of dexamethasone alone was demonstrated successfully in the patient of paediatric tonsillectomy[9] and ambulatory gynecological procedure[4]. Anti emetic effects of Dexamethasone had been well-established inpatient receiving cancer chemotherapy in the 1980, Mekenzie and co-workers showed that ondansetron and dexamethasone were more effective than ondansetron and saline in the prevention of postoperative nausea and vomiting[5]. Dexamethasone 20-mg IV was said to make a significant contribution to the control of nausea

and vomiting during and after chemotherapy. The 8-mg intravenous dose of dexamethasone and 8mg intravenous dose of ondansetron in our study was chosen arbitrarily. We chose single IV dose because it was more practical to give one dose in the operating room. Concluded that intravenous dexamethasone (8mg) is more effective and produce less side effect than ondansetron (8mg) in preventing post operative nausea and vomiting in case of laparoscopic cholecystectomy. Dexamethasone could be used as a prophylactic treatment for reducing postoperative nausea and vomiting in high-risk patient. However, further work is required before dexamethasone may be considered for routine prophylaxis of postoperative nausea and vomiting.

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Original Article

Effect of oxytocin on haemodynamic change during caesarean section under spinal anaesthesia - A comparison between intravenous bolus or infusion technique

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Abstract

Background *Subarachnoid block for caesarean section is very acceptable technique and it rates are steadily increasing in recent years. It is now spreading up to remote areas. Infusion technique of oxytocin is safe during caesarean section under spinal anaesthesia.*

Objective *To compare the haemodynamic changes caused by oxytocin given as an I/V bolus or infusion to decrease uterine bleeding in caesarean section.*

Method *A total number of sixty patients ASA grade I were selected. Thirty patient in each group. In group A, parturient received oxytocin 5IU of I/V in bolus and group B, infusion of oxytocin 5IU diluted with 5ml normal saline given I/V over 2 min by using infusion pump. The study period was started just before oxytocin given and it was continued for a further 10 min. Systolic and diastolic BP, MAP, heart rate, uterine bleeding were recorded in every 1 min.*

Result *The mean difference of all haemodynamic parameters at 2 to 5 mins of administration of oxytocin were statistically significant (p <0.05).*

Conclusion *The haemodynamic changes were more marked in I/V bolus of oxytocin than infusion technique.*

Key words: *Oxytocin, bolus, infusion, haemodynamic, intravenous.*

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Introduction

Caesarean section is a very common surgical procedure for delivery of baby and it rates are steadily increasing in recent years and regional anesthesia has become the preferred technique[1]. Maternal hypotension is a recognized complication of subarachnoid block which may compromise the welfare of both mother and fetus and some times it may lead to a dangerous complication, cardiac arrest leading to remarkable number of mortality and morbidity[3].

Oxitocin, ergot derivatives and prostaglandins are extensively used in clinical practice[4]. The doses schedule of oxytocin drugs in induction and augmentation should aim to initiate effective contraction leading to decreased blood loss, good uterine contraction and good obstetric outcome[5].After caesarean section uterus relaxes. We use some technique to contract uterus. Manual stimulation sometimes causes uterus contraction. Usually we use some drugs e.g. ergometrine and oxytocin etc. to contract uterus. Ergometrine causes nausea, vomiting, vesoconstriction as a result increased blood pressure and CVP[6].

Oxytocin is an octapeptide hormone secreted mainly from posterior pituitary gland , is a potent

stimulant that is essential after caesarean section[7]. Oxytocin causes uterine contraction as well as decrease bleeding after caesarean section but it cause hypotension and tachycardia[8].

In this study, we tried to find out the effect (haemodynamic change at heart rate, blood pressure and uterine contraction) of the recommended dose (ie 5IU) of Oxytocin when given as IV bolus or slow IV infusion diluted in 5 ml of distilled water over 2 minutes during caesarean section under spinal anesthesia.

Methods

A total number of sixty patients undergoing elective caesarean section ASA grade-I were selected randomly as per inclusion and exclusion criteria in two groups. In group A, parturient received 5IU oxytocin IV bolus and group B received slow infusion of oxytocin diluted with 5ml normal saline over 2 minutes by using infusion pump.

Each parturient pre medicated with cap. omeprazole 20mg orally. 1 cap. at evening before and 1 cap. at morning of operation. Arterial blood pressure and heart rate,Spo_2 were recorded . A 18G IV cannula will be inserted and ringer's lactate solution preloaded 10 ml per kg body weight and IV drip was given same as body weight during caesarean section.

