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Part I Minimally Invasive Anesthesia (MIA)® for Minimally Invasive Surgery

Propofol Ketamine with Bispectral Index (BIS) Monitoring

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Introduction

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Introduction

Anesthesiologists are trained to administer anesthesia for surgery. Elective cosmetic surgery is commonly performed in an office-based facility with patients discharged to home. However, elective cosmetic surgery differs from elective or emergency surgery in many substantial aspects (see Tables 1-1 and 1-2).

“Cosmetic surgery is almost always elective, and patients are almost always in good health. The patient, however, is willing to risk this good health (at least to a limited extent) in order to experience improvements in physical appearance, and perhaps more importantly, self-esteem, body image, and quality of life.”

There is no medical indication for elective cosmetic procedures, excluding breast reconstruction post-mastectomy. One may consider risk-benefit ratios of differing anesthetic regimens in medically indicated surgery. However, surgery without medical indication should not accept any avoidable risk. Halogenated inhalation anesthetics are triggering agents for malignant hyperthermia (MH), carry an increased risk of deep venous thrombosis with potential pulmonary embolism, and are emetogenic. If the patient is interested and the surgeon is willing, all cosmetic procedures can be performed under local only anesthesia. Therefore, any additional anesthetic agents should be subject to the highest justification.

Most patients desire some alteration of their level of consciousness from fully awake through completely asleep. Given that all known risks should be avoided, when possible, then which agents are best suited to the task, what monitors should be employed, and to what level
Table 1-1. Elective cosmetic procedures

Commonly performed cosmetic surgical procedures. All procedures have successfully been anesthetized with PK MAC/MIA™ technique in the office-based setting.

1. Rhinoplasty (closed or open)
2. Liposuction or suction assisted lipectomy (SAL)
3. Blepharoplasty (open, transconjuctival, or endoscopic)
4. Rhytidectomy (open or endoscopic)
5. Breast augmentation, subglandular, subpectoral (via areolar, inframammary, transaxillary, or transumbilical approach)
6. Hair transplantation with or without scalp reduction
7. Facial resurfacing (laser, chemical peel, or mechanical dermabrasion)
8. Brow lift (coronoplasty or endoscopic)
9. Abdominoplasty (classical or simple skin)
10. Otoplasty
11. Genioplasty (mandibular advancement or recession)
12. Facial implants (malar and mandibular with silicone or autologous fat)
13. Lip enlargement (autologous fat transfer, radiated cadaver material [Alloderm®, Gortex®, extrusions, Restylane®, Juvaderm®, etc.)
14. Platysma band plication
15. Composite procedures; i.e., (a) endoscopic brow lift and endoscopic rhytidectomy, with open platysma band plication, (b) blepharoplasty, rhinoplasty, and rhytidectomy, or (c) breast augmentation with abdominoplasty

WHY IS MINIMALLY INVASIVE ANESTHESIA® IMPORTANT?

“Less is more” is a Mies Vanderrohe principle applied to the Bauhaus school of minimalist architecture. “Doing more with less” is a Buckminster Fuller concept of housing applied to his geodesic domes.

Table 1-2. Cosmetic procedures by type from PK MAC/MIA™ technique case log March 26, 1992 – March 26, 2002

<table>
<thead>
<tr>
<th>Procedure</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liposuction</td>
<td>663</td>
<td>(25)</td>
</tr>
<tr>
<td>Breast augmentation</td>
<td>489</td>
<td>(18)</td>
</tr>
<tr>
<td>Facial resurfacing mechanical</td>
<td>389</td>
<td>(14)</td>
</tr>
<tr>
<td>arborasion, chemical peel, or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser resurfacing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhytidectomy</td>
<td>305</td>
<td>(11)</td>
</tr>
<tr>
<td>Blepharoplasty</td>
<td>198</td>
<td>(7)</td>
</tr>
<tr>
<td>Rhinoplasty</td>
<td>81</td>
<td>(3)</td>
</tr>
<tr>
<td>Fat transfer</td>
<td>57</td>
<td>(2)</td>
</tr>
<tr>
<td>Abdominoplasty</td>
<td>54</td>
<td>(2)</td>
</tr>
<tr>
<td>Composite or misc. procedures</td>
<td>447</td>
<td>(18)</td>
</tr>
<tr>
<td>Total</td>
<td>2,683</td>
<td>(100)</td>
</tr>
</tbody>
</table>

“We hold the basic premise that the less the involvement of the patient’s critical organs and systems (i.e., the lower the concentration of the agent, or the less ‘deep’ the anesthesia), the less will be the damage to the patient, whether this be temporary or permanent.”

