Anesth Prog. 2004; 51(3): 95–101.
PMCID: PMC2007479

Sedation in Japanese dental schools.

Zac Morse, Kimito Sano, Kazuyuki Fujii, and Tomio Kanri
Author information ► Copyright and License information ►

Abstract

There is very little information about the practice of sedation in Japan. Despite the remarkable advances in dentistry, fear and anxiety continue to be significant deterrents for seeking dental services. Most dental procedures can fortunately be undertaken with the aid of sedation. A comprehensive survey of all the dental schools in Japan was carried out to determine what sedation practices were used in Japan. All 29 dental schools in Japan possessed a dedicated department of anesthesiology at the time of this survey. The survey attempted to determine the specific sedation methods (techniques, routes of administration, and agents used in sedation) as well as practices (monitoring, fasting, location, education, and fees involved in sedation). The results indicate that there was a broad range in sedation practices. The Japanese Dental Society of Anesthesiology may wish to examine the findings of this study and may wish to formulate guidelines appropriate for the practice of sedation in Japan. Others may also wish to compare their own practices with those of Japan.

Sedation in Japanese Dental Schools

Zac Morse, BDS, BScDent(Hons), GradDipClinDent, PhD,*† Kimito Sano, DDS, IJBDA,† Kazuyuki Fujii, DDS, PhD, JBDA,† and Tomio Kanri, DDS, PhD, JBDA,

*School of Oral Health, Fiji School of Medicine, Suva, Fiji Islands, and †Department of Anesthesiology, The Nippo School of Dentistry at Niigata, Japan.

There is very little information about the practice of sedation in Japan. Despite the remarkable advances in dentistry, fear and anxiety continue to be significant deterrents for seeking dental services. Most dental procedures can fortunately be undertaken with the aid of sedation. A comprehensive survey of all the dental schools in Japan was carried out to determine what sedation practices were used in Japan. All 29 dental schools in Japan possessed a dedicated department of anesthesiology at the time of this survey. The survey attempted to determine the specific sedation methods (techniques, routes of administration, and agents used in sedation) as well as practices (monitoring, fasting, location, education, and fees involved in sedation). The results indicate that there was a broad range in sedation practices. The Japanese Dental Society of Anesthesiology may wish to examine the findings of this study and may wish to formulate guidelines appropriate for the practice of sedation in Japan. Others may also wish to compare their own practices with those of Japan.

Key Words: Dental anesthesiology; Dental sedation; Dental anxiety; Dental education; Dental pain control.

There is very little information about the practice of sedation in Japan[1] and no information in the English literature. All 29 dental schools in Japan had a dedicated department of anesthesiology at the time this survey was conducted. A comprehensive survey of all Japanese dental school anesthesiology departments was carried out toward the end of 1999 to determine what sedation methods and practices were used in Japan and whether there was variability or consistency in these practices. All aspects of pain and anxiety control in Japan are primarily managed by specialist dentist anesthesiologists or those in training. It was hoped that the results of these findings would lead to information of what sedation practices occur in Japanese dental schools and whether there is consistency of instruction in this important dental procedure.

Without effective anxiety and pain control, numerous dental procedures would either involve undue pain and/or patient apprehension or be virtually impossible to perform. In addition, both anxiety and pain control techniques are often essential for the special patients, young children, and physically challenged. In this group of and analgesia are essential. Quality c pecially in developed countries, is also sue that determines whether or not needed dental care.

It has been reported that over 88% lation surveyed in Japan reported dent classified as having high fear. Almost veyed reported acquiring dental fear b school. Delay in dental treatment was over 50% of the sample.[2] Patients who seek oral health care more regularly more readily available.[3] As specialists ety control, dental anesthesiologists a position to address these concerns.

Inhalational sedation (IHS) with nitr invasive, allows rapid onset of action, simultaneously supplies oxygen. This low for effective sedation as a sole age matic induction to intravenous sedation which compromises the patient.[4] Ther a documented death directly attributa

Received December 2000; accepted for publication May 29, 2004.

Address correspondence to Assoc Prof Zac Morse, Department of Anesthesiology, Nippon Dental University, Niigata 951-8580, Japan; sano@ngt.ndu.ac.jp.

