SEDATION SOLUTIONS

Series 3 – basics, drugs

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Abstract

The phrase conscious sedation (CS) is almost exclusively used in the UK to define one of the levels of sedation. The rest of the sedation world is using moderate sedation and analgesia as an alternative description of what conscious sedation is. It is said that the term moderate sedation and analgesia is more descriptive of what we as sedation practitioners do with sedation. In the UK the definition of CS means the patient must respond to verbal command. In the rest of the world mild physical stimulation is included in our definition of CS. We acknowledge two sedation techniques available for administration of sedation e.g. basic techniques and advanced or combination drugs techniques. A short summary of the sedation levels and the drugs involved will be discussed.

What is Conscious Sedation [1]

"Conscious Sedation is a technique in which the use of a drug or drugs produces a state of depression of the central nervous system (and the respiratory system) enabling treatment to be carried out, but during which verbal contact with the patient is maintained throughout the period of sedation (UK Department of Health 2003)".

In other words the sedation practitioner will alter the level of consciousness by administration of drugs but the patient will still be able to respond to verbal command. The idea is to make the patient comfortable, free from anxiety and pain and the patient may even sleep.

"The drugs and techniques used to provide conscious sedation for dental treatment should carry a margin of safety wide enough to render loss of consciousness unlikely. The level of sedation (level of consciousness) must be such that the patient remains conscious, retains protective airway reflexes e.g. coughing and swallowing, and is able to respond to verbal commands (UK Department of Health 2003)".

The effective management of pain and anxiety before, during and after operations is of paramount importance for sedation practitioners to achieve patient satisfaction. Conscious Sedation is a fundamental component of this objective. It must however be remembered that local anaesthesia plays an important part in providing analgesia. The safety record is excellent as all international guidelines on sedation expect sedation practitioners to be trained, and to update knowledge and skills regularly by attending courses and symposia.

Discussion

There are many sedation societies in the world that feel that we as sedation practitioners should use Procedural Sedation and Analgesia (PSAA) as a more appropriate and accurate description of what we do with the administration of sedative and analgesic drugs [2]. This may be so but it must be understood that PSAA is a sedation continuum ranging from light to deep sedation, with the depth of sedation easily titrated by selective administration of sedative and analgesic drugs.

Therefore a continuum exists that range from minimal sedation or anxiolysis, (a calm, relaxed state/changing the mood of the patient), moderate sedation and analgesia, to profound, deep sedation (an "unconscious" or hypnotic state called light general anaesthesia in the UK) or even general anaesthesia (unconsciousness).

If a sedation practitioner claims he practices PSSA then it can be any level on the sedation continuum that ranges from minimal sedation, moderate sedation and deep sedation.

Two terms used today in sedation practice need further clarification [3],

- Non-dissociative sedation and
- Dissociative sedation

The non-dissociative drugs e.g. opioids, benzodiazepines, barbiturates, etomidate, propofol, and dexmeditomidine operate on the sedation continuum. This in effect means that the more you give of these drugs the deeper the patient will become, with the possibility of a higher incidence of respiratory depression and adverse events.

Dissociative sedation is produced by the use of ketamine a NMDA receptor antagonist. A trance-like cataleptic state is induced characterized by intense analgesia and sedation, amnesia, retention of protective reflexes, spontaneous breathing, and cardiovascular and respiratory stability.

Discussion

It is absolutely essential that a wide margin of safety is maintained between conscious sedation and the unconscious state of general anaesthesia, where verbal communication with the patient, and protective reflexes are lost. It is important that there is a clear understanding by the patient and the sedation team that conscious sedation does not mean the patient will be "knocked out".

With the use of non-dissociative drugs, the key to prevention of deeper levels of sedation, and possible sedation complications is the careful titration of the drugs to the desired effect.

Some researchers believe that ketamine, a dissociative agent and a NMDA receptor antagonist, does not operate on the sedation continuum as long as the doses administered are within the PSAA range. All that is necessary with ketamine administration is to “top up” the dissociative dose which is much lower than the anaesthetic dose.

Drugs and conscious sedation [3, 4]

Abstract

It is not the intention to discuss the drugs used for conscious sedation in detail. The drugs used for sedation can broadly be classified as the sedative/hypnotics, the analgesics, and the “anaesthetic induction agents” who are also used for PSAA. A thorough knowledge of the pharmacokinetics and pharmacodynamics of the drugs that we use for conscious sedation is crucial for the safety of the patients. A short summary of the available drugs used will be given.

Sedative/hypnotics

Chloral hydrate

Chloral hydrate is one of the oldest sedative, hypnotic drugs available. It is not an analgesic drug and only available in oral formulation. It is considered a safe drug but with all sedative drugs respiratory depression is possible. It is said that the sedative effects of chloral hydrate is unreliable in children over the age of 3 years. Chloral hydrate is especially used in small children for MRI scans or other painless procedures. The drug may cause gastric irritation when administered orally.

The recommended dose is 25 – 100mg/kg administered 30 – 60 minutes before the procedure. The expected time to onset of action is 15 – 30 minutes, with a duration of action of 6 – 8 hours.

Depending on the dose that we give the drug is supposed to lead to minimal sedation, conscious sedation (moderate sedation), or deep sedation.

The benzodiazepines

Most probably the most common and popular drugs used for PSAA. They can be used as single drugs, or in combination with other drugs. The benzodiazepines do not have analgesic properties.

Midazolam:
Midazolam (dormicum, hypnovel®) is a short acting benzodiazepine with a short half- life. It has no analgesic activities. The drug has potent anxiolytic, amnestic, hypnotic, anticonvulsant, skeletal muscle relaxant, and sedative properties.

It can be administered via several different routes e.g. oral, nasal, rectal, intramuscular, and intravenous. It is often given in combination with other analgesic agents e.g. fentanyl.

Route	Dose	Maximum dose	Time to peak effect	Duration of action
Oral	0.25 – 0.5mg/kg	7.5mg	10 – 30 min	± 60 min
Sublingual	0.2 - 0 0.5mg/kg		10 – 15 min	± 20 – 60 min
Intravenous	0.03 – 0.1mg/kg	3mg	3 – 10 min	± 20 – 60 min
Rectal	0.5 – 0.75mg/kg		10 – 20 min	± 60 min
Intranasal	0.2 – 0.5mg/kg		10 – 15 min	± 60 – 90 min

Table: dosing of midazolam as a single agent. When used with other agents the dose should be decreased because of synergistic effects of drugs.

The oral formulation has a bitter taste which especially children find difficult to take. The aqueous solution can be used orally when mixed with a small volume of juice, or even paracetamol. Tablets can be crushed and mixed with paracetamol.

Intravenous administration should be titrated to effect.

Flumazenil (anexate®)

Flumazenil is the antagonist available to reverse the action of the benzodiazepines. It reverses the sedative and respiratory depressant effects of midazolam. The duration of action is shorter than that of midazolam and re-sedation may occur after administration.

Every sedation practitioner must have flumazenil available when doing sedation.

10ug/kg over 30 sec	Can be titrated every 2 minutes	1mg/kg is the maximum dose	Duration of action one hour

Dosage scheme of flumazenil

Conclusion

Drugs and behavioural management techniques remain the most important treatment options available for the sedation practitioner. Every sedation practitioner must know the drugs available for conscious sedation, as well as possible side effects.

In the next CPD article the rest of the drugs available for conscious sedation will be discussed.

References

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