“For the anesthetic itself, overall experiences indicate that the least amount of anesthetic that can be used is the best dose. Local and monitored anesthesia care (MAC) is preferable to regional. Regional techniques are preferable to general anesthesia.”

Table 1-3. Minimally invasive surgeries appropriate for BIS-monitored PK MAC, the MIA™ technique

1. All cosmetic procedures (see Table 1-1)
2. Gym: laparoscopy (tubal ligation, fulgeration, endometriosis)
3. Ortho: arthroscopy
4. Urology: lithotripsy
5. Gen. surg.: hemiorrhaphy & breast cancer surgery
6. Neuro: microdiscectomy, microlaminaectomy, carpal tunnel release
7. sedation for morbidly obese
8. peripheral injuries in U.S. Army field hospitals in Iraq, Afghanistan

Cases being performed with PKR® TIVA
1. U.S. Army neurosurgery in Iraq.
2. Propofol-Ketamine-Remifentanil
Propofol Ketamine with Bispectral Index (BIS) Monitoring

“When possible, procedures longer than three or four hours should be performed with local anesthesia and intravenous sedation because general anesthesia is associated with deep venous thrombosis at much higher rates under prolonged operative conditions.”

“Newer techniques for intravenous sedation that include the use of propofol, often in combination with other drugs, have made it possible to perform lengthy or extensive procedures without general anesthesia and without the loss of the patient’s airway protective reflexes.”

“When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science.” (William Thompson, knighted Lord Kelvin. Popular lectures and addresses [1891–1894])

The bispectral index (BIS) monitor facilitates a numerical expression of the hypnotic component (anesthesia = hypnosis + analgesia) of the anesthetic state and may permit a reasonable inference about the analgesic state. Heart rate, blood pressure, and other clinical signs are notoriously unreliable indicators of anesthetic depth. BIS provides new information about patients that is simply unavailable from any other vital or clinical sign. BIS, as an index, has no units. The scale is 0–100, with 100 representing awake and zero representing isoelectric (or zero) brain activity. Hypnosis compatible with general anesthesia (GA) occurs between BIS 45–60. BIS 45–60 with systemic analgesia defines general anesthesia. BIS 60–75 with adequate local analgesia is a major part of the MIA™ technique. Patients who received MIA™ neither hear, nor feel, nor remember their surgical experience.

Monk et al. published an associated 20% increase in the one-year mortality risk associated with every hour of BIS <45. Therefore, BIS <45 for cumulative periods greater than one hour must be considered as overmedicating.

The routine practice of overmedicating for fear of undermedicating is no longer a desirable or acceptable practice (see Table 1-4).

EMG is the instantaneous display of the frontalis muscle activity if the XP software version of the BIS A2000, or later, is used. Inadequate analgesia leading to patient movement is predictable if the EMG is selected from the advanced screen menu to trend as a secondary trace. A spike in EMG (when BIS is 60–75, in spontaneously breathing patients) nearly always predicts inadequate analgesia, preceding patient movement (see Fig. 1-1). The anesthesiologist should utilize the 15–30 second delay in the change of the BIS value to simultaneously bolus propofol while encouraging the surgeon to supplement the local analgesia.

increased C-reactive protein levels with BIS <45 for more than 50% of the cases.

The BIS monitor does not replace traditional vital-sign monitoring, that is, EKG, NIABP, SpO2, (or EtCO2 when indicated). When measured, the EtCO2 typically runs between 38–42 with the MIA™ technique. The EtCO2 offers the display of the waveform of the patient’s respiration. Many experienced anesthesiologists are capable of assessing adequate respiratory movement without this information. Over 3,000 PK MAC cases have been safely anesthetized without EtCO2 monitoring.

