Articaine for sub-Tenon’s and peribulbar anaesthesia in cataract surgery

Editor—Two recent articles describing the use of articaine 2% for sub-Tenon’s and peribulbar anaesthesia demonstrated a superior block compared with the traditional bupivacaine 0.5%/lidocaine 2% mixture. However, neither article commented on the longer term (2 week) follow-up of these patients, with particular reference to full recovery from block. The experience of articaine in dental surgery should make us cautious if we choose to use this local anaesthetic in ocular blocks. Neurotoxicity was reported by Haas and Lennon in a 21 yr retrospective study of parasthesiae after local anaesthetic administration. In total, 143 cases were recorded by Ontario’s Professional Liability Program from 1973 to 1993. All reports involved anaesthesia of the mandibular arch, with the tongue most frequently reported to be symptomatic. It was most common after the injection of articaine or prilocaine, with the occurrence being significantly greater than the expected frequencies for these agents. In 1993 alone, there were 14 reports of parasthesiae, 10 related to the use of articaine and four to prilocaine. Randall reports that articaine solutions were licensed in the UK in 1998, and by 2003 the Committee on Safety of Medicines had received 72 yellow cards describing 146 suspected adverse drug reactions associated with articaine. These included 10 instances of hypoesthesia, 23 of parasthesiae, and five of delayed recovery from anaesthesia. Other authors have published similar cases of prolonged parasthesiae after the use of articaine for inferior alveolar nerve block.

Neurotoxicity in dental anaesthesia may be related to the high (4%) concentration of articaine used. Admittedly, in the two studies published on ophthalmic anaesthesia, only articaine 2% was used, which may prove to be safer. However, the consequence of neurotoxicity in ophthalmic anaesthesia is arguably more serious than in dental anaesthesia, with possible loss of vision, diplopia and ptosis. Pedlar felt that there was sufficient evidence to urge caution in the widespread use of articaine as a local anaesthetic alternative to lidocaine. Despite the apparent superiority of articaine for ophthalmic anaesthesia, we too would urge caution with the introduction of articaine into ophthalmic anaesthesia.

Moreover, ophthalmic complications such as diplopia were also reported with the traditional use of a combination of lidocaine/bupivacaine. In conclusion, we still think that articaine, because of its low toxicity, quick onset of effect, better tissue penetration and strong block, is a convenient alternative to the traditional combination of lidocaine/bupivacaine in peribulbar anaesthesia for cataract surgery.

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Editor—Many thanks for the opportunity to respond to the comments of King and colleagues. I think that several of their points are worthy of further examination.

Prolonged parasthesiae, as reported by Haas and Lennon, occurred at an estimated incidence of 1:785 000. Of the 143 cases reported over a 21 yr period (49% involving the use of articaine and 42% the use of prilocaine), 31 cases had documented ‘stabbing or electric shock’ type pain on injection of the local anaesthetic. This low frequency and typical history would seem to suggest a mechanism of nerve damage caused by inadvertent intraneural injection.

Randall describes the submission of 72 yellow cards to the Committee on Safety of Medicines concerning articaine. I am uncertain as to the number which would be considered as excessive for a newly released drug, but Randall describes this number as ‘relatively small’.

Finally, we should be careful before ascribing too much weight to anecdotal descriptions of drug reactions. In such reports, it is impossible to distinguish between true drug related events, those caused by adjuncts (e.g. vasoconstrictors), or those attributable to the technique used. However, a recent multicentre, randomized, double-blind study of 1325 dental subjects comparing articaine 4% with lidocaine 2% (both with epinephrine 1:100 000), found no difference in adverse outcomes.

I would whole-heartedly agree that caution should be exercised when using any new agent, and the risks/benefits carefully assessed. The main purpose of our trials using articaine has been to search for a more effective agent for use in sub-Tenon’s anaesthesia. Increased acceptance of this technique might help to reduce the risks associated with sharp needle ophthalmic anaesthetic practice—risks that include a neuro/myotoxicity rate of 0.5% when using standard agents such as lidocaine and bupivacaine. I would like to thank the authors for bringing this literature to our attention.

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Does bispectral analysis add anything but complexity? BIS sub-components may be superior to BIS for detection of awareness

Editor—We read with interest the analysis of Miller and colleagues who found that SyncFastSlow, the bispectral parameter of the bispectral index score (BIS), is not superior to the analogous power spectral parameter. In their study, they calculated PowerFastSlow, the logarithmic ratio of the power of high frequency components (40–47 Hz) and total frequency content (1–47 Hz). In their analysis, prediction of an awake or anaesthetized state was mainly attributable to the change in high frequency content of the EEG. We wish to congratulate the authors for their interesting findings.

The BIS algorithm contains an additional parameter, the Beta Ratio, which is the logarithmic ratio of high frequency components (30–47 Hz) and classic EEG frequency components (11–20 Hz). Inspired by the findings of Miller and colleagues, we decided to evaluate the performance of Beta Ratio and SyncFastSlow in the separation of awareness from unconsciousness. For this purpose, we re-analysed a previously reported study that had produced a very challenging set of EEG data. These data were from 40 patients under general anaesthesia, with a period of intended awareness.

In our analysis, we aimed to compare the performance of Beta Ratio and SyncFastSlow in detecting awareness. Patients were randomized to receive: (i) sevoflurane/remifentanil (0.2 μg kg⁻¹ min⁻¹); (ii) propofol/remifentanil (0.02 μg kg⁻¹ min⁻¹); (iii) propofol/remifentanil (0.01 μg kg⁻¹ min⁻¹); or (iv) propofol/remifentanil (0.02 μg kg⁻¹ min⁻¹). Every 30 s after the start of the remifentanil, patients were asked twice to squeeze the investigator’s hand. Awareness was verified using a “repeated” response to command. Sevoflurane or propofol were given until loss of consciousness (LOC1). Anaesthesia was increased and Tunstall’s isolated forearm technique was used during neuromuscular block with succinylcholine. After tracheal intubation, propofol or sevoflurane were stopped until return of consciousness (ROC1). Propofol or sevoflurane were re-started to induce LOC2. After surgery, drugs were discontinued, and ROC2 was observed. Monitoring included standard anaesthesia parameters, EEG, Patient State Index (PSI), and

![Fig 1](https://example.com/figure1.png)

Fig 1 (a) Beta Ratio (the spectral component of BIS), (b) SyncFastSlow (the bispectral component of BIS) and (c) BIS (the composed index) at loss of consciousness (LOC1), awareness reaction (ROC1), loss of consciousness after the awareness reaction (LOC2), and at return of consciousness at the end of anaesthesia (ROC2). Graphs show individual values, mean (black line) and standard deviation (dashed line) in all patients. Triangles are used for sevoflurane/remifentanil (Groups 1 and 2), and circles for propofol/remifentanil (Groups 3 and 4).

Prediction probability (Pk) (see) for awareness is given for each index. Beta Ratio had the highest, BIS the lowest Pk.

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