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COMPARATIVE STUDY OF ANALGESIC EFFICACY OF SUBARACHNOID FENTANYL MIXED WITH 2% HYPERBARIC LIGNOCAINE AND 2% HYPERBARIC LIGNOCAINE ALONE IN ELECTIVE CAESAREAN SECTION.

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ABSTRACT **BACKGROUND:** Spinal anaesthesia with lignocaine heavy has been popular for short surgical procedures as it has predictable onset and provides dense sensory and motor block of moderate duration. But some reports of neurotoxicity produce doubts on the use of lignocaine for spinal anaesthesia. But some suggest that lignocaine concentration might be responsible for these complications.

In view of the controversy and uncertainty surrounding the use of spinal lignocaine, the present study was undertaken to re-evaluation of the safety and analgesic efficacy of spinal hyperbaric lignocaine 2% regarding the occurrence of transient neurological symptoms and evaluation of any beneficial and adverse effects of addition of fentanyl as an adjuvant in spinal anaesthesia in patients undergoing elective caesarean section.

METHOD- 50 patients scheduled for elective caesarean section were divided into two groups (25 patients in each group).

Group A received 40mg Lignocaine plus 0.5ml normal saline and group B received Lignocaine 40mg and fentanyl (20g) intrathecally (total volume 2.5 ml in both). Onset and duration of sensory and motor blockade and Duration of analgesia and any side effects were recorded.

RESULTS – The onset and time to reach the highest level of sensory block was significantly less in group B. Time of regression of sensory block to T10 level was significantly prolonged in group B as compared to group A. Onset and duration of motor block was similar in both the groups. Incidence of side effects was not significant in both the groups.

KEYWORDS : spinal anaesthesia, lignocaine, fentanyl, transient neurological symptoms.

INTRODUCTION -

Intra-operative and post-operative pain is a well-known morbidity and causes distress to patients. The transmission of nociceptive stimuli from the periphery to the CNS causes neuro-endocrine stress response resulting in increased sympathetic tone this may increase cardiac workload and leads to myocardial ischemia and infarction. Control of these pathophysiologic processes by administering adequate analgesia may lead to improvement in morbidity and patient satisfaction.

Spinal anaesthesia with lignocaine heavy has been popular for short surgical procedures as it has predictable onset and provides dense sensory and motor block of moderate duration. Unfortunately, in the past decade some reports of neurotoxicity produce doubts about the use of lignocaine for spinal anaesthesia.[1,2,3] The phenomenon of transient neurologic symptoms (TNS) may be associated with all local anaesthetics. The etiology of TNS remains unclear and unproven, as well as the reason why after nearly a century of use, it is only now being recognized as an adverse effect of spinal anaesthesia.[4,5] Some suggest the lignocaine concentration itself might be responsible for these complications.[6,7] Because of this a rational approach to the problem would be to look at the comparative efficacy of lower concentrations of lignocaine for spinal anaesthesia.

Studies suggest that 2% lignocaine is approved for obstetric anaesthesia because it produce denser block and early mobilization and there is no incidences of transient neurological symptoms, hypotension and bradycardia.[8,9]

Analgesia produced by neuraxial opioids alone, or as adjuvants to local anaesthetics, has been demonstrated for acute postoperative pain, obstetric, paediatric, and cancer pain.[10]

The advantage of combining the two types of agents explained by their different analgesic properties and their ability to block pain at two different sites. Opioids produce analgesia by specifically binding and activating the opiate receptors in the substantia gelatinosa, whereas local anaesthetics provide analgesia by blocking impulse transmission at the nerve roots and dorsal root ganglia.[11].

Lipophilic opioids have a more favourable clinical profile of fast onset, modest duration, and little risk of delayed respiratory depression. Fentanyl is the most commonly used spinal lipophilic opioids. The combination therefore, has, the advantage of a prompt onset of analgesia and a long action, and has been used for spinal anaesthesia in obstetric.

The aim of study was twofold, re-evaluation of the safety of spinal hyperbaric lignocaine 2% regarding the occurrence of TNS and evaluation of any beneficial and adverse effects of addition of fentanyl as an adjuvant in spinal anaesthesia in patients undergoing elective caesarean section to lignocaine.