With all aseptic precaution spinal anesthesia was given at L3/4 space in sitting position and 2.0 ml. 0.5% Bupivacaine heavy was given intrathecally. Then patient was kept in supine position with left sided with wedge in right buttock and oxygen was given intraoperatively with nasal cannula. After testing the height and quality of the block urinary catheterization was done and surgeon allowed starting the operation. After delivery of the fetus group A received 5IU oxytocin (inj. Piton-S) bolus (Approximately over 1 sec) and group B received 5IU oxytocin (inj. Piton-S) IV infusion slowly diluted with 5 ml normal saline over 2 min. Baseline data was taken before oxytocin given.

Patient was monitored every 3min interval up to the delivery of the fetus. After delivery of the fetus patient was monitored systolic and diastolic BP, MAP, heart rate, oxygen saturation, uterine contraction, uterine bleeding and any adverse effect was recorded in every 1min in data sheet. The study period was started just before oxytocin given and it was continued for a further 10 min. The study period of 10 min was set after a small pilot study. Patient was observed by surgeon the state of uterine contraction expressed as mild, moderate or fully contracted. Uterine bleeding was calculated after suctioning amniotic fluid and blood in separate bottle and visually estimating the blood by surgical sponger and laparotomy pads (laps). A fully soaked sponge (4x4) each side to hold 10 ml of blood, where as a soaked MOP holds 100-150ml. Quantitative definition of postpartum hemorrhage was arbitrary and related to the amount of blood loss in excess of 500 ml following birth of the baby.

At the end of surgery 200 microgram misoprostal per-rectally was given of each patient. Postoperatively patient was monitored the state of uterine contraction, P/v bleeding and cardiovascular status.

All the relevant information for each of the study was recorded on predigined data sheet with the help of volunteers as per requirements.

The result complied and analyzed statistically by unpaired-t test with a p value <0.05 with 95% confident limit.

Results

Observation of the present study was analyzed in the light of comparison among the subject groups, each group having n=30.All results are expressed as mean ± standard deviation. The studied groups became statistically matched for age, gestational age, weight heart rate, systolic and diastolic blood pressure, mean arterial pressure.

Table I : *Demographic data*

Group	Age(yrs) Mean±SD	Gestational age(weeks) Mean±SD	Weitht(Kg) Mean±SD
A	24.1±6.0	39.4±0.7	59.3±3.0
B	25.1±4.7	39.6±0.8	59.9±2.3
P	0.489	0.360	0.327

Values were expressed as mean±SD. Analysis was done by unpaired t-test. There was no significant difference between the groups.

Table II *Changes of heart rate*

	Pre operative	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min	9 min	10 min
A	85.7±3.9	92.3±10	98±2.8	101±5.1	102±7.5	105±5.2	93.2±2.3	92.5±3.0	94.4±12	95.4±10	94±11
B	87.7±5.2	91.3±11	92.6±2.2	90±4.4	87±6.6	90±2.1	90.4±3.5	89.3±2.6	93.7±8.2	95.5±12	95±11
p	0.10	0.72	0.00	0.02	0.01	0.02	0.46	0.38	0.82	0.95	0.95

Values were expressed as mean±SD. Analysis was done by unpaired t-test. The above table shows the heart rate of preoperative and just after giving oxytocin up to 10 minutes one minute interval. There were significant difference between the groups from 2min to 5min. ($p<0.05$).

Table III : *Changes of systolic blood pressure*

	Pre operative	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min	9 min	10 min
A	117±7.8	116±7.5	100±7.3	95.5±5.4	96.5±4.5	97.3±4.5	100±8.1	104±11	104±10	105±10	103±11
B	120±6.9	119±6.7	108±6.9	108±4.3	107±3.6	106±3.6	105±7.4	108±11	108±12	107±11	107±10
p	0.16	0.10	0.02	0.00	0.02	0.03	0.16	0.12	0.24	0.40	0.40

Values were expressed as mean±SD. Analysis was done by unpaired t-test. The above table shows the systolic blood pressure of preoperative and just after giving oxytocin up to 10 minutes one minute interval. There were significant difference between the groups from 2min to 5min.($p<0.05$).