Titrating anesthesia with BIS trend is limited by the fact that the processing required for the BIS algorithm is delayed 15–30 seconds behind real time. This delay has given rise to the legitimate criticism that BIS does not predict patient movement. BIS, a measure of the hypnotic state, was not designed to predict patient movement (see Chapter 3).

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Table 1-4. BIS levels and levels of sedation/anesthesia

<table>
<thead>
<tr>
<th>BIS</th>
<th>Sedation/Anesthesia Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>98–100</td>
<td>Awake</td>
</tr>
<tr>
<td>78–85</td>
<td>Minimal Sedation (“Anxiolysis”)</td>
</tr>
<tr>
<td>70–78</td>
<td>Moderate (“Conscious”) Sedation</td>
</tr>
<tr>
<td>60–70</td>
<td>Deep Sedation</td>
</tr>
<tr>
<td>45–60</td>
<td>General Anesthesia</td>
</tr>
<tr>
<td>+ systemic analgesia</td>
<td></td>
</tr>
<tr>
<td>&lt;45, &gt;1 hr.</td>
<td>Overanesthetized</td>
</tr>
</tbody>
</table>

aWith moderate sedation, passive maneuvers like extension and rotation of the head or shoulder pillow may be all that are necessary to maintain the airway.

bWith deep sedation, active maneuvers, like nasal airway or LMA, may be required to maintain airway patency.

cSee Appendix 1-1.
Postoperative Nausea and Vomiting (PONV)

Macario et al. conducted a statistically validated survey of a panel of expert anesthesiologists on what postoperative anesthetic outcome they believed patients most wanted to avoid. The anesthesiologists concluded that pain was the number one anesthesia outcome patients most desired to avoid. A follow-up, similarly statistically validated survey of patients' anesthesia outcomes they most desired to avoid was emesis. Clearly, a disconnect exists between what anesthesiologists believe about their patients and what the patients actually want most to avoid. A potential explanation could be that patients who consent for elective surgery expect to have some postoperative discomfort but do not want their pain to be compounded by emesis.

How are PONV, preemptive analgesia, and postoperative pain management related?

There is a consensus among PONV authorities like Apfel, Chung, Gan, Scuderi, and White, that both inhalational anesthetics and opioids are emetogenic agents. "In the context of [emetogenic] anesthesia, postoperative pain management and opioid related PONV remain problems." Apfel’s recent NEJM article identifies the highest PONV risk group of patients as nonsmoking females, with a history of previous PONV and/or motion sickness, having emetogenic (i.e., elective cosmetic) surgery of two or more hours. Apfel’s criterion of high risk applies exceptionally well to Friedberg’s previously referenced series of 2,683 patients. Elective cosmetic surgery anesthesia for the "rich and famous" of Beverly Hills and Newport Beach is the highest risk PONV population! This conclusion reflects the southern California geographic bias of the author. There are many other such communities worldwide. The MIA™ technique is not perfect but contextually nonemetogenic. Without any antiemetic prophylaxis, this highest risk group of patients experienced a total of thirteen PONV events for an unprecedented 0.5% PONV rate! A 50 mg dissociative dose of ketamine at BIS <75 propofol levels eliminates the noxious input of the injection of local analgesia while avoiding emetogenic agents like the halogenated inhalational vapors and intravenous opioids. Lidocaine provides intraoperative analgesia with bupivicaine providing postoperative analgesia. In this context, it has been extremely rare for patients to require (emetogenic) opioid relief of their postoperative discomfort.
Elimination of all emetogenic triggers defines nonopioid, preemptive analgesia (NOPA). NOPA is the hallmark of the MIA™ technique. In Friedberg’s fifteen-year experience, no patients have been admitted to the hospital following PK MAC/MIA™ technique for either PONV or unmanageable pain.

**Beware Laryngospasm**

No technique is perfect. Classical laryngospasm can be diagnosed by the characteristic “crowing” sound generated by a small gap in the vocal cords owing to their incomplete closure. With ketamine-associated laryngospasm, the vocal cords most commonly close completely. Hence, only rarely will crowing noise alert the anesthesiologist to impending desaturation. Additionally, the usual remedy of positive pressure ventilation combined with anterior jaw thrust is completely ineffective. The anesthesiologist must pay particular attention to sneezing or coughing as the only prodrome warning him of impending laryngospasm.

