

# SEDATION 1: Oral & Intravenous techniques

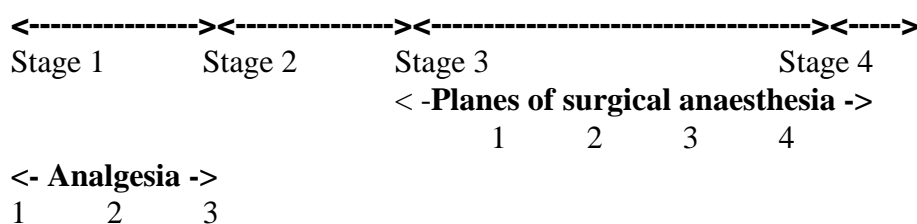
## Definition:

The use of drugs to produce a state of depression of the central nervous system which allays anxiety & fear enabling treatment to be carried out, but during which verbal contact with the patient is maintained.

If at all possible dental treatment should be carried out under LA. However, in some irrational fear, failed or inadequate depth of local analgesia or poor cooperation in children often make this difficult or impossible. sedation may be thought of as the next logical step in achieving safe pain free treatment before resorting to GA. The aim is to break the vicious circle of anxiety - pain -non-attendance - GA insistence. Sedation should be concentrated in the initial visits and then reduced as patient confidence increases. It **SHOULD NOT** be used as a technique to allow high quantity low quality dental treatment to be carried out.

All patients considered for sedation should have a full work up including medical history, previous GA/sedation reactions, family history of GA/sedation reactions. Treatment should be completed within 30 mins.

## The 4 stages of anaesthesia (Guedel)



Stage 1. Onset of analgesia & disorientation, small pupils, rapid irregular breathing. loss of consciousness marks passage into stage 2.

Stage 2. Excitement, large pupils, lash reflex present, regular breathing. **Loss of communication with patient.**

Stage 3. Surgical anaesthesia. lash reflex absent, small pupils, increase in muscle relaxation from plane 1 to 4. Planes 3&4 associated with respiratory depression & fixed dilated pupils.

Stage 4. Medullary paralysis, apnoea. Will progress to cardiac arrest & death if not reversed.

## Required Reading.

Hill,C.M. & Morris, P.J. 1991. General anaesthesia & sedation in dentistry. 2nd ed. pp. 86-114. Oxford. Wright.

Cawson. R. A. Essentials of dental surgery and pathology. 1991. 5th ed. 427-439. London. Churchill Livingstone.

British National Formulary latest edition and appropriate sections.

## Oral Sedation

Avoids the need for injections, generally well tolerated and long lasting but less predictable than intravenous route. Useful for both children & adults. Do not use in patients with psychoses, neuromuscular, renal, hepatic or respiratory disorders. Patients must be warned verbally and in writing not to drive or operate machinery for 24 hours. They should also be accompanied by an adult .

1. Benzodiazepines. Enhance activity of GABA which is the major inhibitory neurotransmitter in the brain. Bind to benzodiazepine receptor which is integral part of GABA complex which controls flow of synaptic chloride ions. Metabolised in liver.

a). Diazepam (Valium).

Probably most widely used of all oral sedatives. 0.1 - 0.25 mg/Kg. Relatively more in children and less in the elderly. Give night before and again half an hour before treatment. Side effects include "hang over", drowsiness and ataxia.

b). Temazepam.

Newer benzodiazepine. Shorter half life therefore less drowsiness. Probably drug of choice for oral sedation in adults. Give as for diazepam in dose of 10 - 30 mg (5 - 15 mg in elderly).

c). Flumazenil.

Specific benzodiazepine antagonist for use in overdose. This MUST always be available if benzodiazepine sedation (oral or IV) has been used. Binds to GABA receptor with greater affinity than other benzodiazepines and displaces them from their binding sites. Only available IV. Much shorter half life than diazepam therefore may need to repeat dose. Initially 200 µg over 15 seconds followed by 100 µg increments every 60 seconds if necessary to maximum dose of 600 µg.

2. H1 - Histamine antagonists. Very useful for paediatric sedation. Probably better than diazepam for allaying irrational fears and reducing difficult behaviour in children. Very useful for outpatient or practice sedation.

a). Trimeperazine (Vallergan).

Tablets or syrup. 2 mg/Kg. Also supplied as Vallergan Forte which may be of more use in older children. Side effects include drowsiness and persisting dreams.

## Intravenous Sedation

In the 1940's Jorgensen pioneered IV sedation by using pentobarbitone, pethidine and hyoscine. Later Drummond-Jackson used intermittent methohexitone. Neither technique is still used but they paved the way for modern techniques.

The agents in routine use are sedative & anxiolytic but not analgesic therefore local anaesthesia MUST still be used. As with oral sedation, the benzodiazepines are the most useful drugs for IV sedation. Other agents such as barbiturates are still available but confer no advantages and are more dangerous. Unless you receive specific post-graduate instruction DO NOT use IV "cocktails". The same contraindications and warnings apply as for oral sedation and as a general rule this is a technique for adults not children.