Table IV : *Changes of diastolic blood pressure*

	Pre operative	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min	9 min	10 min
A	76.3±5.6	72.8±8.5	50.5±3.8	60±9.9	60.8±3.6	61.3±3.6	70.1±4.3	65.3±9.1	68.3±8.1	67±8.7	67.7±8.5
B	78.7±4.3	73.5±8.9	55.0±3.6	73.7±8.1	73.3±4.9	72.6±4.8	74.9±4.9	67.5±8.4	69.7±7.9	69±9.6	69.7±S10
P	0.07	0.71	0.03	0.02	0.01	0.03	0.31	0.42	0.52	0.88	0.88

Values were expressed as mean±SD. Analysis was done by unpaired t-test. The above table shows the Diastolic blood pressure of preoperative and just after giving oxytocin up to 10 minutes one minute interval. There were significant difference between the groups from 2min to 5min.($p<0.05$).

Table V : *Changes of mean arterial pressure*

	Pre operative	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min	9 min	10 min
A	90±6	86.4±5.8	64.3±5.4	64.2±6.2	65.3±5.8	64.7±4.2	69.9±5.3	67.9±5.3	68.5±8.3	69±6.9	64.6±6
B	92.4±3.9	86.3±6.2	72±6	74.7±7.3	73.4±6.2	74.3±5.3	74.8±6.4	70.8±6.4	71.6±9.1	72.1±7.7	72.1±4.7
p	0.06	0.94	0.00	0.03	0.03	0.01	0.35	0.25	0.36	0.24	0.16

Values were expressed as mean±SD. Analysis was done by unpaired t-test. The above table shows the mean arterial pressure of preoperative and just after giving oxytocin upto 10 minutes observed one minute interval. There were significant difference between the groups from 2min to 5min $p<0.05$.

Table VI : *Distribution of PPH in both groups*

Complications	Group A		Group B	
	n	%	n	%
Ignored bleeding< 500ml	30	100	30	100
Postpartum haemorrhage	0	0.0	0	0.0

The above table shows the PPH of patients and found all patients ignored bleeding <500ml in both groups.

Discussion

This prospective, interventional study was carried with an objective to compare the haemodynamic changes caused by oxytocin given as an I/V bolus or infusion to decrease uterine bleeding in caesarean section under spinal anaesthesia. A total of 60 pregnant women age between 18 to 36 years weight between 55 kg to 65 kg belonging physical status ASA grade I with term pregnancy (37 weeks and above) undergo elective caesarean section under spinal anaesthesia were enrolled in this study. These patients were divided into two groups of thirty patients each formed by randomly selected patients by blind envelope method. Out of which 30 were included in group A received 5IU oxytocin bolus (approximately over 1 sec) and 30 in group B, received 5IU oxytocin IV infusion diluted with 5ml normal saline over 2 minutes.

This study shows that slower infusion of 5IU oxytocin can effectively minimize the cardiovascular side-effects but rapid bolus oxytocin causes marked cardiovascular instability without compromising the therapeutic benefits.

The current study demonstrated an average decrease in MAP of 24 mmHg range from 19 to 32 mmHg in group A during 2 to 5 minutes in healthy women having an elective caesarean section who received 5IU of oxytocin as a rapid bolus. Whereas in group B average decrease in MAP of 12 mmHg range from 8 to 18 mmHg during 2 to 5 minutes. Whilst this magnitude of decrease in MAP may be well tolerated normally.

In the present study it was observed that the changes in heart rate were significantly higher in group A with compared to group B during 2 to 5 minutes. However, the gentler increase of heart rate in the infusion group (group B) is preferable clinically. It is reassuring to the anaesthetiologist who prefers to maintain cardiovascular status that this physiological insult can be avoided simply by giving 5IU oxytocin infusion over 2 min. Thomas JS (2006) and his colleague found in their study that the decrease in MAP of 8(8.7) mmHg and the small increase in HR are certainly clinically preferable, which is closely resemble with the present study.[29]

Obviously there have been discussions within the obstetric anaesthesia community about the correct dose of oxytocin and its method of administration.[30] Despite the controversy it seems more anesthetiologist are using the lower dose of 5IU as recommended by the CEMD[31]. This is supported by the work of Pinder and colleagues[9] who showed dose-related haemodynamic effects, although they underestimated the potential reduction in MAP attributable to the usage of lower dosage by showing greater haemodynamic stability when 5IU is administered over 5 min.

Whilst the cardiovascular results of this study are unequivocal, it was acceptable that <500 ml bleeding during caesarean section was ignored in this study. Uterine contraction and urine output were in satisfactory level in both groups. Post partum haemorrhage was observed in the present study between two groups.