The treatment of choice is a rapid IV bolus of lidocaine 1 mg · lb⁻¹ or 2 mg · kg⁻¹.

Concern about adding more lidocaine in patients receiving relatively large amounts of lidocaine local analgesia has led other anesthesiologists to prefer to deepen the propofol level by adding a 50 mg propofol bolus to break the laryngospasm. However, when IV lidocaine has been administered for laryngospasm, no stigmata of lidocaine toxicity have been observed. The BIS showed no decrease in response to the IV lidocaine bolus. There was no transient hypotension or widening of the EKG complex during the case. No patient complained of tinnitus, tremulousness, or metallic taste on the tongue after emergence.

Administering succinylcholine (SCH) to break the spasm is suboptimal because SCH adds unnecessary (and avoidable) risk as an MH triggering agent. (Neither propofol nor ketamine are MH triggering agents.) Further, the myalgias associated with SCH make the agent totally unacceptable in the elective cosmetic surgery patient.

Waiting until desaturation occurs after the prodrome will add a substantial amount of time until the lidocaine can circulate to anesthetize (and open) the vocal cords. Desaturation increases the physiologic stress to the patient. The alarm of the pulse oximeter, accompanied by the bluish discoloration of the patient, increases the psychological stress to the anesthesiologist, surgeon, and operating room nursing staff. This disturbing scenario is best minimized by promptly giving IV lidocaine when the patient coughs or sneezes.

**WHAT IS CLONIDINE-PREMEDICATED, BIS-MONITORED PK MAC, OR THE MIA™ TECHNIQUE?**

Something old (ketamine), something new (BIS-monitored propofol hypnosis), something borrowed (diazepam ketamine technique), no one blue (SpO₂ >90% on room air).

Why Ketamine?

The brain cannot respond to stimuli it does not receive. Critical concept: GA does not reliably block all incoming noxious stimuli! The “wind-up” phenomenon, mediated by the NMDA receptors, is often invoked to explain acute postoperative pain after general anesthesia, as well as the formation of chronic pain states.

“Dissociation” refers to a patient who, under the influence of ketamine, remains motionless in response to noxious stimuli.

Based on clinical observation, the NMDA receptor block from a 50 mg dissociative dose of ketamine reliably blocks all incoming noxious stimuli to the cortex (the so-called mid-brain spinal) for a period of 10–20 minutes. After obtaining an equal dissociative effect with a 50 mg ketamine dose in both 90-pound female and 250-pound male patients, the author concluded that the number of NMDA receptors does not vary with patient body weight in adults.

Preemptive analgesia is most consistently observed when the NMDA receptors are saturated prior to noxious stimulation. Acetaminophen 1,000 mg po is adequate for postoperative pain management (for the few patients who request it) in the context of clonidine-premedicated, BIS-monitored PK MAC patients. (See Table 1-5.)

**Making Ketamine Predictable**

In other contexts, ketamine has a well-deserved reputation for causing hypertension, tachycardia, and an unpredictable 20% of patients experiencing hallucinations or dysphorias. Hypnotic doses of propofol block ketamine-induced hallucinations as well as undesirable hemodynamic sequelae. Being able to assign a numerical value
Ketamine tips

1. 80% patients achieve dissociative effect with 25 mg ketamine, 98% with 50 mg ketamine. No “down side” to 50 mg dose as long as BIS <75. Wait 2–3 min. before injecting local. Wait an additional min. if patient is reactive before administering more ketamine.

2. Preemptive analgesia effect is variable when inadequate dissociative effect is obtained. Saturate NMDA receptors!

3. All adult patients, independent of body weight, require 50 mg ketamine initial dose to saturate NMDA receptors.

4. Reinjection of previously injected field does NOT require more ketamine.

5. Consider injecting both sides with initial ketamine dose.

6. If prep. is cold, consider injecting 25 mg ketamine 2–3 min. before prep. or consider warming prep. solution!

7. With experience, less ketamine is administered. Friedberg’s case log of the last 500 cases (of 2,683 patients) showed 80% performed with either one or two 50 mg doses of ketamine.12

8. Mixing propofol with ketamine is TIVA not MAC.

9. Do not exceed an aggregate total of 200 mg ketamine.

10. Do not give ketamine in the last 20–30 minutes of a case.

Clinical pathway for MIA™ technique

1. Clonidine 0.2 mg PO 30–60 min preop (Systolic >100, body weight >100 pounds).

2. Glycopyrrolate 0.2 mg IV with 2 ccs 1% lidocaine plain.

3. Incrementally titrate propofol to BIS <75 with multiple, sequential 150 μg kg⁻¹ · 20 sec. mini-boluses. N.B. If pump does not have a bolus feature, set initial rate to 450 μg kg⁻¹ min⁻¹ and reduce the rate toward 50 as soon as the EMG begins to decrease.

