

Opioid-free anaesthesia (OFA) for elective cosmetic surgery: A role of processed EEG monitoring

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All cosmetic surgeries, including abdominoplasty, can be performed under local anaesthesia alone. A new sedative has emerged for awake cosmetic surgery, including rhytidectomy or facelift, a sublingual 30 µg sufentanil tablet.^[1] The duration of action of sufentanil often exceeds the surgical time. Patients could be exposed to unmonitored, residual opioid effects, including respiratory depression, postoperative nausea vomiting (PONV), aspiration and even death, after discharge home if an additional opioid for postoperative pain is taken. The risk of fentanyl patch therapy in opioid-naïve patients for postoperative pain was not appreciated until the first patient death. Sufentanil tablets appear to share similar risks.

Most patients prefer some consciousness alteration for elective cosmetic surgery. Most surgeons prefer not to need to speak with awake patients during surgery. Excluding breast reconstruction post-mastectomy, elective cosmetic surgery does not have medical indications, necessitating a different calculus for anaesthesia risk. General inhalation anaesthesia (GIA), as well as succinylcholine (SCH), carries a small malignant hyperthermia (MH) risk acceptable for medically indicated patients but problematic to justify in the cosmetic population. GIA necessitates an anaesthesia machine. Releasing waste gases into hospital atmosphere without scavenging is no longer

acceptable. Most offices need to generate sufficient cases to warrant the expense of purchasing and maintaining an anaesthesia machine. Scavenging waste gases can be reduced with closed-system technique, but not all anaesthesiologists are familiar with or comfortable performing closed-circuit anaesthesia. In addition to stocking dantrolene, MH and cardiopulmonary resuscitation drills must be performed in the event of an MH episode.

A unique, consistent feature of cosmetic surgery is that surgeons administer local anaesthesia with epinephrine-containing lidocaine solutions, primarily for the vasoconstriction effect. Tumescence anaesthesia with lidocaine doses of 35–55 mg/kg can be safely used for liposuction.^[2,3] In California, 5,000 mL are the upper recommended limit of tumescent fluid recommended for liposuction,^[4] and in Florida, 4,000 mL. Tumescence anaesthesia can also be used for a wide variety of other cases.^[5]

Surgeons are taught that vasoconstriction equals adequate analgesia. This common belief had led to over and/or inappropriate medication to calm the surgeon's ire with patient movement. When patients move under intravenous (IV) sedation, the surgeon typically demands deeper sedation to remedy the movement. Often, the anaesthesiologist encourages more local anaesthesia. Deeper sedation will not

resolve an inadequate local analgesia issue, as pain can be perceived even with deep GIA.^[6] Not all patient movement under IV sedation is generated from the cerebral cortex. Some movement is generated from the spinal cord. Differentiating cortical-generated movement (some awareness risk, more propofol required) from spinal cord-generated movement (no awareness risk, more local anaesthesia required) is the difference between accurately treating the actual problem versus not doing so.

Resolving this vexing situation under propofol sedation can involve using a free-standing bispectral (BIS™) index monitor with a secondary electromyogram (EMG) trending [Figure 1]. While the BIS trend tracks across the screen, the information is 15–30 seconds delayed from real time. With GIA, paralysed patients do not exhibit useful EMG activity. EMG spikes signal incipient arousal.^[7] With an EMG spike, the unconscious patient is signalling an immediate change in the level of hypnosis before BIS changes. Arousal precedes pain. Preventing arousal prevents pain. By responding to an EMG spike with the same alacrity as a heart rate (HR) or blood pressure (BP) change using sufficient additional propofol to bring the EMG spike back to baseline, one prevents arousal and subsequent pain. Managing a case with an EMG response prevents most HR or BP changes. Patient movement without an EMG spike defines spinal cord-generated movement, does not expose patients to awareness and is an indication for additional local anaesthesia, not deeper sedation. Adequate local anaesthesia eliminates 98–99% of patient movement. Patient movement with an EMG spike is an indication of additional propofol.

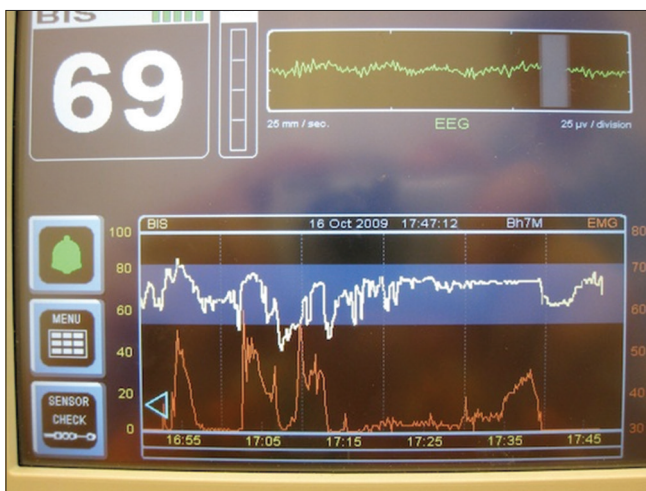


Figure 1: Bispectral index monitor with a secondary electromyogram (EMG) trending

Hypnotic doses of IV propofol block ketamine hallucinations.^[8] IV ketamine 50 mg produces the same 10–20 minutes' immobility (dissociation) to noxious, multiple local anaesthetic injections in patients weighing 30–145 kg and ages ranging 7–94 years in this author's experience. Unique among all other drugs, the effective N-methyl-D-aspartate (NMDA) receptor-saturating ketamine dose does not appear to depend on weight or age. This initial IV 50 mg ketamine dose prevents the patient's brain knowledge of the surgeon's bodily invasion and precludes internal pain fibres from going on high alert. IV propofol before a dissociative 50 mg IV ketamine dose permits the use of the BIS monitor.^[9] IV propofol titrated to $60 < \text{BIS} < 75$ is moderate to deep sedation.^[10] There is a 100-fold variation in propofol infusion rates between 2 and 200 $\mu\text{g}/\text{kg}/\text{min}$ observed to achieve this same numerical sedation level.^[11] Propofol induction was performed with successive 50 $\mu\text{g}/\text{kg}$ boluses combined with a 25 $\mu\text{g}/\text{kg}/\text{min}$ base rate as seen in YouTube propofol induction with BIS monitor without instrumenting airway (<https://lnkd.in/gAnPtSD>). A 0.6% PONV rate without antiemetics in an Apfel-defined, high-risk population was published.^[12] Postoperative pain and PONV are the most common causes of unexpected admission after day surgery. Opioid-free, propofol and then 50 mg ketamine sedation have been administered over 26 years for more than 6,000 patients, all of whom had commercial insurance. There was not a single hospital admission. Most patients were discharged home an hour postoperatively without needing a dedicated aftercare professional.

Success with opioid-free anaesthesia is facilitated by EMG trending secondary to BIS. BIS values only reveal the patient's hypnotic status, which is 15–30 seconds delayed from real time. EMG activity reveals incipient cerebral cortical arousal in real time.

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