Ideal IN Agent

Ideal IN Volume

Dead space eats up drugs

PAIN

anxiety

Analgesia
Anxiolysis
Fentanyl
Midazolam

Painful Procedure
Fentanyl

- Synthetic opioid
- Hemodynamically stable profile
  - No histamine release with resultant hypotension as in morphine
- Careful monitoring of respiratory status
  - Especially in combination with other medications

Dose

<table>
<thead>
<tr>
<th>Route</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>1 – 2 mcg/kg</td>
</tr>
<tr>
<td>IN</td>
<td>2 mcg/kg</td>
</tr>
</tbody>
</table>

Onset 1 – 5 minutes
Duration 30 – 60 minutes

Considerations
- Use lower dose if combining with benzodiazepines
- Chest wall rigidity possible if IVP, especially in neonates

A Randomized Controlled Trial Comparing Intranasal Fentanyl to Intravenous Morphine for Managing Acute Pain in Children in the Emergency Department

- Children aged 7 to 15 years, long-bone fractures
- Fentanyl 1.7 μg/kg as effective as IV morphine 0.1 mg/kg

Intranasal fentanyl for the management of acute pain in children (Review) 2014, Issue 10

- May be an effective analgesic for acute moderate to severe pain
- Causes minimal distress to children
- No definitive conclusions: superior, non-inferior, or equivalent

Risk Respiratory Depression

Intravenous
Intranasal

Therapeutic Threshold

10 kg

2 mcg/kg
50 mcg/ml
= 0.4 mL
Fentanyl

20 kg

2 mcg/kg
50 mcg/mL
= 0.8 mL

✓

Fentanyl

40 kg

2 mcg/kg
50 mcg/mL
= 1.6 mL

?

Fentanyl

40 kg

2 mcg/kg
50 mcg/mL
= 1.6 mL

✓

Use Both

Fentanyl

70 kg

2 mcg/kg
50 mcg/mL
= 2.8 mL

✗
Midazolam (Versed)

- If child not in pain prior to the procedure, start with an anxiolytic

- Hemodynamically stable profile

- Respiratory depression is rare

- Paradoxical agitation (disinhibition)
  - Up to 15% of children

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Atomized Intranasal Midazolam Use for Minor Procedures

- Chart review, children 1 to 60 months, 205 patients
- Laceration repair most common procedure (89%)
- Anxiolysis for minor procedures; No adverse events

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Intranasal lidocaine and midazolam for procedural

- 46 children, 5–50 months, 0.5 mg/kg
- Mean duration 23.1 min; mean depth 1 on modified Ramsay
- Safe, effective for short-term procedures

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Dose

| IV: (< 5 years old) | 0.05 – 0.1 mg/kg |
| IV: (> 5 years old) | 0.025 – 0.05 mg/kg |
| IN: | 0.2 – 0.5 mg/kg |

Onset

| IV: | 1 – 2 minutes |
| IN: | 10 – 15 minutes |

Duration

| IV: | 15 – 30 minutes |
| IN: | 15 – 60 minutes |

Considerations

- Works well with opioids
- Children may become disinhibited

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**5 mg/mL**
Midazolam 5 mg/mL

10 kg
0.3 mg/kg
5 mg/mL
= 0.6 mL

20 kg
0.3 mg/kg
5 mg/mL
= 1.2 mL

20 kg
0.3 mg/kg
5 mg/mL
= 1.2 mL

40 kg
0.3 mg/kg
5 mg/mL
= 2.4 mL

Use Both

Sniffing Position
Ketamine

- NMDA receptor antagonist, related to PCP
- Dissociative amnesia (NMDA receptors) and mild analgesia (µ-receptor activity).
  - Wide therapeutic window
  - Hypersalivation and emesis are common
- Laryngospasm is rare (0.4% incidence)
  - Positive pressure ventilation (bag-mask ventilation)

Fentanyl 1.5 µg/kg v. Ketamine 1 mg/kg
- Similar pain reduction in children with moderate to severe pain
- Ketamine 0.5-0.75 mg/kg
- Reduced VAS pain scores to clinically significant degree in 88%

Dose
- IV: 0.15-0.3 mg/kg (Pain Control)
- IN: 1 mg/kg (Pain Control)
- Repeat every 10 min as necessary

Onset
- 1 minute

Duration
- 15 minutes
- Recovery in 30-60 minutes

Considerations
- Explain to parents nystagmus
- Contraindicated in children less than 3 months, history of tracheal stenosis, hydrocephalus or IOP
Distressful Procedure

Hypnotic

Ketamine

10 kg

1 mg/kg
50 mg/mL
= 0.2 mL

20 kg

1 mg/kg
50 mg/mL
= 0.4 mL

40 kg

1 mg/kg
50 mg/mL
= 0.8 mL

70 kg

1 mg/kg
50 mg/mL
= 1.4 mL

Dexmedetomidine
Dexmedetomidine

- α-2 agonist with sedative and analgesic properties
- Specificity for spinal cord and central nervous system
- Dexmedetomidine has a much shorter half life than clonidine (2-3 hours vs. 12-24 hours)
- Brief periods of deep sedation often needed for imaging procedures in pediatric sedation
- Reports of bradycardia with IV use (none reported with IN use)

**Dose**

**IV:** 0.5-3 mcg/kg
**IN:** 2-2.5 mcg/kg

**Onset:** 10-30 minutes

**Duration:** 30-60 minutes

**Considerations**
- Watch for bradycardia
- Initial hypertension
- Anecdotal advantage in autism

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**A randomised comparison of two intranasal dexmedetomidine**

- 16 children, 1 to 8 years of age
- Dexmedetomidine 1 mcg/kg v. 2 mcg/kg, pre-induction sedative
- No adverse hemodynamic effects
- Conclude 2 μg/kg resulted in excellent sedation in children

*Anesthesia* 2012, 67, 1210-1216

**Intranasal Dexmedetomidine for Sedation for Pediatric Computed Tomography Imaging**

- Prospective observational pilot study; 60 patients
- Dexmedetomidine 2.5 μg/kg; 3 (5%) required 2nd dose of 1 μg/kg
- Time to sedation averaged 13.4 ± 6.4 minutes
- Safe, effective, efficient option for pediatric sedation for CT

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**Dead space**

eats up drugs
Selected References


Intranasal.net