4. Basal propofol infusion rate 50 μg kg⁻¹ min⁻¹.

5. Ketamine 50 mg IVP @ BIS <75 2–3 minutes prior to injection local anesthesia.

6. Adjust basal propofol rate upward to maintain BIS 60–75 if ketamine causes an increase.

7. Inject adequate local analgesia.

8. Administer more ketamine only after two reinjections of the field fail to eliminate patient movement.

9. Maintain propofol at BIS 60–75, EMG 0 on BIS scale, 30 on EMG scale.

10. Bupivicaine in field before closure, especially for browlift, subpectoral breast augmentation, and abdominoplasty.

Because the elective cosmetic surgical patient tends to be healthy, cardiac output and redistribution from the brain tend not to be significant factors in altering established brain levels of propofol. However, the nineteenfold inter-patient variation in propofol hydroxylation may play a significant role in the ability to maintain a stable level of propofol in the brain.23 Measuring an individual patient’s brain response to propofol with BIS would appear to be a more effective strategy than employing target controlled infusions (TCI) to achieve specific blood levels of propofol (see Table 1-6).

 Premedication

PK MAC was derived from diazepam ketamine MAC technique, which was first published in 1981.19 Vinnik clearly enumerated that only after the patient was soundly asleep from the diazepam was the ketamine to be administered.19 Diazepam hypnosis, followed by ketamine dissociation, followed by local anesthetic injection was Vinnik’s clinical pathway. Although Guit was the first to publish the combination of propofol and ketamine, the technique was described as a total intravenous anesthetic (TIVA).24 TIVA
strongly implies that the local analgesia injected by the surgeon is not essential for the success of the TIVA technique. In contradistinction, the surgeon's local analgesia is essential for the success of PK MAC.

Guit’s TIVA technique was unknown to Friedberg in 1992 when Friedberg embarked on replacing Vinnik’s diazepam with propofol. The surgeons quickly complained about the cost of the propofol and pleaded for relief. Friedberg added midazolam in an effort to reduce the amount of propofol. From March 26, 1992 through March 26, 1997, the case log Friedberg maintained contained patient’s names, dates, surgeons, patient age, gender, weight, surgical procedure(s) (see Table 1-2), midazolam, propofol, ketamine, and anesthesia times. Propofol rates, mg · min⁻¹ and ug · kg⁻¹ · min⁻¹, were calculated retrospectively.

If 2 mg midazolam was good, perhaps 4 mg midazolam could be better for propofol-sparing purposes. In the aforementioned case log, a total of 354 patients received 0 mg midazolam, 316 patients received 2 mg, and another 303 patients received 4 mg midazolam premedication from 1992–97. No consistent, incremental relationship could be established in propofol savings between the 0, 2, and 4 mg midazolam groups. In June 1997, Friedberg eliminated the midazolam from PK MAC.

In September 1997, Oxorn published a very elegant Level I study confirming Friedberg’s uncontrolled, clinical experience in 973 patients. Oxorn reported that there was no statistical difference in either induction or maintenance doses of propofol between those patients who received 2 mg midazolam premedication and those who received none. However, the unexpected finding was that a statistically significant threefold number of patients who received midazolam required pain medication in the PACU.

From July 7, 1997, through December 21, 1998, 268 patients received BIS-monitored PK MAC without premedication, midazolam, or other benzodiazepine. During BIS-monitored propofol hypnosis, there were no patients who suffered from hallucinations or a lack of amnesia. This experience led Friedberg to conclude that benzodiazepine premedication was superfluous to provide amnesia or to prevent hallucinations in the presence of BIS monitoring. Some of these patients were included in a subsequent publication.

