VOLUME 32
NUMBER 1
JANUARY 2019

ISSN 2220-8992

Journal of the Bangladesh Society of Anaesthesiologists

Journal of The Bangladesh Society of Anaesthesiologists

Volume 32, No. 1, January 2019

OFFICIAL JOURNAL OF BANGLADESH SOCIETY OF ANAESTHESIOLOGISTS

PUBLISHED BY

Dr. AKM Habibullah on behalf of the Bangladesh Society of Anaesthesiologists

ADDRESS OF CORRESPONDENCE

Dr. Subrata Kumar Mondal
Associate Professor, Dept. of Anaesthesiolgy
Dhaka Medical College and Hospital
Cell : +88-01715-437240,
Email : subrta326@yahoo.com
Web : www.bsabd.com

This is the **official journal** of the Bangladesh Society of Anaesthesiologists. JBSA starts its publication from1987. It is published biannually in January and July each year and recognized by Bangladesh Medical and Dental Council (BMDC).

The Journal publishes original work in all branches of anaesthesia, intensive/ critical care, palliative care and pain medicine, including the application of basic sciences, clinical practice, equipment and training. In addition, the journal publishes review articles, case reports and special articles of general interest.

Printed at

Asian Colour Printing
130 DIT Extension Road, Fakirerpool, Dhaka
Tel: +8-02-49357726, 58313186
E-mail: asianclr@gmail.com
Web : acp1980.com

INFORMATION FOR THE AUTHORS

For preparation of manuscripts, please follow the guidelines as described in "**Uniform requirements for manuscripts submitted to Biomedical Journals"** published in the Ann lalern Medi 1997; 126: 36-37 Authors are requested to visit the Web site www.icmje.org for this purpose.

Condition for publication of the articles:

The BSA Journal is intended to promote prompt publication of concise, scientific article based on the study in all fields of medical and health sciences.

- Manuscript submitted for printing in this journal must not be published in whole or in part in any other journal
- All submitted articles will undergo double blind peer review as per recommendations by subject specific experts selected by editors
- Reviewed manuscripts will be sent to the corresponding author for appropriate response if it is indicated
- Acceptance is based on significance, originality, clarity and fulfillment of the criteria of the publication policy of this journal.
- The Editor-in-Chief will take all final decisions regarding acceptance
- The editors reserves the right to style, if necessary to shorten the manuscript accepted for publication
- The editors also reserves the right to determine the priority and intended for publication of the reviewed and accepted manuscripts in a particular issue.
- Rejected manuscript will be returned if accompanied by stamped or self-addressed envelope
- Upon acceptance for publication the copy right of the paper automatically transfers to the BSA and will not be published elsewhere either in part or whole without written permission of the copy right holder
- Review article should be written by a subject expert
- It is not the duty of the editor to investigate scientific fraud paper.

Ethical aspects:

- Ethical aspect of the study will be very carefully considered at the time of assessment of the manuscript
- Articles on clinical investigation should abide by the ethical standards laid down in the 1964 Declaration of Helsinki revised 2000
- Manuscript must contain a statement in the method section that ail human subjects involved studies have been approved by appropriate ethical committee
- Use of names, initials etc. should be avoided so that patients must be unrecognizable
- Permission of the patients or their families to reproduce photographs of the patients where identity is not disguised
- Author should obtain written permission to reproduce any table, illustration from any other source
- About animal studies, the author should convince that the involved animals have not been subjected to pains or suffering not absolutely necessary for the sake of the finding.

Preparation of manuscript:

a. Manuscript Organization:

- Manuscript should be written in English
- Margin should be 5 cm for the header and 2.5 cm for the remainder
- Font type is Time New Roman with size 12
- Printed in double space on one side good quality A4 80 gm paper
- Manuscript should have uniform style, correct journal format, carefully proofread for grammar, spelling and punctuation.

b. Manuscript format:

The article should be divided in general into the following parts:

- Title page
- Abstract and keywords
- Text
- Acknowledgement
- Table with titles
- References
- Attentively graph with title and illustration with legends
- Each of the sections is to start on a separate page. Pages should be numbered consecutively beginning from the title page.

Manuscript submission:

The authors are requested to strictly follow the guide lines below for submission of manuscript to JBSA for publication. The following documents with manuscripts are to be submitted for publication.

- A covering letter addressed to the Editor-in-Chief of the journal (Sample given at the end)
- A Title page (Sample given at the end)
- Abstract and key words in the first page followed by the text, prepared in the format of IMRAD
- Authors must submit 2 hard copies of all documents and one copy in electronic form preferably written in a CD-RW with adequate labeling
- In special case, submission through E-mail with file attachment of all documents is welcome

Covering letter:

- All authors must sign after seeing the manuscript with the statement that they are the only authors
- The corresponding author should mention the contribution of each author to the work
- It should contain a declaration that this manuscript has not been submitted elsewhere or not under consideration in any journal
- It should clearly indicate the publication type (Original/Review/Case report/Letter etc.)
- Should also mention the expected benefit of the medical science from publishing of this article

Title Page:

- The title page should be in a separate sheet which will include apart from the title of the article (concise but informative and self-explanatory), the name of all authors with their designation and institutional affiliation
- Name of the institute and department where the study was carried out
- Name of the corresponding author with contact address, telephone number, Email address
- Name and address of the authors to whom request for reprint should be addressed
- Number of tables given
- Number of figures given
- Word count of abstract
- Disclosure of sources of funding or sponsor
- A short running head having not more than 50 letters should also be suggested

Abstract and Keywords: The abstract should state the purposes of the study main findings and the principal conclusion.

- Structured with headings- Background, Objectives, Methods with statistical analysis, Result and Conclusion
- Preferably within about 250 words
- Avoid abbreviations except standard
- A non structured abstract is suggested for review article and case report
- Authors name should not be given
- Below the abstract provide and identify as such upto maximum 7 key words or phrases that will assist indexers in cross indexing. Use terms from the medical subject headings list of Index Medicus.

Text:

- The text of observational and experimental articles is usually but not necessarily should be arranged into following sections with the four main heading; Introduction, Methods, Results and Discussions.
- Other type of articles such as case reports, reviews and editorials are likely to need other formats.

Introduction:

- Provide a context or background for the study that is the nature of the problem and its significance
- Review of the literature directly related to the problem with pertinent reference
- Nature/rationale/objectives/hypothesis/benefits of the study expected stated in 1-2 paragraph.

Methods:

- This section should include only information that was available at the time the plan or protocol for the study was being written.
- Methods, subjects, grouping and variables should be described in detail sufficient to allow the work to be interpreted and repeated by the reader.
- Modifications of previously published methods should be explained and appropriately referenced.

- Approval of the study by ethical review committee
- Mention study type, place, time, selection and exclusion criteria
- Description of procedure, methods, apparatus, drugs or chemicals as applicable

Statistics:

- Statistical analysis should be described with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results
- When possible, quantify finding and present them with appropriate indicators of measurement error
- Specify the computer software used

Results:

- All information obtained during the study should be described here and it should be in the text, table and illustration with the main or most important finding firs
- Described without comment
- Results of the experiments should be brief and in logical sequence
- Total number of tables, charts and figures should be limited need to support assessment of paper
- Avoid unnecessary repetition of data, table and figure. Emphasize or summarize only the important observations
- Use graph as an alternative to tables with many entrees

Table:

During preparation of tables following principle should be followed:

- All tables should be on separate sheets with proper captions and be simple, self explanatory and supplement, not duplicate the text
- They should be numbered consecutively using Roman numbers in order of text
- Units in which data are expressed should be given in brackets at the top of the relevant column
- Ditto sings, internal horizontal and vertical rules should not be sued
- Uses of many tables are not encouraged

Illustrations:

Graph, chart, drawing, photographs etc. surfaces should not be marred by clips, pins or heavy writing on the back

- All illustrations must be clearly numbered consecutively in Arabic numerals as they appear in the text
- Submit print photograph of each illustration along with its electronic file
- Original drawing, graphs, charts and lettering should be prepared on an illustration board or high-grade white drawing paper by an experienced medical illustrator

Figures and photographs:

- Should be used only where data cannot be expressed in any other form
- Should be unmounted glossy print in sharp focus, 12.7 X17.3 cms in size
- Figure number, title of manuscript, name of the corresponding author and arrow indicating top should be written on a sticky label affixed on the back of each or on the back preferably with soft pencil

Discussion:

The discussion section should reflect:

- The authors comment on the results, important aspects of the study and the conclusion
- Explore possible mechanism or explanation for the findings
- The discussion should not merely recapitulate the results but compare and contrast the results with other relevant studies
- State the limitations of the study
- Explore the implication of the finding for future research and for clinical practice

Conclusion:

- Conclusion follows from the new and important aspects of the study in the context of the totality of the best available evidence
- Link the conclusion with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data

Legend:

- Must be typed in a separate sheet of paper
- Photomicrograph should indicate the magnification, internal scale and the method of staining.

- All drugs should be mentioned in their generic form. The commercial name may be used in parenthesis

Units:

- All scientific units should be expressed in System International (SI) units

Abbreviations and symbols:

- Use only standard abbreviations; use of non-standard abbreviations can be confusing to readers

Acknowledgement:

- Institution, organization, sponsor, individuals or any bodies can be acknowledged in the article for financial, material, technical or any form of assistance or contribution to the work with their consent.
- Acknowledgement should be placed at the end of the text before the references list.

References:

It is required that each of the papers submitted for printing is accompanied by a list of references at the end.

- These references should be arranged according to the **Vancouver** system which is based on an **American National Standards Institute (ANSI)** style for its database adapted by the **National Library of Medicine (NLM)** and used in Index Medicus**.**
- References should be numbered consecutively in the order in which they are first mentioned in the text
- Identify references in the text, tables and legends by Arabic numerals in superscript
- All citations to electronic references should be presented in numbered references following the text
- The titles of the journals should be abbreviated according to the style used in Index Medicus
- Write names of 6 authors followed by et al. if authors' number is more than six.
- The reference list is not usually checked by the editorial staff or reviewer. It is the total responsibility of author to provide accurate information.

Examples:

- **Standard journal article:**
  Coetzee GJ. Flow through disposable alternatives to the laryngeal mask. Anaesthesia 2003; 58:280-281
- **Standard book with initials for authors:**
  Bowman WC. Pharmacology of Neuromuscular function. 2nd ed; London: Wright, 1990: 196-202.
- **Contributed chapter of a book:**
  Carter EP, Wang Y, Campbell AR. Resolution of alveolar edema. In: Malthy MA, Ingbar DH (eds). Pulmonary edema. New York: Marcel Dekker, 1998
- **Standard journal article on the internet:**
  Kaul S, Diamond GA. Good enough: a primer on the analysis and interpretation of noninferiority trials. Ann Intern Med [Internet]. 2006 Jul4 [cited 2007 Jan4]; 145(1):662-9

Available from : http:/www.annals.org/cgi/reprint/145/1/62.pdf.

COVERING LETTER FOR SUBMISSION TO J B S A

Date……..

To

The Editor-in-Chief

Prof…….

Journal of the Bangladesh Society of Anaesthesiologists.

Sub: Submission of manuscript

Dear Sir,

We are submitting our manuscript entitled by 1……2……3……for publication in your journal. This article **has not been published or submitted for publication elsewhere.**

We believe that this article may be of value to medical professionals engaged in Anaesthesiology/surgery. We are submitting 2 copies of manuscript along with an electronic version (CD).

We therefore, hope that you would be kind enough to consider our manuscript for publication in your journal as **Original/Review article/Case Report.**

Thanks and best regards

A (X)

Professor, Department of ……

BSMMU, Dhaka.

B (X)

Dr., Department of ……

BSMMU, Dhaka.

C (X)

Associate Professor, Department of……

Chittagong Medical College, Chittagong.

D (X)

Assistant Prof., Department of……

Dhaka Medical College, Dhaka.

TITLE PAGE OF ARTICLE

The title of the article……..

……

1. Authors' names and institutional affiliations:

   A (X) Professor, Department of ……...BSMMU, Dhaka.

   B (X) Dr. ……, Department of ……BSMMU, Dhaka.

   C (X) Associate Professor, Department of……Chittagong Medical College, Chittagong.

   D (X) Assistant Professor, Department of…… Dhaka Medical College, Dhaka.

2. The name of the department(s) and institution(S) to which the work should be attributed: Department of …….. Rangpur Medical College, Rangpur. Bangladesh.

3. Disclaimers any: Yes, subject to nonprofit purpose

4. Corresponding author:

The name:……...

Mailing address:……

Telephone:……

E-mail address: ……..

5. The name and address of the author to whom requests for reprint should be addressed:……

Mailing address:……

6. Source(s) of support in the form of grants, equipment, drugs or all of these- [Self finance]

7. **A Short running head:**……

8. Word counts of abstract: [ ]

9. The number of tables: [ ]

10. The number of figures: [ ]

Use of Ultrasonography in Regional Anaesthesia: Bangladesh Perspective

Ultrasound refers to sound wave above human range of hearing 20000 or more vibrations per second used for measuring distance and detecting objects. But in the realem of medical imaging that most people are with ultrasound or ultrasonography or diagnostic sonography is used to visualize structures inside the human body from bones to organs, tendons and blood vessel as well as the fetus in pregnant woman.

Ultrasound was developed by Dr. George Ludwig at Naval Medical Research Institute in the late 1940s. The physicist John Wild is known as the father of medical ultrasound for imaging tissue in 1949. In addition Dr. Karl Theodore Dussek of Austria published the first paper on medical ultrasound in 1942, based on his research on transmisson of ultrasound investigation of the brain and Professor Ian Donald of Scotland developed practical technology and applications for ultrasound in the 1950s.

The use of ultrasound for regional anaesthesia is relatively new, however interest in this application is growning rapidly. Ultrasound guided nerve blocks were first described as early as 1978, but interest in this field was not grew until the advent of advanced technology in the 1990's. Published reports of ultrasound guided regional anaesthesia have largely focussed on brachial plexus block in the interscalene, supraclavicular, infraclavicular and axillary route. Recent studies evaluating the efficacy of ultrasound guidance for femoral, sciatic, psoas compartment, celiac plexues and stellate ganalion blocks are promising, while ultrasound visualization of the epidural space can facilitate neuroaxial block in children, adults and parturients.

Conventional peripheral block techniques that are performed without visual guidance are highly dependent on surface anatomical landmarks for localization of the target nerve. It is therefore not surprising that regional anaesthetic techniques are associated with a reported failure rate up to 20% presumably because of incorrect placement of the local anaesthetic needle. Multiple trial and error attempts to locate the target nerve can lead to operator frustration, unwanted patient pain and time delay in the operating room especially in patient with difficulty anatomical landmarks. Imaging technology such as MRI and CT scan can successfully localize neural structures. However ultrasound is the most practical imaging tool for regional anaesthesia as it is portable, relatively easy to learn, moderately priced & does not pose any radiation risks. Ultrasound provides real time imaging guidance during a nerve block procedure.

Advantages of ultrasound

- Reveal the nerve location and the surrounding vascular, muscular, bony and visceral structures.
- Provides real time imaging guidance during needle advancement allowing for purposeful needle movement and proper adjustment in direction & depth.
- Images the local anaesthetic spread pattern during injection.
- Reduces the number of needle attempts for nerve localization which may reduce the risk of nerve injury.
- Improves the quality of sensory block, shortens the onset time of block, and increases success rate compared to nerve stimulator technique.
- Differentiates extra vascular injection from unintentional intravascular injection.
- Differentiates extraneural injection from unintentional intraneural injection.

Limitations of peripheral nerve stimulation (PNS) technique

- Peripheral nerve stimulation (PNS) guidance is useful only a motor response is elicited.

- PNS provides objective but indirect guidance of nerve location.
- Guidance of proper needle placement that is motor response disappears after injection of 1-2 ml of local anaesthetic.
- Motor response achieved at less than 0.5 mA current does not guarantee a successful or complete block.
- PNS does not prevent intravascular, intraneural or pleural puncture.

So use of ultrasound in regional anaesthesia increases success rate, reduces block related complications and dosage of local anaesthetics. More over use of ultrasound in high risk patient scheduled for surgery reduces mortality and morbidity.

In Bangladesh use of ultrasound in regional block is gaining popularity in recent years. The main barrier to widespread use in this country is price of ultrasound machine and lack of trained manpower. For this reason its use is confined to a few corporate & tertiary level government hospitals. Initial installation price may be high but it is ultimately cost effective. We hope that health ministry and appropriate authority should come forward to spread the use of ultrasound technology in regional anaesthesia throughout the country.

(JBSA 2019; 32(1): 1-2)

Prof. Debasish Banik
Department of Anaesthesia, Analgesia & Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka. Phone- 01911322271, E-mail: profdashdb59@gmail.com

References:

1. Mided medical solutions, History of ultrasound in medicine.
2. Introduction to ultrasound guided regional anaesthesia- NYSORA
3. Advantages of ultrasound in regional anaesthesia- USRA
4. Ultrasound for regional anaesthesia, Toranto Western Hospital.
5. Use of ultrasonogram in anaesthesia by B. Paul. JBA vol 27(1): 2014.