METHODS

We studied 50 patients of ASA grade I and II, aged between 20-30, height between 150cm -165cm and weight 45-75 kg scheduled for elective caesarean section were enrolled after approval from the institutional ethics committee and written informed consent of the patient.

The research methodology was prospectively randomized with the help of chit in box method and patients were divided into two groups: - 25 patients in each group.

1. Group A: Patients received 40mg Lignocaine plus 0.5ml normal saline intrathecally (total volume 2.5ml)
2. Group B: Patients received 40mg Lignocaine plus fentanyl (20g) intrathecally (total volume 2.5 ml)

In the operation theatre, patient s body weight, fasting, consent and PAC was checked. Base line HR, BP, spo2 were recorded. A good IV line with 18G Cannula was secured and inj. Ringer lactate solution was administered as 5-10 ml/kg IV before subarachnoid block and 15-20 ml/kg IV after subarachnoid block to all patients. Inj. Ranitidine 25mg IV & inj. metoclopramide 5mg IV given. Spinal anaesthesia was performed at the L_{3-L4} interspace in left lateral position of patients by using 25G spinal quincke" needle under strict aseptic condition. Free flow of CSF and negative flow of blood had been confirmed, drug volume of 2.5ml was injected over 20 seconds. All Patients were placed in supine position with a 15° head down tilt and 15-20º wedge to left tilt (to accomplished a left uterine displacement to correct aortocaval compression).100% O2 with flow of 2L/min. was given to

all patients by simple-mask.

Onset and highest level of sensory block was noted using pinprick every two minutes until the level had stabilized. Onset and degree of motor block was noted using modified Bromage scale. The quality of anaesthesia during surgery was categorized as excellent – no pain or sensation and patient comfortable, good – patient had only the sensation of motion, fair - mild discomfort and required analgesia, poor – patient in agony and required supplementation by general anaesthesia.

Blood pressure, pulse rate, ECG and SpO2 were monitored continuously. Any complication or adverse effects in the form of hypotension (fall of 20% of MAP baseline), bradycardia (HR 50), nausea, vomiting, chest discomfort, pruritus, shivering and respiratory depression (fall in SpO2 below 90%) were noted and treated accordingly. Apgar score of the new born obtained at 1st and 5th min after the LSCS patients were shifted to recovery room. Time of regression of sensory block, motor recovery and first demand of analgesia and voiding time were recorded. All the patients were enquired on first and second post-operative day about the occurrence of headache, backache, paraesthesia, pain in thighs, buttocks or legs etc.

For statistical analysis, Student't' test was used for comparison between the groups and one way analysis of variance (ANOVA) was used for haemodynamic parameters in the same group.

RESULT:-

All quantitative data were summarized in the form of Mean ± SD. Two groups were compared in accordance with patient's age, mean weight, height, ASA physical status, no of attempts of dural puncture and duration of surgery (P>0.05) [Table 1].

Variables	Group A	Group B	P value
Age (Yrs)	24.12±2.89	24.20±3.14	0.9258
Weight (kg)	57.20±8.16	59.60±7.40	0.2815
Height (c.m.)	155.32±4.04	155.28±3.05	0.9686
ASA grade(I/II)	1.32±0.48	1.44±0.51	0.3924
No. Of attempts	1.08±0.28	1.12±0.33	0.7799
Duration of surgery	30.68±6.69	32.04±6.95	0.4842

P values <0.05 were considered as Significant (S) , P value < 0.01 as highly significant (HS) and P value > 0.05 as statistically Not Significant (NS).

Table no. 2shows the study results –

	Group A	Group B	P –value
Sensory block			
– Onset time (mins)	4.56±0.92	3.80±.76	0.0026
– Highest level	$T_{4.32\pm0.75}$	$T_{4.08\pm0.70}$	0.2481
– Time to regress to T10 level	76.40±13.19	107.60±16.14	0.0000
Motor block			
– Onset time (min)	5.56±0.92	5.16±0.80	0.1068
– Duration (min)	55.83±6.53	59.60±9.35	0.1204
Total duration of Analgesia (min.) (Ist demand of analgesic)	91.60±10.67	142.80±17.91	0.0000
Time of voiding urine	150.30±21.00	154±24.50	0.8686
Adverse effects			
- Hypotension	3	7	0.1076
- Bradycardia	0	1	0.5
- Pruritis	3	8	0.0655
- PDPH	2	3	0.3256
- Nausea / Vomiting	4	3	0.2913
- Backache	4	3	0.2913
- TNS	0	0	-

The onset time of sensory level was significant less in group B (p=0.0026). Time of regression of sensory block to 10 level was significantly prolonged in group B as compared to group A and also time to first demand of analgesic in the post-operative period. Onset and duration of motor block was similar in both the groups (p>0.05).