Patients continued to request premedication to calm them. After attending the New York Postgraduate Assem-
Table 1-7. MIA™ airway algorithm (assumes incremental propofol induction)

1. Extend and laterally rotate head, one side may have better gas exchange than the other.
2. Insert shoulder (not neck) pillow to increase force of extension.
3. Insert lubricated nasal airway (#28 FR most commonly).
4. Insert lubricated LMA (#4 most commonly).
5. No ET required: >15 yrs, >3,000 patients; no opioids, benzodiazepines, or muscle relaxants.

Major Confounding Principle
A blanched surgical field does not guarantee adequate surgical analgesia. More local analgesia resolves the patient movement 99% of the time. Administer more ketamine only after two reinjections of the field fail to eliminate patient movement.

BIS becomes much more than a simple tool with which to titrate propofol. BIS becomes a case management tool. By being able to demonstrate adequate propofol levels (i.e., BIS 60–75) during patient movement, the surgeon can be educated to inject more analgesia. In addition to the initial injection of the local analgesia, the patient is spared noxious, painful input during the surgery. The brain cannot respond to stimuli it does not receive. Postoperative pain management begins intraoperatively! Reproducible preemptive analgesia occurs under conditions of adequate dissociation secondary to the saturation of the NMDA receptors. (See Table 1-5.)

BIS as Fianchetto
From Italian, fianchetto is a chess term meaning a “double move.” In a “binary” system of anesthesia (hypnosis + analgesia = anesthesia), being able to measure hypnosis permits an inference about the adequacy of analgesia. Adequate analgesia produces de facto muscle relaxation for minimally invasive surgery. BIS 60–75 with EMG = 0 (on the BIS scale, 30 on the EMG scale) defines adequate hypnosis for the MIA™ technique. Therefore, adequate hypnosis in the presence of patient movement (usually preceded by a spike in EMG) infers inadequate analgesia!

Postoperative Pain Management
In the context of clonidine-premedicated, BIS-monitored PK MAC, now formally known as the MIA™ technique, postoperative pain is minimal to nonexistent. Part of this phenomenon may be explained by having patients emerge

Table 1-8. Local anesthesia tips

1. PDR limit of 500 mg lidocaine with epinephrine (7 mg · kg⁻¹) is outdated and overly conservative. Neither the 2005, 2006 nor the 2007 (print or electronic) editions of PDR have any entry for injectable lidocaine!
2. 200 ccs of 0.5% lidocaine (1,000 mg) with epinephrine is well tolerated and without sequellae of toxicity
3. Tumescent or “wetting” solution = 500 mg lidocaine, 1 mg epinephrine in 1,000 ccs NSS (Klein) or LR (Hunstead)
4. 5,000 ccs of tumescent solution = 2,500 mg lidocaine
5. 5,000 ccs of tumescent solution in a 60 kg female patient = 42 mg · kg⁻¹
6. Avoid >50 cc 0.25% (125 mg) bupivicaine for postoperative analgesia.
Propofol Ketamine with Bispectral Index (BIS) Monitoring

from propofol with the clonidine still in effect. Patients who have lower anxiety levels, secondary to lowered catecholamines from the clonidine, tend to have less pain complaints. In the diethyl ether era, "stormy induction, stormy emergence" was the common rationale for premedicating surgical patients. Preoperatively, a clonidine-premedicated patient may not appear drowsy but, upon questioning, usually admits to feeling "calmer." A further explanation for the observation of minimal-to-no postoperative pain appears to be the phenomenon of preemptive analgesia.

With the dissociative effect of ketamine, no noxious signals reach the cortex during the injection of local anesthesia. GA does NOT reliably block all incoming noxious stimuli. Use the BIS to not only maintain hypnosis at 60–75 but also to assure inadequate local analgesia is dealt with appropriately (i.e., more local) and not by subterfuge (i.e., more ketamine, propofol, or opioids). Lastly, bupivacaine, especially for browlift, breast augmentation, and abdominoplasty, provides long-lasting nonopioid relief. Do not exceed a total of 125 mg bupivacaine (or 50 ccs 0.25%) for postoperative analgesia. Because the bupivacaine quickly binds to tissue, it is necessary only to splash it into the operative field. Some surgeons prefer to close the wound and inject the bupivacaine retrograde up the suction drainage tube(s). Both approaches with bupivacaine are effective.