This study reports the need for caution using oxytocin as a bolus in cardiovascular unstable patients and offers relative reassurance of the effect when given as an infusion over 2 minutes. concluded that the haemodynamic changes were more marked in IV bolus group than IV slow infusion group. Slower injection of oxytocin can effectively minimize the cardiovascular side-effects as well as equally effective in reducing blood loss without compromising the therapeutic benefits.

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Case Report

Epidural anesthesia for herniotomy and hernioplasty in moderately compromised cardiac patient: case report and review of literature

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Abstract

Commonly herniotomy and hernioplasty is performed under subarachnoid block (SAB). In this report we describe the anesthetic management of a patient with moderately decreased cardiac function who underwent herniotomy and hernioplasty under lumber epidural anesthesia. To the best of our knowledge this case is one of the few literature which describe epidural anesthesia for herniotomy and hernioplasty in a cardiac compromised patient.

(JBSA 2011; 24(2): 77-78)

Case report

A 46 years old male patient presenting us with left sided inguinal hernia. On examination he looked ill but lying supine comfortably in bed. On auscultation first and second sounds were audible with no murmur. Blood biochemical analysis showed normal figures. Chest –X-ray showed cardiomegally with pulmonary hypertension. ECG showed bifascicular block with sinus tachycardia.

Echocardiography showed global hypokinesias with moderate left ventricular systolic dysfunction (LVEF-30%), moderate TR with mild pulmonary hypertension, mild pericardial effusion and diastolic dysfunction(G-1).

Due to his cardiac compromised condition the plan was epidural anesthesia instead of subarachnoid block (SAB). Premedication was given at previous night of oral anxiolytic lexotanil (2.5mg). After proper counseling about the risk of anesthesia and surgery an informed consent was taken from the party.

Upon arrival of the patient to operation theatre routine monitoring were established. The measured blood pressure was 110/70 mm of Hg and heart rate 100 beat/min with oxygen saturation on room air was 98%. Then a 16G i.v cannulation was established in left hand. Then the patient was placed on sitting position and lumber epidural catheter was placed at L3 and L4 level under complete aseptic technique. Then a test dose of adrenaline mixed 2% lignocane (3ml) was given through the catheter and check for either intrathecal or intravascular placement of a catheter. After appropriate checking catheter was fixed on back by micro pore and patient again back to his supine position. Then local anesthetic 2% lignocane 3 ml and 0.25% bupivacane 7 ml was injected through the catheter. Opioid analgesic fentanyl 50 μgm was also given not only increasing the quality of block but also increasing the prolongation of analgesia. After 25-30 minutes of giving local anesthetic agent incision was given by checking with tooth forceps. Foleys catheter was inserted for bladder rest. The mean range of blood pressure intraoperatively was 90-110 mm of Hg. Sedation was maintained with 25mg pethidine every 30 minutes interval. Total fluid received during peroperative period about 700 ml of crystalloids solution. Total urine output was 300 ml and surgery took about 60 minutes. Through the procedure the vital signs were stable and the patient was comfortable. At the end of the procedure he was transferred to surgical ICU with stable vital signs. Next day he was transferred to surgical floor.

Discussion

Commonly herniotomy and hernioplasty is performed under subarachnoid block (SAB). But in our case the cardiac status of patient was moderately compromised. So we choose epidural anesthesia for this patient. As we know in epidural there is less chance of hypotension so requirements of vasoconstrictors is also negligible. There is no chance of post Dural puncture headache (PDPH) in epidural anesthesia. By this technique not only peroperative as well as postoperative analgesia was maintained[1]. In a study compared three anesthetic technique general, general supplemented by fentanyl and general combined with TEA it was found that, general anesthesia with sevoflurane/ N_2O could not suppress stress response of both hypothalamic-pituitary-adrenocortical axis and sumpathoadrenal axis while TEA suppress only the sympathoadrenal responses[2]. In a case report combined spinal/epidural technique was used for a patient with significant chronic obstructive lung disease (COPD) underwent lap. Cholecystectomy with encouraging results[3]. In another series epidural anesthesia was used as sole technique for LC and the authors recommended it for patients who are not good candidates for general anesthesia due to cardio respiratory problems[4].

