



## Lecture notes re The IHS Technique

### **Learning outcomes:-**

At the end the students should know:-

- ✓ A brief historical background re RA
- ✓ Know RA's role in dentistry
- ✓ The objectives of RA
- ✓ Guedell planes of anaesthesia
- ✓ The effect a mixture of N<sub>2</sub>O and O<sub>2</sub> may have on a patient
- ✓ The clinical status of a sedated patient
- ✓ The clinical signs of hypoxia and how to avoid it
- ✓ The recovery process and fitness for discharge

### **Historical Background**

- 1771 Joseph Priestley discovered OXYGEN.
- 1772 Joseph Priestley discovered NITROUS OXIDE.
- 1779 Humphrey Davey discovers some of the effects of Nitrous Oxide
- 1840s Horace Wells, a dentist, employed Nitrous Oxide as anaesthetic agent
- 1889 Liverpool Dental Hospital used Nitrous Oxide analgesia for cavity preparation on teeth
- 1937 Dr Harry Langa in the USA began using Nitrous Oxide analgesia. He was later to write the standard textbook on Relative Analgesia.

### **Conscious Sedation**

The following definition is accepted by the National Dental Advisory Committee, General Dental Council, Standing Dental Advisory Committee and the Dental Sedation Teachers Group

“A technique in which the use of a drug or drugs produces a state of depression of the CNS enabling treatment to be carried out, but during which verbal contact with the patient is maintained. The drug and techniques used should carry a margin of safety wide enough to render loss of consciousness unlikely.”

### **Why Conscious Sedation?**

- 20% Having high fear of dentistry of which 2/3 of these acquired in early childhood  
(Milgrom, JADA 1988)
- 25% Of adult – fear of injections  
(Milgrom, JADA 1997)
- 30% Are somewhat or very nervous or terrified of going to the dentist  
(Dioonne, KADA feb. 1998)
- 23 million are willing to go to the dentist if GA and CS more readily available

### **Evidence of effectiveness**

15% of cases referred for paediatric DGA were successfully treated with inhalation sedation  
*Foley J et al (2002)*

Nitrous Oxide/oxygen very successful adjunct in community paediatric dentistry  
*Bryan RA (2002)*

In fearful, inhibited children, integrated use of sedation appeared to facilitate acceptance  
*Anrup K (2001)*

### **The effect of IHS**

The effect of RA are primarily threefold:-

1. Sedative effect
2. Analgesic effect
3. Degree of amnesia (memory loss)

The various psychomotor and sensory effects occur in three overlapping planes of analgesia

### **The definition of Inhalation Sedation**

Inhalation sedation is a state of euphoria during which painful stimuli are relatively ignored, the pain threshold being raised without loss of consciousness.

The state of euphoria is brought about by submitting the patient to inhalation of nitrous oxide and oxygen and adding to this varying amount of suggestion.

### **The aim of Inhalation Sedation (IHS)**

Although the term RA was coined by Lange in 1937 the principal aim is to sedate the patient and for this reason the term conscious sedation rather than RA is preferred.

IHS aims to:-

- Improve patient co-operation
- Alleviate fear, apprehension and anxiety
- Change mental focus away from painful stimuli
- To raise pain reaction threshold
- To reduce fatigue

### **The Principle of Inhalation Sedation**

To supply N<sub>2</sub>O and O<sub>2</sub> to the patient

The amount N<sub>2</sub>O needed is decided by using the patient as a monitor. This is done by observing changes in the patient's demeanour and noting symptoms reported by the patient.

### **The objective of Relative Analgesia**

To give as little nitrous oxide (N<sub>2</sub>O) as possible so that the patient is treatable and remains conscious throughout the whole treatment.

### **Planes of Inhalation sedation**

Anaesthesia by inhalation of ether has been divided into 4 stages by Guedel.

1. Analgesia (Plane 1 - 3)
  - Moderate sedation and analgesia
  - Dissociation Sedation
  - Dissociation Analgesia
  - Total analgesia
2. Excitement (delirium)
3. Surgical anaesthesia (plane 1 - 4)
4. Respiratory paralysis

### **Approximate Percentages of N<sub>2</sub>O** as per Harry Langa 1937

Plane 1	5% to 25% N <sub>2</sub> O	Moderate sedation and analgesia
Plane 2	25% to 55% N <sub>2</sub> O	Dissociation Sedation and Analgesia
Plane 3	55% to 70% N <sub>2</sub> O	Total analgesia

## The Planes of Analgesia

The degree of analgesia achieved with nitrous oxide (N<sub>2</sub>O) is a continuum and the effects tend to be somewhat variable within each plane.

*Remember RA is an adjunct to behavioural management*

### **RA Technique**

Using the Quantiflex MDM machine

1. Check the machine, scavenging and turn on the gases.
2. Check the nosepiece for correct fit.
3. The patient is seated in the chair and gently lowered into the supine position. The procedure is explained and any anxieties, doubts or fears that the patient may have are answered. The mask is shown to the patient and they are invited to place it over their nose. Check that it is seated correctly and in a quiet hypnotic voice, briefly describe the sensations, which he/she may experience.
4. Switch on the machine. Set mixture control to oxygen 100% - adequate flow rate set
5. Ensure reservoir bag is full.
6. Allow the patient to settle then turn mixture control to 85% oxygen. Adjust flow rate if necessary
7. Repeat in a quiet hypnotic manner the information given in step 3.
8. Allow 2 minutes to establish symptoms of plane I.
9. Having established plane I increase N<sub>2</sub>O by changing the mixture control to 70% O<sub>2</sub> and wait two minutes.
10. Establish plane II. (Floating, Distant, Dreamy).  
At this point treatment may commence. Supplemental Local Anaesthetic may be required. A gag or prop should not be used, as it is important that the operator is able to determine whether the patient is able to maintain an open mouth. Spontaneous closure is a sign that the patient is going too deep and may become anaesthetised.
11. On completion of treatment increase O<sub>2</sub> to 100% and oxygenate for 2 minutes to prevent diffusion hypoxia.
12. Remove nosepiece before shutting off machine.
13. Cleanse and sterilise the nosepiece and tubing.