Anesth Prog 51:95–101 2004

ISSN 0

IHS (>20% O_2) in dentistry; hence its record of safety is superior to the use of local anesthetic alone.

IVS is an extremely effective, predictable, and safe method for anxiety control, particularly after the introduction of modern monitoring such as oximetry. The use of anxiolytic, sedative, and anesthetic techniques by appropriately trained dentists in the dental office and other settings continues to have a long history and remarkable record of safety.

METHODS

A survey was sent to all 29 departments of anesthesiology in Japanese dental schools toward the end of 1999. The questionnaire consisted of 30 main questions and was in English.

RESULTS

The response rate was 24/29 (82%). Three surveys were completed in Japanese. As multiple agents and techniques were used by many departments, the total percentages may exceed 100%. The results are as follows:

- Routine IVS technique: benzodiazepine boluses, 25%; continuous propofol infusion, 25%; benzodiazepine continuous infusion, 13%; propofol infusion with bolus administration, 4%; propofol bolus administration only, 4%; combination of the listed techniques, 29% (none of these techniques were patient controlled).
- Medications used during IVS grouped according to reported use. As sedatives (note that some analgesics were reported as sedatives): midazolam, 96%; propofol, 75%; diazepam, 42%; flunitrazepam, 25%; ketamine, 21%; pentazocine, 17%; thiopentone, 4%; hydroxyzine, 4%; and fentanyl, 4%. As analgesic: pentazocine, 21%; fentanyl, 13%; butorphanol, 8%; and ketamine, 8%. Number of sedative agents available: 1, 5%; 2, 18%; 3, 36%; 4, 5%; 5, 27%; and 6, 9%.
- Medication used for intraoperative analgesia (not including local anesthesia): pentazocine, 67%; fentanyl, 25%; butorphanol, 21%; flurbiprofen/ketamine, 13%; pethidine, 4%; and eptazocine, 4%. Number of intraoperative analgesics available: 1, 22%; 2, 52%; 3, 9%; and none, 17%.
- Postoperative analgesics used: yes, 83%; no, 17%. Postoperative analgesics used by anesthetist or surgeon: diclofenac (suppository), 17%; diclofenac (orally), 13%; flurbiprofen, 13%; fentanyl, 4%; acetaminophen (orally or rectally), 4%; loxoprofen sodium (orally), 4%. If postoperative analgesic proportion given by anesthetist: yes, 8
- Opioids used: yes, 43%; no, 57%. opioids were not used: complicated pro respiratory depression, 31%; patients a 15%; psychiatric effects, 8%; multiple 8%; local anesthetic sufficient, 8%; sho not familiar with, 8%; and no reason, of reasons given for not using opioids 54%; and none, 8%.
- Antisialoguges used: no, 74%; yes, 100% used atropine, and 33% used atro polamine.
- Oxygen used routinely as part of IVS: 33%; 75% used nasal cannula. Flow r min.
- Nitrous oxide in oxygen used with IVS: 29%; sometimes, 13%. No potent inh used with IVS. Concentration % of <30–58%; =30–25%; >30–17%.
- Percentage of sedation patients using o ± 15.5%; range, 0–50%.
- Proportion of patients receiving consc 83 ± 22%, range 30–100%; deep se 22%, range, 0–70%.
- Proportion of IVS patients that are am stay cases): 60 ± 35%, range 0–100%
- Written preoperative information pro tients: yes, 71%; no, 29%.
- Written postoperative information pro tients: yes, 54%; no, 46%.
- Consent required before intravenous s yes, 100%. Consent was oral, 83%; both, 33%.
- Length of food fasting for IVS: 5.5 range, 0–12 hours.
- Length of liquid fasting for IVS: liquid hours, range 0–9 hours.
- Monitors for IVS: pulse oximetry, 100% sure, 100%; electrocardiogram (ECG) rate, 88%; respiratory rate, 21%; PaC perature, 4%; stethoscope, 4%. Numbe used: none, 0%; 1, 0%; 2, 0%; 3, 42% 13%; 6, 4%.
- Monitors for inhalational sedation (IH 87%; BP, 91%; ECG, 83%; heart rate ratory rate, 17%; $PaCO_2$, 4%. Numbe used: none, 4%; 1, 0%; 2, 0%; 3, 50% 8%. Monitors for IVS same for IHS: 5
- IVS used in the operating theater: yes, IVS used out of the operating theater:
- Types of dentistry IVS used for: intra 100%; extraoral surgery, 91%; genera

vative, 83%; periodontics, 83%; implant surgery, 92%; other, 21%.