The spinal block was successful in all the patients but the quality of intra operative anaesthesia was excellent in group B compare to group A. None of the patients in any group required supplementation by general anaesthesia. Incidence of hypotension, bradycardia and other side effects was not significant in both the groups. No patient in any group complained of symptoms suggesting the evidence of neurological toxicity. There was no statistically significant difference in haemodynamic parameters in both groups at any time of surgery (p 0.05). Fentanyl did not affect significantly mean pulse rate and mean blood pressure at any time surgery.

DISCUSSION -

Despite all the criticisms spinal anaesthesia is the very popular and preferred technique of anaesthesia for obstetrics and gynaecological procedures since decades because it is simple to perform, economical, produces rapid onset of anaesthesia and complete muscle relaxation.

Spinal anaesthesia with Lignocaine 5% in dextrose has been used extensively, effectively and, presumably, safely for short surgical procedures for the past 40 years but has recently been implicated in neurological complications after ranging from transient radicular irritation (TRI) to overt cauda equine syndrome.[12]

Because the toxicity of local anaesthetics is believed to be concentration-related, we studded the comparative efficacy of lower concentrations of lignocaine.

The principal findings of this study were that the addition of fentanyl to intrathecal lignocaine not only speeded up the onset and increased the duration of sensory block but also prolonged the postoperative analgesia without affecting the recovery of motor block. It improved the intraoperative anesthesia and thus lesser number of patients required additional supplementation by sedatives or analgesics. The findings of prolongation of sensory block and postoperative analgesia are consistent with experimental [13,14] as well as clinical synergistic interaction between spinal opioids and local anaesthetics.[15,16,17]. Opioids appear to produce analgesia by inhibition of synaptic transmission in nociceptive afferent pathways via Ad and C fibers by opening presynaptic K+ channels to inhibit transmitter release and thus reduce Ca++ influx. There is also a direct postsynaptic effect with hyperpolarization and reduced neuronal activity along with inhibition of substance P release in dorsal horn of spinal cord. Local anaesthetics act primarily by impeding Na+ access to the axon interior by occluding transmembrane Na+ channels.[18]

The overall incidence of side effects was similar in both the groups. Neurotoxicity of all local anaesthetics has been known for many years in doses and concentration much greater than those used clinically. Hampi et al[2] used the term transient neurological symptoms (TNS) to describe this syndrome. They defined it as "Pain and or dysaesthesia in the buttocks, thighs or lower limbs occurring after resolution of subarachnoid block". The patients reporting with TNS have an onset time of 6-24 hrs after surgery and duration varying between 12 hrs to 4 days. No objective signs of neurological impairment are detected in our study. Recent evidence suggests that there are predisposing factors in addition to the use of intrathecal lignocaine associated with development of TNS. These include surgical position (lithotomy and knee arthroscopy position), outpatient status and possibly advanced age, obesity and prolonged operation.[1,2,3,19] How these factors may contribute to the development of TNS is not yet determined, although potential etiologies include musculoskeletal strain or sciatic stretching.

We did not find evidence of any neurological symptoms in any of our patients in both the groups as reported previously. The patients were categorically asked leading questions regarding paraesthesia, radiating pain in legs, buttocks or thighs or any other neurological symptoms. Certainly none of the risk factors that increase the likelihood of TNS were present in our patients except the drug, lignocaine. The surgeries were of moderate duration (30-40 mins) done in supine position. No patient was mobilized before 24 hrs (which is a routine in our surgical wards).

CONCLUSION -

We concluded that intrathecal 2% hyperbaric lignocaine is an excellent and safe modality for patients undergoing caesarian section. The Addition of fentanyl is beneficial because compared to lignocaine alone it potentiates the sensory block and prolongs the postoperative

analgesia without affecting the motor recovery.

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