Regional anaesthesia practices in India: A nationwide survey

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ABSTRACT

Background and Aims: There are no surveys documenting the existing regional anaesthesia (RA) practices in our country. This nationwide survey aims to record the existing RA practices, identify any lacunae that might exist and project the future direction of evolution. Methods: This online survey consisting of 31 questions was sent to all members of the Indian Society of Anaesthesiologists and addressed participants’ demographic features, central neuraxial block and peripheral nerve block practices, drug selection, RA training and safety measures. The data were analysed using Statistical Package for the Social Sciences version 24.0. All categorical variables were expressed as frequencies and percentages. Results: A total of 2141 responses were received, with participants distributed across the country. Forty-two per cent of the respondents reported that more than 60% of surgeries were performed under RA. Most of the participants use ‘traditional’ test dose for epidural space confirmation. Fifty participants (2.4%) use ultrasound for neuraxial space identification. Twenty per cent of the participants use a checklist for monitoring post-operative epidural analgesia. 6.7% have undergone specialised training in RA. Around 3.5% of the respondents have performed a wrong-side block. 31.4% of the respondents store intralipid in the operating room. Conclusion: The current survey highlights the prevailing practices, various deficiencies in monitoring and the need for RA training programmes. The data accrued can serve as a baseline for future comparison.

Key words: Anaesthetics, analgesia, epidural, surveys and questionnaires

INTRODUCTION

Regional anaesthesia (RA) techniques have been commonly used for surgical anaesthesia and post-operative analgesia. Epidural analgesia and peripheral nerve blocks can provide post-operative analgesia, enhance recovery after surgery and improve patient satisfaction.[1-4] With ultrasonography (USG) availability, these techniques are extensively being utilised to provide improved peri-operative care.[5] To the best of our knowledge, a nationwide survey about RA practices in India is lacking. A nationwide survey can provide data about practices at different hospitals and aid to gain acquaintance with the prevailing clinical practices. The results will guide the training in RA and can improve the safety features required to prevent complications associated with RA.
techniques. The results can be used as a standard for future comparisons and the evolution of RA practices in India. This descriptive survey aims to evaluate the existing RA practices across various institutions, identify any lacunae and project the future direction of evolution.

METHODS

This online cross-sectional study was conducted by the Indian Society of Anaesthesiologists (ISA) from January 1, 2021, to April 30, 2021, after obtaining institutional ethics committee approval and registering with the Clinical Trials Registry - India (CTR/2020/06/026171). The survey questionnaire was reviewed for content and structure by eight senior consultants with a minimum of 10 years of experience in RA to ensure validity and precision. The survey addresses participants' demographic features, central neuraxial block (CNB) and peripheral neuraxial block (PNB) practices, drug selection, training and safety measures. An electronic questionnaire was created in Google forms (Google, Alphabet Inc, California, USA), a web-based survey research tool that allows users to create surveys using question format templates. Further, as a pilot study, the questionnaire was sent to eight anaesthesiologists not involved in validating the questionnaire to ensure the functioning of the questionnaire in various platforms and rectify ambiguous questions, and their feedback was obtained. The secure link containing the questionnaire was sent to all registered anaesthesiologists of the ISA through their mobile number using WhatsApp messenger (WhatsApp®, MountainView, CA, USA). Subsequently, two electronic reminders were sent through e-mail one month after the initial message. The responses were anonymous, and there was no incentive for participation.

The questionnaire consisted of 31 questions, of which 24 were objective choice type, and seven were of the ‘yes’ or ‘no’ type (Annexure 1). All the responses were saved to the Google account of ISA. The data were analysed using Statistical Package for the Social Sciences version 24.0 (SPSS version 24.0, Chicago, Illinois). All categorical variables were expressed as frequencies and percentages.

