Controversial Issues in Neuroanaesthesia and Their Current Practice in India – A Questionnaire Survey

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Summary

To address the practice of various controversial issues in neuroanaesthesia practice in India, a questionnaire survey was conducted during the Annual Conference of Indian Society of Neuroanaesthesiology and Critical Care (ISNACC), held in Hyderabad this year in February 2008. The aim of the survey was to assess the views of the neuroanaesthetists on these issues and its influence in their clinical practice.

A simple questionnaire comprising of eight questions was prepared related to the various controversies in neuroanaesthesia. Participants were asked to fill the questionnaire and return before the end of conference. All the questionnaires were distributed in hand and collected personally.

The response rate was 66.25% from the nearly 160 delegates. The response was received from nearly an equal number of practitioners, both in the government and corporate sectors. Most of the respondents shared a neutral opinion on the controversies in neuroanaesthesia.

New challenges are being faced by anaesthetists with evolution of neurosurgical practice. Various controversies have led to more research in this field. Although the awareness exists among Indians, the practice continues at many centres. Multi-centric trials to address such issues may prove beneficial.

Keywords Neuroanaesthesia; Controversies; Questionnaire survey

Introduction

As ‘Neuroanaesthesia’ continues to expand and develop, the basic principles remain unchanged – provision of optimal operative conditions, maintenance of cerebral perfusion pressure (CPP), and cerebral oxygenation. However, despite advances in drugs and monitoring modalities, many controversies remain regarding the clinical practice of neuroanaesthesia the choice of anaesthetic agent and fluids, and intraoperative hypothermia.1-5 To address some of these issues such as the use of nitrous oxide, intraoperative hypotension and anaesthetic technique for carotid endarterectomy 6-12, we conducted a survey on the practice amongst the neuroanaesthetists in India. The aim of the survey was only to find out the opinion and preference on the controversial topics in the neuroanaesthesia practice of the anaesthetists.

Methods

A questionnaire was prepared asking questions on the various controversial issues in neuroanaesthesia practice. We surveyed all anaesthetists practicing neuroanaesthesia who attended the 9th Annual Conference of Indian Society of Neuroanaesthesiology and Critical Care, held at Hyderabad, India, from 8th to 10th February 2008. A questionnaire was distributed
randomly to the delegation of about 160 persons. The questionnaire [Appendix 1] included the practice of

Appendix I

Name (optional)
Gender: M/F
Institute: (Govt./Pvt./ Corporate)
Years in clinical practice:

ISSUES Do You Practice?
1. Induced Hypotension Frequently / Occasionally / Never
2. Hypothermia Frequently / Occasionally / Never
3. Nitrous Oxide Frequently / Occasionally / Never
4. Inhalational/Intravenous Inhalational/Intravenous/ Combined
5. Invasive Vs Noninvasive Invasive / Non invasive / Both monitoring
6. Fluids NS / RL / DNS / 5 % Dextrose
7. Carotid Endarterectomy GA / Regional or Local/Not done
8. Cerebral protection during aneurysm surgery Yes / No

induced hypotension, hypothermia, use of nitrous oxide, preference for inhalational versus intravenous anaesthesia, choice of fluids, and anaesthetic technique for carotid endarterectomy (CEA). Participants were asked to fill the questionnaire and return before the end of conference. Respondents were asked to mark single answer for each question except the one on fluids choice, where more than one answers were acceptable. The respondents were also required to fill their gender, place of work and years of clinical experience.

This survey is not a comparative study where statistical tests can be applied. However, results are expressed as mean (range), number or percentage.

Results

A total of 106 replies were received giving a response rate of 66.25%. Two respondents were currently practicing outside India and their replies were not analysed further. The results are based on the remaining 104 respondents. There were 64 male and 40 female respondents working in government and corporate sectors of the country. The division in the working sector was nearly equal, with 60 working in government hospitals and the remaining 44 in various corporate and private sectors. The duration of clinical practice of the respondents was 12.8 (5 – 29) years. The demographics are tabulated in Table 1. Majority of re-