Original Article

A comparative study of caudal epidural bupivacaine with bupivacaine plus fentanyl and bupivacaine plus neostigmine for anaesthesia and postoperative analgesia in children undergoing sub-umbilical surgeries

Mizanur Rahman[1], Md. Habibur Rahmn[2], Md. Kamrujjaman[3], Md. Shafiqul Islam[4]

[1]Assistant registrar, Faridpur Medical College Hospital,[2]Associate Professor, Khulna Medical College Hospital,[3]Associate Professor, Sher-E-Bangla Medical College Hospital, Barisal, [4]Assistant Professor, Sher-E-Bangla Medical College Hospital, Barisal

Corresponding Author: Email: drmizan07@gmail.com

Abstract:

Background: *Single-shot caudal anaesthesia with local anaesthetic has a limited duration of action. Therefore, many children undergoing sub-umbilical surgery with caudal analgesia require further analgesia during the postoperative period. This study compared the effect of single-dose caudal epidural bupivacaine, bupivacaine plus fentanyl and bupivacaine plus neostigmine for anaesthesia and postoperative analgesia in children.*

Objective: *To evaluate effectiveness of bupivacaine with the addition of fentanyl or neostigmine for caudal anaesthesia and analgesia in children undergoing sub-umbilical surgeries.*

Methods: *Total ninety (90) paediatric patients, aged 2-8 years with ASA(American society of anesthesiologist) grades I & II who were scheduled for surgery in Sher-E-Bangla Medical college Hospital, Barisal were included in this study. Data were collected by using a pre-designed questionnaire. The patients were randomly allocated to one of the three groups. Group A was received caudal 1 ml/kg of bupivacaine 0.25%, Group B 1 ml/kg of bupivacaine 0.25% with fentanyl 1 µg/kg and Group C 1 ml/kg of bupivacaine 0.25% with neostigmine 2 µg/kg. Heart rate (HR), Blood pressure (BP), oxygen saturation (SpO2), Respiratory rate (RR) were recorded during operation and every five minutes thereafter. The duration of analgesia was defined as the time from caudal injection to first dose of rescue analgesia. Rescue analgesia was given for an objective pain scale (greater than or equal to) 4 in the form of oral paracetamol (15mg/kg).*

Results: *Assessment of anaesthesia was significantly longer in the two groups of children who received additives compared with local anaesthetics group alone ($p<0.01$). Mean time to first postoperative analgesic administration was 167.37±17.30 min, 280.57±14.40min, and 357.77±19.08 min in group A, Group B, and group C respectively. The difference was statistically significant ($p<0.01$) between the three groups. In these cases duration of analgesia was considered from the placement of caudal to first analgesia.*

Conclusion*: Addition of fentanyl or neostigmine to bupivacaine prolonged the duration of surgical anaesthesia and postoperative analgesia after a single shot caudal injection with minimal incidence of side effects in children undergoing sub-umbilical surgeries. This could be a safe and cheap alternative to extradural catheter placement for surgical procedures of intermediate duration.*

Key words: *Caudal epidural, bupivacaine, fentanyl, neostigmine, postoperative analgesia, sub-umbilical surgeries.*

(JBSA 2019; 32(1): 3-9)

Introduction:

Caudal anaesthesia (CA) is a common paediatric regional technique that is quick to learn and easy to perform, with high success and low complication rates. CA provides high quality intraoperative and early postoperative analgesia for sub-umbilical surgery. In children, CA is most effectively used. Single-shot caudal anaesthesia with local anaesthetic has a limited duration of action.[2] Therefore, many children undergoing sub-umbilical surgery with caudal analgesia require further analgesia during the postoperative period.[4] Prolongation of anaesthesia can be achieved by adding various adjuvants, such as opioids and non-opioids like clonidine, ketamine, midazolam and neostigmine drug used to mimic the effects of stimulation of the parasympathetic nervous system. , with varying degrees of success. [1-5]

Opioids have been commonly used in caudal blocks with or without local anesthetic agents. The major disadvantage of opioid additives is the risk of respiratory depression. Another disadvantage of neuroaxial opioids is the increased incidence of postoperative pruritus, nausea, and vomiting. Although fentanyl 1 mcg/kg may prolong a caudal block, the incidence of pruritus and vomiting also increases.[6] Despite the pitfalls of using opioids as a component of central blockade, the practice continues because of the relative advantages these agents offer. Prolongation of analgesia in a study in which fentanyl 1 mcg/kg was added to a mixture of bupivacaine and lidocaine in children aged 6 to 108 months. The mean duration of analgesia in the fentanyl group was 253 ± 105 minutes compared with 174 ± 29 minutes in the control group without fentanyl. Vomiting occurred in 4 of 15 of the children who had extradural fentanyl and 0 of 14 in the children who had not received fentanyl.[6]

The use of neostigmine in the epidural space is a relatively new concept in children. Its action may be attributed to either direct action on the spinal cord via inhibition of the breakdown of acetylcholine in the dorsal horn or by peripheral antinociceptive effect.[7] A study in children compared three groups to determine the effectiveness of neostigmine 2 mcg/kg as a caudal analgesic for hypospadias repair, either alone or in combination with bupivacaine.[8]The groups received 1 ml/kg of either 0.25% bupivacaine plain, bupivacaine with neostigmine 2 mcg/kg, or neostigmine 2 mcg/kg plain. The neuroaxial administration of neostigmine is known to produce analgesia in animals, human volunteers and patients with acute postoperative and chronic pain.[9,10]

Methods

Ninety (90) paediatric patients, aged 2-8 years with ASA grades I & II who were scheduled for sub-umbilical surgeries. The study was approved by the ethics committee and written informed consent was obtained from legal guardian. Children with sacral bone abnormalities, spina bifida, Coagulopathy, infection at the site of caudal injection, hypovolaemia, body weight greater than 25 kg and failed caudal block.The patients were randomly allocated to one of the three groups. Patients was kept fasting for six hours before the procedure. Clear fluids were allowed up to two hours before the procedure. The patients received no premedication. An intravenous line was established with a 22G canula. After establishing the intravenous line a solution of 5% dextrose in 0.45% NaCl was started. All the procedures were performed under sedation combined caudal extradural block. Sedation was induced by Ketamine (2mg/kg), Atropine (0.02mg/kg) and diazepam (0.2mg/kg).Oxygen was administered through face mask. Now check for HR, BP and SpO2.When these parameters were within normal range, the patient was turned to lateral position with the knee drawn upto the chest. The caudal block was performed by an experienced anaesthetist using a 23 gauge short-bevel needle under aseptic conditions. After negative aspiration for blood or cerebrospinal fluid, the study solution was administered. The patients were randomly allocated to one of the three groups (n=30 in each group) by using a random number table. Group A received caudal 1 ml/kg of bupivacaine 0.25%; Group B 1 ml/kg of bupivacaine 0.25% with fentanyl 1 μg/kg and Group C 1 ml/kg of bupivacaine 0.25% with neostigmine 2 μg/kg.

HR, BP, SpO2, RR were recorded during operation and every five minutes thereafter. BP was measured by aneroid sphygmomanometer using child size cuff. HR and SpO_2 were monitored

continuously by using standard pulse oximetry. During surgery, adequate intraoperative analgesia was defined by haemodynamic stability, as evidenced by the absence of an increase in the heart rate or a mean arterial blood pressure greater than 20% compared to the baseline values obtained before skin incision. An increase in the HR or BP within 15 minutes of skin incision indicated failure of caudal anaesthesia and excluded from the study. Maintenance fluid requirement was calculated by applying 4:2:1 rule. That was 4 ml for first 10kg/hr, 2 ml for second 10kg/hr, and 1 ml for remaining kg/hr.

Onset of analgesia was evaluated by pinching the skin. If the patient does not move with pinching surgery was started. After the operation, Duration of anaesthesia was recorded. Pain score was assessed using the OPS, which measures five variables: respiratory rate, heart rate, discomfort, cry and pain at the site of operation. Each variable score from zero to two to give a possible total score of zero to 10. A lower score was associated with less pain. The duration of analgesia was defined as the time from caudal injection to first dose of rescue analgesia. Rescue analgesia was given for an objective pain scale (greater than or equal to) 4 in the form of oral paracetamol (15mg/kg).

Results

Demographic data are given in table-I. There were no significant difference in age, weight, height and ASA grading of the patients. HR, Systolic blood pressure(SBP) and Diastolic blood pressure(DBP) recorded in preoperative, at induction, at skin incision, 15 min,30 min,1 hours,2 hours,4hours,6 hours, 8 hours and 12 hours of block. There were no significant differences between the three groups (Table-II,III,IV).

Duration of surgical anaesthesia was statistically significant ($p<0.01$) between the three group(table-I). Mean duration of analgesia among the three groups were compared using Compare mean with ANOVA. It was observed that mean time to first postoperative analgesic administration was 167.37±17.30 min, 280.57±14.40min, and 357.77±19.08 min in group A, Group B, and group C respectively. The difference was statistically significant ($p<0.01$) between the three groups(table-I). In these cases duration of analgesia was considered from the placement of caudal to first analgesia. The pain score was assessed using the OPS and the three groups were compared using Compare mean with ANOVA. It was found that there was a significant difference between the three groups from four hours to six hours post-operatively with a *P* value < 0.02, < 0.01 respectively (Table-V).

There were no instances of hypotension, bradycardia, residual paralysis or toxic reactions to local anaesthetics, fentanyl or neostigmine during or after administration of the caudal blocks. No postoperative urinary retention and motor weakness of the legs was observed when the children were discharged from the recovery room.

Table-I *Demography and operative data of the present study(n=90)*

Variables	Group A	Group B	Group C	P Value
Age in years	5.23±1.79	5.30±1.80	5.16±2.02	0.96(NS
Weight in kg	17.0±3.58	16.43±3.41	16.30±3.38	0.70(NS)
Height in cm	104.9±12.34	104.47±12.22	105.4±13.93	0.96(NS
ASA	**I-II**	**I-II**	**I-II**	
Duration of anaesthesia (min**)**	119.27± 9.85	145.17± 9.24	144.8± 8.93	<0.01(S)***
Duration of analgesia (min)	167.37±17.30	280.57±14.40	357.77±19.08	<0.01(S)***

NS = Non-Significant.S=Significant. Values are expressed as mean±SD. Analysis between group,time interaction was done by ANOVA.Values are significant when $p<0.05$ (CI-95%).

Table –II *Distribution of the study patients according to heart rate*

HR(beat/min)	Group-A (n=30)	Group-B n=30)	Group-C (n=30)	P-value
Preoperative	98.60±9.68	99.13±8.25	100.80±7.49	0.58(NS)
Induction	142.30±5.52	140.97±5.42	139.30±4.74	0.09(NS)
Skin incision	141.97±5.12	143.03±5.03	143.03±3.95	0.60(NS)
After 15mins	124.36±4.82	123.43±5.34	123.40±4.85	0.70(NS)
After 30mins	114.57±3.62	115.60±3.84	116.70±3.08	0.07(NS)
After 1 hr	107.53±5.65	110.57±5.77	110.47±4.27	0.05(NS)
After 2hrs	95.00± 7.73	93.77± 6.66	98.23± 7.01	0.05(NS)
After 4hrs	105.17±9.44	105.57±7.55	107.60±6.08	0.43(NS)
After 6hrs	101.93±8.85	102.73±6.43	105.73±5.30	0.09(NS)
After 8hrs	102.67±9.09	104.60±8.21	105.50±7.22	0.40(NS)
After 12hrs	103.93±8.86	105.00±6.88	106.83±6.47	0.32(NS)

NS = Non-Significant.S=Significant. Values are expressed as mean±SD. Analysis between group,time interaction was done by ANOVA.Values are significant when p<0.05 (CI-95%).

Table-III *Distribution of the study patients according to systolic blood pressure*

Systolic blood pressure(mmHg)	Group-A (n=30)	Group-B (n=30)	Group-C (n=30)	P value
Preoperative	103.17±7.93	103.67±8.42	102.93±9.01	0.94(NS)
Induction	110.70±6.27	111.43±8.25	109.77±8.42	0.70(NS)
Skin incision	113.07±5.91	113.90±6.94	112.17±7.33	0.61(NS)
After 15mins	108.50±6.72	109.97±6.72	109.00±8.14	0.73(NS)
After 30mins	106.13±6.87	107.33±6.26	107.37±7.55	0.73(NS)
After 1 hr	104.17±7.44	104.67±6.69	104.33±7.40	0.96(NS)
After 2hrs	100.70±7.49	101.17±7.62	100.33±7.65	0.91(NS)
After 4hrs	105.00±7.54	106.67±5.92	103.67±6.15	0.22(NS)
After 6hrs	108.00±6.24	109.47±5.50	106.33±6.56	0.15(NS)
After 8hrs	106.33±6.29	105.80±7.21	104.33±6.40	0.49(NS)
After 12hrs	107.50±5.98	106.80±6.59	105.83±6.11	0.43(NS)

NS = Non-Significant.S=Significant. Values are expressed as mean±SD. Analysis between group,time interaction was done by ANOVA.Values are significant when p<0.05 (CI-95%).

Table-IV *Distribution of the study patients according to diastolic blood pressure*

Diastolic blood pressure(mmHg)	Group-A (n=30)	Group-B (n=30)	Group-C (n=30)	P value
Preoperative	61.63±6.24	60.93±5.56	60.93±6.44	0.88(NS)
Induction	68.00±5.75	66.83±5.82	66.43±6.30	0.57(NS)
Skin incision	70.30±5.51	68.50±5.68	67.57±5.67	0.17(NS)
After 15mins	68.43±5.20	67.50±5.78	66.70±5.78	0.49(NS)
After 30mins	65.00±5.09	65.00±4.36	63.50±4.94	0.38(NS)
After 1 hr	59.67±5.56	58.73±5.70	58.83±5.36	0.77(NS)
After 2hrs	57.83±5.86	57.03±5.92	57.30±5.49	0.86(NS)
After 4hrs	61.13±5.34	62.60±5.53	63.63±5.18	0.20(NS)
After 6hrs	65.00±5.57	64.27±5.62	63.33±5.77	0.52(NS)
After 8hrs	63.47±6.26	63.10±6.59	63.27±6.20	0.98(NS)
After 12hrs	62.83±4.76	62.63±5.67	61.67±5.84	0.68(NS)

NS = Non-Significant, S=Significant. Values are expressed as mean±SD. Analysis between group, time interaction was done by ANOVA. Values are significant when p<0.05 (CI-95%).

Table-V *Distribution of the study patients according to pain score (n=90)*

Time interval of Pain Score	Group-A (n=30)	Group-B (n=30	Group-C (n=30)	P value
After 30mins	0.40±0.50	0.30±0.65	0.27±0.45	0.61(NS)
After 1 hr	0.50±0.68	0.43±0.77	0.43±0.68	0.91(NS)
After 2hrs	0.93±1.05	0.53±0.63	0.63±0.63	0.05(NS)
After 4hrs	1.50±1.10	0.87±0.92	0.83±0.95	0.02***
After 6hrs	3.40±1.19	1.83±1.23	1.63±1.35	0.01***
After 8hrs	2.43±1.63	2.17±1.37	1.87±1.43	0.34(NS)
After 12hrs	2.07±1.53	2.07±1.36	2.13±1.38	0.98(NS)

NS = Non-Significant.S=Significant. Values are expressed as mean±SD. Analysis between group,time interaction was done by ANOVA.Values are significant when p<0.05 (CI-95%).

Objective pain scale:

Parameter	Findings	Points
Systolic blood pressure	Increase <20% of preoperative blood pressure	0
	Increase 20-30% of preoperative blood pressure	1
	Increase >30% of preoperative blood pressure	2
Crying	Not crying	0
	Crying, responds to TLC	1
	Crying, not responds to TLC	2
Movements	None	0
	Restless	1
	Thrashing[moving wildly]	2
Agitation	Asleep or calm	0
	Mild	1
	Hysterical	2
Complains of pain	Asleep, state no pain	0
	Vague, cannot localize	1
	Localizes pain	2
Total		10

Discussion

Our study indicates that addition of fentanyl or neostigmine to bupivacaine 0.25% for caudal analgesia in children significantly prolongs the duration of analgesia, as compared with bupivacaine alone. Our findings are consistent with those reported by several other studies. To avoid extradural catheter placement, and yet prolong the duration of single shot caudal anaesthesia ,various additives such as opioids and non-opioids like clonidine, ketamine, midazolam and neostigmine neostigmine (nç'ôst-g'mçn, –m-n), drug used to mimic the effects of stimulation of the parasympathetic nervous system. to local anaesthetic solutions have been used with varying degrees of success. [1-5]

Fentanyl is added commonly to local anaesthetics administered in extradural space to improve analgesia in the postoperative period.[11] However; few studies have addressed the benefit of fentanyl for single shot procedures. The addition of fentanyl produced only a slight change in the quality and duration of analgesia after administration of 2% lidocaine with epinephrine for a short surgical procedure[13]or after administration of 0.125% bupivacaine[12] .Constant et al[12] found that single

shot caudal block provided adequate surgical analgesia in only 57% 0f children in bupivacaine group compared with 93% in fentanyl group. Similar observations regarding surgical anaesthesia were also observed by Mostafa et al[14].Gainity et al[15] concluded their study that adding fentanyl 1 μg/kg to bupivacaine in the caudal epidural block in children does not influence plasma levels of E and NE, nor does it improve the analgesic intensity of the caudal block. However, Fentanyl was commonly added to local anaesthetics, and in a meta-analysis of 18 studies conducted in adults this combination was found to provide safe and effective intraoperaive pain relief[16].

Neostigmine potentiated the effect of caudal bupivacaine[17]. D Krushal et al[18] demonstrated that co-administration of neostigmine with bupivacaine prolonged the duration of surgical analgesia after a single shot caudal injection. This could be a safe and cheap alternative to extradural/ caudal catheter placement for surgical procedures of intermediate duration. Kumar Pet al[19] compared Midazolam, Ketamine and neostigmine administered with bupivacaine found all groups, increased the duration of caudal block. Majahan R et al[17]concluded that neostigmine potentiated the effect of caudal bupivacaine, but neostigmine alone in doses 2-10 μg/kg is not effective. Even though Memis D et al[20] tried low doses of neostigmine 1 μg/kg with bupivacaine for caudal block and found no significant advantage over bupivacaine alone. However, several paediatric studies have already demonstrated that neostigmine added to bupivacaine or lignocaine increase the duration and quality of postoperative analgesia provided by caudal anaesthesia. In children, doses of 2 μg/kg, 3 μg/kg have been used without adversed gastrointestinal, respiratory or haemodynamic effects, while an increase in postoperative nausea and vomiting was observed after a dose of 5 μg/kg.[5,18,21]

In our study, addition of fentanyl or neostigmine was effective in increasing the duration of surgical analgesia. Most children required supplementary analgesia in the postanaesthesia care unit. In the fentanyl or neostigmine group, mean time from caudal injection to first administration of analgesia was longer than control group. In these studies, no respiratory depression had been reported after caudal administration of fentanyl or neostigmine.