RESULTS

The survey questionnaire was sent to all the ISA members (life and associate). There were 2141 responses, giving a response rate of 10%. Though 35% of the respondents were from medical college hospitals, there was adequate representation from government hospitals, corporate hospitals and freelancing practitioners. The majority responded that more than 60% of the surgeries are performed under RA [Figure 1]. The participants were distributed throughout the country [Figure 2]. The total number of responses for each question was considered for calculating proportions.

The common position adopted for performing the neuraxial technique is the sitting position (46.6%). The commonly used needle size and type is 25G with a bevelled tip [Table 1]. Co-loading of intravenous (IV) fluids is mainly practised. Almost 90% of the respondents encountered post-dural puncture headache in less than 2% of patients. The loss of resistance to air is the most common method used for epidural space identification (64.5%). 6.7% of the respondents had undergone fellowship or certificate course training in performing PNBs. Around 46% of the respondents perform PNBs under USG guidance, and 28.6% perform using landmark technique. 55.4% of the respondents routinely evaluate motor and sensory blockade recovery after peripheral nerve blocks and document it.

Bupivacaine is the most common drug used for spinal anaesthesia, and opioids are the commonly used adjuvant [Table 2]. Around 16% of the respondents use off-label drugs as adjuvants in spinal anaesthesia. Test dose containing lignocaine and adrenaline is commonly used in obstetric and non-obstetric patients. The combination of bupivacaine and lignocaine is commonly used (61.1%) in PNBs. Dexamethasone, opioids and dexmedetomidine are widely used drugs as adjuvants in PNBs. Several off-label drugs like sodium bicarbonate, tramadol, midazolam, ketamine, magnesium sulphate, buprenorphine, butorphanol and hyaluronidase are used as adjuvants in PNBs.

The majority (89.1%) of the respondents used epidural catheters, and 23.5% used perineural catheters for post-operative analgesia [Table 3]. A combination of opioids and local anaesthetics (LA) is commonly used in epidural analgesia. 20.1% of the respondents used a checklist for monitoring post-operative epidural analgesia. 73.4% of the respondents mark and confirm the site of the block before performing the block. 3.5% of the respondents have performed a wrong side block. 31.4% of the respondents store intralipid in the operating room [Table 4]. Around 60% of the...
respondents have seen one or more complications following RA.

RA techniques were commonly used in the daycare setting too. 390 (18.7%) respondents used spinal anaesthesia, and 485 (23.2%) used PNBs for daycare surgeries. In the paediatric setting, caudal anaesthesia remains the most common [1546 (73.3%)] technique. However, the participants also used nerve blocks [706 (33.5%)] and spinal-epidural techniques [1088 (51.6%)]. Around 118 (5.6%) respondents never use any RA techniques in the paediatric population.

DISCUSSION

This survey aimed to document the existing RA practices in our country. The survey questionnaire was divided into categories like demographic factors, neuraxial and PNB techniques, drug selection, post-operative pain management, safety measures and RA in the daycare and paediatric settings.

Most respondents (35%) were from medical college institutions, but other hospitals were also equally represented in the survey. Also, 32% of the respondents had more than 15 years of experience in anaesthesia. 42.3% responded that more than 60% of the surgeries are performed under RA. This finding does not come as a surprise given the numerous advantages of RA with superior equipment like USG, better needles and catheters and drug availability (drugs with better toxicity profiles), making it more popular among anaesthesiologists and patients alike.\(^6\) The respondents who performed more than 60% of surgeries under RA predominantly belonged to government medical colleges or were freelancing practitioners. It is probably because of the ease of managing patients and also the ability to provide surgical anaesthesia with a single drug in RA.

