Opioid analgesics

Opioid analgesics (formerly opiates - substances derived from opium, or narcotics - substances that induce sleep [1]) have a very strong analgesic effect. They suppress visceral pain, suppress the psychological component and the emotional reaction to pain. They act centrally, supraspinally. They have an analgesic and antitussive effect. The main representative is **morphine**. A person can easily become addicted to them.

Structure

Depending on the structure, we distinguish between **2 groups of opioids** [1]:

1. derived from the morphine molecule found in opium, the dried sap of poppy seeds[2]
   - natural opioids (alkaloids) − morphine, codeine
   - semi-synthetic alkaloids − diacetyl-morphine (heroin), hydromorphone, oxycodone
2. synthetic (derived from the phenylpiperazine molecule) − pethidine, fentanyl, megaphone

1% morphine for intravenous administration

Human body is capable of producing endogenous opioids, which include endorphins, enkephalins, dynorphin and endomorphins.[1] They are synthesized in nervous tissue from precursors [3]:

- *pre-POMC* (pre-pro-opiomelanocortin) − precursor to β-endorphin, ACTH and MSH (melanocyte stimulating hormone)
- *pre-pro-enkephalin A* - precursor to met-enkephalin and leu-enkephalin
- *pre-pro-enkephalin B* − precursor to dynorphin and neo-endorphin

Another opioid peptide is *nociceptin*, which is similar to dynorphin and affects the perception of pain, although it does not interact with any of the known opioid receptors.

Pharmacodynamics

Opioids act on 3 types of opioid receptors: μ, κ and δ. According to the affinity of individual opioids to these receptors, we can divide them as follows[1]:

1. agonists − morphine, pethidine, oxycodone, etc.;
2. partial agonists − buprenorphine;
3. agonists-antagonists
4. antagonists − naloxone.

12,5mcg/h fentanyl transdermal patch

Effects on the CNS:

- analgesic;
- calming down – removing tension and fear;
- euphoria – inner bliss – leads to addiction;
- dysphoria – κ (*pentazine*) bad moods, nightmares – *pentazocine* (psychotomimetic effects);
- drowsiness, delirium - "downers" - premedication before surgery. In case of overdose, it can lead to unconsciousness (respiratory depression, anesthesia);
- respiration - they reduce the sensitivity of the respiratory center to CO_2 (typically *fentanyl*), which can lead to respiratory depression - monitoring with an oximeter;
- antitussive - therapeutically *codeine*, (due to potential risks of opioids, antitussives without a central effect are used - *butamirate*, **dropypizin**).
- nausea/vomiting - a frequent side effect is vomiting due to the effect on the area in the medulla oblongata - it disappears after repeated administration or with the addition of an antiemetic;
- miosis – is also a marker of opioid intoxication (except for *pethidine*);
- neuroendocrine – increased secretion of ADH, PRL, STH, decreased secretion of FSH, LH.

Peripheral effects of OA:

- GI tract – increased smooth muscle tone, slowing down the intestinal passage, closing the sphincters (causing spastic constipation);
- Cardiovascular system – in the case of a myocardial infarction, it is necessary to distinguish between opioids, as morphine causes histamine release, which leads to hypotension. Fentanyl is a better option (it has better hemodynamics);
- reduction of uterine tone and uterine motility - slowing down labor;
- reduction of epithelial cilia movement (tubes, bronchi);
- bronchoconstriction - due to histamine release;
- muscle rigidity – fentanyl – ICU with ventilation;
- passing into breast milk (infants cannot metabolize OA)

- passing through the placental barrier - blue baby (respiration supression).

Principles of administration

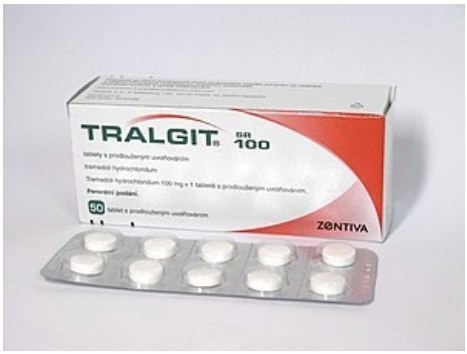
1. An intravenous form is indicated for acute pain, an oral form for chronic pain.
2. Titration administration starting from the lowest doses.
3. Initiating treatment means testing the opioid for a specific pain.
4. Administration of antiemetics in the first days, constipation treatment and laxatives.
5. There is no maximum dose for cancer pain. For chronic non-cancer pain, doses higher than 180-200 mg of morphine have not proven effective.
6. In case of developing side effects, or if the efficacy of the treatment decreases, it is reccomended to switch to another opioid.[1]

Side effects

- respiratory depression - the most feared complication;
- nausea, vomiting;
- dizziness;
- depression;
- itching;
- constipation;
- increased pressure in the bile ducts;
- urine retention;
- hypotension
- increase in tolerance - need to increase the dose in order to maintain initial effect.

Representatives

1. Weak opioids - a ceiling effect may apply (further dose increasing does not lead to an increase in the effect)
   - Codeine − weaker effects (administered in combination with paracetamol), serves as an antitussive;
   - Tramadol
   - Dihydrocodeine
   - Pentazocine
   - Nalbuphine
2. Strong opioids - for severe intractable pain
   - Morphine
   - Pethidine
   - Hydromorphone
   - Oxycodone
   - Buprenorphine
   - Piritramide
   - Methadone − only as a substitution treatment for psychological addiction. [1]



Tramadol for oral administration

Recalculation of dose and calculation of the next dose

Links

Related articles

- Equianalgesic opioid doses
- Opioids (pediatrics)
- Opioid abuse
- Disorders caused by opioid use

External links

- https://www.akutne.cz/algorithm/cs/82--/

References

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