Table 1 Demographics of the participants of the survey on controversial issues in neuroanaesthesia practice in India. Mean [range], (n – number of respondents) or %.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total questionnaires distributed</td>
<td>160</td>
</tr>
<tr>
<td>Questionnaires replied</td>
<td>106</td>
</tr>
<tr>
<td>Response rate</td>
<td>66.25%</td>
</tr>
<tr>
<td>Replies excluded</td>
<td>2</td>
</tr>
<tr>
<td>Data analysed for</td>
<td>104</td>
</tr>
<tr>
<td>Male/female</td>
<td>60/40</td>
</tr>
<tr>
<td>Government service</td>
<td>60</td>
</tr>
<tr>
<td>Corporate/private hospitals</td>
<td>44</td>
</tr>
<tr>
<td>Duration in clinical practice</td>
<td>12.8 [5 – 29] years</td>
</tr>
</tbody>
</table>

respondents [76.9%] favoured combined anaesthesia as compared to 9.6% respondents who preferred inhalational anaesthetic techniques and eight respondents [7.7%] practiced intravenous method of anaesthesia. A small number of respondents [5.8%] did not disclose their preference and left the question unanswered. Overall results revealed an inclination of the anaesthetists towards combined anaesthesia technique.

[Fig 1] Our survey revealed that induced hypothermia

![Fig 1 Diagram showing the preference of anaesthetic technique in neurosurgical practice. NA-not answered](image-url)
was not preferred by majority of the respondents [44.2%] and was never practiced by them. Nearly an equal number of participants [42.3%] informed that they occasionally induced hypothermia to their patients. This was mostly passive as a result of the operating room temperature. No active measures were taken by them to reduce temperature in their patients. Twelve respondents [11.5%] frequently induced hypothermia to their patients during intraoperative period. The trend among Indian neuroanaesthetists was mostly towards maintenance of normothermia. [Fig 2] Our survey revealed occasional practice of induced hypotension in the intraoperative period [55.8%]. While 25% of respondents claimed to be practicing induced hypotension frequently, 19.2% never favoured the technique. [Fig 3]

The results of our survey revealed that majority of the anaesthetists [55.8%] used general anaesthesia for CEA as compared to only 21.2% who used regional blocks and local anaesthesia. Around 23% of respondents admitted that CEA was not performed in their centre. [Fig 4] However, our survey shows that a vast majority of respondents [76.9%] believed in using both invasive and non-invasive monitoring techniques. Nearly an equal number preferred invasive and non-invasive methods; 9.6% and 7.8% respectively. The question was not answered by 6 respondents [5.7%]. [Fig 5] Nor-
normal saline remained the fluid of choice by 96% of our respondents. Many participants also gave additional choice for fluids other than normal saline. Ringer’s lactate solution was routinely used by 61.5% of anaesthetists in their neuroanaesthesia practice. Dextrose 5% was undoubtedly not the favoured fluid and no respondent admitted its use in their practice. Ten respondents out of 110 used Dextrose-normal saline solution along with normal saline. [Fig 6] Our respondents frequently used nitrous oxide and claimed it to be an indispensable part of their anaesthetic practice. Nitrous oxide was frequently used by 67% and occasionally by 21%. Six respondents had completely stopped using nitrous oxide in their neurosurgical anaesthetic practice. The question was left unanswered by 5% of the respondents. [Fig 7] In our survey, we also enquired whether any sort of cerebral protective measures were being used intraoperatively, especially during aneurysmal surgery. To this majority of the respondents answered positively [84.6%]. Around 4% of respondents said that they did not use any cerebroprotective measures and maintained routine anaesthesia. The question was not answered by 11.5% participants, mostly by those in whose centre the surgery for intracranial aneurysm was not being performed. What agent was being preferred for cerebral protection was not asked as it was beyond the scope of our survey. [Fig 8] However, on enquiring, it was found that most respondents who used cerebro-protective measures favoured the use of thiopentone sodium. Some respondents even suggested using propofol and mannitol intraoperatively as their strategy for cerebral protection.

