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EFFICACY OF FEMORAL-SCIATIC NERVE BLOCK IN PATIENTS WITH HEAD INJURY- A CASE SERIES

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ABSTRACT **Introduction:** Anaesthesia for Patients with head injuries posted for orthopaedic surgeries is challenging. Though general anaesthesia is preferred over neuraxial blockade it is not devoid of risks. We need to come-up with methods which do not affect the head-injury component any further. Regional anaesthesia like femoral- sciatic nerve block is another option for below knee orthopaedic surgeries and the benefits have been discussed here. **Methods:** USG guided femoral and sciatic nerve blocks were given to 40 patients undergoing below knee orthopaedic surgeries whose head injuries like EDH,SDH or SAH with GCS 12-15 was being managed conservatively. **Results:** Regional anaesthetic technique like femoral-sciatic nerve block is a potential anaesthetic technique for such patients considering safety and benefits. The block effect was satisfactory and also hemodynamic fluctuations were minimal which is a matter of concern in head injury patients. The GCS of patients included in the study was unaffected after the procedure. No patient required analgesia supplementation or administration of General Anaesthesia due to block failure or sparing. **Conclusion:** Based on the study conducted on 40 patients the combined femoral-sciatic nerve block seems to be a good alternative for below knee orthopaedic surgeries. The use of USG makes the procedure even more safer.

KEYWORDS : Head Injury, Below Knee Orthopaedic Surgeries, Femoral-Sciatic Nerve Block.

INTRODUCTION:

In a day to day practise of Anaesthesiology and managing ICUs we see A lot of patients with traumatic head injuries like subdural hematoma, extradural hematoma, subarachnoid haemorrhage who also present with chest, abdominal, vertebral injuries and fractures. Choosing between operative and conservative management for subdural hemorrhage (SDH), epidural hemorrhage (EDH), and subarachnoid hemorrhage (SAH) involves evaluating several factors like Glasgow Coma Scale, volume of haemorrhage, the amount of midline shift and haemodynamics of the patient.[1] After the opinion from the neurosurgeon for the head injuries, the patients who were managed conservatively were posted for orthopaedic below knee surgeries. Providing anaesthesia for patients with head injury is a difficult task. Using general anaesthesia (GA) in patients with intracranial lesions poses several risks, and neuraxial blocks are generally not recommended. Although GA is typically preferred over neuraxial anaesthesia in cases of traumatic brain injury (TBI) it still presents significant concerns like Hemodynamic Instability, Increased Risk of Re-bleeding and Hematoma Expansion, Challenges in Neurological Monitoring, Delayed Recovery, Possible Neurological Deterioration. This article aims to explore the efficacy of Femoral-Sciatic Nerve Block in below knee orthopaedic surgeries for patients with head injuries, focusing on its benefits and safety considerations.

MATERIALS AND METHODS:

A total of 40 patients were included in this study. The patients were in the age group of 20-60 years and were given femoral-sciatic nerve block for orthopaedic surgeries below knee. The study was conducted at a tertiary care center in the year 2021-2022.

Inclusion criteria 1) Patients in the age between 20-60 years 2) patients with head injury with components like EDH, SDH, SAH along with below knee orthopaedic injuries. 3) Head injury patients with GCS 12-15 who were managed conservatively by neurosurgeon and were cleared for orthopaedic surgery. Exclusion criteria includes 1) morbidly obese patients 2) pregnant women 3) allergic to local anaesthetics.

Patient's gratification was scored as 0: failed, 1: weak, 2: moderate, 3: good, and 4: excellent[7,8]. Anaesthesia quality (anaesthesiologist) was scored as follows: 1: general anaesthesia was required, 2: complementary analgesic was needed, moderate complaints, 3: no need for complementary analgesia, few complaints, and 4: no complaints.[7] All the patients were explained about the procedure of block to be given and also explained about the need of general anaesthesia in case of block failure. The risks associated with General Anaesthesia was also explained. A written informed consent was taken. A detailed Pre-anaesthetic evaluation was done for all the patients and on the day of surgery patients were pre-medicated with inj pantoprazole and inj ondansetron. Patients vitals like Heart rate, Blood Pressure, oxygen saturation, respiratory rate were noted by connecting the patients to multipara monitor.

