Suitability of patients for conscious sedation

Dentists have to consider carefully a wide range of health conditions before deciding on the appropriate approach for those that need to be sedated

Dr Laura Fee

Patients suitable to undergo conscious sedation (CS) include those with moderate-severe anxiety, a swallow/gag reflex or a mild learning/physical disability such as cerebral palsy. Well-controlled medical conditions such as asthma, epilepsy, gastro-oesophageal reflux and mild hypertension are exacerbated by stress, making CS hugely beneficial.[1]

Hospital-based intravenous (IV) CS helps patients with severe systemic disease or disability to avoid unnecessary general anaesthesia (GA). However, a small percentage of patients will still simply not tolerate dental treatment without being 'knocked out', making GA essential to facilitate dental treatment.

An in-depth medical, dental and social history is mandatory at a visit before treatment. It is important to ascertain the patient's degree of dental anxiety. This helps determine the most suitable sedation technique as some patients with severe needle phobia are unable to tolerate cannulation making inhalation sedation the best option for them.[2]

General health considerations

ASA Physical Status Classification[3]

- ASA 1 – Heathy person – suitable for IV/inhalation sedation
- ASA 2 –Patient with mild systemic condition – mild disease with minimum functional limitation – generally suitable for IV/inhalation sedation in primary care
- ASA 3 – Patient with severe systemic condition – significant functional limitations such as with COPD – may be suitable for inhalation sedation in primary care, but otherwise careful evaluation for hospital-based sedation
- ASA 4 – severe systemic disease constantly threatening life – myocardial infarction or stroke <six months ago – anaesthetist-led team
- ASA 5 – Moribund.

About the author

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Age

Age is not an absolute contraindication to sedation but older patients are more sensitive to sedatives.[4] The incidence of delirium following treatment with midazolam was 10 per cent higher in the elderly.[5] Elderly patients also tend to have poorly tethered, friable veins, which may be more susceptible to cannulation damage. IV sedative agents in children <12 is not recommended unless provided by a paediatric specialist. Disinhibition in adolescents is common and even slight over-

sedation can lead to rapidly deteriorating respiratory depression.[6]

Cardiovascular System

(See table below).

There should be no elective surgery if the diastolic value is >110 mmHg. However, when measuring blood pressure always consider the risk of "white coat hypertension".

Patients with controlled/uncontrolled hypertension have a more labile haemodynamic profile during CS making hypotensive swings more likely.[7]

It has been shown that there is little evidence that a BP < 180mmHg/110mmHg causes perioperative complications. However, a BP>180/110mmHg is linked to perioperative ischaemia, arrhythmias and cardiovascular lability. There is no clear evidence that deferring anesthesia lowers perioperative risk. The intraoperative BP should be within 20 per cent of best BP estimate.[8]

Dentists must evaluate pre-operatively for the presence of target organ damage such as coronary artery disease. Target organ damage lowers the treatment thresholds for raised BP.[9]

A study examining the cardiovascular effects of epinephrine with IV midazolam examined 75 patients with heart disease treated in two groups. The rate-pressure product (RPP) was used to indicate myocardial ischemia. This is the systolic BP x heart rate = RPP, which is a reliable indicator of myocardial oxygen consumption. Ischemic changes were demonstrated in patients with an RPP of >12,000, increasing their CS risk. The pressure rate quotient, which is mean BP divided by heart rate, also assesses a patient's suitability for CS. The results of this study indicated that treatment with midazolam and epinephrine does not generate significant ischemic risk. It is important that the lowest effective dose of local anaesthetic containing epinephrine is used and that intravascular injections are avoided.[10]

NYHA classification of angina

0 healthy
1 no hindrance to normal physical exertion
2 slight limitation, angina with fast walking, ascending stairs, excitement
3 significant limitation of regular movement. Angina on climbing normal staircase
4 angina with minimal activity/rest.

Increased stress levels exacerbate angina, making sedation and good local anaesthesia important in reducing heart rate.

Unstable angina contraindicates elective treatment. Patients with angina that affects normal daily activity such as NYHA 3 are unsuitable for sedation in primary care. If the GP/cardiologist confirms stability of angina then NYHA 2 patients can progress with elective sedation.[11]

Post MI

At six months post-infarction a patient is classed as ASA 3. The risk of re-infarction is 16 per cent. Elective sedation in well-controlled patients reduces stress, helping to lower risk.

Post-percutaneous coronary intervention (PCI)

Patients must wait three months after stenting before elective sedation. Angina must always be successfully controlled before treatment.[1]

Classification of cardiac functional reserve capacity

- Class 1: Able to climb a normal flight of stairs without stopping. Can continue walking with no rests – safest for IV CS
- Class 2: Climbs without rest. Rests on top – safest for IV CS
- Class 3: Climbs with rest during ascent – outpatient CS unsuitable
- Class 4: Unable to climb stairs.