- IVS used based on ASA classification: ASA I, 100%; ASA II, 96%; ASA III, 67%; ASA IV, 4%.
- Youngest age IVS is provided: 6.5 ± 4.8 years, range 0–16 years. Sedation method used for children same as adults: yes, 83%.
- Tests routinely requested for ASA I patients for IVS (not for the surgery): hematology studies, 33%; interview and examination, 24%; ECG (12 lead), 19%; BP, 14%; respiratory rate, 14%; heart rate, 9%; urine analysis, 9%; Spo_2, 5%; internal medicine consult, 5%; spirogram, 5%; chest radiograph, 5%; depth respiration, 5%; Cornell Medical Index, 5%. Number of tests used: none, 45%; 1, 15%; 2, 15%; 3, 20%; 5, 5%.
- IVS services provided by any dental anesthesia departmental member to private clinics outside the hospital: no, 32%; yes, 68%. If yes, type of clinic: general clinic, 80%; specialist clinic, 60%.
- Does department provide education regarding resuscitation to general dental practitioners: yes, 87%.
- Does department provide education and training regarding IVS to general dental practitioners: no, 71%. If no, is it important to provide such education and training: yes, 76%.
- IVS services used enough in private general dental practices: yes, 30%; no, 70%. Reasons why not: general dentists do not have training or experience or knowledge, 44%; cost or remuneration (not covered by insurance), 25%; lack equipment, 12%; difficult/impossible/dangerous by general dental practitioner, 6%; lack of staff, 6%; not enough dental anesthetists for the amount of general practices, 6%.
- Should there be guidelines for IVS sedation in private general practices: yes, 96%. If yes, should the Japanese Society for Dental Anesthesiology be responsible for preparing these guidelines: yes, 95%.
- Fees charged for IVS: ¥17,256 ± 21,690; ¥0–50,000; no charge, 4%; receive insurance fee, 8%; cost of drugs, 8%; time-dependent, 4% (100.00 JP¥ ≈ 0.95 US$).
- Fees charged for IHS: ¥1582.25 ± 1684, ¥0–4358; no charge, 13%; receive insurance fee, 13%; cost of drugs, 13%.

DISCUSSION

The response rate of 82% represents an excellent return for a mailed questionnaire. The results should provide a reasonably accurate assessment of sedation practices in Japan around the year 2000.

Both intravenous and inhalational sedation were reviewed in this study with the major focu
of agents and techniques will depend
status of the patient, age, length and ty
depth of sedation and analgesia, and th
preference of the practitioner as well as
support available. One technique, l
serve the needs of all patients, and a
techniques will decrease the likelihood

The most common IVS technique
benzodiazepines or propofol delivered
uous infusion or boluses. After benz
propofol, the next most common sed
was ketamine. It appears that 59% of
responding have 3 or fewer sedative ag
IVS. It may be that many of these d
only 2 benzodiazepines and propofol o
zodiazepine, propofol, and ketamine a
hence the dominance of the single dru
ported in the survey. Interestingly, opio
tazocine and fentanyl, were also listed a
by some departments. It is presumed
used in combination techniques with
tives, rather than as opioid-only sedatio
the only barbiturate listed as being us
tone. Thiopentone has a steep dose
Pentobarbital, with a flatter dose-resp
be an excellent alternative barbiturate
sedative procedures lasting 2–4 hours.