CNBs are the most commonly performed RA techniques worldwide. In this survey, 50% responded that they preferred the sitting position for administering spinal anaesthesia and used a 25G bevelled tip needle. Almost 90% of the respondents encountered PDPH in less than 2% of patients. Bupivacaine remains the standard drug used in spinal anaesthesia given its long duration of action and availability. These findings are consistent with those from other nationwide
Opioids are the most common adjuvants used in spinal anaesthesia. The use of off-label drugs has always been prevalent. Though stringent guidelines have been issued for off-label drugs in research, their use will remain in practice. More rigorous documentation, reporting, and record-keeping may pick up various drugs’ advantages and toxicity profiles. In the current survey, three hundred and fifty respondents acquiesced to using other off-label drugs in spinal anaesthesia. An ideal epidural test dose should identify the intrathecal and intravascular placement of catheters so that complications due to drug injection into the wrong space could be avoided without causing any complication by itself. Most respondents in this survey commonly use the traditional test containing a small dose of lignocaine and adrenaline in both the non-obstetric and obstetric populations, albeit a lower percentage in the latter. In the obstetric population, adrenaline-containing test dose can give inconclusive results, making it controversial. Due to the various adverse effects of adrenaline on the foetal circulation and ambiguous heart rate variability in a patient in labour, the use of test dose and its validity has always been a matter of study. In the current survey, 21.4% of the respondents do not use a test dose to confirm epidural catheter placement in the obstetric population.

USG has integrated itself into various aspects of the world of anaesthesiologists. From vascular catheter insertion to PNBs to pre-operative echocardiography, USG finds its use all around. The use of USG has brought about a paradigm shift in RA. USG-guided PNB has become the gold standard, as reflected by almost half (46.8%) of the respondents performing PNBs under USG guidance. In previously published studies from China and Greece, anatomical and nerve stimulator (NS) guided blocks were more common, respectively. This could be because USG was not as accessible then as it is now and could also be due to limited expertise. Though not so prevalent in CNBs, the increasing incidence of obesity and patients with challenging anatomy presenting for surgeries has brought the need for innovative techniques in identifying the epidural/spinal space. In the present survey, most respondents mentioned that they use the loss of resistance to air to identify the epidural space, but 51 respondents used USG to identify the epidural space. Of these 51 respondents, 26 belonged to a medical college hospital. Anaesthesiologists in medical college hospitals update themselves regularly and will probably be the first to incorporate the latest advances in their clinical practice.

A combination of bupivacaine and lignocaine was used in PNBs to have the best of both worlds, namely, faster onset and prolonged duration of action. Nevertheless, with the advent of USG and NS, precise needle location is possible, enabling drug deposition very close to the nerve bundles facilitating faster onset. It should be emphasised that co-administration of bupivacaine and lignocaine in spinal anaesthesia should still be done with caution.

### Table 1: Neuraxial and peripheral nerve block techniques

| Parameter                                                   | n (%)   |
|-------------------------------------------------------------|---------|
| Position to perform CNBs                                     |         |
| Lateral                                                     | 568 (26.6) |
| Position according to patients' comfort                      | 568 (26.6) |
| Sitting                                                      | 997 (46.7) |
| Common needle size used                                      |         |
| 23G                                                         | 434 (20.3) |
| 25G                                                         | 1050 (49.2) |
| 26G                                                         | 391 (18.3) |
| 27G                                                         | 258 (12.1) |
| Common type of needle used for spinal anaesthesia            |         |
| Bevelled tip needle                                          | 1808 (84.7) |
| Pencil tip needle                                            | 326 (15.2) |
| Intravenous fluids before initiating spinal anaesthesia      |         |
| Co-load all patients                                         | 741 (34.7) |
| Preload all patients                                         | 673 (31.5) |
| Preload or co-load selective patients                        | 674 (31.5) |
| Never                                                       | 44 (2) |
| Incidence of post-dural puncture headache                   |         |
| Less than 2%                                                | 1881 (88.7) |
| 2%-5%                                                       | 208 (9.8) |
| More than 5%                                                | 30 (1.4) |
| Method for epidural space identification                    |         |
| Loss of resistance to air                                   | 1817 (85) |
| Loss of resistance to saline                                | 492 (23.1) |
| Hanging drop method                                         | 364 (17.1) |
| Ultrasound                                                  | 51 (2.4) |
| Training for performing PNBs                                 |         |
| Certificate course/Fellowship                                | 142 (6.7) |
| Residency                                                   | 1209 (57.7) |
| Workshops/Online content                                    | 743 (35.4) |
| Performing PNBs under general anaesthesia                   |         |
| Yes                                                         | 785 (37.1) |
| No                                                          | 1331 (62.9) |
| Technique to perform PNBs                                   |         |
| Combined USG with nerve stimulator                           | 240 (11.3) |
| Landmark                                                    | 604 (28.6) |
| Nerve stimulator                                            | 277 (13.1) |
| USG guided                                                   | 988 (46.8) |
| Evaluation and documentation of sensory and motor recovery   |         |
| following nerve blocks                                       |         |
| Yes                                                         | 1160 (55.4) |
| No                                                          | 933 (44.5) |

