

Regional anaesthesia in developing countries

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Summary

In modern anaesthesia practice, regional techniques are preferred to general anaesthesia for many types of surgery, particularly in obstetric care. Improved outcomes have been recorded in UK practice, but the techniques remain underutilised in many parts of the world. With encouragement, training and a regular supply of appropriate needles and local anaesthetic agents, the advantages of regional techniques in the developing world could be realised.

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Drugs for regional anaesthesia

Drugs are in short supply in many sub-Saharan countries. This is for many reasons. Funding can be erratic and can come from many sources; for example, central government, district government, foreign national aid groups, and church-affiliated aid groups. There may be periods when the hospital has very little money to acquire drugs. The storage and stock-keeping of drugs is also often less than optimal. Drug potency may suffer as a result of exposure to excessive heat or humidity. It is not uncommon to find many drugs in hospitals that have passed their expiry date. Hospital personnel may not be well trained in stock management, with the result that supplies of a drug may be allowed to run out before new drugs are ordered. An over-bureaucratic system can lead to orders being delayed while the necessary signatures and authorisations are obtained. The steady, reliable supply of anaesthetic drugs that we are so used to in the West often does not happen in Africa.

At times, hospitals run out of local anaesthetic altogether. Hodges et al. [1] in their recent study of anaesthesia resources in Uganda found that 30% of anaesthetists stated that they never had, and 28% stated that they only sometimes had, local anaesthetic solution for spinal anaesthesia in their hospitals.

When single ampoules run out, practitioners will sometimes use multidose vials of local anaesthetic, the same vial being used throughout a list, or sometimes reused over several days. This puts patients at risk of infection. Pandian [2] reported on a series of 27 patients over 18 years with iatrogenic meningitis treated in a

referral hospital in India. All cases followed spinal anaesthesia, often for Caesarean section. Cerebrospinal fluid culture was positive in 22% of cases, usually with skin contaminants. The mortality in this series was high at 36%. It would be easy to say that one should not use unsterile multidose vials for spinal anaesthesia; however, at times these may be all that are available. If they are used, then obviously the utmost care must be taken in adhering to the best aseptic techniques possible.

Vasopressors are used routinely when performing spinal anaesthesia. Alternatives to the more familiar ephedrine are commonly used: metaraminol, methoxamine, phenylephrine, noradrenaline and adrenaline. All are useful to treat hypotension, provided that they are diluted appropriately and carefully titrated to effect. The speed of onset and duration may vary, and reflex bradycardia may occur with methoxamine and phenylephrine. The use of a range of vasopressors in hypotension induced by spinal anaesthesia has been reviewed in *Update in Anaesthesia* [3]. Other simple, non-pharmacological treatments for hypotension after spinal anaesthesia may also be useful. Elevation of the legs is a safe, simple technique that auto-transfuses the patient and a high block can be avoided if the manoeuvre is carried out about 15 min after the spinal injection. Intravenous fluids and oxygen, if available, can also be given.

Equipment for regional anaesthesia

Lack of equipment, or inadequate or inappropriate equipment for regional anaesthesia is an ongoing problem. Anecdotally, I can report on an anaesthesia

storeroom brimming with boxes of paediatric spinal needles, and boxes of state-of-the-art 27G pencil-point needles and thru-the-needle combined spinal/epidural kits which have been kindly donated by hospitals and individuals in the West, but which are difficult for the local anaesthetists to use, as they may have only had a basic training in spinal anaesthesia.

For reasons of cost and availability, the most commonly used needle in Zambia is the 22G Quinke needle. This needle is simple and easy to use, with a very high success rate, and an acceptable incidence of post dural puncture headache. Nafiu found an incidence of 33% post dural puncture headache in women having Caesarean section in Ghana using a 22G needle, and the headaches were generally rated as mild to moderate [4]. Further research in this area would be beneficial as the problem may be significantly under-reported.

A creative solution to a shortage of spinal needles is the use of the introducer needle from a 20G intravenous cannula as a spinal needle. These needles are sterile, sharp and long enough to reach the dura to deliver local anaesthetic drugs. Compared to the short bevel on a purpose-designed spinal needle, the bevel on this introducer needle is quite sharp, as it is designed for penetrating skin and vein walls. Although theoretically there might be a risk of trauma to the cauda equina, those using the technique reported no neurological sequelae following the use of this needle.

Equipment for peripheral nerve blocks such as nerve stimulators and block needles are expensive, the techniques complex to learn and not commonly used in the rural hospital setting. Ophthalmic surgery, such as cataract extraction and lens insertion, is commonly carried out under local anaesthesia. The lack of a specific peri-bulbar needle does not deter the surgeons; procedures are often carried out under topical local anaesthesia alone, with some reassuring words to the patient.

Training in regional anaesthesia

There is a critical shortage of all healthcare workers in much of sub-Saharan Africa, as they face the burden of endemic disease and for economic reasons are often lost to the developed world [5]. Anaesthesia is usually delivered by non-physician providers, usually (but not invariably) clinical officers. Clinical officers train for 2 years to become general clinical officers, capable of managing a medical ward or staffing an out-patient clinic; they can then go on to train for a further 1–2 years to become clinical officers in anaesthesia. Most would have trained and have experience in spinal anaesthesia, but not other forms of regional anaesthesia. Further training in regional anaesthesia is difficult as many anaesthetists have no access

to teaching resources; fewer than half of the anaesthetists surveyed by Hodges et al. reported owning a textbook on anaesthesia [1]. Most hospitals in the rural setting do not have a library.

Why is regional anaesthesia not used more frequently?