During the administration of anesth
the needs of many patients may be be
advantage of the combined effects
agents.[6] Two or more analgesic/sedativ
niques may be superior to the use of
by taking advantage of the combined e
a "balanced" technique. For instance
like benzodiazepines that produce am
olysis can be combined with opioids, w
algesia and in some cases a more stabl
combination, however, may increase
adverse effects, such as respiratory dep
sea. Midazolam in combination with k
terms of both safety and cost, be in th
public interest.[7]

The use of patient-controlled sedat
ported as part of any routine IVS techn
safe practice of sedation will probably l
tients to control their own sedation u
supervision. This allows the mean dos
drug to be decreased, therefore allow
more control over his or her treatmen

Mixed agonist-antagonist opioids se
for IVS in Japan as pentazocine and b
among the most commonly used analg
torphanol is a superior mixed opioid a

in comparison to pentazocine with fewer adverse effects, particularly dysphoric effects. Although butorphanol has been reported to increase cardiovascular workload,[5] this is highly unlikely at commonly used IVS doses. Eptazocine is another opioid agonist-antagonist, but there are few human reports in the English literature and it appears that the agent is not available outside of Japan for comparison. There is a common misconception that these drugs produce less respiratory depression than conventional mu agonist opioids. Although a ceiling effect for respiratory depression does exist for the agonist-antagonist group, at commonly used dosages in IVS, respiratory depression, either alone or combined with other sedative agents, is comparable to mu agonist agents. Their popularity is likely to be due to less bureaucracy involved in their use in comparison to the pure opioids.

Postoperative analgesia, other than local anesthesia, is usually a nonsteroidal anti-inflammatory agent. Dental anesthesiologists were more likely than surgeons to administer opioids for postoperative pain control. Postoperative analgesic plans for ambulatory patients are important to prevent unanticipated hospital admissions, and NSAIDs, compared with opioids, are less likely to induce postoperative nausea and vomiting. The literature supports the efficacy of 2 or more analgesic techniques (including nonpharmacologic methods) used in combination for the control of perioperative pain, especially when different sites and/or mechanisms of action are involved and/or when synergy of effect is achieved. In addition, the literature indicates that multimodality approaches are associated with side effects no greater than those resulting from single analgesic techniques for perioperative pain management.[6]

The main reason given for the lack of use of opioids was that they involve "complicated procedures"; hence a matter of convenience and practicality was at issue, rather opioids being clinically contraindicated or related to patient factors and other adverse effects of opioid analgesics such as nausea and vomiting or mental clouding.

Interestingly, 17% of respondents indicated that they do not use postoperative analgesics. It is unclear whether they are unavailable or not used in dental procedures that do not normally require postoperative analgesics.

Anticholinergics are very useful in the practice of dentistry for reducing salivary secretions and atropine, in particular to correct vagally induced bradycardia.[5] Atropine and scopolamine can, however, increase the risk of anticholinergic syndrome with attendant postoperative delirium. Glycopyrrolate is a potent antisialagogue that does not cross the blood-brain barrier and is less likely to produce unwanted central nervous system (CNS) effects. Other adjunctive agents such as hydroxyzine, a potent antihistaminic drug that h actions, can be particularly useful in the ga Antiemetic agents as such were not rep been used.

Oxygen must be available during IVS a easy and inexpensive to administer; hov respondents do not use oxygen routinely. apy with nasal cannulae is generally desir mandatory, and three quarters of the re lized this method of oxygen delivery.[7] Pa increased by breathing supplemental o than room oxygen, as these patients are experience oxydesaturation.[4,8]

Nitrous oxide continues to be an impor pain and anxiety control, with an inhaled tration of N_2O being equianalgesic to 10–15 mg of morphine.[9] Nitrous oxide c ported to be between 20 and 40%, but an may vary anywhere between 5 and 70%. anxiety followed by syncope can occur, p fore IV cannulation.[1] Premedication for in with IHS may be a more effective techniqu anxiety associated with intravenous ca prevent some episodes of syncope. The ad N_2O in oxygen when used alone has no to significantly alter end-tidal CO_2 and c tion.[4] The addition of 30% nitrous oxide sedation with propofol has been shown to dose of propofol for oral surgery sedation half, thereby hastening patient recovery. is nonirritating and has been used success eous sedative in dentistry,[11] but it was no have been used in this survey. Nitrous c only active agent reportedly used for IHS

Preprocedural information and counse patient satisfaction and reduces risks an portant in obtaining informed consent.[8] operative instructions were provided by 7 ments. Presumably all departments prov structions. Increasing the quantity of pos formation significantly increases pain reli satisfaction without increasing analgesic c Approximately half (54%) of the departm written postoperative instructions. The res who will accompany the patient at dischar have written instructions. Half of the respo obtain written consent before IVS. In m gious societies, such as the United States datory. A body such as the Japanese Den Anesthesiology may wish to prepare stan uments such as consent forms and pre/p formation.