Patients with palpitations

Patients with benign palpitations benefit from the stress reduction produced by CS. A patient with malignant palpitations, however, must be treated in hospital. Any individual with an automated implantable cardioverter-defibrillator is unsuitable for treatment in primary care. A hospital setting is mandatory for patients with a pacemaker or those following AV node/conduction pathway ablation surgery. Wolff-Parkinson-White syndrome is an absolute contraindication to sedation.[1]

Respiratory disease

Midazolam has a greater effect on the respiratory system compared to the cardiovascular system. Healthy patients who present with respiratory infections on the day of treatment should be rescheduled.

Cardiovascular System
ASA According to Blood Pressure (BP):

<140 systolic and <90 diastolic	ASA I	Primary care suitable
140-160/90-94mmHg	ASA II	Primary care suitable
160-199/95-115mmHg	ASA III	Specialist unit
200 systolic and >115 diastolic	ASA IV	In-patient services

Careful assessment of the patient's disease and functional reserve will indicate the most suitable setting for CS. It must be remembered that opioids act synergistically with sedation with regards to respiratory depression.[12]

Dyspnoea grading system[12]

0 Healthy
1 Mild dyspnoea
2 Moderate – limited outdoor movement – hospital management safest
3 Marked dyspnoea on minimal exertion indoors – unsuitable for outpatient sedation
4 Dyspnoea while resting – unsuitable for outpatient sedation.

Asthma

The dentist must ensure the asthmatic is well controlled. A mild asthmatic is considered ASA 2; however, an untreated Grade 2 is unsuitable for treatment in primary care. Hospital management is necessary for ASA 3 patients who have frequent episodes/attacks. It must be borne in mind that theophylline can interact unfavourably with IV midazolam. Inhalation sedation can be a safer option due to guaranteed oxygen levels.[13]

COPD

Extreme caution is needed with COPD patients who suffer with emphysema or bronchitis. A patient with chronic bronchitis is ASA 3. Midazolam results in dose-related respiratory depression, which is more exaggerated in COPD patients. Hospital treatment of the patient in an upright position with supplemental oxygen is required due to the increased risk of hypoxia.

If a patient needs supplemental oxygen at home or has severe orthopnoea or a productive cough then sedation is contraindicated.[12]

Renal system impairment

Hepatic microsomal oxidation is responsible for midazolam's biotransformation. This is susceptible to factors such as old age, hepatic cirrhosis and drugs (cimetidine) as they reduce the oxidative capacity. A high regular intake of alcohol increases midazolam clearance.

Renal failure causes a build-up of metabolites which prolongs sedation. CS is contraindicated in cases of advanced liver disease.[1]

Patients undergoing haemodialysis or continuous ambulatory peritoneal dialysis are unsuitable for sedation.

Haemodialysis patients swing from being centrally underfilled where they are at risk of hypotension to centrally overfilled. Day 2 is considered the safest time to treat but outpatient CS is still best avoided. Post-renal transplant patients with good renal function may be suitable for hospital-based CS.[11]

Methadone and midazolam are both metabolised by the cytochrome P450 3A pathway. Chronic methadone use leads to the induction of this pathway with more rapid midazolam metabolism and higher dosage requirements.[14]

Neurological disease

IV midazolam helps to reduce involuntary movement in patients with multiple sclerosis and Parkinson's disease making dental treatment more comfortable. Many patients will have reduced swallowing capacity so sitting the patient upright with adequate suction is vital. Controlled epileptics are suitable for CS although more research is needed to develop clearer guidelines. Liaising with the GP/neurologist confirms if the patient has a driving licence and when the last three seizures occurred. Anti-epileptic drugs such as phenytoin can increase or decrease plasma concentration of sedatives.[11]

Recovered stroke victims may experience a re-emergence of symptoms when benzodiazepines are administered. Light sedation can trigger a re-occurrence of symptoms such as right-sided paralysis and dysphasia. Sedation is contraindicated for one year after a stroke.[15]

Haematological disorders

Sedation should be avoided in patients with sickle cell anaemia and thalassaemia. This cohort are high risk for reduced oxygen tension with respiratory depression or over-sedation. Inhalation sedation is preferred.[16]

Pregnancy

The second trimester is the safest time to treat, but the mother's metabolism is altered due to the increased demands of the baby. This makes sedation unpredictable. There are also foetal teratogenic risks.[12]

Intellectual or physical impairment

Patients with mild learning disabilities are suitable for sedation. Severe learning or physical difficulties require management by an anaesthetist-led team.[17]

Endocrine diseases

Diabetes

HbA1c helps identify pre-diabetic patients. It also helps recognise diabetics at risk of complications. A BM check of >5mmol/l pre-treatment is advisable.[18]