‘The failure of single-injection spinal anaesthetic techniques to achieve richly deserved popularity is difficult to understand given the obvious advantages with which such simple, straightforward, effective, safe and even inexpensive techniques are associated’ (Nick Greene, 1993) [6].

Widespread uptake of regional anaesthesia is prevented by the combination of lack of drugs, equipment and training, and also institutional tradition and surgical preference. For example, there seems to be reluctance among some practitioners to use local anaesthesia by infiltration for surgery. A study from Ghana showed that for inguinal hernia repair, local African surgeons performed the procedure only half as frequently under local anaesthesia as did visiting surgeons [7].

The lack of training in regional anaesthesia is exacerbated by lack of access to textbooks. For those anaesthetists in the developing world with access to the Internet, the Virtual Anaesthesia Textbook (<http://www.virtual-anaesthesia-textbook.com>) has a wealth of information. There is a link here to a very practical article on local anaesthesia for hernia repair, which would be useful to practitioners and teachers alike [8].

Practitioners often have very little knowledge of the physiological changes that occur during spinal anaesthesia, the possible complications or their management. In both Zambia and Malawi, patients commonly receive spinal anaesthesia for Caesarean section without routine provision of supplementary oxygen to the mother intra-operatively. Many women undergoing Caesarean section are not placed on the operating table with left lateral tilt. It is difficult to assess the real impact of these factors, which are routine practice in the developing world, but they may explain why outcomes may not always be ideal and why techniques are slow to gain popularity. The incidence of significant maternal hypotension is unknown, but delivery of asphyxiated babies is not uncommon. The impact of maternal oxygen supplementation and tilting the operating table remains unknown.

There are many cases in which spinal anaesthesia or infiltration could be considered the technique of choice, but often anaesthetists prefer to manage such cases with ketamine (with or without tracheal intubation), as it is perceived to be quicker, simpler, more reliable and

cheaper. Whereas it may be debatable whether choice of technique affects outcome in non-obstetric cases, Fenton et al. [9] have shown conclusively in their study on obstetric outcomes in Malawi that both maternal and perinatal outcome is better following spinal anaesthesia. They also demonstrated that, in addition to pre-operative factors such as ruptured uterus and pre-operative blood loss, the level of training of the anaesthetist also influenced maternal mortality.

Shortage of local anaesthetic drugs is another barrier to practice. Local anaesthetics have been in very short supply in much of Malawi for the last few years, so there has been very little regional anaesthesia carried out. This has a negative effect on the training of the whole cohort of

trainee anaesthetists as they are not exposed to regional anaesthetic techniques during training. When local anaesthetic drugs do become available, these anaesthetists are unlikely to have the skills or the confidence to perform regional blocks.

Economic factors also influence choice of technique. Shortage of local anaesthetic drugs means that blocks that require high volumes of drug, such as epidurals, brachial plexus blocks, intravenous regional anaesthesia and even surgical site infiltration may only rarely be carried out. The amount of local anaesthetic needed to perform one of these blocks would often be adequate to carry out 10 spinal anaesthetics, so the local anaesthetic would be reserved for these.

My best anaesthetic experience

O. T., trainee anaesthetic officer

Towards the end of July 2006 we were granted our second semester holidays and I went back to my home district. I reported to the district director of health services and asked him if I could have some practical experience in the hospital, which offer he accepted enthusiastically.

It was on the night of 8th August 2006 when I had my best anaesthetic experience. I was on night duty under the supervision of the senior anaesthetic officer when we received a 34-year-old mother who required a Caesarean section for obstructed labour.

I assessed the mother and found her to be fit for spinal anaesthesia. I counselled her about the technique of anaesthesia and she consented.

An intravenous line was established with a 16 gauge cannula. She was taken to the operating room and placed in the sitting position. I identified the L3/4 interspace and administered 75 mg of lidocaine.

Whilst I was performing the procedure, everybody in the theatre was keen to watch what I was doing. I was amazed to learn that no anaesthetist had ever performed a spinal anaesthetic in the hospital and that is why it appeared so strange to both the theatre staff and surgeon. I became the first person to perform this technique in my hospital.

A 3.5-kg baby was delivered successfully with Apgar scores of 10 in the first minute and 10 in the fifth minute. Anaesthesia was uneventful and the mother remained stable and chatting to us throughout the operation.

The surgeon was particularly excited and commented that he had enjoyed the operation which was done under spinal anaesthesia.

The news about that spinal anaesthesia spread all over the hospital and the nearby village especially when the patient was taken back to the ward fully conscious and talking, which most people referred to as a 'miracle'.

The medical superintendent of the hospital was informed and he invited me to work with him the following day. I joined him in theatre where he was operating. That morning I performed two more spinal anaesthetics and he operated without any problem. The theatre was full of staff from the wards and the theatre staff who wanted to observe how spinal anaesthesia was performed and how it works.

The medical superintendent was so impressed, to the extent that he ordered the purchase of spinal drugs and needles which was effected the following week. I am grateful that since that time spinal anaesthesia is being practised in my hospital by all my fellow anaesthesia providers. The other interesting point is that patients now know about spinal anaesthesia and request it, especially mothers who are due Caesarean section.

In summary, I am happy and call it my best anaesthetic experience because I was the first to perform spinal anaesthesia in my local hospital and am impressed that the anaesthetic providers in the hospital are still practising the same procedure, and the community is happy about it. I also thank the medical superintendent for taking the initiative to buy the spinal drugs and needles. I have special thanks for the tutors of the school of anaesthesia for teaching me this technique and also the head of department of anaesthesia and all the anaesthetic and theatre staff in my teaching hospital who have made it easy for me to learn.

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