A wide range of fasting times was r known that 95% of clear liquids are emp

stomach of healthy, ambulatory patients in 2 hours or less. Especially for light IVS or IHS, there appears to be little advantage in withholding clear fluids for more than 2 hours before surgery, which is especially helpful in preventing dehydration in pediatric patients[8] and patients who may not be able to eat or drink for some time because of the nature of their surgery or long-acting local anesthesia of the oral cavity. It has been shown that prolonged fluid fasting before anesthesia actually increases the volume and decreases the pH of gastric juice.[13] The volume of liquid ingested is less important than the type of liquid ingested. Preoperative fasting of solids between 4 and 8 hours increases patient comfort/satisfaction and reduces adverse outcomes. Fried, fatty foods or meat may prolong gastric emptying time compared with lighter meals.[14] There is insufficient information to show that any fasting decreases the incidence of adverse outcomes during dental sedation or anesthesia.[8]

Monitoring practice also appears somewhat variable among departments of anesthesiology. Verbal communication was not mentioned as a part of monitoring the patient, but for many patients this is a simple and effective method to determine level of consciousness and appropriate anxiolysis. Other patient observations such as ptosis of the eyelid, slurred speech, or level of muscular relaxation were also not mentioned. No doubt this is routinely undertaken but not mentioned as monitoring was interpreted as technology-based. The percentage of monitors used to measure heart rate was less than the percentage of monitors such as pulse oximetry, blood pressure, and ECG, which invariably measure heart rate as well. It is presumed that the difference is due to people reporting less dedicated monitors solely for measuring heart rate.

Pulse oximetry, heart rate, ECG (which is considered optional for ASA I patients), continuous blood pressure, and pretracheal/cordial stethoscope are all required for IVS. $PaCO_2$ is optional as well as temperature measurement during long procedures but is not essential.

Capnography may provide an advantage for use in children, especially when supplemental oxygen is given; however, this has not been proven to be more useful than pulse oximetry alone.[15] In regard to capnography, there are a number of disadvantages to its use in the dental setting. Scavenging is required when nitrous oxide sedation is being used with a nasal hood; hence sampling directly from a nasal hood has been proven to be inefficient and may confuse the observer.[16] If the patient is mouth breathing, then this type of monitoring is totally ineffective. However, conducted noise by dental drills and other equipment may compromise the efficacy of monitoring by stethoscope; therefore, capnography may be beneficial.[17] Ventilatory functio
itored by observation and/or auscultat

ECG monitoring is recommended in
nificant cardiovascular disease such a
dysrhythmias.[8] Vital signs should be
corded before IVS, intraoperatively
and immediately before discharge.
these measurements will depend o
amount of medications given, the len
dure, and the condition of the patient.
to indicate the need or effectiveness of
tronic monitoring during IHS.

Although the majority of respond
ASA III patients, 33% would not. The
ing to do so was not given. Antianxi
lows for a less stressful encounter for
ing dental treatment and likely impro
high-risk patients with active ischemi
Similarly, geriatric patient's oral surg
managed in the dental office with IV
complications.[19]

Patients between the ages of 1 and
with mental or developmental delay re
most procedures, including those for
thesiologists in particular are in the
tively and safely offer younger patien
and anxiety control. There is no diff
pected future dental behavior or anxie
experience sedation compared with g
for dental treatment at a young age.[2

Although this survey was most inter
sedation techniques, deep sedation w
17% of departments, and general an
cases were provided by 60% of depart
oral surgery with sedation and local an
shown to be superior to same-day ge
and the cost savings are obvious. The
to return promptly to their home envi
cidence of general anesthesia–relate
oral surgery is approximately 1 : 100
IVS.[22] Of course, some patients, such
and physically challenged, pre-coopera
others undergoing extensive procedur
anesthesia.

The costs of laboratory tests are hi
ture indicates that they are inferior t
and physical examination. Often when
ties are detected, they are not pursue
sive blood pressure, ECG, and pulse o
are adequate for preoperative testing o
II patients provided a detailed medica
cused anesthetic physical examination
and no additional data are deemed
pressure and SaO_2 readings are mand

dural laboratory testing should be guided by the patient's medical condition and the chance that the results will affect their sedation management.[8] Hence it is almost always unnecessary for ASA I patients.