n - number, CNB - central neuraxial blockade, G - gauge, PNBs - peripheral nerve blocks, USG - ultrasonography
Lignocaine may increase the potential for toxic effects when maximum doses of both are used. Dexamethasone remains the most common adjuvant added, followed by opioids and clonidine. Dexmedetomidine, another alpha-2 agonist, has been used as an adjuvant in clinical and research settings.\[14,15\]

Epidural catheters are quite commonly used by 89% of the respondents. However, perineural catheters are not that commonly used; 23.5% of participants used peri-neural catheters for post-operative analgesia. The lesser use of perineural catheters could be due to a lack of knowledge, availability and training in securing perineural catheters. Only 20% of the respondents use a designated checklist to monitor for complications. Rest follow routine vitals monitoring, and 12% of the respondents only monitor peripheral oxygen saturation, which could cause concern. Following PNBs, 44.5% of the respondents do not check the motor and sensory blockade recovery. There should be defined guidelines for the required level of monitoring depending on the type of post-operative analgesia and the need to follow the same, which could make RA for post-operative analgesia management safer and, in turn, well received.

Most of the respondents were trained in PNBs as a part of their residency. Only 6.7% had undergone a certificate course or a fellowship in RA. In a survey in the US, they found that even after satisfying the requirement of various accreditation societies, residents did not feel competent enough to perform all the PNBs.\[16\] It has been observed that there is increased demand for continuing education beyond residency.\[17\] Also, the consultants might not be trained in USG guided nerve blocks due to the unavailability of the USG facility during their learning period. Fellowships or workshops in RA enable us to bridge this knowledge gap. With emerging new blocks, ranging in use from pre-operative period to emergency room to palliative care, it is important now more than ever to introduce new national RA fellowship programmes enabling better learning and training.

Local anaesthetic systemic toxicity (LAST) is a severe complication seen following RA when there is an intravascular injection of LA. Its incidence has been very low, but when it does occur, it can be fatal. Almost 20% of the respondents have witnessed LAST. With the increased use of RA in various locations, there has been increased attention towards preventing and treating LAST, and several international guidelines have been issued for the same.\[18\] Intralipid has been mentioned in all the guidelines as the only possible therapy for reversing the LA actions. It is the authorities’ responsibility to ensure the availability of intralipid in areas where local anaesthetics are administered. National health services (NHS) recommends stocking at least 1500 mL of intralipid as part of the antidotes with instructions for its use. However, only 33.4% responded affirmatively to stocking intralipid, which