References:

1. de Beer DAH, Thomas ML. Caudal additives in children: solution or problems? Br J Anaesth 2003; 90:487-498.
2. Lee JJ, Rubin AP. Comparison of a bupivacaine-clonidine mixture with plain bupivacaine for caudal analgesia in children. Br J Anaesth 1994; 72:258-262.
3. Naguib M, Sharif AM, Seraj M, el Gammal M, Dawlatly AA. Ketamine for caudal analgesia in children: comparison with caudal bupivacaine. Br J Anaesth 1991; 67:559-564.
4. Naguib M, El Gammer M, Elhattab YS, Seraj M. Midazolam for caudal analgesia in children: comparison with caudal bupivacaine. Can J Anaesth 1995; 42:758-764.
5. Abdulatif M, El-Sanabary M. Caudal neostigmine, bupivacaine, and their combination for postoperative pain management after hypospadias surgery in children. Anesth Analg 2002; 95:1215-1218.
6. Constant I, Gall O, Gouyet L, Chauvin M, and Murat I.: Addition of clonidine or fentanyl to local anaesthetics prolongs the duration of surgical analgesia after single shot caudal block in children, *Br. J. Anaesth1998; 80:294-298*
7. Shafer SL, Eisenach JC, Hood DD, Tong C. Cerebrospinal fluid pharmacokinetics and pharmacodynamics of intrathecal neostigmine methylsulfate in humans. *Anesthesiology* 1998; 89:1074.
8. Norden J Hanallah R et al. Reliability of an objective pain scale in children. J Pain and Symptom Management1991; 6: 196.
9. Naguib M, Yaksh TL. Antinociceptive effects of spinal cholinesterase inhibition and isobolographic analysis of the interaction with miu and alpha 2 receptor systems. Anesthesiology 1994; 80: 1338-48.
10. Hood DD, Eisenach JC, Tuttle R. Phase I safety assessment of intrathecal neostigmine methylsulphate in human. Anesthesiology 1995; 82: 331-43.

11. Lejus C, Roussière G, Testa S, Ganansia MF, Meignier M, Souron R. Postoperative extradural analgesia in children: comparison of morphine with fentanyl. *Br J Anaesth* 1994; 72:156-9.

12. Campbell FA, Yentis SM, Fear DW, Bissonnette B. Analgesic efficacy and safety of a caudal Bupivacaine-fentanyl mixture in children. Can J Anaesth 1992;39(7):661-4.

13. Jones RD.Gunawardene WM, Yeung CK. A comparision of lignocaine 2% with adrenaline 1:200,000 and lignocaine 2% with 1:200,000 plus fentanyl as agents for caudal anaesthesia in children undergoing circumcision. Anaesthesia and Intensive Care 1990;18:194-99.

14. Mostafa EI hamamsy, Abd-Elraman ahmed ahmed, Abd-Elrahman, Mohammed Hesham Ahmed Abd-elaziz Essa, Denazakaria: Prolongation of caudal analgesia in pediatric surgery: Comparison between Dexmedetomidine, clonidine, Tramadol, and Fentanyl. www.fayoum.edu.eg/Medicine/Anaesthesiology/pdf/Drmostafa3.pdf

15. Gaitini LA, Somri M, Vaida SJ, Yanovski B, Mogilner G, Sabo E, Lischinsky S, Greenberg A, Levy N, Zinder O. Does the addition of fentanyl to bupivacaine in caudal epidural block have an effect on the plasma level of catecholamines in children? Anesth Analg 2000;90(5):1029-33.

16. Curatolo M, Petersen-Felix S, Scaramozzino P, Zbinden AM. Epidural fentanyl, adrenaline and clonidine as adjuvants to local anaesthetics for surgical analgesia and side effects. Acta Anaesthesiol Scand 1998;42:910-20.

17. Rajesh Majahan, Vinod K, Grover, Pramila. Caudal neostigmine with Bupivacaine produces a dose-independent analgesic effect in children. CAN J ANAESTH 2004;51(7):702-706

18. D. Kaushal, V. Singh, H. Abbas, A. Mallik & G. Singh.Caudal bupivacaine-neostigmine for perioperative analgesia in pediatric patients undergoing infraumbilical surgeries: A prospective, randomized, double blind, controlled study. *The Internet Journal of Anesthesiology* 2009; Volume 21 Number 1

19. Kumar P, Pan A.k, Acharya A. Caudal additive in Pediatrics : A comparison among midazolam, ketamine and neostigmine consideration with Bupivacaine. Anesth Analg 2005;101:69-73.

20. Memes D, Turan A et al. Caudal neostigmine for postoperative analgesia in paeatric anaesthesia 2003;13(4):324-8.

21. Sunanda Maji, Sampa Dutta Gupta, Kanak Kanti Kundu, Jaydeb Roy, Tibar bandhyopadhyay.Comparison of Post-operative Analgesic Efficacy of Caudal Epidural Bupivacaine Versus Bupivacaine and Neostigmine Combination in Infraumbilical Surgeries in Children. Indian Medical Gazette 2013:192-198

Original Article

Efficacy and Safety of Dexamethasone versus Fentanyl as an adjuvant with Bupivacaine and Lignocaine in Supraclavicular Brachial Plexus Block

Sanjida Hasan[1], Ahmed Abu Nasar Chowdhury[2], SyedaNafisa Khatoon[3], Kalyan Barua[4] AKM Shamsul Alam[5]

[1]Assistant Professor of Anesthesiology, Southern Medical College, Chittagong, [2]Associate Professor of Anesthesiology; Chittagong Medical College, [3]Assistant Professor of Anesthesiology; Chittagong Medical College, [4]Associate Professor and Head of Anesthesiology; Southern Medical College, Chittagong, [5]Professor and Head of Anesthesiology; Chittagong Medical College

Corresponding Author: E-mail: sanjidahasanurmee@gmail.com

Abstract

Background: *Brachial plexus blockade is gaining popularity day by day for the upper extremity surgery. Increasing the duration of local anesthetic action by adding different adjuvant is often desirable to prolong the surgical anesthesia and analgesia. The aim of this study was to make a comparative evaluation of the efficacy and safety of dexamethasone and fentanyl as an adjuvant with bupivacaine-lignocaine in supraclavicular block.* ***Material and methods:*** *This comparative study was carried out in the department of anesthesiology in Chittagong Medical College Hospital in collaboration with the department of orthopedic surgery over a period of 22months starting from July, 2012 to April, 2014. A total 130 adult patients of either sex with American Society of Anesthesiology (ASA) health status I-II were selected for upper limb surgery under supraclavicular brachial plexus block was randomly allocated in to two groups of 65 patients in each. Group- D was received dexamethasone 2ml (10mg) and Group-F was received fentanyl 2ml (100μg) in 38ml of bupivacaine and lignocaine with adrenaline (total volume of 40ml).* ***Result****: The mean onset of sensory&motor block was 7.72±1.949min & 8.75±2.008min in group-D and 7.60±3.711min & 9.23±5.114min in group-F. Both the results in two group was not statistically significant (p>0.05).The duration of analgesia in group-D was 11.40±0.844hrs and in group-F was 8.62±1.747hrs.The results was significantly higher in group-D than group-F (p<0.05).* ***Conclusion:*** *There was significantly prolonged duration of analgesia and better onset of sensory and motor block in dexamethasone group than in fentanyl group without any unwanted effects.*

Keywords: *Supraclavicular brachial plexus block; Dexamethasone; Fentanyl; Bupivacaine; Lignocaine; Adjuvant.*

(JBSA 2019; 32(1): 10-17)

Introduction

Brachial plexus block is a versatile and reliable regional anesthetic technique employed as an alternative to general anesthesia for upper limb surgery. This technique involves the injection of local anesthetic agents in close proximity to the brachial plexus, temporarily blocking the sensation and ability to move the upper extremity. The subject remains awake during the ensuing surgical procedure.

Regional nerve block avoids the unwanted effects of anesthetic drugs used during general anesthesia and the stress of laryngoscope and tracheal intubation. Minimizing the stress response and using minimal anesthetic drugs is always beneficial for the patients and provides optimal surgical condition with prolonged postoperative analgesia. Patient's safety, surgeon's satisfaction and quicker initial recovery are among the other benefits of regional anesthesia. Thus it is gaining

popularity day by day for the upper limb surgery.[1-3]

The supraclavicular block of the brachial plexus has many advantages over other approaches to brachial plexus block.[4-6] It is performed at the trunk level where the plexus is presented most compactly. This anatomical compactness is responsible for complete and reliable anesthesia. Another advantage is that it can be performed with the patients arm in any position to provide excellent anesthesia for elbow, forearm and hand surgery.[7]

Mixture of local anesthetics provides few clinically significant advantages. But the onset of action and duration of anesthesia are the limiting factors. Lignocaine is an effective local anesthetic of amide group, with a rapid onset of action and lasts for 60-90 minutes. It has a tendency to cause vasodilatation and this is normally counteracted by the addition of a vasoconstrictor. Adrenaline is used with lignocaine to delay absorption and prolong the action. Bupivacaine is a local anesthetic of amide group, four times more potent than lignocaine, slower in onset but has a significantly longer duration of action.[8, 9]

However local anesthetics provide analgesia for not more than 4-8 hrs. Increasing the duration of local anesthetic action is often desirable because it prolongs surgical anesthesia and analgesia. But the results are either inconclusive or associated with side effects like heavy sedation, respiratory depression and psychomimmetic effects. Drugs with minimal side effects are always looked for.

Steroids when used intrathecally are reported to cause arachnoiditis but there is no evidence suggesting any neuritis when steroids are used in low concentration in peripheral nerve blocks. Steroids have powerful anti-inflammatory as well as analgesic property. Perineural injection of steroids is reported to influence postoperative analgesia. They relieve pain by reducing inflammation and by blocking transmission in nociceptive myelinated C fibers and suppressing ectopic neuronal discharge.[10] A study in supraclavicular brachial plexus block suggest that dexamethasone when added to lignocaine results in a faster onset and prolonged duration of sensory and motor blockade.[11]

It has been suggested since long, that peripheral nerve possess opioid receptors and this has tempted clinicians to add narcotics to local anesthetics to prolong the analgesic effects of these solutions. The peripheral administration of opioids provides stronger and longer lasting analgesia with a lower dose of opioid without central side effects such as respiratory depression, nausea, vomiting and pruritus.

With this background, several studies are carried out to evaluate the efficacy of fentanyl or dexamethasone as an adjuvant to local anesthetics in Supraclavicular brachial plexus block.

Till date, no study have compared dexametosone with fentanyl in respect to quality, onset and duration of sensory and motor block, sedation and post operative analgesia in our country.

Considering the fact, the current study was planned to compare the anesthetic and analgesic effects of adding fentanyl or dexamethasone to bupivacaine-lignocaine in supraclavicular brachial plexus block for upper limb surgery.

Materials and Method:

All patients of both sexes, age 18-60 years, ASA class-I & class-II undergoing routine operation schedule for upper limb surgery under supraclavicular brachial plexus block were enrolled in this study. Patients were excluded if they had sepsis at the site of injection, body wt <50kg, pregnant women, known hypersensitivity, circulatory instability, diabetes, coagulopathy, history of neurological, renal & liver diseases, peptic ulcer disease.

Patients were randomly selected by card sampling method into two groups. Sample size was 65 in each group. A box was prepared containing 130 cards (F-card & D-card in equal numbers). Randomization of the sample was done by asking the patient to draw one card blindly from the box. The patients who drew card marked F were allocated into group-F and patients with card marked D were assigned to group-D. After selecting the patient entry of the name of the patients in the case record form and initial pulse, NIBP (noninvasive blood pressure), RR (respiratory rate), saturated pluse oximetry (SPO_2) were monitored and were recorded as base line value.

Group-D received Dexamethasone 2ml (10 mg) and Group-F received 2ml (100µg) in 38ml of Bupivacaine and Lignocaine with adrenalin.

After block given, Patients pulse, blood pressure, RR, SPO_2 were recorded and then first 30 mins at 10 mins interval then 15 mins interval up to the end of surgery.

The onset of sensory block was assessed in every minute using pin prick method in different areas innervated by radial, ulna, median and musculocutaneous nerve. The onset of motor block was assessed in every minute by modified bromage scale compared to the opposite limb by asking the patient to raise their hand or move their fingers. The time of onset of sensory block (the time elapsed between the injection of local anesthetic drugs and just impaired sensation to pinprick perception i.e. grade1 compared to the opposite upper limb). The time of onset of motor block (the time elapsed between the injection of local anesthetic drug and just impaired ability to raise the hand i.e. grade1 of modified bromage scale, compared to the opposite limb) was noted. Duration of block (time between onset of sensory anesthesia and patient complaining of pain visual analog scale>3) and quality of block by Numeric scale was noted.

Any incidence of nausea, vomiting, pruritus, respiratory distress, dryness of mouth, local anesthetic toxicity, pneumothorax, hematoma formation or any others was noted by yes/no. If respiratory distress develops; phrenic nerve block and Pneumothorax were excluded by X-ray chest posterior anterior view. If any side effects detected clinically in per and post operative period then it was managed according to the need. The patient who needed sedative drug assessed by Ramsay Score was recorded.

Postoperative analgesia was noted by interviewing the patient according to visual analog scale (VAS) and Verbal rating scale (VRS) in post operative ward.

The sociodemographic variables studied were age, sex and weight. The preoperative variables were pulse, blood pressure, SpO2, respiratory rate. The outcome variables were the assessment of sensory and motor block, onset time of sensory and motor block, duration of surgery, duration of anesthesia, adjuvant required, sedation score, G /A required, quality of block, side effects monitored as well as per-operative hemodynamic stability by recording pulse, NIBP, SPO_2 and RR. Postoperative variables on analgesic demand by VAS and VRS to determine analgesic demand. A structured case record form was developed containing all the variables of interest. Proper permission was taken for this study from the ethical committee of Chittagong Medical College.

Collected data was complied, checked and edited. Data processing and analysis was done with the help of computer using statistical software SPSS(Statistical Package for Social Sciences) version -18(Chicago, IL, USA).. The test statistics used for analysis of data was Student's t-test (for comparison of data presented in quantitative scale-age, sex, wt), Chi-square test (for comparison of data presented in categorical scale-outcome in both groups). The results were presented in tables and figures. The statistical terms was included in this study are mean, standard deviation, percentage. Statistical significance was set at $p<0.05$ and confidence interval set at 95% level.

Results

The mean onset of sensory & motor block was 7.72±1.949& 8.75±2.008min in group-D and 7.60±3.711& 9.23±5.114min in group-F. Both the results in two group was not statistically significant ($p>0.05$). [Table-1]

The duration of analgesia in group-D was 11.40±0.844hrs and in group-F was 8.62±1.747hrs.The results was significantly higher in group-D than group-F ($p<0.05$). [Table-2]

The side effects of procedure and the drug of study patients where 2 case of ptosis in group-D and 3 case of ptosis, 1 case of hematoma in group-C. Total 4.6 %($p=0.680$). [Table-3]

Preoperative variables pluse, SBP, DBP, SPO2, resp. rate have no effect on drug group. [Figure 1, 2, 3]

Table 1 *Onset of sensory and motor block in study patients (n=130)*

	Group D (n=65)		Group F (n=65)		p value*
	Mean	±SD	Mean	±SD	
Onset of sensory block (min)	7.72	1.949	.60	.711	0.813
Onset of motor block(min)	8.75	2.008	9.23	.114	0.485

*(Calculated by t- test)

Table-II *Duration of analgesia between the study groups (n=130).*

	Group D (n=65)		Group F(n=65)		p value*
	Mean	±SD	Mean	±SD	0.001
Duration of analgesia (hrs)	11.40	0.844	.62	1.747	

*(Calculated by t- test)

Table-III *Side effects observed in the study patients (n=130)*

Side effects	Group D(n=65)		Group C(n=65)		Total	
	No.	%	No.	%	No.	%
Hematoma formation	0	0	1	1.5	1	4.6
Ptosis	2	3.1	3	4.6	5	
None	63	96.9	61	93.8	124	95.4

* (Calculated by Chi square test)

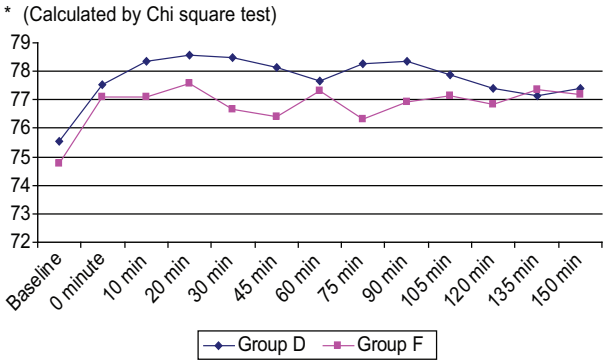

Figure 1: *Per operative monitoring of pulse of the study patients (n=130)*

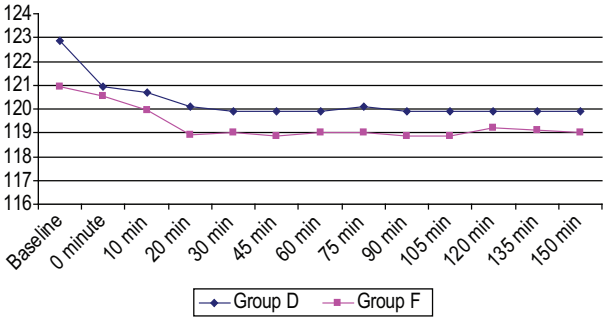

Figure 2: *Per operative monitoring of systolic blood pressure of the study patients (n=130)*

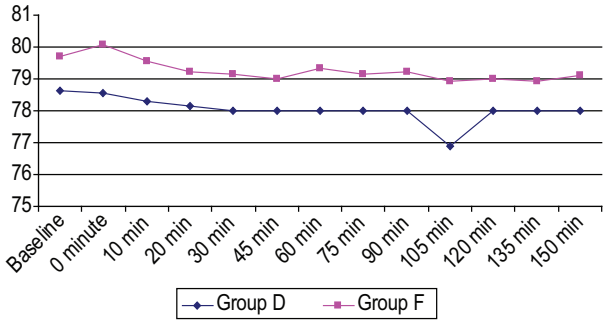

Figure 3: *Per operative monitoring of diastolic blood pressure of the study patients (n=130)*

Discussion

The present study which is a prospective comparative randomized clinical trial was carried out with the objectives to make a comparative evaluation of the efficacy and safety of dexamethasone and fentanyl as an adjuvant with bupivacaine-lignocaine in supraclavicular block during upper limb surgery.

Regarding the mean onset of the sensory block in group-F and group-D was 7.60±3.71min and 7.12±1.949min (p=0.813). The mean onset of the motor block in group-F and group-D was

9.23±5.114min and 8.75±2.008min (p=0.485 respectively). Both these data were not significant statistically as pÃ0.05. So in present study showed that there was no significant difference in the onset time of sensory and motor block between two groups.