In conclusion, patient with limited cardiac reserve undergoing lower abdominal surgery present challenges to anesthesiologists. So patient with moderate to severely compromised cardiac function should be assessed adequately preoperatively not only by anesthesiologists but also by cardiologist and should be counseled about the risk properly to the patient and also to the party before giving anesthesia.

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News


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Original Article

Wound infection in surgery department in bsmmu: A study of 100 cases

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Abstract

Background *Surgical site infections (SSI) are the most common nosocomial infection in surgical patients, accounting for 38% of all such infections, and are a significant source of postoperative morbidity resulting in increased hospital length of stay and increased cost.*

Objectives *To find out the incidence of wound infection in patients following elective surgery and the most likely causative organisms and their resistance pattern.*

Methods *Prospective data were collected on 496 surgical patients admitted in the surgery department in BSMMU from January 2010 to June 2010. All preoperative risk factors were evaluated. Patients operated were followed in the post operative period and if any wound infection noted, swab from the site of infection was sent for culture and sensitivity and antibiotics were given accordingly.*

Results *Following 496 elective operations 20.16 % patients developed wound infection. Highest numbers of infection were seen in the fifth decade with slight female preponderance. Wound infection progressively rises with the degree of contamination and increasing operative time. The common risk factors for development of surgical wound infection were anemia (52%), malnutrition (44%), diabetes (38%), jaundice (30%), contaminated operation (44%) dirty operation (38 %), obesity and smoking. The most predominant isolated organism was Escherichia coli (43%) followed by Staphylococcus aureus (33%) and Pseudomonas aeruginosa (11%). Ceftriaxone still remains the most effective antibiotic although the incidence of resistance is rising.*

Conclusion *Despite a good numbers of variables influence surgical site infections; it is still possible to reduce the infection rate by correcting modifiable risk factors, reducing degree of contamination and duration of operation. To battle the emerging resistance of pathogens a definitive guideline is essential.*

Key Words *Surgical site infection, wound infection, nosocomial infection, anemia, risk factor.*

(JBSA 2011; 24(2): 65-59)

Introduction

Examination of the causes of late mortality in individuals seeking surgical attention reveals that as much as 78% of all deaths may be attributed to septic complications[1], suggesting the value of understanding the prevention and treatment of sepsis. Despite adequate systemic support and meticulous application of the principles of appropriate wound care, certain wounds are still prone to infection.

Over the past decade increased attention has been focused on the risk factors both intrinsic[2], such as weight, presence of diabetes, haemoglobin values etc. and extrinsic risk factors[3], such as shaving, preoperative skin preparation, skin asepsis, operative room ventilation, inadequate sterilization of instrument, poor haemostasis, duration of operation etc. that contribute to the development of these infections. The surgical

techniques and infection control measures that can be used to reduce the incidence of infection and the appropriate antimicrobial agents that can and should be used to treat these potentially devastating complications effectively need careful evaluation from time to time.

The pattern of bacteria causing infections in surgical patients is being analyzed in multiple reports. Most important pathogen appeared as Staphylococcus aureus, Esch. Coli, Pseudomonas spp. and Klebsiella spp[4, 5]. The single most disadvantages with these microbes stood as their multidrug resistance property. To overcome this problem newer Cephalosporin and Quinolone antibiotics are randomly used for prophylactic and therapeutic purposes. But this approach is not cost effective in developing countries. Many a time patient cannot afford these antibiotics due to poverty. So, treatment course remains incomplete leading to a chance of emerging resistance to that particular drug by those particular bacteria. This is rather a chronic situation; hence high magnitude of resistance would be rightly explored.

There are still some controversies in the application of antibiotic prophylaxis. The first major controversy concerns the choice of drug[6]. Although patients present with a variety of sources of infections, every hospital should have antibiotic prophylaxis protocol. Protocol must be reviewed and updated regularly. New agents may become available that are more appropriate and more importantly, resistance pattern may change with time.