External patient monitoring including pulse oximetry and ideally ECG should be available and used for all patients. Resuscitation equipment and drugs, especially oxygen (and a knowledge of how to use them) should also be available.

Insert a canula into a convenient vein (dorsal hand or ACF) tape and leave *in situ* until patient is fully recovered. A "Butterfly" or pink Venflon are ideal. Venepuncture techniques are taught in your GA sessions and lectures and you should make sure you are proficient with them!

### 1). Diazepam.

Introduced in the mid 1960's diazepam revolutionised the treatment of anxious patients. It is available in a propylene glycol or lipid emulsion (Diazemuls) form. The latter reduces the incidence of thrombophlebitis markedly. Both are supplied in vials with 10 mg/2mls. Both have a long half life and are prone to produce a rebound sedation up to 18 hours post administration due to release of active metabolites (desmethyl diazepam) so ideally use IV sedation in afternoon session.

Initial dose is 0.1- 0.2 mg/kg. slowly IV. Titrate dose to response. Watch for partial ptosis (Verrill's sign) slurred speech and a feeling of warmth and relaxation. Anterograde amnesia is maximal after 1 minute so give the LA then (use pre injection topical analgesia). The patient MUST remain in communication at all times in order to guarantee fully functioning protective reflexes. Respiratory depression occurs in overdose therefore use a pulse oximeter and don't use IV sedation in patients with respiratory disease.

### 2). Midazolam (Hypnovel).

Introduced in 1983 Midazolam solved the problems of long half life and thrombophlebitis which had always been major disadvantages of Diazepam. It is some 2.5 times stronger than Diazepam and has a slower onset of action. Coupled with the fact that the traditional monitoring of Verrill's sign is unpredictable with Midazolam it requires careful administration & titration. Initial dose is 0.08 - 0.1 mg/kg within the range 2.5 - 7.5 mg. Slurred slow speech and regular breathing are good signs of adequate depth of sedation. Recovery is faster and there is less "hangover" than with Diazepam. For those more used to Diazepam the major problem is adjusting to using much less drug .

## **SEDATION 2: Inhalational techniques**

### **Ideal properties:**

1. Anxiolytic
2. Analgesic
3. Amnesiac
4. Anti emetic
5. Adequate operating time
6. Accelerated onset & clearance
7. Administration by operator safe and free of side effects.

### **Nitrous oxide sedation**

At present this is the closest to the ideal agent. Has been used for over 150 years found to be safe and acceptable. The aim is to achieve a smooth induction into stage 1 anaesthesia without taking the patient into stage 2. which is signified by excitability & lack of cooperation. Ideal depth is analgesia plane 1-2. At this level patient has ideal analgesia, anterograde amnesia, relaxation, euphoria & sedation. Protective cough reflex is maintained. Normally achieved with nitrous oxide concentration of 20 - 25%.

Safety of technique depends on not administering a hypoxic mixture. Thus oxygen concentration MUST NEVER fall below 23%. Modern RA machines have safety features which will permit maximum nitrous oxide/oxygen ratio of 70/30%. If oxygen delivery falls below 30% then nitrous oxide supply is cut off.

Commonest machine is Quantiflex which delivers a continuous gas flow which cuts out if oxygen flow is less than 3L/min. Remember normal minute volume in adult is about 5L. In children tidal volume is less but ventilation rate is greater so minute volume will be variable.

### **Technique**

Patient should only have had a light snack for 2-3 hr's preop. Make sure a full explanation of procedure has been given before appointment. Consider preop oral sedation. The success of the technique is as much to do with auto-suggestion and hypnosis as the gasses. Thus for it to work the patients must be relaxed before you start. It is not sufficient to just switch on the machine and start work. This technique requires a constant empathic dialogue between you and your patient. Lie patient supine, place nasal mask and start on pure oxygen at 5L/min. After 2-3 minutes "dial up" the required nitrous oxide percentage (10 -30%). The machine will automatically adjust the gas flows to maintain 5L/min. The correct analgesic plane is reached when patient feels relaxed (often accompanied by peripheral tingling and feeling of warmth). Light headiness or dizziness presages too great a depth and you should reduce the nitrous oxide concentration. Administer local anaesthetic after using topical paste. At completion of treatment turn off nitrous oxide and give 100% oxygen for 2

minutes. This will allow all the nitrous oxide to be removed and prevent diffusion hypoxia.

Patient may leave surgery after 10 minutes but should remain "on-site" for 30 minutes. Adults must not drive home and all should be accompanied home by an adult whose sole responsibility it is to look after the patient (this thus excludes parents with other children to look after).

## **Conclusion**

You must be fully conversant with all 3 sedation techniques above. A full and knowledgeable use of these techniques will allow you to treat the overwhelming majority of patients in a caring, sympathetic and painless manner.

It is mandatory that before you practice these techniques you also have a full understanding of basic (and ideally advanced) life support techniques and that your surgery has all the recommended resuscitation equipment and drugs.

This handout is only a very basic outline of the sedation techniques available. I strongly advise you to read at least the references in the reading list!