### Table 2: Drug selection

| Parameter | n (%) |
|-----------|-------|
| Drug commonly used in spinal anaesthesia |  
| Bupivacaine | 2106 (98.6) |
| Ropivacaine | 22 (1) |
| Other drugs | 6 (0.2) |
| Adjuvants used in spinal anaesthesia |  
| Clonidine | 663 (31.1) |
| Opioids | 1746 (82) |
| Other off label drugs like dexmedetomidine | 350 (16) |
| None | 174 (8.1) |
| Epidural test dose in non-obstetric patients |  
| 3 mL 1.5% Lignocaine with adrenaline 15 µg | 1597 (75.5) |
| 3 mL Lignocaine 2% | 256 (12.1) |
| No test dose | 214 (10.1) |
| Other drugs | 46 (2.1) |
| Local anaesthetic commonly used in PNBs |  
| Bupivacaine | 513 (24.3) |
| Bupivacaine + lignocaine | 1291 (61.1) |
| Ropivacaine | 307 (14.5) |
| Adjuvant used in PNBs |  
| Dexamethasone | 1248 (62.5) |
| Opioids | 789 (39.5) |
| Dexmedetomidine | 712 (35.6) |
| Clonidine | 345 (17.2) |
| None | 77 (3.8) |
| Other drugs | 60 (3) |

n-number, PNBs- peripheral nerve blocks

| Parameter | n (%) |
|-----------|-------|
| Use of epidural for post-operative analgesia |  
| Yes | 1893 (89.1) |
| No | 231 (10.8) |
| Drug routinely used for post-operative epidural analgesia |  
| Both opioids and local anaesthetics | 1626 (78.5) |
| Local anaesthetics | 326 (15.7) |
| Opioids | 118 (5.7) |
| Monitoring of patients receiving epidural analgesia |  
| No checklist but SpO2, RR, HR, BP | 1347 (65) |
| No monitoring | 43 (2) |
| Only SpO2 | 265 (12.7) |
| Using a checklist | 417 (20.1) |
| Use of perineural catheters for post-operative analgesia |  
| Yes | 492 (23.5) |
| No | 1600 (76.4) |

n-number, SpO2- Peripheral oxygen saturation, RR- respiratory rate, HR- heart rate, BP- blood pressure

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Table 4: Safety measures

| Parameter                                                                 | n (%)   |
|---------------------------------------------------------------------------|---------|
| Marking and confirming the site of the block before performing peripheral nerve blocks |         |
| Yes                                                                       | 1541 (73.4) |
| No                                                                        | 556 (26.5)  |
| Performed a wrong side block                                              |         |
| Yes                                                                       | 75 (3.5)  |
| No                                                                        | 2027 (96.5) |
| Complications seen following regional anaesthetic techniques              |         |
| Haematoma                                                                 | 588 (28.2) |
| IV injection                                                              | 540 (25.9) |
| LAST                                                                     | 343 (16.4) |
| Nerve injury                                                              | 232 (11.1) |
| Never                                                                    | 829 (39.8) |
| Routine storage of intralipid in the operating room                      |         |
| Yes                                                                       | 663 (31.4) |
| No                                                                        | 1444 (68.5) |

n- numbers, IV- intravenous, LAST - local anaesthesia associated systemic toxicity

This survey brings to the forefront several essential issues in the field of RA in the Indian setting. Though several advancements were noted in the field of RA, there were also some imperfect practices still followed, which needs adaptation. The survey also highlights the escalating demand for dedicated RA fellowships or courses for better quality-focused RA education. This survey acts as a record of the existing nationwide RA practices and will serve as a reference for future comparison.

CONCLUSION

This survey brings to the forefront several essential issues in the field of RA in the Indian setting. Though several advancements were noted in the field of RA, there were also some imperfect practices still followed, which needs adaptation. The survey also highlights the escalating demand for dedicated RA fellowships or courses for better quality-focused RA education. This survey acts as a record of the existing nationwide RA practices and will serve as a reference for future comparison.

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Conflicts of interest
There are no conflicts of interest.