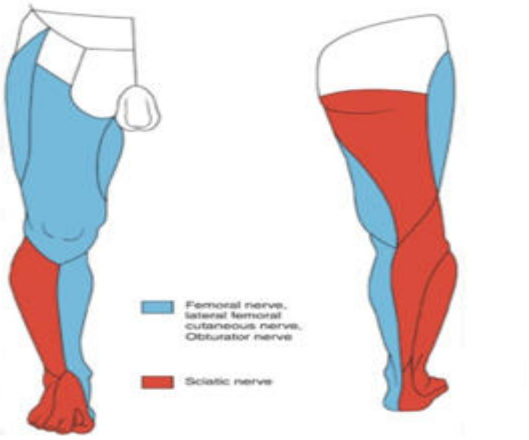

Image 1: Distribution of Femoral and Sciatic Nerve supply in lower limb

Patients were given Ultrasound guided Femoral Nerve Block in supine position and Ultrasound guided Sciatic Nerve Block by Transgluteal approach in lateral position [6]. For every patient 10 ml of 1% lignocaine and 10 ml of 0.25% bupivacaine was given for femoral nerve block. For Sciatic nerve block 10 ml of 1% lignocaine and 15 ml of 0.25% of bupivacaine was given.

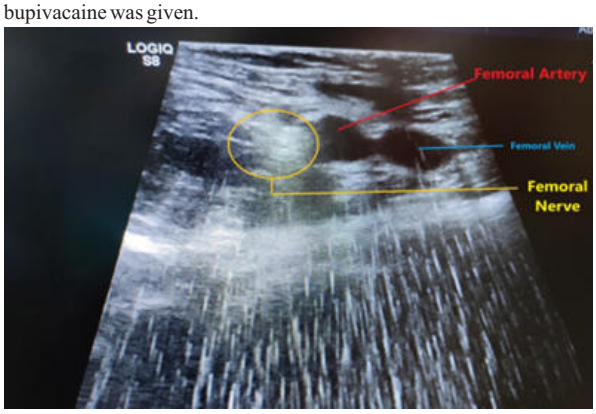

Image 2: USG Guided Femoral Nerve Block

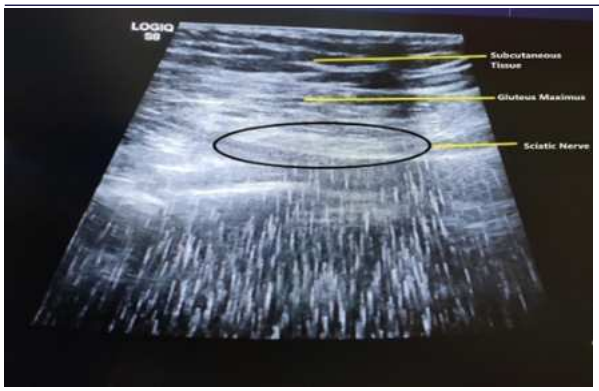

Image 3: USG Guided Sciatic Nerve Block by Transgluteal approach

The onset of action of effect of block was between 5-10 mins. After confirming the sensory and motor effect of block the patients were handed over to surgeon for surgery. The patients were operated by trained orthopaedic surgeons. The various surgeries lasted from 1 hour to 3 hours. The intra-operative hemodynamics and events were noted. Blood Transfusion was done in necessary patients depending on the blood loss. The patients were then shifted to post-operative recovery room and observed for one hour and then shifted to ward.

OBSERVATION AND RESULTS:

A total of 40 patients having one or more head injury components like EDH,SDH and/or SAH were given USG guided Femoral-Sciatic Nerve block. Out of 40 patients 28 were male and 12 were female patients

1. Table Showing Distribution Of Patients Based On Age Groups.

Age Group	Number
21-30	12
31-40	14
41-50	8
51-60	6
Total	40

2. Table showing distribution of patients based on gender.

Male	Female	Total
28	12	40

3. Table Showing Duration Of Surgery

Duration	Number
upto 1 hour	12
1-2 hours	16
2-3 hours	12

4. Table showing Patient gratification, Anaesthesia and surgical quality.[9]

	1	2	3	4
Patient satisfaction	0	0	7	33
Anaesthetic quality	0	0	5	35

Patient satisfaction: 1. Poor 2. Moderate 3. Good 4. Excellent

Anaesthesia quality: 1. Failed; General anaesthesia was required, 2. Moderate; complementary analgesia was required, 3. Good; little complainant, complementary analgesia was not required, 4. Excellent; patients did not complain.

5. Table Showing Hemodynamic Fluctuations

	Before administration of block	At the time of administration of block	15 mins after admistration of block	At the time of incision
Mean Pulse Rate	88.6	89.2	88.9	88.1
Mean Systolic Blood Pressure	136.4	137.4	137	136.8
Mean Diastolic Blood Pressure	78.2	78.9	78.1	77.9

It was observed that all these patients did not have any hemodynamic fluctuations from the time of performing the block to taking the incision. The entire surgery for any of the patients, were performed under the effect of block and no patients were given general anaesthesia for inadequate analgesia or for the need of relaxation. Patients were not given analgesia for effect sparing.

The effect of the block lasted for 8-12 hours and the patients did not complain of urinary retention.