### **Points to remember for Inhalation sedation**

- A heavy meal prior to the appointment is inadvisable. Patients however should not go without food before the appointment but have only a light meal and non-alcoholic drink.
- Written and informed consent is always required.
- It is not absolutely necessary for patient to be accompanied, though for a nervous patient having the support of a friend is usually beneficial.
- The operator must be chaperoned at all times with a sedated patient.
- The equipment must be checked before every session (see check-lists).
- Always use scavenging and good working practices to reduce surgery contamination.
- A Dental Nurse trained in sedation must be present and available in the surgery.
- Pulse oximetry for R.A is not routinely necessary. It may be used when a patient's medical condition warrants it.

- Backup emergency portable oxygen and equipment with appropriate attachments to provide intermittent positive pressure ventilation to the lungs must be available close by.
- Emergency equipment and drugs must be located nearby.
- A quiet atmosphere is essential in an RA environment.
- To avoid diffusion hypoxia 2 minutes 100% oxygen must always be given at the end of the procedure
- Patients need to be recovered for 15-20 minutes. If driving then 30 minutes is advisable.
- Patients should be assessed for discharge using the  
EVE sign (-) - eyes closed and tip of finger to point of nose.  
Romberg's signs. - Stand to attention with eyes closed without swaying.

### **Plane 1 Relative Analgesia 5 - 25% Nitrous oxide**

Pain threshold elevated

Fear reduced

Possibly slight amnesia

Relaxation begins

Tingling beginning in fingers & toes lips or tongue

Physiology otherwise normal

Patient responds clearly to questions and commands

### **Plane 2 Relative Analgesia 25 -55% Nitrous oxide**

- Pain reaction markedly reduced
- Fear eliminated
- Amnesia more likely
- Pleasant euphoria, mild intoxication
- Patient less bothered by surroundings
- Sense of detachment, floating or lethargy

### **Plane 2 Relative Analgesia 25 -55% Nitrous oxide**

- Change in character of voice (throaty)
- Physiology, reflexes normal
- Communication easy
- Mouth stays open
- Responses may be sluggish
- Nausea is rare

### **Plane 3 Relative Analgesia 50 -70% Nitrous oxide**

- The deterioration of co-operation deteriorates
- Treatment becomes impossible

Hence Plane 3 acts as a buffer between the end of stage 1 and the beginning of stage 2 of Anaesthesia

### **Points to remember:-**

- Nausea if occurs becomes a matter of concern – laryngeal reflex
- Never ever use a mouth prop –  
If the patient loses consciousness, the patient cannot keep his/her mouth open nor would the patient be able to co-operate. This may become unnoticed due mouth prop.

- The plane/amount of RA that a patient will require will depend on the individual susceptibility to the gas. Therefore % of N<sub>2</sub>O is merely a guide.  
*In all cases the level is determined by the pt reaction rather than % N<sub>2</sub>O*

### **Analgesia**

It is estimated that a 20% : 80% mixture of N<sub>2</sub>O - O<sub>2</sub> produces the analgesic effectiveness of 10-15mg of morphine.  
The optimum concentration of N<sub>2</sub>O for the production of analgesia is 35%

### **Clinical Status of A Sedated Patient + Eve**

- ✓ ABILITY TO MAINTAIN A PATENT AIRWAY
- ✓ ABILITY TO MAINTAIN VERBAL CONTACT
- ✓ ABILITY TO MAINTAIN AN OPEN MOUTH
- ✓ ABILITY TO COUGH & SWALLOW
- ✓ ABILITY TO MAINTAIN OPEN EYES

Additional objective signs showing readiness for treatment

- ✓ Mental and physical relaxation
- ✓ Parasthesia
- ✓ Mild intoxication and euphoria
- ✓ Lethargy
- ✓ Feeling warm
- ✓ Dreaming
- ✓ Indifference to surroundings and passage of time

### **Recovery**

Ensure the patient is breathing 100% O<sub>2</sub> for 2min and then for a further 2min to finish.  
This will ensure that the gas exhaled is vented outside the surgery  
Also the surgery should be well ventilated fan open at floor level window

### **Elimination of N<sub>2</sub>O & Diffusion Hypoxia**

- In normal alveolus air contains at least 16 % O<sub>2</sub>.
- For few minutes on termination of RA the O<sub>2</sub> may drop to 10% !!
- There is a rapid elimination of N<sub>2</sub>O from the blood into the alveoli.
- This dilutes the O<sub>2</sub> present and causes the hypoxia.
- Hypoxia causes headache, nausea, and lethargy-hangover effect.

**however**

**Prevent DIFFUSION HYPOXIA by giving 100%oxygen for 2 - 3 minutes.**

### **Fitness for Discharge**

- Discharged by the sedationist
- Accompanied home by a responsible adult
- Post-operative advice given to both
- Adult patient may be discharged unaccompanied at the dentist's discretion

### **Good Working Practices**

Points to remember

- Check equipment prior to use
- Good seal of mask - is the bag moving?

- Minimise mouth breathing
- Minimise patient talking
- Minimise levels of Nitrous used
- 2 minutes oxygen to finish.
- Keep mask on for further 2 minutes