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### Annexure 1: Questionnaire:

**General information:**
- Your hospital level: Free lancing practitioner, Corporate hospital, Medical college institution, Government hospital.
- Years of experience: Less than 5 years, 5–10 years, 10–15 years, More than 15 years.
- Enter your state: 
- What percentage of surgeries in your department are done under regional anaesthetic techniques? Less than 20%, 20-40%, 40-60%, More than 60%.
- What percentage of patients undergoing surgeries receive regional anaesthesia for post-operative analgesia? Less than 10%, 10-20%, 20-30%, more than 30%.

**Questions:**
- In what position do you routinely perform neuraxial techniques? Lateral, Sitting, Position depends on patient.
- What type of needle do you commonly use for spinal anaesthesia? Beveled tip needle, Pencil tip needle.
- What needle size do you commonly use for performing spinal anaesthesia? 23G, 25G, 26G, 27G.
- Do you routinely administer intravenous fluids before initiating spinal anaesthesia? Preload all patients, Co-load all patients, Preload or co-load on selective patients (eg: prolonged fasting), Never.
- Which local anaesthetic agent is commonly used in spinal anaesthesia? Bupivacaine, Ropivacaine, Other drugs.
- What is the incidence of post-dural puncture headache in your hospital? Less than 2%, 2-5%, More than 5%.
- What adjuvants do you use in spinal anaesthesia? Opioids, Clonidine.

**Annexure 1: Contd...**

Other off label drugs like dexmedetomidine
- Never
- What method do you use for epidural space identification? Loss of resistance to saline, Loss of resistance to air, Hanging drop method, Ultrasound.
- What drug do you use for epidural test dose in non-obstetric patients? 3 mL Lignocaine 1.5% with adrenaline 15 µg, 3 mL Lignocaine 2%, Other drugs, No test dose.
- What drug do you use for epidural test dose in obstetric patients? 3 mL Lignocaine 1.5% with adrenaline 15 µg, 3 mL Lignocaine 2%, Other drugs, No test dose.
- Do you use epidural analgesia for providing post-operative analgesia? Yes, No.
- Which drug do you routinely use for post-operative epidural analgesia? Opioids, Local analgesics, Both opioids and local anaesthetics.
- How are the patients receiving epidural analgesia monitored? Using a checklist, No checklist but SpO₂, RR, BP, Only SpO₂, No monitoring.
- What kind of training have you undergone for performing peripheral nerve blocks? Certificate course/fellowship, Workshops/online content, Residency.
- Which local anaesthetic agent is commonly used in peripheral nerve blocks? Bupivacaine, Ropivacaine, Bupivacaine + lignocaine.
- Do you perform peripheral nerve blocks under general anaesthesia? Yes, No.
- Do you mark and confirm the site before performing peripheral nerve blocks? Yes, No.
- Have you performed a wrong side peripheral nerve block? Yes, No.
- Which techniques do you use to perform peripheral nerve blocks? USG guided, Landmark, Nerve stimulator, Combined USG with nerve stimulator.
| Annexure 1: Contd... |
|----------------------|
| Which complications have you seen following regional anaesthetic technique? |
| Local anaesthetic systemic toxicity |
| Nerve injury |
| IV injection |
| Haematoma |
| Never seen |
| Does your hospital routinely store intralipid in the operating room? |
| Yes |
| No |
| Which adjuvants do you use in peripheral nerve blocks for extremity surgery? |
| Dexamethasone |
| Dexmedetomidine |
| Clonidine |
| Opioids |
| Others |
| Do you routinely evaluate recovery of sensory and motor functions and document the same following nerve blocks? |
| Yes |
| No |
| Do you secure perineural catheters for post-operative analgesia? |
| Yes |
| No |
| What regional anaesthetic techniques do you use for daycare surgery? |
| Spinal |
| Nerve blocks |
| Both spinal and nerve blocks |
| Never |
| Which regional anaesthetic techniques do you perform in paediatric patients? |
| Spinal/epidural |
| Caudal |
| Nerve blocks |
| Never |

SpO$_2$ - peripheral oxygen saturation, RR- respiratory rate, BP- blood pressure, USG-ultrasonography.