All of the anesthesiologists’ efforts to prevent PONV and effect adequate pain management may be for naught if the surgeon discharges the patient home with an opioid-containing analgesic (i.e., Vicodin® or Tylenol #3®). Darvocet® or other similar nonopioid analgesics may provide an increment of relief greater than 1,000 mg acetaminophen every six hours. Oral diazepam is especially effective for decreasing the muscle spasm associated in subpectoral breast implant patients. N.B. This is also a useful strategy for any other submuscular implants; i.e., gluteal.

The few patients who do complain of pain present a differential diagnosis of “central” (or supratentorial) versus “peripheral” (infratentorial) pain. Both complaints are real. Some patients may complain of pain when they had been predominantly immobile for the surgery. This pain is more likely to be “central” in origin. This type of patient may respond better if 50 mg po diphenhydramine (Benadryl®)

<table>
<thead>
<tr>
<th>Table 1-9. Errors to avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ketamine before propofol: NO</td>
</tr>
<tr>
<td>2. Ketamine at BIS &gt;75: NO</td>
</tr>
<tr>
<td>3. Bolus propofol induction: NO</td>
</tr>
<tr>
<td>4. Inadequate local analgesia: NO</td>
</tr>
<tr>
<td>BIS as fianchetto for adequate propofol and lidocaine</td>
</tr>
<tr>
<td>5. Opioids instead of more lidocaine: NO</td>
</tr>
<tr>
<td>6. Ketamine instead of more lidocaine: NO</td>
</tr>
<tr>
<td>7. &gt;200 mg total ketamine or any in last 20 min. of case: NO</td>
</tr>
<tr>
<td>8. Tracheostomize patient for laryngospasm instead of IV lidocaine: NO</td>
</tr>
<tr>
<td>9. SCH instead of lidocaine for laryngospasm: NO</td>
</tr>
</tbody>
</table>

is added to the 1,000 mg acetaminophen (Tylenol P.M.®). More experience with the MIA™ technique will eliminate most of the patient movement seen with inadequate local analgesia. These patients may require ketorolac 30–60 mg IV to deal with “peripheral” pain issues. As the surgeon becomes more willing to inject additional local analgesia during the case when patient movement occurs at BIS 60–75, fewer issues of “peripheral” pain will be manifest. None of the more than 3,000 PK MAC patients has ever required hospital admission for intractable pain. (See Table 1-9.)

CONCLUSION

One must empathize with those who, understandably, have difficulty believing that a subpectoral breast augmentation in combination with a classical abdominoplasty can be performed as an office-based or day surgery without PONV or postoperative pain management issues. “Cognitive dissonance” is the psychological principle that precludes individuals from believing what they observe when it sharply contradicts what they have been taught to believe.

The On-Q® pump may have some additional value; but in the context described in this chapter, it offers little pain management benefit to offset the additional $280 cost (in 2005 dollars). While dexmedetomidine may possess 8 times the alpha2 agonist potency of clonidine, it is 400 times more expensive (2005 dollars) and more tedious to
administer. There are no current plans to replace clonidine with dexmedetomidine in the MIA™ technique.

The MIA™ technique reproducibly provides preemptive analgesia and is not technically difficult to execute. It does, however, require the active cooperation of the surgeon. Surgeons have become more interested in the use of local anesthesia to diminish PONV and postoperative pain management problems they perceive to be produced by the emetogenic agents the anesthesiologist chooses to administer.

Although initially developed for office-based, elective cosmetic surgery, the MIA™ technique is by no means limited to these types of cases (see Table 1-3). The MIA™ technique offers superior outcomes to alternative forms of anesthesia (see Part II) for cosmetic surgery (i.e., essentially zero PONV without the use of anti-emetics and minimal postoperative pain management).

In the final analysis, the MIA™ technique provides safety, simplicity, and satisfaction for all parties involved in the surgical experience: patients, their at-home caregivers, surgeons, nurses, and anesthesiologists.

REFERENCES


2. www.mhaus.org


11. www.aspectms.com/resources/bibliographies