As compared to the study done by Sarkar et al, where 1ml (50ìg) fentanyl was used in Lignocaine (2%) with adrenaline (1:2, 00,000) 10ml + bupivacaine (0.5%) 20 ml + distilled water 10ml, to make total volume of 40ml, in Supraclavicular block using nerve stimulator technique.[12] Onset time of the sensory and motor block was 4.4±1.41min and 3.04±1.31 min respectively. This does not correlate with the present study done by paraesthesia technique. In a study, Ahmed et al**,** used 100ìg fentanyl in 40ml of 0.25% of bupivacaine in the supraclavicular approach in paraesthesia technique.[13] And achieved the onset of the sensory and motor block at 8.9±2.9 min and 8.8±2.7 min, respectively. The results nearly matched with the present study. Almost similar result was depicted in a comparative study carried out by Chavan and colleagues**,** by addition of Fentanyl to local anesthetics (Bupivacaine 0.5% and Lignocaine 2%) undergoing surgery of forearm and hand with Supraclavicular approach and revealed that the gripping forces significantly decreased 10 minutes after the injections.[14] In a study by Shrestha BR et al, brachial plexus block was done by paraesthesia technique with 40-50 ml of local anesthetic with 1:200.000 adrenalines plus 4-8mg dexamethasone.[15] Onset of action was 10-20 minutes (mean14.5±2.10). As compared to the study done by Islam et al, who used 2% lignocaine and 0.5% bupivacaine plus dexamethasone 8mg in supraclavicular block.[16] Achieved the onset of the sensory and the motor block at 9.89±1.97min and 11.09±1.28mim, both of the study results nearly matched with the present study. This does not correlate with the study done dexamethasone and fentanyl as an adjuvant with bupivacaine-lignocaine in supraclavicular block during upper limb surgery. by Pathak et al; in brachial plexus block, performed by nerve stimulator technique.[17] They found that the onset time of sensory and motor blockade at 5.92 min and 15.8 min in local anesthetic (1.5% adrenalized xylocaine 20ml and 0.5% bupivacaine 16ml) plus dexamethasone group. The onset of sensory block was faster than motor block in both groups in this study which was similar in most of the study done in brachial plexus block. But the study done by Jarbo et al and Shrestha et al, have shown in their study, the onset time of motor block was significantly faster than the onset of the sensory block, which does not correlate with those found in present study.[18,19] This can be explained by the "core and mantle concept" of Winnie.[20] As described by Winnie, the outer motor fibers are blocked earlier than the sensory fibers which are situated deeper in the brachial plexus at the level of trunk and division. But the earlier time to achieve the sensory block than motor in present study, as compared to theirs, can be attributed to the mixture of local anesthetics which were used.

The duration of analgesia in present study was demonstrated that mean duration of analgesia was significantly longer in group-D (11.40±0.844) than that produced by group-F (8.62±1.74). P<0.001, which was highly significant between two groups.

As compared to the study, the duration of analgesia with local anesthesia plus dexamethasone in brachial block in the study by Shrestha BR et al was 12 hrs.[15] As compared to the study done by Islam et al, who achieved 11.87±.53hrs in local anaesthetic plus dexamethasone group.[16] Both the study was nearly matched with this present study. Similarly many previous studies, Birader et al (326±58.6 min), Pathak et al (834±78.1 min), Parrington et al (332min) reported early onset and marked prolonged supraclavicular brachial plexus block without any unwanted effects by using dexamethasone to local anesthesia[11,17,21]. Regarding the duration of analgesia with fentanyl in brachia plexus block in a study by SP Singh and colleagues, they found the duration was maximum with the addition of fentanyl to local anesthetic (7.28±0.55 hrs).[22] Similar result was depicted in a comparative study carried out by Chavan and colleagues to evaluate the analgesic efficacy and side effects of addition of fentanyl to local anaesthetics[14]. The study revealed that mean duration of analgesia was extended (695±85 min), if fentanyl is added to local anesthetics without increasing the side effects, however onset time of

analgesia was prolonged. Both the results nearly matched with the present study. Similarly, there were number of study regarding duration of analgesia, such as in Ahmed et al was 10±1.5 hrs and Sharker et al was 11 hrs, Denz et al was 10.1 hrs[13,12,23] These results were also nearly matched with this present study.

Regarding the complications the present study was showing side effects of 1(1.5%) case of hematoma in group-F and ptosis was found in 5(3.8%) cases in each groups. All above side effects were related to procedure rather than drug. Others side effects like nausea, vomiting, pruritus, respiratory distress, dryness of mouth, LA toxicity, pneumothorax was not found in both groups.

The side-effects reported after opioids administration in a study done by Bazin et al, was pruritus (1), nausea (2), vomiting (3).[24] However, such side-effects were relatively rare and their incidence was similar to that reported previously.[25] The serious potential risk of opioid administrations respiratory depression, although it seems a small risk in young patients given the doses of opioids currents used. Moreover, all the side-effects observed in Bazin et al study took place during the first 6h following the injection. This suggests that blood level became very low after this time. Regarding the safety of dexamethasone use in nerve sheath may raise some concerns. In Sugita K et al study, after approximately 2000 intrathecal injection of dexamethasone (8mg) in 200 patents for treatment of posttraumatic visual disturbance, no neurological disorder found at 1-month follow up. Nerve injury is a rare complication of dexamethasone injection, and it usually occurs in the context of needle trauma. The neurological risk, if any, of dexamethasone thus appears to be small[26].

In the present study the baseline characteristics were within normal value between two groups. The mean difference of pulse and blood pressure were not statistically significant ($p>0.05$), which indicates that almost similar pulse rate and blood pressure were found between two groups, which support the Jarbo et al.Study[18]. In this study it was observed that per-operative mean pulse rate changes at different times were almost similar between two groups no significant ($p>0.05$) mean difference was found. Similarly mean systolic blood pressure and diastolic blood pressure changes at different times were almost consistent between two groups and no significant ($p>0.05$) difference were found. The mean $SP0_2$ and respiratory rate changes at different times were almost regular between two groups and no significant ($p>0.05$) difference were found. Jarbo et al**.** found the heart rate, systolic blood pressure, diastolic blood pressure, oxygen saturation were comparable between groups and did not change significantly in the Intraoperative or postoperative period, which is closely resemble with the present study[18]. In another study Dogru et al. showed stable hemodynamic parameters in their study groups, which support the present study findings.[27]

Limitation and recommendations of the study:

It was a single center study. Relative perception of pain by the patients may have caused biasness regarding postoperative pain assessment by VAS and VRS and that could have affected the findings of the present study. Availability of an ultrasound and/or peripheral nerve stimulator would have helped to achieve more accurate nerve blocks.

Large scale multicenter double blind study with nationally representative sample and nerve stimulator or ultrasound guided techniques, find more accurate result to have a conclusion.

Conclusion

In this comparative study, main comparison was done on duration of analgesia by use of Dexamethasone and Fentanyl as an adjuvant with Bupivacaine and Lignocaine in Supraclavicular brachial plexus block. In our study Dexamethasone was more prolonged duration of analgesia than Fentanyl. Onset of sensory and motor block and hemodynamic stability was almost similar in both groups.

So, on the basis of student's t-test and Chi-square test, we can conclude that there was significantly prolonged duration of analgesia and better onset of sensory and motor block in Dexamethasone group than in Fentanyl group without any unwanted effects.

Discloser

All the authors declared no competing interest.

References

1. Wedel DJ, Harlocker TT, Nerve blocks. In: Miller RD, Eriksson LI, Fleisher LA, Wiener-Kronish JP, Young WL, eds. Miller's Anesthesia. USA: Elsevier Churchill-Livingstone; 7th Ed.2010; 1639-1674.
2. Madison SJ, Llfeld BM, Peripheral nerve blocks. In: Butterworth JF, Makey DC, Wasnick JD, eds. Morgan & Mikhail's Clinical anesthesiology. USA: Appleton & Lange; 5th Ed.2013; 975-1022.
3. Benzon Honorio T.and Raja Srinivas, Local Anesthetic and Nerve Blockade. In: Essentials of Pain Medicine & Regional Anesthesia, Churchill Livingstone, Newyork, 1st Ed. 2001; 393-414.
4. Jeon DG, Kim W. Case series: ultrasound-guided Supraclavicular block in 105 patients. *Korean J Anesthesiol*. 2010; 58(3): 267-271.
5. Singh A, Gupta R, Vashisth M, Singh S, Kumari A, Aujla KS. Comparison of Effectiveness of Brachial Plexus Block by Supraclavicular and Axillary Approach Alone or in Combination. *J Anaesth Clin Pharmacol*. 2010 ; 26(1): 31-34.
6. Yang CM, Kwon HU, Cho CK, et al. A comparison of Infraclavicular and Supra-clavicular approaches to the brachial plexus using neuro stimulation. *Korean J Anesthesiol* .2010; 58(3): 260-266.
7. Neal JM, Gerancher JC, Hebl JR, IIfield BM, et al. Upper Extremity Regional Anesthesia: Reg Anaesth Pain Med.2009; 34(2): 134-170.
8. Neal MJ, Hebl JR, Gerancher JC, Hogan QH. Brachial Plexus Anesthesia: Essentials of Our Current Understanding. Reg Anesth and Pain Med.2002; 27: 402–428.
9. Covino BG, Wildsmith JAW. Clinical pharmacology of local anesthetic agents. In: Cousins MJ, Bridenbaugh PO, eds. Neural blockade in clinical anesthesia and management of pain. Philadelphia: Lippincott-Raven Publishers; 3rd Ed.1998; 97-128.
10. Prithvi PR. Pain medicine a comprehensive review.2005; New York: Mosby publication.
11. Biradar PA, Kaimar P, Gopalakrishna k. Effect of Dexamethasone added to Lignocaine in Supraclavicular brachial plexus block: A prospective, randomized, double-blind study.2013; *Indian J Anaesth*; 57:180-184.
12. Sarker D, Khurana G, Chaudhary A, Sharma JP. A comparative study on the effects of adding fentanyl and Bupivacaine to local anaesthetics in brachial plexus block. *Journal of clinical and Diagnostic Research*.2010; 4:3337-3343.
13. Ahmed NU, Hossain M, Akhtaruzzaman AKM, Mondol MK , Khatun UHS. Addition of clonidine or fentanyl with Bupivacaine for Supraclavicular brachial plexus block in upper limb surgery-a randomized comparative study.Journal of BSA.2011; 24(1).
14. Chavan SG, Koshire AR, Panbude P. Effect of addition of Fentanyl to local anesthetic in brachial plexus block on duration of analgesia. *Anesthesia: Essays and Reaches*.2011; 5(1): 39-42.
15. Shrestha BR, Mahrjan SK and Tabedar S. ' Supraclavicular brachial plexus block with and without dexamethasone- A comparative study', Kathmandu University Medical Journal.2003; 1(3); 158-160.
16. Islam SM, Hossain MH MD, Maruf AA, 2011. Effect of addition of Dexamethasone to local anesthesia in Supraclavicular brachial plexus block. *JAFMC Bangladesh*.2011; 7(1).
17. Pathak RG, Satkar AP, Khade RN. Supraclavicular brachial plexus block with & without Dexamethasone-A Comparative Study. International Journal of Scientific and Research Publication.2012; 2 (12), 2250-3153.
18. Jarbo K, Bara YK, Panda NB. Brachial plexus block with midazolum and Bupivacaine improves analgesia. *Can J Anaesth*.2005; 52: 822-6.
19. Shrestha BR, Maharjan SK, Shrestha S, Gautam B, Thapa PB, Joshi MR. 'Comparative study between tramadol and

dexamethasone as an admixture to bupivacaine in supraclavicular brachial plexus block', *J Nepal Med Assoc*. 2007; 46(168); 158-164.

20. Winnie AP, Tay CH, Patel KP, Ramamurthy S.Durrani z. Pharmacokinetics of local anaesthesia during plexus block. Anaesth Analg.1977; 56: 852-61.
21. Parrington SJ, Donnell DO, Chan VW.S, Shreves DB, Subramanyam R, Brull R. Dexamethasone added to mepivacaine prolongs the duration of analgesia after Supraclavicular brachial plexus blockade. *Reg Anesth Pain med*.2010; 35: 422-426.
22. Singh SP, Singh V, Kaushal D, Jafa S. Comparison of Fentanyl-Bupivacaine and Alkalinized Bupivacaine in Supraclavicular brachial plexus block: A double blind, randomized controlled trial. Available from: http://www.aja-online.com.pdf. Accessed on 20.6.2011.
23. Deniz K, Fazl B, Sibel B, Fuat G, Ayla T. Addition of Fentanyl to Bupivacaine prolongs anesthesia and analgesia in axillary brachial plexus block. *Reg Anesth Pain Med*.2001; 26: 434–438.
24. Bazin BZ, Massoni C, Bruelle P, Fenies V, Groslier D, Schoeffler P. The addition of opioids to local anesthetic in brachial plexus block: the comparative effects of morphine, buprenorphine and suefentanil. Anaesthesia. 1997; 52: 858-862.
25. Gobeaux D, Landais A, Bexon G. Addition of fentanyl to adrenalized lidocaine for the brachial plexus block. Anesthesiology. 1987; 35: 195-9.
26. Sugita K, Kobayash S, Yokoo A, et al. Intrathecal steroid therapy for posttraumatic visual disturbance. Neurochrurga(stuttg). 1983; 26:112-7.
27. Dogru K, Duygulu F, Yildiz K, Kotanoglu MS, Madenoglu H, Boyaci A, 2003, 'Hemodynamic and blockade effect of high/low epinephrine dose during axillary brachial plexus blockade with lidocaine 1.5%: A randomized, double blinded study', *Anesth Pain Med*.2003; 28(5): 401-405.

Original Article

Effect of Intrathecal Dexmedetomidine as Adjuvant to Hyperbaric Bupivacaine for Total Abdominal Hysterectomy: A Double Blind Control Study

Abdul Jabbar[1], Kawsar Begum[2], Rona Laila[3], Kawsar Sardar[4], Raihan Uddin [5], Mushfiqur Rahman[6], Muslema Begum[7]

[1]Medical officer, [4]Professor, [5,6]Associate Professor, Department of Anaesthesiology & SICU, BIRDEM. [2]Classified specialist in anaesthesiology, CMH, Dhaka. [3]Associate Professor, Department of Gynae & obstetrics, BIRDEM. [7]Assistant Professor, Department of Anaesthesiology & ICU, DMCH.

Corresponding author: Dr. Md. Abdul Jabbar, E-mail: jabbardr32@gmail.com

Abstract

Aims and Objectives: *The aim of this study is to evaluate the effects of Dexmedetomidine as intrathecal adjuvant to Bupivacaine in spinal anaesthesia on the onset and duration of sensory and motor block in Total Abdominal Hysterectomy (TAH).*

Materials and Method: *Sixty patients of ASA status I and II posted for Total Abdominal Hysterectomy were randomly divided into three groups. Group C were administered Hyperbaric Bupivacaine 15mg plus 0.5 ml normal saline, Group D was administered Hyperbaric Bupivacaine 15mg + Dexmedetomidine 10µg in 0.5 ml normal saline. Duration and quality of sensory and motor block were assessed.*

Results: *Sensory and motor block in group D patients were longer than group C patients.*

Conclusion: *Intrathecal dexmedetomidine when added to bupivacaine heavy (0.5%) provide better and prolonged analgesia.*

Keyword: *Total Abdominal Hysterectomy, Bupivacaine, Intrathecal, Dexmedetomidine.*

(JBSA 2019; 32(1): 18-23)

Introduction

Subarachnoid block is on of the most commonly used technique for Total Abdominal Hysterectomy [1]. It can also be done with general anaesthesia, epidural anaesthesia. Perioperative pain control is a major problem in these surgeries because of relatively short duration of action of local anaesthetics, so early analgesic drugs or intervention is needed in the postoperative period. A number of adjuvants, such as clonidine and midazolam, and opioid's have been studied to prolong the effect of spinal aesthesia [2-5]. Now a days, although fentanyl used commonly but its intrathecal use has been shown to be associated with side effects like pruritus and respiratory depression [6].

Dexmedetomidine, a new highly selective á2-agonist, is under evaluation as a neuroaxial adjuvant as it provides stable hemodynamic conditions, good quality of intraoperative and prolonged postoperative analgesia with minimal side effects. As because its effect on spinal á-2 receptors, dexmedetomidine mediates its analgesic effects. Based on earlier human studies, it has been shown that a low dose of 10 ìg, dexmedetomidine provides a prolonged anaesthesia and good quality postoperative analgesia when used as an intrathecal adjuvant to bupivacaine with minimal effects on the hemodynamic status of the patient[7-9].

Therefore, our present study is being undertaken to evaluate the effects of dexmedetomidine as intrathecal adjuvants to bupivacaine.

Methods

This randomized prospective clinical study was carried out in the department of Anaesthesia

Analgesia and SICU, BIRDEM General Hospital, Shahbag Dhaka. The approval of the Hospital Ethical Committee was duly taken before carrying out the study. Informed consent was taken from patients from july 2016 to jun 2017. Sixty women aged between 35-60 years and weight between 50-70 kg, height of 150 cm to180 cm of ASA physical status I and II with Mallampatti grade I and II scheduled for elective TAH was included. Patient with history of Diabetics or hypertension were also included in our study. Exclusion criteria were patients presenting with known contraindications to spinal anaesthesia. Patients on therapy with adrenergic receptor antagonist, calcium channel blocker, ACE inhibitor, with history of heart block or dysrhythmia, hypersensitivity to any of the study drugs and who refused to consent to be part of study are also excluded. The study population was randomized using random number table generated from computer software. Random intervention assignment slip was placed in serially numbered opaque and sealed envelopes. These envelopes were opened following enrolment of the case. After recruitment 60 patients were randomly divided into two groups (n= 30) patients each. Patients in group C received Hyperbaric Bupivacaine 15mg plus 0.5 ml normal saline, group D Hyperbaric Bupivacaine 15mg + Dexmedetomidine 10 ìg in 0.5 ml normal saline intrathecally.

All the patients were kept for 10 hours fasting prior to surgery. Anti HTN were continued but morning insulin were omitted. Tablet Alprazolam (0.25 mg) was given as a premedication a night prior to surgery. Preloading was done with Ringer lactate solution (10 ml/kg body weight). Routine monitoring including non-invasive blood pressure (NIBP), ECG, heart rate and pulse oximetry was done.