The majority of dental schools provide education regarding resuscitation, but they do not provide training for IVS. Most did, however, state that IVS training for general dental practitioners was important. Seventy percent of respondents stated that IVS services were not being used enough in private general practices. Stakeholders such as the Japanese Dental Society of Anesthesiology, Japanese Dental Association, universities, and the Ministry of Health and Welfare may wish to further investigate this situation.

Training to competency in conscious sedation techniques may be acquired at the predoctoral, graduate, postgraduate, or continuing education level.[25] Postgraduate clinical training (internship) is becoming more common and in the future will become compulsory in Japan. This may be a suitable program for the training of appropriate pain and anxiety control techniques.[26] Various countries, for example Australia,[27] United Kingdom,[25] and the United States have developed postgraduate programs in sedation and pain control. As pain control forms a fundamental part of general dentistry, its place in the undergraduate course may need to be reviewed. The American Dental Association (ADA) has guidelines for teaching the comprehensive control of anxiety and pain to the dental student.[28] Education and training is also required for ancillary staff (dental nurses). Such courses with clinical practice are available in other countries.

Currently there are no guidelines for IVS in private Japanese general dental practices. The ADA has a policy statement entitled "The Use of Conscious Sedation, Deep Sedation, and General Anesthesia in Dentistry and the Guidelines for the Use of Conscious Sedation, Deep Sedation, and General Anesthesia for Dentists,"[29] which may be useful as an initial guide.

There was a large range in fees charged for IVS, and the fees for IHS seem to be very low compared with other dental services. It is important that the national health insurance system supports pain and anxiety control as it does any other form of treatment, particularly if it allows the patient to complete a dental procedure that they might otherwise avoid.[30] There are also the questions of subsequent psychological trauma and quality of life. Through appropriate marketing and education, patients may be willing to pay on a private basis if they can be provided with comfortable and pain-free treatment.

The results of this study indicate that there is a wide range of practices associated with sedation in Japan. The information gained may be useful for both those within and outside of Japan. Not all patien equately managed with simple conscious s tal anesthetists are trained and experience the full range of pain and anxiety contro particularly in airway management. Much of Japanese dental anesthesiologists, the been a single fatality due to the direct resul or general anesthetic administered in school. This indicates that all forms of pai control are well managed in Japan, which model for the rest of the world. The rea phenomenon are multiple and complex b flect the high standards of training, prac search in the specialty.

REFERENCES

1. Kaneko Y. Sedation in dentistry. *Masui.* S60.

2. Domoto P, Weinstein P, Kamo Y, Woh Tanaka A. Dental fear in Japan: Okayama pr study of adolescents and adults. *Anesth Prog.* 220.

3. Dionne RA, Gordon SM, McCullagh L Assessing the need for anesthesia and sedation population. *J Am Dent Assoc.* 1998;129:167

4. Rubin D, Eisig S, Freeman K, Kraut R and IV sedation: effect on $ETCO_2$ and SpO_2. 1997;44:1–4.

5. Malamed SF. *Sedation: A Guide to Pa ment.* 3rd ed. St. Louis, Mo: Mosby; 1995.

6. American Society of Anesthesiologists Pain Management. *Practice Guidelines for Ac agement in the Perioperative Setting: A R American Society of Anesthesiologists Task Management, Acute Pain Section.* Availab www.asahq.org/publications and services/pain July 24, 2004.

7. Whitwam JG, McCloy RF. *Principles a Sedation.* 2nd ed. Oxford, England: Blackwell

8. American Society of Anesthesiologists Sedation and Analgesia by Non-Anesthesiolo guidelines for sedation and analgesia by non-an *Anesthesiology.* 1996;84:459–471.

9. Dookun R, Lyne Jp, Robb ND. Nitrou present, and future. *SAAD Digest.* 1997;14:1

10. Oka S, Takahashi M, Tajima A, Kyoda study of intravenous sedation with propofol a comitant use of inhalation sedation. *J Jpn Den* 2000;28:70–75.