Methods

Present prospective study comprised of patients admitted and operated for different types of elective surgery in the surgery department of Bangabandhu Seikh Mujib Medical University during the period from January 2010 to June 2010. Patients with operations involving obviously infected wounds were excluded. Those requiring more than one operation in same admission were excluded. Skin preparation consisted of shaving prior to surgery. Povidone Iodine solution was used as a pre-operative antiseptic skin preparation. Cloth drapes were standard and steridrapes were not used. After each operation, the surgeon was required to assign a specific classification to the surgical wound, using a standard classification system. In brief, dirty and contaminated wounds were considered to be those with gross contamination or spillage in the operative field, whereas clean—contaminated wounds were those that involved the surgical transaction of a nonsterile mucocutaneous surface. All other procedures were considered to be clean. If unexpected problems were discovered at the time of surgery, surgeons were instructed to indicate them in the wound classification. Duration of operation was noted from operation note. Operated patients were followed in the post operative period. All incisions were examined post-operatively. The diagnosis of infection was based on fulfilment of one from the following criteria-

1. Discharge of pus from the wound;

2. Microorganisms present in swabs taken from any discharge from the wound;

3. Surgical revision and drainage of the wound with positive bacteriology;

4. Antibiotic treatment due to clinically suspected infection.

Deep infection was defined as infection located under the deep fascia. Specimens were obtained for culture from all surgical wounds with evidence of infection, and all isolates recovered were identified by standardized methods of culturing. Patient related data was collected using a structured research instrument (data collection format) containing variables of interest.

Results

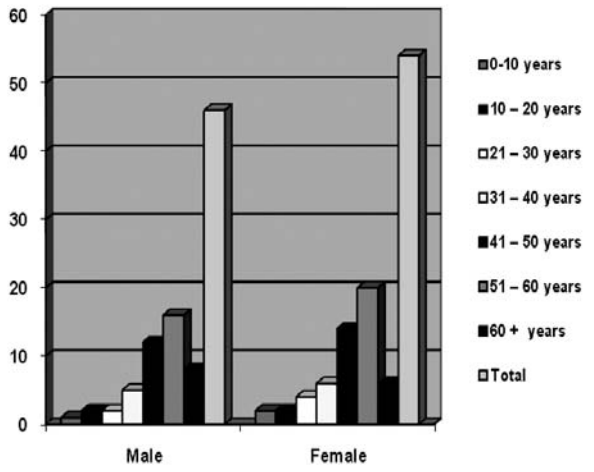

Fig 1 *Distribution of wound infection according to age and sex*

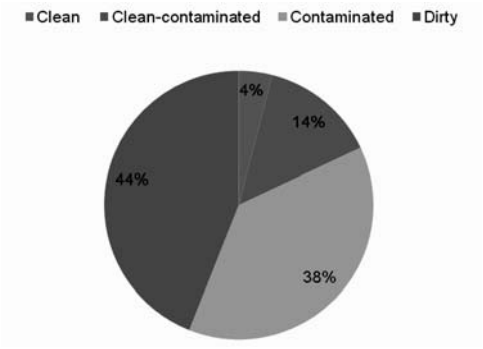

Fig 2 *Distribution of wound infection according to types of surgery and nature of wound (n=100)*

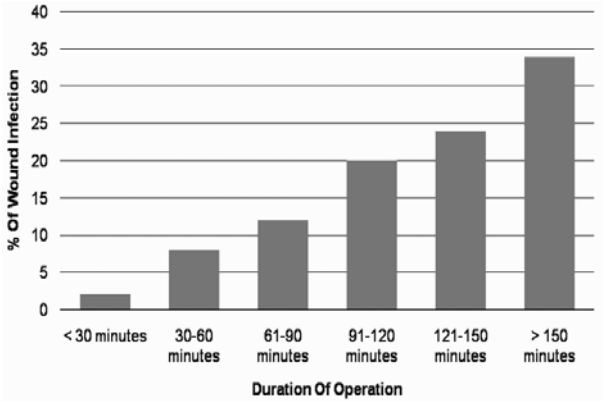

Fig 3 *Distribution of wound infection according to duration of operation [n=100]*

Table I
Relation of surgical wound infections with risk factors (n=100)

Risk Factors	No. of Wound Infection	% of wound infection
Anemia	52	52%
Malnutrition	44	44%
Diabetes	38	38%
Jaundice	30	30%
Renal Failure	06	06%
Hypotension	04	04%
Steroid Therapy	08	08%
Smoking	20	20%
Obesity	18	18%
Contaminated Operation	38	38%
Dirty Operation	44	44%

Table II
Distribution of organism in positive cultures [n=93]

Organism Isolated	Number of positive culture
Escherichia coli	43
Staphylococcus aureus	33
Pseudomonas aeruginosa	11
Bacteroids	02
Mixed	04
Total	93

Table III
Resistance pattern of organisms to different antibiotics [n=93]