**Discussion**

Controversies regarding the provision of anaesthesia for intracranial neurosurgery remain, with no ideal technique identified. Despite the theoretical benefits of intravenous agents, volatile agents remain popular. In a study comparing desflurane, isoflurane and sevoflurane in a porcine model of intracranial hypertension, at equipotent doses and normocapnia, cerebral blood flow (CBF) and intracranial pressure (ICP) were greatest with desflurane and least with sevoflurane. The same authors also confirmed that sevoflurane also caused least vasodilation. In two separate studies, isoflurane was seen to impair autoregulation, although reversible with hyperventilation, while autoregulation was virtually intact with sevoflurane 1 – 1.2% at
normocapnia. Although large studies may be needed, sevoflurane appears to be the most suitable volatile agent for neuroanaesthesia practice. The detrimental effects of nitrous oxide are well documented. However, most of the studies can be directly extrapolated to clinical practice where other agents influence the effects of nitrous oxide. Interesting finding in a study on 700 patients was that the drugs used for induction and maintenance of anaesthesia, were not independent risk factors for intraoperative brain swelling. ICP at the start of surgery, degree of midline shift on computed tomographic scan, and the histological diagnosis of glioblastoma or metastasis were the risk factors.

Cerebral ischemia and hypoxia can occur in a variety of perioperative circumstances and controversy surrounds the role of hypothermia in cerebral protection. While hypothermia initially showed beneficial effects in survivors of cardiac arrest and hypoxic insults, its application was not favoured in years to come. This was probably due to the lack of efficacy and the logistics. There is no doubt that deep hypothermia (18 - 22°C) is highly neuroprotective but a large trial on patients with traumatic brain injury has shown no improved outcome after mild hypothermia. The randomized prospective International Hypothermia Aneurysm Trial did not find a beneficial effect of induced mild intraoperative hypothermia (33°C) during aneurysm surgery. In the course of defining hypothermia efficacy, it has become apparent that hyperthermia has adverse effects on post-ischemic brain. Therefore, aggressive treatment of hyperthermia should always be considered.

Induced hypotension was once favoured during intraoperative aneurysm surgery at the time of clipping. However, it is no longer used routinely because it may critically impair overall cerebral perfusion, especially in presence of hypovolemia, and has been associated with adverse outcome and a higher incidence of severe cerebral vasospasm.

Another debate is on the superiority of regional anaesthesia or general anaesthesia in the management of CEA. An awake patient is the best monitor for CEA. There are reports of reduction in intraoperative shunting and perioperative stroke and the duration of hospital stay after regional anaesthesia than general anaesthesia for CEA. Local anaesthesia also offers clinical and cost advantages over general anaesthesia. However, an uncooperative patient may require general anaesthesia, which requires optimal cerebral monitoring.

Less invasive monitoring strategies have recently gained some acceptance in neurosurgical practice. It has been shown that because of hazards and complication of invasive monitoring, non-invasive monitors that are equally sensitive, safe and easy to learn are preferred.

The intraoperative fluid management of neurosurgical patients presents special challenges for the anaesthetist. The movement of water between the vasculature and the brain's extracellular space is driven primarily by the presence of osmotic gradients. Clinically, these gradients are established by administration of either hyperosmolar (mannitol) or hypoosmolar (5% dextrose) solutions. In the brain (unlike peripheral tissue) plasma oncotic pressure has little impact on cerebral edema formation. Attempts to minimize cerebral edema formation with fluid restriction are unlikely to be successful and, if overzealously pursued, may lead to haemodynamic instability. Although no single intravenous solution is best suited for the neurosurgical patient who is at risk for intracranial hypertension, the use of isosmolar crystalloids is widely accepted and can be justified on scientific basis.

There has been a decline on the use of nitrous oxide over the past few years, mainly due to the health related hazards of the gas and other associated complications, like, pneumocephalus, air embolism, neuropathies etc.

The response from our surveys does suggest that there is awareness among the anaesthetists regarding the controversies in neuroanaesthesia. Most prefer to use combined anaesthetic techniques, maintain normothermia in their patients, at times induce hypotension, and use both invasive and non-invasive techniques of
monitoring. The preferred fluid remains normal saline and most have no reservations on use of nitrous oxide. CEA is generally performed under general tracheal anaesthesia and majority use some cerebral protective measures intraoperatively in their patients. The last decade has seen a rapid expansion of our knowledge in clinical neurosciences. New challenges are being faced by anaesthetists with evolution of neurosurgical practice. The evolving clinical practices and monitoring modalities have helped in improved patient outcome. At the same time, controversies pertaining to drugs, intraoperative fluid management, and intraoperative anaesthetic techniques have resulted in more clinical trials in search of appropriate solutions. It is possible that a repeat survey in future would give us a better understanding of the changing trends among the neuroanaesthesiologists in India.

References