11. Ganzberg S, Weaver J, Beck FM, McCa sevoflurane inhalational sedation for outpatient gery. *Anesth Prog.* 1999;46:21–29.

12. Vallerand WP, Vallerand AH, Heft M. postoperative preparatory information on the

following third molar extraction. *J Oral Maxillofac Surg.* 1994;52:1165–1170.

13. Greenfield SM, Webster GJ, Vicary FR. Drinking before sedation. *BMJ.* 1997;314:162.

14. American Society of Anesthesiologists. *Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: Application to Healthy Patients Undergoing Elective Procedures.* Available at: http://www.asahq.org/publicationsAndservices/NPO.pdf. Accessed July 24, 2004.

15. Iwasaki J, Vann Wf Jr, Dilley DC, Anderson JA. An investigation of capnography and pulse oximetry as monitors of pediatric patients sedated for dental treatment. *Pediatr Dent.* 1989;11:111–117.

16. Bennett J. A case against capnographic monitoring as a standard of care. *J Oral Maxillofac Surg.* 1999;57:1348–1352.

17. Vascello LA, Bowe EA. A case for capnographic monitoring as a standard of care. *J Oral Maxillofac Surg.* 1999; 57:1342–1347.

18. Findler M, Galili D, Meidan Z, Yakirevitch V, Garfunkel AA. Dental treatment in very high risk patients with active ischemic heart disease. *Oral Surg Oral Med Oral Pathol.* 1993;76:298–300.

19. Campbell RL, Smith PB. Intravenous sedation in 200 geriatric patients undergoing office oral surgery. *Anesth Prog.* 1997;44:64–67.

20. Keengwe N, Hegde S, Dearlove O, Wilson B, Yates RW, Sharples A. Structured sedation programme for magnetic resonance imaging examination in children. *Anesthesia.* 1999;54:1069–1072.

21. Kupietzky A, Blumenstyk A. Comparing the behavior of children treated using general anesthesia with those treated using conscious sedation. *J Dent Child.* 1998;65:122–127.

22. Pruitt JW, Goldwasser MS, Sabol S
Intramuscular ketamine, midazolam and gly
diatric sedation in the emergency departm
lofac Surg. 1995;53:13–17.

23. Haug RH, Reifeis RL. A prospectiv
value of preoperative laboratory testing fo
and sedation. *J Oral Maxillofac Surg.* 19

24. Cohn S. Preoperative evaluation fo
what laboratory tests are really needed? *S*
Based Anesthesia Newsletter. 1997;2(4).

25. American Dental Association. *Polic*
Use of Conscious Sedation, Deep Sedat
Anesthesia in Dentistry. Available at: htt
prof/resources/positions/statements/use
July 24, 2004.

26. Robb ND, Smith DG. Postgraduate
tion: a new development. *Br Dent J.* 199

27. American Dental Association. *Guide*
the Comprehensive Control of Anxiety
tistry. Available at: http://www.ada.org/
sitions/statements/anxiety-guidelines.pdf.
2004.

28. Flick WG, Clayhold S. Who should c
ical necessity of dental sedation and general
ical commentary supported by Illinois patie
surveys. *Anesth Prog.* 1998;45:57–61.

29. Glassman P, Garrison R. A sugges
teaching conscious sedation in advanced ge
grams: GPR and AEGD. *Special Care D*
34.

30. Grainger JK, Johnson A, Kingon A
velopment of the diploma in clinical denti
dation and pain control), faculty of dentistry
ney. *Aust Dent J.* 1994;39:382–388.

Selected References

These references are in PubMed. This may not be the complete list of references from this article.