Under proper aseptic conditions, spinal anaesthesia was given at the level of L3-L4 interspace in sitting position using a midline approach by a 25G Quincke spinal needle. The drug was injected slowly over 10-15 seconds with the bevel of the needle pointing upwards and all patients were made supine immediately. All patients received supplemental oxygen via mask (4 l/min).

The intrathecal drug formula was prepared by a separate anaesthesiologist under strict aseptic conditions. The anaesthesiologist who administered anaesthesia was blinded to the group allocation. After administering anaesthesia the vital signs of the patient were recorded. Vitals were recorded every 2 minutes up to the 10th minute and every 5 minutes thereafter up to 20 minutes. Beyond 20 minutes the vitals were recorded every 20 minutes till the time of discharge from PACU (Post Anaesthesia Care Unit).

The sensory dermatome level was assessed by loss of pin prick sensation to a 23 G hypodermic needle.

The motor dermatome level was assessed according to the Bromage [6] Scale:

- Bromage 0-Patient able to move hip, knee and ankle.
- Bromage 1- Patient unable to move hip, but able to move knee and ankle.
- Bromage 2- Patient unable to move hip and knee but able to move the ankle.
- Bromage 3- Patient unable to move hip, knee and ankle.

Time to reach the sensory block up to highest dermatome level and motor block of bromage 3 level was noted. On achieving T6 sensory blocked level, the surgical procedure was carried out. Sensory and motor status was assessed prior to the spinal injection. After spinal injection every 2 minutes for the first 10 minutes, every 5 minutes for the next 10 minutes and thereafter every 20 minutes until the time to regression of sensory level to dermatome S2 and motor scale to bromage 0 was noted in PACU. All durations were calculated taking the spinal injection time as time zero. If the sensory levels were not equal bilaterally the higher dermatome level was used for statistical analysis. Sedation was assessed by using Modified Ramsay sedation score each time the vitals were noted.

Modified Ramsay sedation scale[9]:

1. Anxious, Agitated, Restless.
2. Cooperative, Oriented, Tranquil.
3. Responds to commands only.
4. Brisk response to light glabellar tap or loud noise.
5. Sluggish response to light glabellar tap or loud noise.
6. No Response

Postoperatively, the pain scoring was done by using visual analog scale (VAS)[10] . In it 0 = no pain, 10 = sever pain). Also the vital recordings of the study until the patient was discharged from PACU. Time of administering the first dose of rescue analgesia was noted. Paracetamol was given intravenous as rescue analgesia when VAS was greater than 4.

For the purpose of the study hypotension was defined as a decrease in systolic blood pressure more than 30% of the baseline value or fall below 90 mmHg, which was treated by inj. Ephedrine Hydrochloride 5 mg iv. incremental and fluid infusion. Bradycardia was defined as heart rate less than 60/min but the intervention with iv atropine 0.6mg was done only when heart rate fell below 50/min.

Side effects including nausea, vomiting, bradycardia, hypotension, pruritus, respiratory depression, shivering were assessed both intra-operatively as well as post-operatively. All the patients were examined by the anaesthesiologist up to 24 hours of the spinal block and were assessed for any postdural puncture headache or transient neurologic symptoms. Hemodynamic status of the patient, sedation score and side effects if any were noted.

All data were collected in a pre-designed data collection form. Results were compiled and analyzed using student's t test or Chi square test, Fisher exact test. P value <0.05 was considered statistically significant. The statistical analysis was done by using software SPSS (Statistical Package for Social Sciences) version 16 and Microsoft excel 2013.And we use web site https://www.graphpad.com/quickcalcs, https://www.socscistatistics.com/tests/

Results

Both groups were comparable as regard to age, height and weight. There were no significant differences in heart rate, MAP, SPO2 between the groups. Intergroup analysis showed a statistically significant difference in the highest level of sensory blockade amongst group C and D (p = 0.004).Two segment regression time was more in dexmedetomidine group in comparison to control group.

Onset time to both sensory and motor block was faster on group D than group C. Regression time of motor block to bromage 0 was slow and time to rescue analgesia was longer in dexmedetomidine group in comparison to control groups. Sedation score was more in dexmedetomidine group. VAS score was lower in dexmedetomidine group than control groups. In our study the incidence of bradycardia, hypotension, nausea, vomiting, shivering was not statistically significant.

Table I *Demographic profile*

Parameters	Group C	Group D	P value
Age (years)	39.16±10.12	43.6±10.5	0.100
Weight (kg)	56.87±7.20	56±7.82	0.655
Height (cm)	156.47±6.40	158.43±5.92	0.223
ASA(I:II)	21:9	18:12	0.416
Duration of surgery (min)	98±17.84	97.67±15.24	0.938

Values were expressed as mean±SD. Data were analyzed by student's- t test. ASA grading done by chi-square test. Values were regarded as significant if p< 0.05.

Table II *Characteristics of spinal block*

Variable (min)	Group C	Group D	P value
Time of onset of sensory block	2.94±0.44	2.69±0.63	0.08
Time of onset of motor block	3.61±0.65	3.30±0.57	0.054
Onset time to reach T6 level	8.11±1.09	6.22±0.42	0.0001
Time of 2 segment regression	94.1±12.2	396.67±24.12	0.0001
Time of regression to S1	220.2±50.4	380.6±48.2	0.0001
Time of regression to Bromage 0	145±23.6	386±30.6	0.0001
Time to rescue analgesia	203.2±27.1	312±48.6	0.0001

Values were expressed as mean±SD. Data were analyzed by student's t -test. Values were regarded as significant if p< 0.05.

Table-III *Highest dermatome level of sensory block*

Highest level of sensory dermatome	Group D	Group D	Total
T4	4	9	13
T5	10	18	28
T6	16	3	19

Data were analyzed by AVONA -test. Values were significant if $p < 0.05$. ($p = 0.004$).

Table IV *Adverse effect of spinal block, (values are numbers)*

Adverse effect	Group C	Group D	P value
Hypotension	7(23%)	5(16.66%)	0.518
Bradycardia	3(10%)	4(13.33%)	0.687
Resp. depression	0	1(3.33%)	›.05
Nausea, vomiting	3(10%)	1(3.33)	0.30
Dry mouth	3(10%)	2(6.66%)	0.640
Shivering	6(20%)	2(6.66%)	0.128
Sedation	2(6.66%)	4(13.33%)	0.389

Results were expressed in number and percentages in parentheses. Data were analyzed by chi-square test, Fisher exact test. Values were regarded as significant if $p< 0.05$.

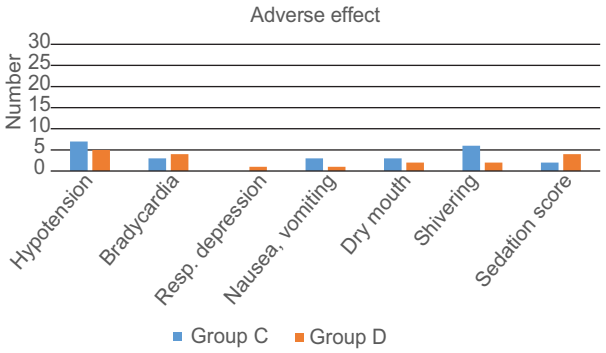

Fig 1 *Showing adverse effect in both group*

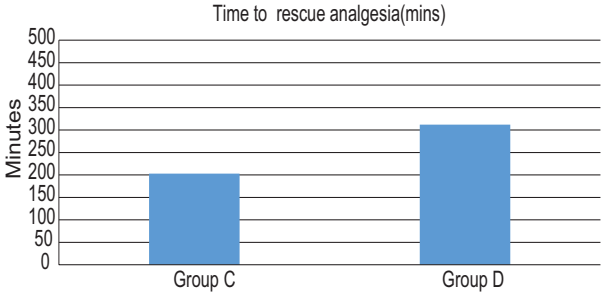

Fig 2 *Time of first rescue analgesia (if VAS ≥4)*

Discussion

The results of our study show that the supplementation of intrathecal bupivacaine with 10 ìg dexmedetomidine significantly prolonged both sensory and motor block compared with control group. Patients in the group of dexmedetomidine had reduced post-operative pain scores and a longer pain free period than those who received spinal bupivacaine alone. No hemodynamic instability or severe adverse effects were reported in any group. Time taken to achieve peak level of sensory and motor blockade was earlier in dexmedetomidine group than other group.

Kanazi et al. used a small dose of dexmedetomidine (3mcg) with bupivacaine intrathecally in humans .They found shorter onset of motor block and prolongation in the duration of motor and sensory block with haemodynamic stability and lack of sedation [11]. And that is similar in our study where we did with dexmedetomidine 10 ìg. Our study were also similar with the study of Al-Mustafa M M et al.[12]. They studied the effect of adding different doses of dexmedetomidine (5ìg or 10ìg) to bupivacaine (12.5mg) for neuroaxial

anaesthesia in urological procedure. They observed that dexmedetomidine prolongs the duration of spinal anaesthesia in dose-dependent manner.

El-Hennawy AM et al [13] found that addition of clonidine or dexmedetomidine to bupivacaine prolongs caudal analgesia in children. Alka Shah et al.[14] studied Hemodynamic effects of intrathecal dexmedetomidine added to ropivacaine intraoperatively and found that it prolonged the postoperative analgesia. Gehan A. Tarbeeh et al.[15] studied the effects of intrathecal bupivacaine–fentanyl versus bupivacaine dexmedetomidine diabetic surgical patients and concluded that dexmedetomidine produced better block characteristics. This was similar to our study in which dexmedetomidine group showed a statistically significant prolongation of both sensory and motor regression when compared to bupivacaine alone group.

Al Ghanem et al [16] conducted a three group study as- control, dexmedetomidine, fentanyl and observed that the onset time of bromage 3 motor block was also not different between dexmedetomidine and fentanyl group. Regarding time taken to achieve peak motor blockade there was no statistically significant difference was seen amongst all the three groups. The time to regression of sensory block to S_1 segment was significantly longer in dexmedetomidine group than in fentanyl group & control group ($p < 0.001$). The regression time to reach bromage 0 in dexmedetomidine group was significantly longer than that for fentanyl group ($p<0.001$). In our study we also found statistical significant difference ($p < 0.001$) in both group. Jain et al [17] studied the perioperative effect of epidural dexmedetomidine with intrathecal bupivacaine on hemodynamic parameter and quality of analgesia and found that it is better than other adjuvants.

Bradycardia was seen in total number of 7 patients in our study and was more in dexmedetomidine group (4 patients) compared to control group, but it was transient and did not require any intervention. There was no statistically significant difference noted amongst the groups.

Nausea and vomiting was highest in control group (3 patients) and least in dexmedetomidine group. It was also not statistically significant on analysis ($p>0.05$). Sedation was more in dexmedetomidine group (4 patients) then control group though statistically not significant.

Conclusion

We conclude from our study that supplementation of bupivacaine spinal block with a low dose of 10ìg intrathecal dexmedetomidine produces a significantly longer duration of sensory and motor block than bupivacaine along. It provides hemodynamically stable conditions, minimal side effects, and excellent quality of postoperative analgesia. Thus, 10 ìg dexmedetomidine seems to be an attractive adjuvant in several gynecological operation as we conduct in total abdominal hysterectomy.

Limitations of the study

This study was not without limitation. The limitations of the studies were as follows:

- Small sample size of the study population.
- It was a single centre study. Only patients admitted in BIRDEM General Hospital, Shahbag Dhaka were taken for the study. So this will not reflect the overall picture of the country. A large scale study needs to be conducted to reach to a definitive conclusion
- Study was conducted in a tertiary care hospital which may not represent primary or secondary centre.
- Sample were taken by purposive method in which question of personal biasness might arise.
- Others limitation were short duration of study and limited investigation facility.

References:

1. Bauchat JR, et al. Evidence-based anesthesia for major gynecological surgery. Anesthesiol Clin.2015 Mar; 33(1):173-207
2. Carollo DS, Nossaman BD, Ramadhyani U. Dexmedetomidine: a review of clinical applications. Curr Opin Anesthesiol. 2008: 21:457–461
3. Kaabachio, Zarghournia, Ouzeini R, Abdel Aziz A B, Chattaoui O, Kokki H 2007 Clonidine 1 microg/kg is a safe and effective

adjuvant to plain bupivacaine in spinal anesthesia in adolescents Anesth Analg.105: 516–9

4. Ho K M, Ismail H 2008 Use of intrathecal midazolam to improve perioperative analgesia: a meta-analysis Anaesth Intensive Care.36:365–73
5. Boussofara M, Carlès M, Raucoules-Aimé M, Sellam MR, Horn JL. Effects of intrathecal midazolam on postoperative analgesia when added to a bupivacaine-clonidine mixture. Reg Anesth Pain Med 2006; 31:501-5
6. Gwirtz et,al. safety and efficacy of intrathecal opioid analgesia for acute postoperative pain: Seven years' experience with 5969 Surgical patients at Indiana university hospital. Anesth Analg.1999; 88:599-604
7. Robert D. Sanders, Mervyn Maze. Alpha$_2$-agonists and other sedatives and amnestics. In.: Alex S, Evers, Mervyn Maze, Evan D. Kharasch, editor .2nd edition. Anesthetic Pharmacolo.gy .Cambridge University Press; 2011.pp 478-492
8. Anand VG, Kannan M, Thavamani A, Bridgit MJ. Effects of dexmedetomidine added to caudal ropivacaine in paediatric lower abdominal surgeries. Indian J Anaesth.2011; 55:340-6
9. Panzer O, Moitra V, Roberet N Sladen. Pharmacology of sedative-analgesic agents – Dexmedetomidine, remifentanil, ketamine, volatile anaesthetics and the role of Mu antagonists. Critical Clin.2009; 25:451-69.
10. Stinson JN, Kavanagh T, Yamada J et al. Systematic review of the psychometric properties, interpretability and feasibility of self-report pain intensity measures for use in clinical trials in children and adolescents. Pain.2006:125(1-2):143–57.
11. Kanazi GE, Aouad MT, Jabbour-Khoury SI, Al Jazzar MD, Alameddine MM, Al-Yaman R, et al. Effect of low-dose dexmedetomidine or clonidine on the characteristics of bupivacaine spinal block. Acta Anesthesiologica Scandinavica.2006; 50(2):222-7.
12. Al-Mustafa MM, Abu-Halaweh SA, Aloweidi AS, Murshidi MM, Ammari BA, Awwad ZM, et al. Effect of dexmedetomidine added to spinal bupivacaine for urological procedure. Saudi Med J.2009; 30:365-70.
13. El-Hennawy AM, Abd-Elwahab. Addition of clonidine or dexmedetomidine to bupivacaine prolongs caudal analgesia in children. Br J Anaesth.2009; 103;268-74.
14. Alka Shah, Ila Patel, Rachana Gandhi et al. Haemodynamic effects of intrathecal dexmedetomidine added to ropivacaine intraoperatively and for postoperative analgesia. International Journal of Basic & Clinical Pharmacology .January-February 2013: Vol 2: Issue 1, 26-29.
15. Gehan A. Tarbeeh, Ayman A. Mohamed et al. Effects of intrathecal bupivacaine–fentanyl versus bupivacaine–dexmedetomidine in diabetic surgical patients. Egyptian journal of Anaethesia.2013; 29, 13-18.
16. Al-Ghanem SM, Massad IM, Al-Mustafa MM, Al-Zaben KR, Qudaisat IY, Qatawneh AM and Abu-Ali HM. Effect of Adding Dexmedetomidine versus Fentanyl to Intrathecal Bupivacaine on Spinal Block Characteristics in Gynecological Procedures: A Double Blind Controlled Study. Am J Appl Sci.2009; 6: 882-7.
17. Jain D, Kumar D, Khan RM, Kumar N et al. Perioperative effect of epidural dexmedetomidine with intrathecal bupivacaine on haemodynamic parameter and quality of analgesia. South Afr J Anaesth Analg. 2012;18(1):105-109.

Original Article

Efficacy of Intravenous Paracetamol Pretreatment for Prevention of Pain on Propofol Injection: A Randomized Placebo-Controlled Study

Muhammad Sazzad Hossain[1], Md. Shahidul Islam[2], Mohammad Mamunur Rashid[3], Md. Anisur Rahman Babu[4], Devashis Saha[5]

[1]Associate Professor and HOD, Department of Anesthesiology, National Institute of ENT. Tejgaon, Dhaka, [2]Professor of Pediatric Anesthesiology, Dhaka Shishu Hospital, [3]Junior Consultant, department of anesthesiology. NIENT, [4]Medical officer, department of anesthesiology. NIENT, [5]Research officer, department of anesthesiology. NIENT

Corresponding Author: E mail: sazzadicu786@yahoo.com

Abstract

Background and aim of study: *Propofol, most frequently used intravenous anesthetic, is used for induction of routine elective surgical procedure. Pain on propofol injection (POPI) still remains a considerable concern for the anesthesiologist. A number of techniques has been tried to minimize propofol-induced pain with variable results. Aim of this prospective randomized study is to observe the efficacy of intravenous paracetamol injection as pretreatment for the prevention of pain caused by the propofol injection.*

Materials and Methods: *A total of 80 patients were selected in this study with the age group of 20 to 50 years of either sex, ASA grade I and II, scheduled for routine elective surgical procedure under general anesthesia with endotracheal intubation. The patients enrolled were divided randomly into two groups of 40 patients each. Group I received 50 mg of intravenous paracetamol in 10 ml. Group II (placebo group) received 10 ml of 0.9% intravenous normal saline. The patients were asked to report their pain during injection of propofol according to the McCririck and Hunter S scale.*

For all statistical tests, $p<0.05$ was taken to indicate a significant difference.