DISCUSSION:

We come across many patients with head injuries like Sub-arachnoid haemorrhage, Sub-dural haemorrhage, Extra-dural haemorrhage also presenting with fractures. It takes time for these haemorrhages to resolve and not all head injuries require surgical management. Depending on the size of haematoma, mid-line shift, GCS of the patient the patients are advised conservative management. But the orthopaedic issues of the patient need to be addressed as early as possible as per the Damage Control Orthopedics[10] protocol. The anaesthetic management of these patients with head injury is challenging to the anaesthesiologists.

On pre-anaesthetic evaluation of a patient with traumatic brain injury anaesthesiologists go for general anaesthesia but general anaesthesia is not completely safe. The induction agents, maintenance agents and the laryngoscopy have a detrimental effect on already damaged brain causing secondary brain damage as described by Schulte am Esch J et al, Brussel T et al, Tobias JD et al and Field LM et al[2,3,4,5]. The article presented by Hyunjee Kim and Ankur Khandelwal descriptively explained the various concerns of administering general anaesthesia in patients with traumatic brain injury. Also after administering general anaesthesia to a head injury patient, the possibility of delayed recovery and post operative mechanical ventilation requirement increases.

Ankita Kabi et al[11] in their study have explained how a large anesthetic dose injected in epidural space has increased the inctracranial tension leading to agitation. H Hilt et al[12] in their study concluded that epidural injections should not be used in patients with raised intracranial tension and patients with space-occupying lesions. The other concern related to epidural anaesthesia is inadvertent puncture of dura during the procedure.

Ahed Zeidan et al[13] in their study reported how spinal anesthesia caused subdural rebleeding in a patient with head injury who was apparently having no signs of head injury. All patients with head injury need not have a poor GCS. The patients may appear normal despite a head injury component like SAH, SDH, EDH. Many a times the findings could be missed on a CT scan. In such patients, administering a subarachnoid blockade is risky. Just like Sangam Yadav et al[18] in their study reveal that neuraxial anesthesia in patients with head injury can cause intracranial hematoma expansion. We can find various case reports on detrimental effects of spinal anaesthesia in head injury patients but as such no studies have been conducted on this mode of anesthesia because of the existing literature.

Until now we have discussed how general anesthesia, epidural anesthesia and sub-arachnoid blockade have posed risks in patients with head injury while managing extra-cranial injuries. So whenever possible peripheral nerve blocks can be opted as their safety was proved by various studies. Khandelwal et al[14] in their article have mentioned how major plexus blocks like brachial, femoral, sciatic blocks are acceptable in patients with head injury and how use of USG makes them safer. Andrew Chang et al[16] and Benjamin D et al[15] have laid down their conclusions on how peripheral nerve blocks are advantageous in any type of patients. But they have also mentioned about the complications which include infections, allergies, nerve damage, systemic absorption of local anesthetic leading to toxicity and bleeding which can happen in any patient not specific only to head injury patients and these complications can be reduced by the use of USG where structures are visualised and accuracy is high.

There is no study to exactly prove that femoral-sciatic nerve block is effective and safe in patients with head injury but there are studies showing the effectiveness of peripheral nerve blocks over other modes of anesthesia and there is literature showing peripheral nerve blocks effective in head injury patients managing extra cranial injuries.

So efforts have been taken through this study to show that femoral-sciatic nerve block is safe in patients with head injury for managing below knee surgeries and through the observations and results we can see that the hemodynamics and GCS of the patients were not affected. Due to the efficacy of the block no patients were given analgesics like

opioids which can otherwise cause sedation which makes the assessment of GCS intraoperatively difficult and which can also cause respiratory depression. Jordan T. Bateman et al[17] have shown the detrimental effects of opioids on respiration and lethal effects due to it. The analgesia lasted for 8-12 hours post-operatively which delayed the dose of first systemic analgesics in contrast to general anesthesia or sub-arachnoid blockade. One more post operative complication of sub-arachnoid blockade like urinary retention was not seen in these patients as only a single limb was blocked and no opioids were used.

CONCLUSION:

A case series of femoral-sciatic nerve block administered in 40 patients with head injury with GCS 12-15 managed conservatively by neurosurgeons and cleared for orthopaedic procedures have shown a satisfying motor and sensory blockade without hemodynamic fluctuations or instability with a prolonged post-operative analgesia. Based on the observations conducted on these 40 patients the combined femoral-sciatic nerve block seems to be a good alternative for below knee orthopaedic surgeries as described above. The use of USG makes the procedure safer and accurate. No respiratory depression was observed and no urinary retention in any of these patients were noted.

Limitations:

This study is just an observational study and no comparative groups were included. The sample size as this is a case series is only 40. There is a `need of studies with larger sample size. The comparison among various methods of anesthesia is not done in this study to prove this mode of anaesthesia is better than the other modes. Use of USG guided block has its own limitations like availability of USG in all centres and a steep learning curve. Use of USG Guided blocks is associated with difficulty to interpret the images, needle insertion and a possible risk of Peripheral Nerve damage in the beginners.

Conflict Of Interest: None

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