- Kaneko J. [Methods for sedation in dental anesthesia]. *Masui.* 1998 Dec;47 (Suppl):S52–S60. [PubMed]
- Weinstein P, Shimono T, Domoto P, Wohlers K, Matsumura S, Ohmura M, Uchida H, Omachi K. Dental fear in Japan: Okayama Prefecture school study of adolescents and adults. *Anesth Prog.* 1992;39(6):215–220. [PMC free article] [PubMed]
- Dionne RA, Gordon SM, McCullagh LM, Phero JC. Assessing the need for anesthesia and sedation in the general population. *J Am Dent Assoc.* 1998 Feb;129(2):167–173. [PubMed]
- Rubin DM, Eisig S, Freeman K, Kraut RA. Effect of supplemental gases on end-tidal CO2 and oxygen saturation in patients undergoing fentanyl and midazolam outpatient sedation. *Anesth Prog.* 1997 Winter;44(1):1–4. [PMC free article] [PubMed]
- Dookun R, Lyne JP, Robb ND. Nitrous oxide. Past, present and future. *SAAD Dig.* 1997 Apr;14(1-2):13–35. [PubMed]
- Ganzberg S, Weaver J, Beck FM, McCaffrey G. Use of sevoflurane inhalation sedation for outpatient third molar surgery. *Anesth Prog.* 1999 Winter;46(1):21–29. [PMC free article] [PubMed]
- Vallerand WP, Vallerand AH, Heft M. The effects of postoperative preparatory information on the clinical course following third molar extraction. *J Oral Maxillofac Surg.* 1994 Nov;52(11):1165–1171. [PubMed]
- Greenfield SM, Webster GJ, Vicary FR. Drinking before sedation. *BMJ.* 1997 Jan 18;314(7075):162–162. [PMC free article] [PubMed]
- Iwasaki J, Vann WF, Jr, Dilley DC, Anderson JA. An investigation of capnography and pulse oximetry as monitors of pediatric patients sedated for dental treatment. *Pediatr Dent.* 1989 Jun;11(2):111–117. [PubMed]
- Bennett J. A case against capnographic monitoring as a standard of care. *J Oral Maxillofac Surg.* 1999 Nov;57(11):1348–1352. [PubMed]
- Vascello LA, Bowe EA. A case for capnographic monitoring as a standard of care. *J Oral Maxillofac Surg.* 1999 Nov;57(11):1342–1347. [PubMed]
- Findler M, Galili D, Meidan Z, Yakirevitch V, Garfunkel AA. Dental treatment in very high risk patients with active ischemic heart disease. *Oral Surg Oral Med Oral Pathol.* 1993 Sep;76(3):298–300. [PubMed]
- Campbell RL, Smith PB. Intravenous sedation in 200 geriatric patients undergoing office oral surgery. *Anesth Prog.* 1997 Spring;44(2):64–67. [PMC free article] [PubMed]
- Keengwe IN, Hegde S, Dearlove O, Wilson B, Yates RW, Sharples A. Structured sedation programme for magnetic resonance imaging examination in children. *Anaesthesia.* 1999 Nov;54(11):1069–1072. [PubMed]
- Kupietzky A, Blumenstyk A. Comparing the behavior of children treated using general anesthesia with those treated using conscious sedation. *ASDC J Dent Child.* 1998 Mar-Apr;65(2):122–127. [PubMed]

- Pruitt JW, Goldwasser MS, Sabol SR, Prstojevich SJ. Intramuscular ketamine, midazolam, and glycopyrrolate for pediatric sedation in the emergency department. *J Oral Maxillofac Surg.* 1995 Jan;53(1):13–18. [PubMed]
- Haug RH, Reifeis RL. A prospective evaluation of the value of preoperative laboratory testing for office anesthesia and sedation. *J Oral Maxillofac Surg.* 1999 Jan;57(1):16–22. [PubMed]
- Robb ND, Smith DG. Postgraduate education in sedation--a new development. *Br Dent J.* 1997 Jan 25;182(2):45–47. [PubMed]
- Flick WG, Clayhold S. Who should determine the medical necessity of dental sedation and general anesthesia? A clinical commentary supported by Illinois patient and practitioner surveys. *Anesth Prog.* 1998 Spring;45(2):57–61. [PMC free article] [PubMed]
- Glassman P, Garrison R. A suggested curriculum for teaching conscious sedation in advanced general practice programs: GPR and AEGD. American Association of Hospital Dentists. *Spec Care Dentist.* 1993 Jan-Feb;13(1):27–34. [PubMed]
- Grainger JK, Johnson A, Kingon A, Klineberg I. Development of the Diploma in Clinical Dentistry (Conscious Sedation and Pain Control) Faculty of Dentistry, University of Sydney. *Aust Dent J.* 1994 Dec;39(6):382–388. [PubMed