Non-IV Sedation
And the MKO Melt
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Why is the type of anesthesia important?

Cataract surgery is the most common procedure performed by Ophthalmologists, the most commonly performed surgical procedure in the US Medicare population and the number one cause of blindness worldwide.\(^1\), \(^2\)

Eye surgery represents 4-5% of all surgical anesthesia claims in the Anesthesia Closed Claims Project database. Of the cases involving movement, 33% were under monitored anesthesia care, 59% under general anesthesia and 9% received a block. Vision loss accounted for 97% of all claims associated with movement during the procedure.\(^3\)

A 2006 closed claim analysis of monitored anesthesia care cases found that 21% were undergoing elective eye surgery and of these, respiratory depression (21%) was the most common mechanism of injury.\(^4\)
Why sedation without an IV?

Older patient population with more difficult IV placement

Patient anxiety related to getting the IV and many complaints are related to the IV. When given a choice, patients would choose oral sedation over IV sedation 5

The IV contributes to pre-op time and potentially delays and decreased efficiency

Risk is minimal with IV but that risk eliminated by going IV free
Sublingual route for medication administration

Dysphagia and malabsorption are prevalent with advance age - sublingual route bypasses the need for swallowing and gastric absorption

Bypasses the hepatic first pass effect with the result being bioavailability as much as 3-10 times greater when compared to oral medications

Most permeable area of the mouth, with rapid and effective drug absorption and onset with peak blood levels occurring in approximately 10-15 minutes. Sublingual midazolam resulted in better sedation scores compared to oral, likely due to higher blood concentration of drug.

Intranasal route less desirable because the “enzymatic barrier of the nasal mucosa creates a pseudo-first-pass effect.”
What is the MKO melt?

Commercially available since 2016

Sublingual troche that contain 25 mg ketamine, 3 mg midazolam and 2 mg ondansetron

Typically administer 2 troches to achieve the desired level of sedation and comfort

Combining midazolam with a medication that has analgesic properties is beneficial and ketamine, being a non-narcotic analgesic, is a great choice!
Why Midazolam and Ketamine combined?

The Ideal anesthetic….alleviates anxiety, causes amnesia, relieves/prevents pain, allows the patient to remain cooperative and lay still, provides cardiovascular stability, is cost effective, allows for rapid recovery, and has minimal side effects.

Topical anesthesia alone cannot address all of these factors as, intraoperative and postoperative pain is significantly higher.9

Cataract surgery typically involves a low level of pain and therefore, small doses of analgesic and sedative medication should be required. Opiates, while they relieve pain, cause respiratory depression and nausea and vomiting among other things.
Midazolam

Used as a sedative alone has limitations.

Found to significantly increase the patient perception of pain to cold, heat and electrical stimuli.\textsuperscript{10}

Single dose midazolam (1 mg) was similarly found not to decrease pain or anxiety during cataract surgery.\textsuperscript{11}

Patient controlled IV PCA has been tried but in the setting of the current opiate crisis and concerns for respiratory depression and nausea and vomiting would not be a preferred choice of anesthesia.\textsuperscript{12}
Ketamine

Active metabolite - both norketamine and ketamine primarily act at glutamate, NMDA and non-NMDA receptors. The antagonism at the NMDA receptors responsible for amnesia, psychosensory effects and analgesia.

Elimination half life of 2-3 hours (similar to midazolam)

Produces a cataplectic state during which the patient experiences analgesia and amnesia but doesn’t necessarily lose consciousness. Patients lay comfortably with their eyes open ("ketamine stare") while maintaining their protective reflexes, most importantly those of the airway.
Ketamine

Common side effects of ketamine (0.5-1 mg/kg IV) were vomiting (4%), clonic movement (4%) and agitation (13%). Agitation, when present, is successfully treated with benzodiazepines in 58% of patients. Hallucinations, reported overwhelmingly as pleasant, were present in 80% of patients across all groups when surveyed, volunteers stated that they would volunteer again for the same treatment.

Adding ketamine to droperidol and diazepam showed that low dose ketamine didn’t affect intraocular pressure, hemodynamics maintained, ventilation maintained, and no complaints of moderate to severe pain, nausea/vomiting or hallucinations.

Trend towards better surgical outcomes and higher patient satisfaction in a ketamine/midazolam combination when compared to midazolam alone.
Prospective Randomized Controlled Trial

611 patients were analyzed. Additional IV medications were required 32.1% of the time (difference in need for additional IV meds significant, $p=0.048$)

- 26.5% need of IV medication for MKO melt group (lowest)
- 31.8% for diazepam + tramadol + ondansetron (group 2)
- 37.9% for diazepam only (group 1)

The most common need for additional IV medications was anxiety, with MKO again having the lowest percentage at 14.7% (23.3% and 18.9% for groups 1 and 2, respectively)

No significant difference between surgical or discharge times across patient groups ($p=0.935; p=0.183$), surgeon or patient satisfaction, or side effect profile between groups

There were no major adverse events
Summary

MKO melt offers an opioid-sparing alternative to conscious sedation that is safe, effective and superior to diazepam in the reduction of anxiety and need for additional IV medications when used for cataract surgery in appropriately selected patients.
References

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