	Amoxycillin	Gentamycin	Ciprofloxacin	Ceftriaxone	Nitrofurantoin	Cloxacillin	Meropenem
Escherichia coli	93.02%	37.21%	32.56%	11.63%	25.58%	ND	ND
Staphylococcus aureus	87.88%	48.48%	36.36%	12.12%	ND	63.64%	ND
Pseudomonas spp.	100.00%	27.27%	27.27%	18.18%	ND	ND	0%

DISCUSSION

Among 496 patients 20.16 % patients developed wound infection postoperatively mostly (36%) in the 1st postoperative week. The highest numbers of infection were seen in the fifth decade followed by fourth decade. Female had slight higher infection rate than male. An odd ratio of surgical wound infection is 1.2 for every 10 years of age[7]. It is thought to be due to multiple factors like low healing rate, malnutrition, increased catabolic processes and low immunity[8].

Most of the wound infection occurred among day laborers followed by service holder, housewives and students and least in teachers. This is probably due to lack of education, personal cleanliness, poor nutritional status etc.

Wound infection rate varies according to the type of wound created surgically. In this series wound infection rate in clean wounds were 4%, clean-contaminated wounds were 14%, contaminated wounds were 38% and in dirty wounds were 44%. This clearly showed that chances of wound infection progressively rises with the degree of contamination of the wound.

The common risk factors for development of surgical wound infection were analyzed and showed that anemia (52%), malnutrition (44%), diabetes (38%), jaundice (30%), contaminated operation (44%) dirty operation (38 %), obesity, smoking etc. carried significant association with wound infection. Risk of wound infection had repeatedly been shown to be proportional to the length of operative procedures. A higher incidence of post operative wound infection was observed when duration of operation was more than 150 minutes. Cruse PJE et al.[9] found an increase in wound infections with longer procedures, roughly doubling with every hour of the procedure. This may be due to several factors like doses of bacterial contamination increases with the time and longer procedures are more liable to be associated with blood loss and shock, thereby reducing the general resistance of the patients. Increased amount of suture and electro-coagulation may also reduce the local resistance of the wounds.

In this study 93 % wound infections revealed growth of microorganism and 07% yielded no growth of organism even with the presence of other signs of surgical site infection. This may be due to presence of anaerobic bacteria, prior use of antibiotics which inhibited the growth of any bacteria in vitro culture. The most predominant isolated organism was *Escherichia coli* (43%) followed by *Staphylococcus aureus* (33%) and *Pseudomonas aeruginosa* (11%). The resistance pattern was identified using the commonly used antibiotics. *Escherichia coli* was found resistant to Amoxycillin in 93.02% cases followed by Gentamicin in 37.21%, Ciprofloxacin in 32.56%, Nitrofurantoin in 25.58% and least being Ceftriaxone in 11.63%. Siguan SS[10], 1990 showed a lower resistance to Ampicillin (70%), Ciprofloxacin (0%) but a higher resistance to Gentamicin (50%), although a similar resistance is shown against Ceftriaxone (15%). This difference may be due to that with time and increased use of Ciprofloxacin and Gentamicin the resistance has increased. In case of Staphylococcus aureus, it is most resistant to Amoxycillin (87.88%) followed by Cloxacillin (63.64%), Gentamicin (48.48%), Ciprofloxacin (36.36%) and least resistant to Ceftriaxone (12.12%). In this study Pseudomonas aeruginosa remained resistant to Amoxycillin in all (100%) cases. Although it showed 27.27 % resistance to Gentamycin and Ciprofloxacin, Ceftiraxone is resistant in 18.18% cases and no organism was resistant to Meropenem (0%). In a nutshell, Ceftriaxone still remains the most effective antibiotic although the incidence of resistance is rising. The increasing resistance against the oral forms especially Ciprofloxacin is alarming. Gentamicin, although an old and cheap agent still remains one of the strength for the surgeons. Proper handling of the patients by a dedicated and expert group of staffs with prompt action, use of antiseptic technique and judicial use of chemotherapeutic agents should surely decrease the rate of wound infection in the ward.

Surgical wound infections delay the recovery of patients by about 10 days and in some cases significantly prolong the duration of hospital stay[11]. The unexpected post operative hospital stay due to development of wound infection varied from 2-20 days. In case of localized cellulitis, surgical intervention was not required and patients were discharged on oral antibiotics. But when abscess developed and required surgical intervention, patients remained in the ward for more than the expected duration; 26 patients with SSI stayed between 2-5 days, 30 patients 5-10 days and 44 of them between 10-20 days.

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