Pre-operative starvation can upset blood sugar levels. The evidence for fasting is low so a degree of clinical judgement required.[19] Well-controlled diabetics are best treated in the morning to avoid interference with their insulin

routine. Poorly controlled diabetics requires hospital management. Inhalation sedation can be a safer option as it is easily reversible.[16]

Adrenal insufficiency
Patients on long-term steroids must be treated in an anaesthetist-led facility to avoid an adrenal crisis.[13]

Thyroid disease
Hyperthyroidism can cause tachycardia and atrial fibrillation. Hypothyroidism can cause bradycardia, making CS unpredictable.[12]

Specific drug considerations
- Cardiac medication: Ace inhibitors, beta blockers, calcium channel blockers and nitrates enhance the hypotensive effect of midazolam[20]
- Erythromycin effects metabolism of midazolam[21]
- Midazolam interacts with herbal medicine potentiating CNS depression[22]
- Opioids such as heroin can cause significant respiratory depression with midazolam. Veins are often unusable[1]
- Cocaine adversely effects respiratory/cardiovascular control with sedation[1]
- Cannabis makes oxygen saturation levels unpredictable during sedation[1]
- Central nervous system depressants for mental health conditions can act synergistically with benzodiazepines. Tolerance may have developed in these patients similar to recreational drug users.[20]

Assessment of vital signs

Blood pressure, oxygen saturation, BMI, heart and respiratory rate must provide a satisfactory baseline indicating fitness for sedation. Sometimes a screening may reveal an unknown condition requiring further investigation by a GP before sedation can be performed.[16] It is important to predict a patient's risk for conscious sedation. Hospital-based sedation is advisable in the following instances:
- Baseline SaO2 is <95 per cent
- Patients with respiratory disease such as COPD
- Patients classified as ASA 3-4

Patients with a history of more than one attempt for previous intubation.[23]

BMI
A patient with a BMI of <35kg/m2 is suitable for primary care CS. Caution is advised with a BMI of 35-40kg/m2 especially if the patient has co-morbidities such as hypertension and diabetes.

The standard dental chair has an upper weight limit of 140kg making referral to hospital sometimes necessary for the use of a DIACO chair which can hold 500kg. Successful cannulation can be difficult due to the effects of increased adipose tissue on vein morphology.[24]

Sleep apnoea is more common in individuals with a BMI of >35. Sedation is an absolute contraindication in patients with obstructive sleep apnoea(OSA). The pharyngeal airway dilator muscles are highly sensitive to benzodiazepines.[25] The STOP-BANG questionnaire is a useful screening tool for identifying potential cases of OSA.[26]

Malampatti system
This is a visual assessment of the distance from the base of the tongue to the soft palate. A Class 3 or 4 patient is at increased risk of airway obstruction. The patient must be asked to protrude their tongue. It is important to document the level of visibility of the back of the mouth.[27]

A difficult airway can also be judged if the thyromental distance is <6.5cm. A short, fat neck and receding jaw is an airway risk. Males are more susceptible to airway obstruction.[28]

Indications for inhalation sedation (IS)

IS can be used from the age of three. Patients who are allergic to benzodiazepines or those tolerant to them due to treatment for anxiety/insomnia are suitable for IS. In patients previously addicted to benzodiazepines IV, CS can reactivate dependence making inhalation sedation safer.[30]

Contraindications to IS

IV sedation suits mouth-breathers, anyone taking methotrexate due to the anti-folate effects of IS and also someone who had vitreoretinal surgery within 12 weeks. Severe autism or ADHD patients are unsuitable for IS due to compliance difficulties. A hearing impediment reduces the hypnotic suggestion aspect of IS treatment making CS more effective.[16]

Non-titratable sedation techniques

If titratable techniques are deemed inappropriate then oral or intranasal sedation may be considered. Special care dental patients with challenging behaviour benefit greatly from these advanced techniques.[31]

Conclusion

A treatment plan is devised by combining the information gathered during history-taking and the clinical exam. The patient must be of sound mind to give their valid written consent at a visit separate to treatment. If needed, the presence of a responsible adult escort must be possible.[32] Careful consideration regarding the nature of the patient's disease and functional capacity is essential. The dentist has a duty of care to predict patients at risk of

complications with CS such as cardiac, respiratory or neurological deterioration. After risk stratification, the optimum timing and setting for treatment must be decided to ensure patient safety.

There will always be a place in dentistry for general anaesthesia, especially for treatment plans involving extensive work on multiple teeth that make multiple sedation visits impractical and overall more expensive. Also in certain sedation cases, patients can move unpredictably, compromising the quality of the dentistry performed, which may necessitate the use of general anaesthesia.

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