Results: *The incidence of pain experienced in paracetamol group is 25% patients and in saline group is 70% patients, which is statistically significant $p<0.05$. The severity of POPI is also lower in paracetamol group than the saline group ($p<0.05$). The incidence of mild and moderate pain in paracetamol groups versus saline group was 17.5% versus 45% and 7.5% versus 25% respectively $p<0.05$. There was no severe pain recorded in any groups.*

Conclusion: *Pretreatment of intravenous paracetamol is effectively reduces pain on propofol injection.*

Keywords: *Paracetamol, propofol, pain on propofol injection (POPI).*

(JBSA 2019; 32(1): 24-27)

Introduction

Patient satisfaction with perioperative care is assuming more importance in the recent years. Propofol is an intravenous (IV) sedative and hypnotic agent commonly used for induction of general anesthesia. Its rapidity and reliability in causing loss of consciousness and quick smooth recovery are favorable features. However pain on injection when given intravenously is a common problem with propofol, the incidence of which is between 40-86%.[1] The mechanisms of pain on propofol injection are not known completely but a number of factors may be responsible for the pain. Several strategies to attenuate this pain include the use of antecubital vein,[1] with venous occlusion,[1] lignocaine,[1,2] cooling[3] or warming[4] of the drug, diluting propofol solution,[5] pretreatment with antiemetics,[6,7] metoclopramide,[8] opioids,[8] ketamine,[1,9] flurbiprofen[10]and paracetamol.[11] Other alternative strategies include various formulations of propofol emulsions such as nano emulsions.[12]

It has been shown that paracetamol selectively suppresses peripheral PGE_2 and increases COX 2 gene expression in a clinical mode of acute inflammation.[13] Propofol characteristically causes vascular pain that occurs in response to prostanoids, particularly PGE_2, which is selectively suppressed by paracetamol.[14] This study was undertaken to evaluate the efficacy of intravenous paracetamol 50mg in comparison with placebo (normal saline) on incidence and severity of pain on propofol injection (POPI).

Materials and methods

The present prospective, randomized study was conducted in National Institute of ENT Dhaka, during the period of August to October 2017. After obtaining written informed consent, a total of 80 patients, ASA grade I and II were taken up in the study with the age group of 20 to 50 years of either sex scheduled for routine elective surgical procedure under general anesthesia with endotracheal intubation. Patients excluded were those who had history of adverse effects to propofol, study drugs, presence of hepatic or renal dysfunction, patients with seizure disorder, history of drug abuse and uncontrolled hypertension. Pre-anesthetic check-up was done a day before surgery including a detailed history, a thorough physical and systemic examination. Routine investigations included CBC, routine urine test, electro-cardiogram, serum urea, serum creatinine, blood sugar and chest radiograph. The patients were fasted for 8 hours preoperatively.

In the operating room, monitors including non-invasive arterial pressure, electrocardiography and pulse oximetry were applied. The patients enrolled were divided randomly into two groups of 40 patients each. Group I was selected for pretreatment with 50 mg of intravenous paracetamol in 10 ml volume and group II was selected for pretreatment with 10 ml of intravenous normal saline. A 20 G intravenous cannula was placed in a vein on the dorsum of the no-dominant hand and Ringer's Lactate solution was started 100 ml/ hour. The mid arm of the side on which cannula was placed on the dorsum of hand was occluded by a BP cuff. The study drug was then injected and maintained in the vein for 1 minute. After 1 minute, the occlusion was released and one fourth of total calculated dose of propofol was injected over 5 seconds. Then the patients were asked by a blinded investigator to any sensation of pain during injection of propofol as per the McCririck and Hunte S scale.[15]

After the assessment of pain, induction of anesthesia was completed with the remaining dose of propofol, and tracheal intubation was facilitated with the injection of succinylcholine. Anesthesia was maintained with injection of fentanyl, vecuronium, oxygen, nitrous oxide (66%) and halothane. When surgery was completed general anesthesia was reversed as usal.

Grading of pain: As per McCririck and Hunter S scale[15]

0= No pain

1=Mild pain (pain reported only in response to questioning without any behavioral signs)

2= Moderate pain (pain reported in response to questioning and accompanied by a behavioral sign or pain reported spontaneously without questioning).

3= Severe pain (strong vocal response or response accompanied by facial grimacing, arm withdrawal or tears).

Statistical analysis: For comparison of quantitative variables between the two groups, the unpaired t-test and for qualitative variables the Chi-squared test was used. The statistically significant level was $P<0.05$.

Results

There is no significant demographic difference between the groups (Table I).

Basal MAP and HR are comparable in both groups. There is no significant difference of MAP and HR between paracetamol and saline groups during pre-intubation or three minutes post-intubation period ($p>0.05$) (Table II).

The incidence of pain experienced in paracetamol group (group I) is 25% patients and in group II (saline group) is 70% patients, which is statistically significant $p<0.05$ (Table III). The severity of POPI is also lower in paracetamol group than the saline group ($p<0.05$) (Table III). The incidence of mild and moderate pain in groups I versus group II was 17.5% versus 45% and 7.5% versus 25% respectively $p<0.05$. There was no severe pain recorded in any groups.

Table I *Comparison of demographic data between the two groups*

Parameters	Group I (Parecetamol group) n=40	Group II (Saline group) n=40	p value
Age in years (mean±SD)	38.53±8.42	37.53±9.67	p>0.05
Weight in kg (mean±SD)	63.68±8.42	64.72±9.16	p>0.05
Sex (male/female)	25/15	24/16	p>0.05
ASA Physical status I/II	37/3	36/4	p>0.05

Table II *Changes of mean arterial pressure and heart rate between two groups*

Hemodynamic parameter	BasalGroup I / Group II	Pre intubation Group I / Group II	Post intubation Group I / Group II
Mean arterial pressure (MAP) mm Hg	94/97	90/92	105/108
Heart rate per minute	78/81	73/77	91/93

Table III *Incidence and severity of pain following propofol injection between two groups*

Characteristics of pain	Group I (Parecetamol group) n=40. Number and %	Group II (Saline group) n=40. Number and %	p value
No pain	30 (75%)	12 (30%)	p <0.05
Pain	10 (25%)	28 (70%)	p <0.05
Mild pain	7 (17.5%)	18 (45%)	p <0.05
Moderate pain	3 (7.5%)	10 (25%)	p <0.05
Severe pain	0	0	-

Discussion

Pain on propofol injection is a common problem, can be immediate or delayed. The immediate pain could be the result of a direct irritant effect, but the kinin cascade is probably the cause of delayed pain. The lipid solvent for propofol activates the plasma kallikrein–kinin system which results in bradykinin production that increases local vein permeability and dilation. The aqueous-phase propofol diffuses into more free nerve endings outside the endothelial layer of the vessel which is more permeable and dilated because of bradykinin effect, thereby intensifying pain on injection.

In present study, the overall incidence of pain on propofol injection experienced in paracetamol group is 25% patients and in saline group is 70% patients, which is statistically significant p<0.05. The severity of POPI is also lower in paracetamol group than the saline group (p<0.05). The incidence of mild and moderate pain in paracetamol groups versus normal group was 17.5% versus 45% and 7.5% versus 25% respectively p<0.05. There was no severe pain recorded in any groups.The study done by Canbay et al.[16] on efficacy of intravenous acetaminophen (paracetamol) and lidocaine on propofol injection pain and recorded the overall incidence of pain during IV injection of propofol in the control (saline) group was 64% compared with 22% in IV paracetamol and with 8% in lidocaine group, suggesting that IV acetaminophen injection is effective in reducing propofol injection pain compared with control. The results of present study correlated with the results of the study by Canbay O et al on prevention of POPI by paracetamol.

In the study conducted by Biswal S et al.[11] the overall incidence of POPI during IV administration of paracetamol is 56.7% compared to 26.7% with IV lignocaine group. In contrast to present study, the incidence of POPI is higher in the study

conducted by Biswal S et al. (25% versus 56.7%). Further study with large number of patients may be required for prevention of propofol injection pain by pretreatment with intravenous paracetamol.

A study done by Borazan et al, [17] they concluded pretreatments 1 min before propofol, paracetamol 1 mg/ kg and lidocaine 0.5 mg/ kg were equally effective in attenuating pain during intravenous injection of propofol whereas pretreatment with paracetamol 2 mg/ kg was shown to be the most effective treatment.

Conclusion

Pretreatment with a dose of 50 mg paracetamol intravenously administered with mid-arm occlusion applied for one minute before propofol administration can effectively reduce the incidence and severity of pain on propofol injection.

References

1. Jalota L, Kalira V, George E, Shi YY, Hornuss C, Radke O, et al. Prevention of pain on injection of propofol: Systematic review and meta analysis. BMJ 2011;342:1110.
2. Picard P, Tramèr MR. Prevention of pain on injection with propofol: A quantitative systematic review. Anesth Analg 2000;90:963 9.
3. Barker P, Langton JA, Murphy P, Rowbotham DJ. Effect of prior administration of cold saline on pain during propofol injection. A comparison with cold propofol and propofol with lignocaine. Anaesthesia 1991;46:1069 70.
4. Fletcher GC, Gillespie JA, Davidson JA. The effect of temperature upon pain during injection of propofol. Anaesthesia 1996;51:498 9.
5. Klement W, Arndt JO. Pain on injection of propofol: Effects of concentration and diluent. Br J Anaesth 1991;67:281 4.
6. Draškoviæ B, Kne•eviæ S, Radovanoviæ D, Rakiæ G. Ondansetron, alfentanil and nitrous oxide in the prevention of pain on injection of propofol. Srp Arh Celok Lek 2013;141:61 5.
7. Ahmed A, Sengupta S, Das T, Rudra A, Iqbal A. Pre treatment with intravenous granisetron to alleviate pain on propofol injection: A double blind, randomized, controlled trial. Indian J Anaesth 2012;56: 135 8.
8. Rasmussen KG, Ritter MJ. Anesthetic induced pain on injection in electroconvulsive therapy: Review of the literature and suggestions for prevention. J ECT 2014; 30:203 9.
9. Wang M, Wang Q, Yu YY, Wang WS. An effective dose of ketamine for eliminating pain during injection of propofol: A dose response study. Ann Fr Anesth Reanim 2013;32: e103 6.
10. Zhang L, Zhu J, Xu L, Zhang X, Wang H, Luo Z, et al. Efficacy and safety of flurbiprofen axetil in the prevention of pain on propofol injection: A systematic review and meta analysis. Med Sci Monit 2014;20:995 1002.
11. Biswal S, Moningi S, Ramachandran G. Effect of intravenous tramadol, acetaminophen in attenuating pain on propofol injection: Comparison with lignocaine: A randomized, Double-blind, controlled study. Karnataka Anaesth J 2015;1:118-22.
12. Rodrigues TA, Alexandrino RA, Kanczuk ME, Gozzani JL, Mathias LA. A comparative study of non lipid nanoemulsion of propofol with solutol and propofol emulsion with lecithin. Rev Bras Anestesiol 2012;62:325 34.
13. Lee YS, Kim H, Brahim JS, Rowan J, Lee G, Dionne RA. Acetaminophen selectively suppresses peripheral prostaglandin E2 release and increases COX 2 gene expression in a clinical model of acute inflammation. Pain 2007;129:279 86.
14. Ando R, Watanabe C. Characteristics of propofol evoked vascular pain in anaesthetized rats. Br J Anaesth 2005;95:384 92.
15. Mc Crirrick A, Hunter S. Pain on injection of propofol: the effect of injectate temperature. Anaesthesia 1990; 45: 443–4.
16. Canbay O, Celebi N, Arun O, Karagoz AH, F. Sarýcaoglu F,Ozgen S. Efficacy of intravenous acetaminophen and lidocaine on propofol injection pain. BJA 2008;100(1:)95-8.
17. Borazan H, Erdem TB, Kececioglu M, Otelcioglu S. Prevention of pain on injection of propofol: a comparison of lidocaine with different doses of paracetamol. Eur J Anaesthesiol. 2010 Mar;27(3):253-7.

Original Article

Role of Fentanyl With Bupivacaine During Spinal Anaesthesia for Caesarean Section in Reducing Hypotension

Col Md. Al Mamun[1], Lt Col Md Rabiul Alam[1] Maj Suraya Akter[1], Brig Gen Mozibul Haque[2]

[1]Classified Anaesthesiologist, Combined Military Hospital, Dhaka; [2]Adviser Anaesthesiologist, CMH, Dhaka

Corresponding Author: E-mail: mamun720@gmail.com

Abstract:

Background and Objectives: *The hypotension following spinal anaesthesia is a common problem in caesarean section. The combination of reduced dose of local anaesthetics with intrathecal opioids makes it possible to achieve adequate spinal anaesthesia with minimum hypotension. We investigated whether this synergistic phenomenon could be used to provide less frequent hypotension while incurring adequate spinal anaesthesia for caesarean section.*

Methods: *Sixty women scheduled for caesarean delivery (thirty in each group) were divided into two groups of patients who received a spinal injection of either 12.5 mg of hyperbaric bupivacaine or 10 mg of hyperbaric bupivacaine with 25 μg fentanyl added. Each measurement of a systolic blood pressure less than 95 mmHg or a decrease in systolic pressure of greater than 25% from baseline was considered as hypotension and treated with a bolus of 5 to 10 mg of intravenous ephedrine. The quality of surgical anaesthesia was evaluated also.*

Results: *Spinal block provided excellent surgical anaesthesia in almost all patients. Peak sensory level was higher (D_{2-3} vs. D_{4-5}) and motor block was more intense in the hyperbaric bupivacaine group; the patients from bupivacaine group were more likely to require treatment for hypotension (75% vs. 15%) and had more persistent hypotension (4.6 vs. 1.0 hypotensive measurements per patient) than patients in the reduced bupivacaine-fentanyl group. Mean ephedrine requirements were 15.0 mg and 3.5 mg, respectively. Patients in the bupivacaine group also complained of emetic effects more frequently than patients in the reduced dose bupivacaine-fentanyl group.*

Conclusions: *Bupivacaine 10 mg plus fentanyl 25 μg provided spinal anaesthesia for caesarean delivery with less hypotension and vasopressor requirements while ensuring excellent perioperative surgical anaesthesia.*

Key words: *Caesarean delivery; spinal anaesthesia; bupivacaine, fentanyl.*

(JBSA 2019; 32(1): 28-34)

Introduction

A spinal anaesthesia for caesarean section has become increasingly popular and the recent decade has been the preferred technique for the majority of anaesthesiologist. This is primarily due to increased maternal mortality with general anaesthesia and benefits conveyed to the mother. But, spinal anaesthesia is associated with major or minor complications in the pregnant patient, the commonest being maternal hypotension. It is believed to occur in up to 95% of the patients and may lead to a reduction in utero-placental perfusion resulting in foetal acid-base abnormalities[3]. How important is this and what should we be doing to prevent it? Local anaesthetics plus opioids administered together intrathecally have been shown to have a synergistic analgesic effect[4,5,9]. Intrathecal opioids increase the quality of analgesia and reduces local anaesthetic requirements, with some studies showing favourable effects on haemodynamic stability[6,7,9,10]. Therefore, it may be possible to achieve spinal anaesthesia with less hypotension, by using a reduced (low) dose of local anaesthetic in combination with fentanyl. The

aim of this study was to test a reduced dose intrathecal bupivacaine in combination with intrathecal fentanyl for caesarean delivery both in terms of its feasibility as an anaesthetic and as its potential to minimize maternal hypotension.

Methods

The study included 60 ASA I healthy parturients between 18 and 40 years of age with similar demographic characteristics, scheduled for elective, semi urgent or urgent caesarean section. Complicated pregnancies such as multiple pregnancy, serious pregnancy induced hypertension, and placenta previa patients were excluded; patients with cardiac, renal, or other organ-system disease were also excluded from the study. Each patient received 10 mg metoclopramide intravenously before spinal block and a rapid intravenous infusion of 500 mL of saline solution were given in the operating room via an 18-gauge intravenous catheter. In addition to the loading dose of IV fluids, patients received a further saline solutions during the remainder of the operation. Only minimal sedative medications were administered during the operation (midazolam1-2 mg). Standard continuous electrocardiogram monitoring and pulse oximetry was included. Baseline maternal heart beat and blood pressure values were established before the lumbar puncture. The lumbar puncture was performed at the L2–3 (mostly patients with bupivacaine-fentanyl injection) or L3–4 interspace, with a 26-gauge B Braun needle, with the parturients in the sitting position. After confirming the correct placement of the spinal needle by aspiration of the cerebrospinal fluid (CSF) and after completion of the injection (the spinal volume was injected over 20–25 seconds) the patients were immediately returned to the supine position with 15 to 20 degrees of left uterine displacement breathing oxygen via face mask. The patients were randomly assigned into two groups defined by the spinal injection. They received either 12.5 mg (2.50 ml) of hyperbaric (0.5% bupivacame in the first group or 10 mg of hyperbaric bupivacaine plus fentanyl 25 μg (2.25 ml) of volume in the second group. Blood pressures were measured via the non-invasive blood pressure (NIBP) monitor at 3 minute interval during the first 15 minutes after the spinal injection and every 5 minutes thereafter. Whenever systolic blood pressure was lower than 95 mm Hg or 20% below the pre-induction level (defined as hypotension), ephedrine 5 mg intravenously dosage was administered. The number of hypotensive measurements and total ephedrine use for each patient were recorded. Patients who complained of pain were given 50 μg increments of IV fentanyl. Pain scores were summed across the following sequential intervals during the procedure: skin incision, delivery until uterine exteriorization, uterine replacement and start of facial closure and skin closure. The visual analogue scale (VAS) was used if pain (analgesia) persists. The protocol allowed for conversion to general anaesthesia as deemed necessary. The degree of motor block was assessed using Bromage Scale (BS): BS0, full flexion of knees and feet; 1, just able to move knees; 2, able to move feet only; 3, unable to move feet and knees, and complete motor block was defined as BS 3. The level of sensory block was tested with method of touch sensation. All of these time variables were measured from the beginning of the spinal injection. The newborns' Apgar scores at 1 and 5 minutes were recorded immediately after delivery. Emetic effects- nausea or vomiting were registered; other side effects were evaluated if needed.

Statistical analysis was performed using statistical tests included Student's t-test, Fisher exact test and contingency table analysis. Results were considered significant at a p value of 05.

Results

There were 30 patients in each group of total 60 patients, and were similar with respect to age, weight, and height among the groups (Table I).

