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International Commission for Alpine Rescue

Commission for Mountain Emergency Medicine

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Treatment of Pain on the Field

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Intended for mountain emergency physicians

Preamble:

The treatment of pain is an unequivocal duty of the medical profession to relieve human suffering. Analgesic therapy is always important in the management of patients who have sustained injuries, because intense pain can cause clinical deterioration. Drugs given to relieve pain may occasionally provoke dangerous drops in blood pressure and other side effects, therefore all drugs should be titrated against effect. This means that the doctor must be familiar with the actions, desired and undesired effects and potential complications of the drugs he employs and must understand the management of these complications, so that any necessary measures can be started immediately. Proper management of pain in the acutely injured patient hence calls for knowledge of the pathophysiology of shock, acquaintance with pharmacology and an understanding of the principles of intensive care.

Significance of Severe Pain in Trauma Patients

Individual Perception of Pain	Wide range from feeling discomfort to real suffering
Pulmonary Dysfunction	Resulting in Hypoxemia, e.g. shallow tachypnea by serial rib fractures
Deterioration of Shock	Vasovagal reflexes causing Hypotension
Neurohumeral Stimulation	High Cortisol level resulting in immuno-suppression, excessive sympathoadrenergic stimulation causing circulatory dysfunction, promoting ARDS and Multi Organ Failure

In severe to extreme pain Opioids and Ketamine are the only

drugs providing sufficient analgesia:

1. NALBUPHINE	Moderate Opioid
2. MORPHINE	Strong Opioid
3. FENTANYL	Very strong Opioid
4. KETAMINE	Non Opioid, potent Analgesic and Narcotic

Footnote: Continuous monitoring is mandatory with all these drugs.
Normally, in emergency situations opioids should be administered by IV-line. Under special circumstances in the mountains, opiods may be administered sublingual, transdermal, and Ketamine also intramuscular.

References*:*

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	Dose, relative potency	Action	Advantages	Disadvantages
NALBUPHINE (Nubain)	*Iv/sublingual* : 0,15 – 0,3 mg/kg Rel. Potency : 0,5 – 0,8	Onset : 2 min Maximum : 10 min Duration : 2 – 3 H	- limited respiratory depression (ceiling effect) - cardiovascular stability - no dysphoria - not subject to the Mmisuse of Drugs Regulation	- moderate analgesic potency - sedation, nausea and emesis - vertigo - continuous monitoring mandatory
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MORPHINE	*Iv/sublingual* : 0,05 – 0,2 mg/kg Rel. Potency : 1,0	Onset : 5 min Maximum : 20 min Duration : 2 – 4 H	- highly potent analgesic - sedative, hypnotic and euphoric effects - cardioprotective action, e.g. reduction of heightened sympathetic activity - antitussive and antiemetic (late) effect	- respiratory depression - histamine liberation - nausea and emesis (early effect) - muscle spasm in gastrointestinal tractus - drop of blood pressure - continuous monitoring mandatory
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FENTANYL	*Iv* : 1 – 1,5 micrograms/kg Rel. Potency : 100	Onset : 1 min Maximum : 5 min Duration : 25 – 35 min	- very high analgesic potency	- respiratory depression - continuous monitoring mandatory
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KETAMINE	Subanesthetic single dose : *iv* 0,25 – 0,5 mg/kg *im* 0,50 – 2,0 mg/kg repetitive administration : *iv* 0,25 mg/kg Combination with benzodiazepine (midazolam) and antisialogogue (atropine) recommended	Onset : *iv* : 1 – 3 min *im* : 5 min Maximum : *iv* : 5 min Duration : *iv* : 15 min *im* : 30 min	- high analgesic potency - no significant respiratory depression - bronchodilation, no vasodilation - preserved protection reflexes - no alteration of seizure threshold - no release of histamine, rare allergic reaction - no cumulation, no organ toxicity - not subject to the Misuse of Drugs Regulations	- central sympathetic stimulation - increase of systemic and pulmonary arterial blood pressure, heart rate and myocardial oxygen consumption - increase of intracranial pressure under spontaneous breathing - induction of salivary secretion - low hypnotic potency - emergence delirium, bad dreams - continuous monitoring mandatory - contraindicated in coronary heart disease and hypertension

Note : **S – Ketamine** (l – enantiomer) will replace Ketamine (racemic) in the near future. S – Ketamine is in Germany already admitted for use. S – Ketamine has twice the potency of Ketamine, the dosage is therefore half of Ketamine. S – Ketamine is said to have fewer side effects.