Table I *Demographic characteristics of the patients undergoing caesarean section*

Indices	Plain bupivacaine	Reduced bupivacaine+ fentanyl
Patients (n)	30	30
Previous caesarean section	10	12
Age (yr)	23.0 ± 5.5	24.2 ± 3.7
Weight (kg)	68.5 ± 10	67.5 ± 8.5
Height (cm)	160 ± 4	161 ± 5
Initial systolic BP (mmHg)	128 ± 10.2	127 ± 11.5
Initial diastolic BP (mmHg)	75.4 ± 9.	76.6 ± 8.5.
Duration of the operation (min)	60.5 ± 9.5	62.5 ± 8.5

Block onset times of sensory block (to T5) was slightly faster in the hyperbaric bupivacaine group (5.5 min versus 7 min), but it was not significantly different from bupivacaine plus fentanyl group. Peak median cephalad sensory block to touch sensation was significantly higher (by at least 2 dermatome) in the hyperbaric bupivacaine group with the highest level of anaesthesia occurred at the fifth cervical dermatome in the same group (Table II). Sensory block was sufficiently intense in both groups to provide surgical anaesthesia for all patients although one patient from bupivacaine plus fentanyl group required conversion to general anaesthesia (GA) because of inadequate surgical anaesthesia. Pain: 2 of the 30 patients (2/30) in each group, noted transient pressure or stretching or mild operative pain at the time of delivery; but all patients from bupivacaine-fentanyl group reported a high level of satisfaction with their anaesthetic at the end of the procedure. There was the sole exception of one patient needed general anaesthesia, which was at the time of the delivery until uterine exteriorization. No patient in hyperbaric bupivacaine group required conversion to general anaesthesia. Dissatisfaction because of nausea, not from anaesthesia, was noted by 3 women in the bupivacaine group. Most of the patients in the plain bupivacaine group developed and vanished significantly faster and more intense motor block (Bromage score 2, 3, $p < 0.05$) compared with patients from bupivacaine+ fentanyl group, (Table II).

Hemodynamic effects and neonatal outcomes: With regard to hypotension, there were pronounced and significant differences between the groups. 14/30 patients developed hypotension in the bupivacaine group compared with only 14/30 patients in the bupivacaine-fentanyl group; furthermore, other 13/30 patients with bupivacaine injection developed severe hypotension with transient respiratory or conscience disturbances. In the bupivacaine-fentanyl group, only 3 patient required treatment for hypotension versus 15/30 patients (50%) of the patients in the hyperbaric bupivacaine group. There was a difference between groups in the frequency, severity, and persistence of the hypotension also. No patient in the bupivacaine fentanyl group required more than 10 mg of ephedrine, whereas in the hyperbaric bupivacaine group the median dose was 22.0 (range 0–65 mg) (Table-III). Nausea and vomiting were more pronounced in the hyperbaric bupivacaine group, occurring in 40% of patients as opposed to none of patients in the bupivacaine-fentanyl group. As noted, mostly patients express dissatisfaction with their anaesthesia in the hyperbaric bupivacaine group. Interestingly, patient dis-satisfaction stemmed from the unpleasant sensation (nausea) rather than from pain. Nausea and unpleasant feeling occurred mostly at the end of exteriorization of the uterus and manipulation of the peritoneum.

Table II *Intervertebral space used for spinal puncture; characteristics of sensory and motor spinal block and number of patients required additional analgesia or GA; patient comfort satisfaction.*

Intervertebral space forpuncture	Hyperbaric bupivacaine only (n = 30)	Bupivacaine+ fentanyl (n =30)
L2–3	9	18
L3–4	20	12
L4-5	1	0
Peak sensory levelmedian, range	T2, 3 (C5–T5)	T4,5 (2-6)
Motor block (Bromage scale) (0–1–2–3)	0-0-4-16	0-6-12-2
Pain during surgery, (requiring fentanyl)	2/30	2/30
Pain during surgery,(requiring GA)	0/30	1/30
Nausea/Vomiting	8/30	0/30
Satisfaction with anaesthesia	3-0-17	1-0-19
(1–4, 5–7, 8–10) 3–0–17 1–0–19		

Table III *Spinal block and hypotension; ephedrine requirements; neonatal outcome during surgery*

Variables	Hyperbaric bupivacaine (n=30)	Reducedbupivacaine+ fentanyl (n=30)
Hypotension < 95 mmHg	14	13
Severe hypotension < 80 mmHg	3	1
Number of measurements ofhypotension (mean ± SD)	4.6 ± 3	1.0 ± 1.2
Required treatment of hypotension	15	3
Ephedrine total dose(mean ± SD), range	22.0 ± 18.4(0–65)	3.5 ± 3.4(0–10)
Apgar score, 1 min	8.5 ± 0.5	8.8 ± 0.8

Neonatal outcome parameters Apgar scores were similarly excellent in both groups, and there were no significant differences between the groups.

Discussion

The principal finding of this study was that the combination of reduced (low) dose of bupivacaine -10 mg with opioid (fentanyl) provides excellent spinal anaesthesia for caesarean delivery with significantly less hypotension than standard dosage of bupivacaine alone. Nowadays, textbooks of anaesthesia recommend large (standard) doses of bupivacaine still, even though clinical experience favour small doses combined with opioids. Often, dosages between 12–15 mg of hyperbaric bupivacaine are recommended, but hypotension could be very often complication with such dosages. Further, unacceptable high spinal anaesthesia has been reported with doses larger than 12 mg of bupivacaine in patients undergoing caesarean section, although the problem seems not to be often[8,21]. Thus, the appropriate dosage of bupivacaine seems to be under re-evaluation[8]. Hypotension is perhaps the most common complication of standardized bupivacaine spinal anaesthesia. If no preventive measures are taken during this manoeuvre, the incidence of hypotension is reported as 92% and 94%.[15,18] The variety of ways have been tried to minimize the hypotension during this anaesthetic procedure. Measures to prevent hypotension include the administration of fluids (colloids or crystalloids) before the regional anaesthesia, left uterine displacement and administration of a prophylactic vasopressor. But, adding colloids as preloading protocol may counteract hypotension; the infusion of prophylactic ephedrine may be associated with umbilical pH values under 7.20 in some newborns[4,11,22]. The concept of using a reduced (low) dose of local anaesthetic with opioid to minimize hypotension has received an attention.[1,5] The combination of reduced (low) dose of local anaesthetic plus lipophilic opioid, over traditional higher-dose local anaesthetic spinal anaesthesia, has increased in recent years, producing clear benefits: less hypotension and better perioperative analgesia. Vercauteren et al. used a combination of sufentanyl with low-dose bupivacaine (6.6 mg) for spinal anaesthesia in caesarean section and found a lower incidence of hypotension;[26] spinal administration of fentanyl, may potentiate the local anaesthetics analgesia and be associated with a decreased incidence of hypotension also, faster onset of block and motor recovery, and shorter time to micturition[7]. Bruce Ben-David et al. concluded that spinal anaesthesia using very low doses (as 5 mg) of isobaric bupivacaine plus 25 ìg fentanyl, is associated with significantly less hypotension and vasopressor requirements than 10 mg of isobaric plain bupivacaine, but they have evaluated non representative number of patients.[3] Other clinical experiences with doses between 5–10 mg bupivacaine are valuable and report about similar findings.[5,10,13,17] Definitely, the reduced local anaesthetic doses (bupivacaine) play role in getting less severe hypotension together with the mechanism by which intrathecal opioids decrease hypotension. Intrathecal fentanyl have a very selective spinal cord site of action; it acts synergistically with bupivacaine to enhance the

effect on the efferent pathways but without an effect on sympathetic pathways, thus producing no hypotension.[20,25] Even more, it appears that the addition of intrathecal fentanyl to bupivacaine spinal anaesthesia, potentiates the surgical analgesia for somatic and visceral pain, thus making the patients from bupivacaine-fentanyl anaesthesia more satisfied with their anaesthetic (Table II). It is likely that complex mechanisms along with potency, lipophilicity, and drug concentration all play a role in the local anaesthetic actions of spinal opioids[16]. Furthermore, studies in gravid animal models suggest hormonal milieu may also contribute to opioid effectiveness. Jayaram and Carp found that spinal progesterone potentiated the analgesic effect of spinal opioids in rats.[19] Adequate spinal anaesthesia for caesarean section which provides sympathetic blockade up to T4 causes a minimal reaction of hypotension compounded with reflex increase in heart rate. Most patients in the bupivacaine-fentanyl group reached lower median peak sensory level (T4), compared with patients from other group, but it seems this sensory level was quite enough to reach adequate surgical anaesthesia. The normal blood pressure compounded with this median peak sensory level, was associated with a reduction in the mean ephedrine requirement; in fact, most patients in the bupivacaine – fentanyl group required no ephedrine. It seems, that peak sensory level above those segment, affects the cardiac sympathetic innervation, thereby attenuating the compensatory mechanism and so high spinal block may further reduce the heart rate and produce a hypotension with more ephedrine requirement (Table II). Maintenance of normal maternal blood pressure during spinal caesarean section is key factor for adequate neonatal outcome, too. The mature placenta is high capacitance organ with no auto regulatory ability, so uteroplacental perfusion pressure is dependent on systemic blood pressure. The patients in the bupivacaine-fentanyl group experienced significantly less nausea than patients in the plain bupivacaine group. The decreased incidence of emetic effects after supplementation of spinal anaesthesia with intrathecal fentanyl in our study has also been reported by other investigators.[27] The finding of less nausea in the bupivacaine-fentanyl group may be surprising in that nausea is generally considered a side effect of intrathecal opioids. Palmer et a1. found a lower incidence of perioperative nausea and vomiting when 15 μg fentanyl was added to lignocaine spinal anaesthesia for caesarean delivery;[16] Dahlgren et al. found that either fentanyl or sufentanyl added to the spinal anaesthetic for caesarean delivery led to reduced need for intraoperative antiemetic.[7] The increased emetic effects in the bupivacaine group may be secondary to the increased incidence of hypotension, because effects were relieved when the blood pressure was increased after the administration of ephedrine. It has been our observation that rare hypotension in bupivacaine-fentanyl group occurs in the absence of nausea and vice versa. These findings and observations suggest about a protective effect of the intrathecal fentanyl, rather than from the more stable haemodynamics.

Conclusion

The findings of this study suggest that spinal anaesthesia for caesarean delivery using 10 mg hyperbaric bupivacaine plus 25 μg fentanyl is associated with significantly less hypotension, vasopressor requirements and nausea than spinal anaesthesia with 12.5 mg of bupivacaine, without untoward effects. This combination has been shown to improve the quality of spinal anaesthesia for caesarean delivery. But, further large study is warranted to verify a reliable minimum dose of bupivacaine-fentanyl for spinal anaesthesia in caesarean delivery.

References

1. Akerman B., Arwestrom E., Post C. (1988): Local anesthetics potentiate spinal morphine antinociception. Anesfh Analg; 67: 943–948.
2. Alahuhta S., Kangas-Saarela T., Hollmen A. I., Edstrom H. H. (1990):Visceral pain during caesarean section under spinal and epidural anaesthesia with bupivacaine. Acta Anaesthesiol Scand; 34: 95–98.
3. Ben-David B., Solomon E., Levin H., Admoni H., Goldik Z. (1997): Intrathecal fentanyl with small-dose dilute bupivacaine: better anesthesia without prolonging recovery. Anesth Analg; 85: 560–565.

4. Belzarena S. D. (1992): Clinical effects of intrathecally administered fentanyl in patients undergoing cesarean section. Anesth Analg; 74: 653–657.

5. Chu C. C, Shu S. S., Lin S. M., Chu N. W., Leu Y. K., Tsai S. K., Lee T. Y. (1995): The effect of intrathecal bupivacaine with combined fentanyl in cesarean section. Acta Ana- esthesiol Sin; 33: 149–I54.

6. Courtney M. A., Bader A. M., Hartwell B., Hauck M., Grennan M. J., Datta S. (1992): Perioperative analgesia with subarachnoid sufentanil administration. Reg Anesth; 17: 274–278.

7. Dahlgren G., Hultstrand C., Jakobsson J., Norman M., Eriksson E. W., Martin H. (1997): Intrathecal sufentanil, fentanyl, or placebo added to bupivacaine for cesarean section. Obstet Anesth; 85: 1288–1293.

8. Finucane B. T. (1995): Spinal anesthesia for cesarean delivery the dosage dilemma. Reg Anesth; 20: 87–89.

9. Hamber E. A., Viscomi C. M. (1999): Intrathecal lipophilic opioids as adjuncts to surgical spinal anesthesia. Reg Anesth; 24: 255–263.

10. Hunt C. O., Naulty S., Bader A. M., Hauch M., Vartikar J.V., Datta S, Hertwig L. M., Ostheimer G. W. (1989): Perioperative analgesia with subarachnoid fentanyl-bupivacaine for cesarean delivery. Anesthesiology; 7I: 535–540.

11. Kang Y. G., Abouleish E., Caritis S. (1982): Prophylactic intravenous ephedrine infusion during spinal anesthesia for cesarean section. Anesth Analg; 61: 839–842.

12. Liu S., Chiu A. A., Carpenter R. L., Mulroy M. F., Allen H. W., Neal J.M., Pollock J. E. (1995): Fentanyl prolongs lidocaine spinal anesthesia without prolonging recovery. Anesth Analg; 80: 730–734.

13. Lu J. K., Manullang T. R., Staples M. H., Kern S. E., Bailey P. L. (1997):Maternal respiratory arrests, severe hypotension, and fetal distress after administration of intrathecal, sufentanil, and bupivacaine after intravenous fentanyl. Anesthesiology;87: 170–172.

14. Lu J. K., Schafer P. G., Gardner T. L. (1997): The dose-response pharmacology of intrathecal sufentanil in female volunteers. Anesth Analg; 85: 372–379.

15. Moran D. H., Perillo M., LaPorta R. F., Bader A. M., Datta S. (1991):Phenylephrine in the prevention of hypotension following spinal anesthesia for cesarean delivery. J Clin Anesth; 3: 301–305.

16. Palmer C. M., Voulgaropoulos D., Alves D. (1995): Subarachnoid fentanyl augments lidocaine spinal anesthesia for cesarean delivery. Reg Anesth; 20: 389–394

17. Randalls B., Broadway J. W., Browne D. A., Morgan B. M. (1991): Comparison of four subarachnoid solutions in a needle-through-needle technique for elective caesarean section. Br J Anaesth; 66: 314–318.

18. Riley E. T., Cohen S. E., Rubenstein A. J., Flanagan B. (1995): Prevention of hypotension after spinal anesthesia for cesarean section: Six percent hetastarch versus lactated ringer's solution. Anesth Analg; 81: 838–842.

19. Jayaram A., Carp H. (1993): Progesterone-mediated potentiation of spinal sufentanil in rats. Anesth Analg; 76: 745–750.

20. Solomon R., Gebhart G. (1994). Synergistic antinociceptive interactions among drugs administered to the spinal cord. Anesth Analg; 78: 1164–1172.

21. de Simone C. A., Leighton B. L, Norris M. C. (1995): Spinal anesthesia for cesarean delivery: a comparison of two doses of hyperbaric bupivacaine. Reg Anesth; 20: 90–94.

22. Singh H., Ynag J., Thornton K., Giesecke A. H. (1995): Intrathe cal fentanyl prolongs sensory bupivacaine spinal block. Can J Anesth; 42(11): 987–991.

23. Shende D., Cooper G. M, Bowden M. I. (1998): The influence of intrathecal fentanyl on the characteristics of subarachnoid block for caesarean section. Anaesthesia; 53: 706–710.

24. Tejwani G. A., Rattan A. K, McDonald J. S. (1992): Role of spinal opioid receptors in the antinociceptive interactions between intrathecal morphine and bupivacaine. Anesth Analg; 74: 726–734.

25. Wang C., Chakrabarti M. I, Whitwam J. G. (1993): Specific enhancement by fentanyl of the effects of intrathecal bupivacaine on nociceptive afferent but not on sympathetic efferent pathways in dogs. Anesthesiology; 79: 766–773.

26. Vercauteren M. P, Coppejans H. C., Hoffmann V. L., Saldien V., Adriaensen H. A. (1998): Small-dose hyperbaric versus plain bupivacaine during spinal anesthesia for caesarean section. Anesth Analg; 86: 989–993.

27. Van Gessel E. F., Forster A., Schweizer A., Gamulin Z. (1991): Comparison of hypobaric, hyperbaric, and isobaric solutions of bupivacaine during continuous spinal anesthesia. Anesth Analg; 72: 779–784.

28. Manullang T. R., Viscomi C. M., Pace N. L. (2000): Intrathecal fentanyl is superior to intravenous ondansetron for the prevention of perioperative nausea during cesarean delivery with spinal anesthesia. Anesth Analg; 90: 1162–1166.

Case Report

Anaesthetic Challenge of Craniopagus Twin: A Case Report

Moumita Talukdar[1], Rebeka Sultana[2], Md. Mozaffar Hossain[3], Subrata Kumar Mondal[4], SM Shafiqul Alam[5]

[1]Junior consultant,Burn & Plastic surgery unit of DMCH,[2]Junior consultant,Burn & Plastic Surgery Unit of DMCH, [3]Professor & Head of the Department of Anesthesia, Analgesia, Palliative and Intensive Care Medicine, DMCH, [4]Associate professor, Department of Anesthesia, Analgesia, Palliative and Intensive Care Medicine, DMCH, [5]Senior Consultant, Department of Anesthesia, Analgesia, Palliative and Intensive Care Medicine, DMCH, Dhaka

Corresponding Author: E-mail dr_moumita24@yahoo.com

Abstract:
We describe the anaesthetic management of 2 years old Craniopagus twins for cerebral angiogram & embolization. Anesthetic management for Craniopagus twins is associated with unique concerns of cross circulation, difficulty in mask ventilation, difficult access to airway and intubation due to angle between the heads.Adequate preparation and teamwork is the keystone to the management of these patients.

Key wards: *Conjoined twin, Craniopagus, difficult airway.*

(JBSA 2019; 32(1): 35-37)

Introduction

The successful operative separation of conjoined twins requires detailed preoperative assessment, multidisciplinary team planning & intensive anesthetic management. Conjoined twins are babies jointed together in utero. They result from an aberrant twinning process with incomplete fission of zygotes premitive streak at 20 days of ovulation. Incidence of this anomaly has been estimated to be 1:25000 to 1:100000 births, with approximately 60% stillborn and a smaller fraction of pairs born alive have abnormalities incompatible with life[1].An increased incidence has been noticed, ranging from 1:14000 to 1:25000 in some Asian countries, eg- India, Pakistan, and Thiland as well as in Africa especially East Africa,Nigeria and south Africa [2-3].The overall survival rate for conjoined twins 25%.It is infrequently found in females with a ratio of 3:1.Conjoined twins are classified by the point of union: Thoraco-omphalopagus(32%), thoracopagus (19%0, Omphalopagus (10%), Parasitic twins(7%), and Craniopagus (3%)[4]. Craniopagus babies can be joined at the back of the head,front of the head and at the side of the head.Their skulls are fused but bodies are separate.

Case Report

Anesthesia and sedation may be required for a variety of surgical or investigative procedures in conjoined twins. Diagnostic investigations that are often required include CTscan, MRI, Cardiac catheterization, Echocardiography, various endoscopic procedures, and many plain radiological studies

Fig 1 *Craniopagus Twin (Rabeya, Rokeya)*

Prior to separation, operations for a variety of pathological problems may be necessary. In our experience of this pair of babies there are 3 steps prior to separation. Initially cerebral angiogram and embolization of superior sagittal sinus was

done on 28/02/2018 and embolization of Transverse sinus was done on 19/08/2018 at Cath Lab of Dhaka Medical College Hospital. Next step will be insertion of tissue expander and after adequate tissue expansion separation will be done after 4 to 5 months later.

We describe the Anesthetic and airway management for cerebral angiogram and embolization of superior sagittal sinus and transverse sinus.

A 23 months old twin baby (Rabeya & Rokeya) got admitted to the department of Burn and plastic surgery unit of Dhaka Medical College Hospital with the complaints of fusion of head of the two babies since birth. They were born in Pabna district of Bangladesh by ceaserian section. Except head all other parts of their body were separated and normal. Their all investigations (CBC, CXR, S.Albumin, Bleeding profile, S.creatinine,USG of whole abdomen, CTscann of Brain, Echo-cardiography) were done .Finally they diagnosed as a case of Craniopagus with a common superior sagittal sinus and Transverse sinus by CTangiogram.Then they were prepared for cerebral angiogram followed by embolization of superior sagital sinus and transverse sinus under general anesthesia for the development of co-lateral circulation.

Pre operative assessment

- Suspected difficult intubation as their heads attached at the posterolateral aspect of occiput and slight tracheal deviation due to muscle traction.
- All baseline investigations were within normal limit.
- They were immunized as per EPI schedule.
- No history of allergy to any food or drugs.

Anesthetic planning

- Ready two skilled anesthesia team for two baby.
- Prepare two trolley for management of difficult intubation.
- Prepare two anesthesia machine with monitor.
- Prepare two Pediatric ventilators with ICU support for post operative period.

Anesthetic Management

Two skilled anesthesia team were ready for giving anesthesia. Difficult intubation trolley was ready. All procedure were done at Cath Lab of DMCH on a Single operating table.Their total weight were 26 kg, so drugs and fluid were calculated as 13kg for each baby separately. Before induction cross circulation was ruled out by giving anticholinergic to baby Rabeya with no significant change in the heart rate of Rokeya. Inhalation induction was done first,then two separate intravenous canula of 24G were inserted.After inhalational induction and insertion of IV canula, intubation was done one after another with.inj. Fentanyl ; inj. Propofol and inj. Suxamethonium. Intubation was slight difficult for one baby (Rokeya) first time, but second time intubation was more difficult because they are growing and the angle between two heads became more acute. ETT size was 3.5 .Intravenous fluid was started as per protocol in two separate micro burette.

Then anesthesia was maintained by Oxygen, Nitrous oxide, Hallothane, inj.Fentanyl and inj. Atracurium. We monitor pulse, blood pressure (NIBP), Temperature,SpO2,ETCO2 and urine output during the procedure. It took 3 hours at first day and 3.5 hours at second day anesthesia for cerebral angiogram and embolization. After the procedure revarsal from anesthesia was done smoothly with Neostigmine and Atropine. Adequate fluid was maintained in the post-operative period as per protocol. Any alteration in change of position of their head make them irritable, so adequate analgesia and sedation was maintained with inj.Acetaminophane and inj.Pethedine as per schedule. Two ventilators with all ICU monitor system were ready for any emergency but there were no need for ICU support. After over night monitoring in the post operative period they were shifted in the cabin next morning.

Discussion

The first case of surgical seperation of conjoined xiphopagus twins was reported in 945AD from Constantinople,where one of the twins died and the other survived for 3days[5].The first successful separation of xiphopagus twins was performed by Konig in 1689.The separation was by tightening and necrosing the band of tissue between the twins. The first successful seperation of thoracopagus twins.with at least one twin surviving, was performed in1900,for Pyopagus

twins in 1912 and for Craniopagus twins in 1952.In 1966,the first separation of ischiopagus tetrapagus twins, in which both twins survived, was reported. Anesthetic management for seperation of conjoined twins was first published by Hall et al, from Maryland in 1957[6].During induction of Anesthesia, induction agents and muscle relaxants given to one twin may pass to the other and may result in sedation,airway obstruction, hypoventilationor apnea in other twin. Anesthesia should be induced after it is known that both twins can be mask-ventilated[7].In our case twins undergone cerebral angiogram with embolizaton of superior sagittal sinus as an early step of separation. Next step will be insertion of tissue expander and after adequate tissue expansion separation will be done.

Conclusion:

It is concluded that giving anesthesia of Craniopagus twin present a big challenge to the anesthetist. Mainly pediatric anesthetists are well prepared for managing this type of situation. our principal concern were difficult intubation and calculation of drugs and fluid as there were chance of cross circulation.Presence of two anesthesia team of 4 members,neurosurgery team, vascular surgery team, circulating nurses, machines, monitors all together in one room were also a problem. Even then we finally prepared the creniopagus twin for insertion of tissue expander and finally seperation.

References:

1. Diaz JH, Furman EB. Perioperative management of conjoined twins. Anaesthesiology 1987 ;67:965-973.
2. O' Neill jr jA,Rowe MI,Grosfeld JL et al.Conjoined twins, in Pediatric surgery,5th edn.vol 2,1998.Pp.1925-1938.
3. Hoyle RM.Surgical seperation of conjoined twins.Surg Gyne Obste 1990;170:549-562.
4. Jenny M Thomas and J Tessa Lopez, Conjoined twins-the anesthetic management of 15 sets from 1991-2002,Pediatric Anesthesia 2004; 14:117-129
5. Pentogalos GE, Lascaratos JG A surgical operation performed on Siamese twins during the tenth century in Byzantium.Bull His Med 1984;58:99-102.
6. Hall KD,Merzig J,Norris FH.Case report: separation of craniopagus. Anesthesiology 1975;18:908-910.
7. Greenberg M, Franklin DD,Hilfiker M. Seperation of omphalopagus conjoined twins using combined caudal epidural-general anesthesia. Can J Anaesth 2001;48:478-482.

Case Report

Caesarean Section in A Patient with Myasthenia Gravis: A Challenging Anaesthesia

Nahida Parveen Nimmi, Golam Ferdous Alam, S.P. Mitra, Lutful Aziz

Department of Anaesthesia and Pain Medicine, Apollo Hospitals Dhaka, Bangladesh.

Corresponding Author: Dr. Nahida Parveen Nimmi, Department of Anaesthesia and Pain Medicine, Apollo Hospitals Dhaka, Bangladesh.

Abstract

Myasthenia Gravis (MG) is an acquired, autoimmune disorder affecting neuromuscular junction presenting with easy fatigability, progressive weakness, diplopia, difficulty in speaking and swallowing and even ventilator failure in severe cases. During pregnancy the disease may go into remission or may exacerbate at any time during first, second and third trimesters or postpartum period. We are reporting a case of a 32 years old primi gravida, a known case of MG, who underwent emergency caesarian section due to postdated pregnancy. Both the mother and the baby were well managed in the perioperative period.

(JBSA 2019; 32(1): 38-41)

Introduction

Myasthenia Gravis (MG) is an acquired, autoimmune disorder affecting neuromuscular junction presenting with easy fatigability, progressive weakness, diplopia, difficulty in speaking and swallowing and even ventilator failure in severe cases. During pregnancy the disease may go into remission or may exacerbate at any time during first, second and third trimesters or postpartum period. Although plenty of literature is available regarding the anaesthetic management of such patients undergoing thymectomy, but clear cut guidelines for those undergoing labor and caesarian delivery are still lacking.

Case report

A 32-year-old primi gravida, a diagnosed case of MG for 1 year. The diagnosis was established after detection of antibodies against acetylcholine (Ach) receptor in patient's serum using radio-immunoassay. A repeated nerve stimulation (RNS) test also supported post synaptic neuromuscular transmission defect. She was under treatment with oral pyridostigmine and prednisolone. After the diagnosis, she did not experience any exacerbation of the disease process and was well controlled on oral pyridostigmine 60 mg four times daily and prednisolone 12.5 mg on odd days and 10 mg on even days.

She reported to our hospital and clinical examination and laboratory parameters including thyroid function tests and ECG were within normal limits. Emergency caesarian section was scheduled due to postdated pregnancy.

A subarachnoid block was instituted with 2.0ml of 0.5% hyperbaric bupivacaine in L3-L4 interspace using 25G Quincke type spinal needle. No perioperative steroid supplementation was given as it may aggravate the weakness. Her hemodynamic and respiratory parameters remained stable throughout the surgery. A 2.8kg healthy male baby was delivered who cried immediately after birth, Apgar score being 9,9,9 at 0,1,5-minute. The newborn was shifted to neonatal ICU for observation. After giving a bolus of 5 IU of oxytocin, an infusion was started. At the end of the surgery Diclofenac suppository of 50 mg per rectally and TAP block was given for post-operative pain management. The mother was also shifted to the surgical ICU for close observation and better management. She was closely monitored for respiration, swallowing and speech to detect any evidence of skeletal muscle weakness. The oral pyridostigmine and prednisolone was

started after reappearance of bowel sounds, 4 hours after surgery. On the next day evening patient was shifted to the ward with all stable vital parameters and without any evidence of muscle weakness.

Discussion

MG is most common disorder affecting the neuromuscular junction. (1) It can present at any age but has bimodal peak of incidence. The first peak is seen in females in third decade of life while second peak occurs in sixth decade mainly in females. The etiopathogenesis is characterized by the presence of anti- Ach receptor antibodies in the serum of 85% patients of generalized MG and 50-60% patients of ocular MG. Seronegative patients have anti-muscle specific kinase (MUSK) antibodies in 10-20% cases. There is antibody mediated destruction of Ach receptors present on the post synaptic membrane with loss of folds and widening of a synaptic cleft.[2]

Abnormality of thymus is seen in 75% cases of MG of which 85% have germinal hyperplasia and 15 % have tumor of the gland. Thymectomy is indicated for thymoma and is recommended in all young myasthenics who have a deteriorating response to anticholinesterase drug.[3,4] Thymectomy is more beneficial if done prior to pregnancy. Case reports are present when thymectomy was beneficial even when done during pregnancy. [5]

MG runs a variable and unpredictable course during pregnancy with one third patients improving, one third deteriorating and one third remaining the same during the period of pregnancy.[6] The worsening of symptoms has been reported to occur in first trimester by some,[6,7] in second trimester by a few,[8] while others have reported it in third trimester.[9,10] Our patient remained the same during the perioperative period. It is recommended that anticholinesterase therapy be continued orally throughout the period of pregnancy. However, erratic gastric absorption during labor may necessitate a shift to equivalent intramuscular dosages. Steroids, though safe during pregnancy, should be reduced to minimum effective dose. Other modalities like plasmapheresis and azathioprine can be used in case of an acute exacerbation.[11] Magnesium sulfate therapy, if needed due to development of PIH, is contraindicated in myasthenics as magnesium may itself produce neuromuscular block by inhibiting release of Ach from the pre junctional membrane. Although the incidence of obstetric complications and surgical delivery are higher in myasthenic patients, it is not an indication for caesarian section and vaginal delivery is preferred.[12] In our case, vaginal delivery was planned by the obstetrician, as the disease was well controlled, but had to be taken up for surgical delivery due to postdated.

The neonate born to myesthenic mother may experience a transient myasthenic syndrome presenting weak cry, difficulty in sucking and swallowing and respiratory weakness. There are reports of this syndrome of 21%, out of which 67% developed it within few hours of birth.[13] Response to oral anticholinesterase is good and complete recovery occurs in less than 2 months. The atypical form may present as arthrogryposis multiplex genitalia. In our case, the baby did not develop any weakness or respiratory distress nor required any anticholinesterase therapy.

It is important for the anaesthesiologist to assess the extent of respiratory or bulbar involvement and determine frequency and severity of myasthenic attacks. The type and dosage of anticholinesterase drug and other medications should be noted and readjusted to obtain optimal symptomatic relief before labor. In severe disease, pulmonary function tests and ECG should be considered. Thyroid function tests may be undertaken as high incidence of autoimmune thyroid disorders are associated with this condition.

Use of labor analgesia is highly desirable to prevent fatigue and exhaustion associated with expulsion efforts during second stage of labor. Opioids are poor choice for this due to risk of excessive depression especially if bulbar or respiratory involvement is present. Central neuroaxial blockade has been used and recommended by many clinicians for vaginal delivery.[10,11,14] In our case, labor analgesia was not used as it was decided to be taken up for CS due to postdated pregnancy.

Both regional and GA have been described by various workers for caesarian delivery in myasthenics. Regional anaesthesia is the better

choice in ocular and well controlled generalized disease.[11] Central neuroaxial blockade in the form of spinal is preferable over epidural as systemic absorption of the greater quantity of local aneasthetics needed in epidural block can itself result in muscle weakness, theoretically. Use of amide local anaesthetics which do not require pseudo cholinesterase for metabolism appears to be the logical choice. Irrespective of the route, it is essential to limit the upper level of block by using lower doses of local anaesthetic along with opioids in spinal and graded doses of LA in epidural anaesthesia. Use of the combined spinal and epidural technique is also not without limitations. The advantage of smaller dose of LA into subarachnoid space can be offset by the failure of epidural block as the catheter remains untested in CSE. (14) Therefore, we employed SAB in our patient using 2.0 ml of 0.5% bupivacaine without any problem. Moreover, spinal block takes considerably lesser time than CSE and was thus better suited to the indication of fetal distress.

In severe disease with bulbar involvement, GA with endotracheal intubation is mandatory due to the risk of aspiration. Schnider et al. (11) recommended RSI with immediate endotracheal intubation. In severely compromised patients, thiopentone alone may be used as sole anaesthetic agent. Depolarizing neuromuscular blockers are better avoided as resistance to their action is present.MG patients are exquisitely sensitively to the action of non-depolarizing agents. One tenth to one fifth, the calculated dose is sufficient to cause complete muscle paralysis. This sensitivity is seen in both seropositive and seronegative patients. (15) Is more in generalized than ocular disease (16) and remains even in patients of cured MG (i.e., thymectomised patients who are symptom free without any medication). (17) Use of inhalational agents should be cut down to minimum as they aggravate muscle weakness. Only low doses of short acting opioids are recommended to provide analgesia after delivery of baby. After the end of the surgery, reversal should be achieved using incremental doses of neostigmine (0.5mg) intravenously with the response monitored with a nerve stimulator. Overenthusiastic efforts at reversal may precipitate a cholinergic crisis. In severe disease, postoperative ventilation might have to be considered.

In the postoperative period, anticholinesterase therapy should be restarted via intramuscular route. Shift to oral route is made once bowel sounds return. These patients can develop complications in the form of myesthenic crisis or cholinergic crisis at any time during pregnancy, labor or post-partum period. (12) Postpartum exacerbation of myasthenic weakness is especially common. Hence the patient should be nursed in ICU / HDU with constant watch for any clinical evidence suggesting muscular weakness.

To conclude, anaesthesiologist has an important role not only in the anaesthetic management of a pregnant myasthenic undergoing caesarian section but also in management of myasthenic crisis which may be precipitated at any time, especially during the immediate postoperative period. The anaesthetic technique of choice is central neuroaxial block in well controlled disease and general anaesthesia in severe disease. The significance of postoperative monitoring of skeletal muscle power cannot be overemphasized.

References

1. MacDonald BK, Cockerell OC, Sander JW, Shorvon SD. The incidence and life time prevalence of neurological disorders in a prospective community based study. Brain 2000; 123:665-76.
2. Thanvi BR, Lo TC. Update on myasthenia gravis. Postgrad Med J 2004;80:690-700.
3. Rosenbaum RB, Donaldson JO. Peripheral nerve and neuromuscular disorders Neurol Clin 1994;12:461-78.
4. Eden RD, Gall SA. Myasthenia gravis and pregnancy : A reappraisal of thymectomy. Obstet Gynecol 1983;62:328-33.
5. Jp MS, So SY, Lam WK, Tang LC, Mok CK. Thymectomy in myasthenia gravis during pregnancy. Postgrad Med J 1986;62 :473-4.
6. Batocchi AP, Majolini L, Evoli A, Lino MM, Minisci C, Tonali P. Course and treatment of myasthenia gravisduring pregnancy. Neurology 1999;52:447-52.

7. Schlezinger NS. Pregnancy in myasthenia gravis and neonatal myasthenia gravis. Am J Med 1955;19:718-20.

8. Tellez – Zenteno JF, Hernandez-Ronquillo L, Salinas V, Estanol B, da Silva O. Myasthenia Gravis and pregnancy : Clinical implications and neonatal outcome. BMC Musculoskelet Disord 2004;5:42.

9. Djelmis J, Sostarco M, Mayer D, Ivanisevic M. Myasthenia gravis in pregnancy: Report on 69 cases. Eur J Obstet Gynecol Reprod Biol 2002;104:21-5.

10. Mitchell PJ, Bebbington M,. Myasthenia gravis in pregnancy. Obstet Gynecol 1992;80:178-81.

11. Rolbin WH, Levinson G, Schider SM, Wright RG. Anaesthetic considerations for MG and pregnancy. Anesth Analg 1978;57:441-7.

12. Hoff JM, Daltveit AK, Gilhus NE. Myasthenia gravis: Consiquences for pregnancy, delivery and the newborn. Neurology 2003;61:1362-6.

13. Papazian O. Transient neonatal myasthenia gravis. J Child Neurol 1992;7:135-41.

14. D'Angelo R, Gerancher JC. Combined spinal and epidural analgesia in a parturient with severe MG. Reg Anesth Pain Med 1998; 23:201-3.

15. Itoh H, Shibata K, Nitta S. Sensitivity to vecuronium in seropositive and seronegative patients with myasthenia gravis. Anesth Analg 2002;95:109-13.

16. Itoh H, Shibata K, Nitta S. Difference in sensitivity to vecuronium between patients with ocular and generalized myasthenia gravis. Br. J Anaesth. 2001;87:885-9.

17. Basaranoglu G, Erden V, Delatioglu H. Anesthesia of a patient with cured myasthenia gravis. Anesth Analg 2003; 96:1842-3.

JOURNAL OF THE BANGLADESH SOCIETY OF ANAESTHESIOLOGISTS

VOLUME - 32 **NUMBER - 1** **JANUARY 2019**

CONTENTS