Clinical Reports

General anaesthesia in the private dental office

Marvin Kay MD

Experience with a mobile anaesthetic service providing general anaesthetics in dental offices is reported. With the aid of a trained assistant, the author administered more than 10,000 general anaesthetics in over 200 dental offices during the past 18 years.

Fear was the most frequent indication for general anaesthesia, followed by economy and comfort during lengthy treatment, young age, and the inability to co-operate. Requests for restorative dentistry exceeded those for dental surgery.

Patients aged 5 to 55 were accepted after examination by their family physicians. Before the procedure each patient received printed instructions, and a telephone call and a questionnaire was completed prior to the anaesthetic.

The principal equipment used was a portable Haloxair unit. After intravenous induction and nasotracheal intubation, halothane in air with added oxygen was used for maintenance.

The procedures lasted from 45 to 120 minutes.

Patients recovered in the dental chair, were discharged accompanied by a responsible adult and contacted again by telephone on the same evening.

Transient postoperative complications encountered were: sore throat, muscle stiffness, nausea and vomiting, nasal bleeding. One patient with undiagnosed malignant hyperthermia was immediately taken to hospital but died in spite of therapy. Two patients with succinylcholine apnoea were transported to hospital after completion of the dental procedure.

The experience of 18 years demonstrates that general anaesthesia can be administered safely in dental offices, with care in patient selection and attention to technical detail.

Key words

ANAESTHESIA: dental, outpatient. ANAESTHETIC EQUIPMENT: portable.

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Many patients postpone necessary dental treatment because of deep fears of the dentist, the dental operator, or dental procedures. Although most dentists are skilled in techniques of local anaesthesia and nerve blocks, and some employ nitrous oxide analgesia or techniques of intravenous sedation, there is still a substantial number of patients who prefer to undergo the necessary dental treatment under full general anaesthesia.

Only a small number of the dental patients wanting general anaesthesia can be admitted to a hospital operating room. Since not all hospitals have adequate facilities for complete dental treatment, and few dentists have hospital privileges, I undertook to provide general anaesthetics in private dental offices.

Using portable anaesthetic equipment, and with the aid of an assistant trained by myself, I developed a travelling anaesthetic practice which can simulate hospital conditions in any private dental operating room, or "operatory."

From October 1964 to February 1983 I performed 10,650 general anaesthetics for patients in the offices of 201 dentists in the greater Toronto area.

Detailed charts were kept on each patient and data were subjected to computer analysis which provided the information quoted in this article.

Description of the practice

Any procedure normally carried out in the dental office under local anaesthesia can also be done for selected patients under general anaesthesia, including restorative dentistry, extractions, periodontal surgery and endodontic therapy. I administered an average of 671 general anaesthetics each year in dental offices. Usually three or four anaesthetics are administered in one day. Sometimes an entire day will be spent in one dental office, but more often, I

**Follow These Instructions
BEFORE
The Anesthetic**

- 1** The patient is required to have a physical check-up by his family physician prior to the anesthetic appointment. The patient should bring the written results of that examination to the anesthetist at the time of the anesthetic.
- 2** The patient must have nothing to eat or drink for 10 hours prior to the anesthetic. It is most important that your stomach is empty before an anesthetic.
- 3** The patient must be accompanied home after the anesthetic by a responsible adult. Patients will not be permitted to travel home alone in a taxi.
- 4** *Children under 18 years of age must be accompanied to the dental office by one or both parents.*
- 5** The patient must not drive an automobile, or operate machinery for 24 hours following the anesthetic. Plan to rest for 12-24 hours after the anesthetic.
- 6** The patient should wear a comfortable, loose-fitting outfit, preferably sleeveless, or with short sleeves.
- 7** Women should not wear lipstick, nail polish or high-heel shoes.

FIGURE 1 Patient instructions. The brochure containing these instructions includes appointment information and a form for the patient's physician to summarize the results of the physical examination and laboratory investigation.

visit one dentist in the morning and a second dentist in the afternoon. When there is more than one patient to be anaesthetized in a particular office, the first patient is allowed to recover in the dental chair. When he is fully recovered and can converse coherently, I move my equipment and medications into the dentist's second operatory and commence the next anaesthetic.

Classification of patients

Group I

The largest group (about 85 per cent) needing general anaesthesia are patients, both children and

adults, who have a great fear of the dentist, his operatory, his instruments and the dental procedures.

Group II

The next largest group (about 11 per cent) consists of patients who require extensive or lengthy dental treatment, either fillings or extractions. Rather than return to the dental office for numerous appointments, the entire course of treatment can often be done in one session under general anaesthesia, usually at an economical advantage to the patient.

Group III

Less frequent indications for general anaesthesia in the dental office include: (a) allergy to local anaesthetic drugs; (b) hyperactive gag reflex; (c) mental retardation which precludes reasonable patient co-operation; (d) spastic neuromuscular conditions, such as cerebral palsy.

Selection of patients

Three separate processes have been established to ensure that only healthy patients receive a general anaesthetic in the dental operatory.

Step I

Each dentist has a check list which he can study prior to referring a patient for general anaesthesia. The patient must be between the age of 5 years and 55 years and in good health. (Patients as young as 3½ years, and as old as 60 years have been accepted, providing they are in good health.) Patients with known cardiovascular, endocrine or active lung diseases are not accepted. Patients with gross obesity or a recent history of jaundice are not accepted. Pregnant women, at any stage of the pregnancy, are also excluded.

Step II

The next stage in the preoperative screening process is an examination of the patient by his family physician. Each patient receives a preoperative instruction sheet (the dentist has a supply) which he takes to his physician for completion (Figure 1). My assistant phones each patient to ensure that each item on the instruction sheet is understood. This telephone call also gives the patient an opportunity to ask any questions concerning the general anaesthetic.

MARVIN KAY, M.D.
PRE-ANESTHETIC QUESTIONNAIRE

Instructions: phoned..... mailed.....

Patient's Name.....

Name of Spouse.....

Parent or Guardian, if under age 18.....

Age..... Date of Birth.....

Address:
Residence.....

Business.....

Telephone: Residence..... Business.....

Name & Phone Number of Driver.....

CONFIDENTIAL QUESTIONNAIRE

Please check either "Yes" or "No" on both sides and sign on back.

	Yes	No
1. Have you been under the care of a physician recently?.....	☐	☐
If so, for what reasons?.....		
2. Have you ever had a serious illness?.....	☐	☐
If so, give details.....		
3. Have you ever had any operations or anesthetics?.....	☐	☐
Describe each operation and the year it was done.....		
4. Have you ever had asthma, bronchitis, emphysema, tuberculosis, pneumonia, or any other lung disease?.....	☐	☐
If so, give details.....		
5. How much do you smoke?.....	☐	☐
6. Have you ever had a heart attack, heart failure, or any other heart disease?.....	☐	☐
If so, give details.....		
7. Have you ever had an electrocardiogram?.....	☐	☐
8. Pains in the chest?.....	☐	☐
9. Shortness of breath?.....	☐	☐
10. Swelling of the ankles?.....	☐	☐
11. High blood pressure?.....	☐	☐
12. Have you ever had jaundice, liver disease, or gall bladder disease?.....	☐	☐
If so, give details.....		
13. Have you ever had kidney disease?.....	☐	☐
14. Do you have hay fever, or any other allergies?.....	☐	☐
15. Do you have diabetes?.....	☐	☐
Does anyone in the immediate family have diabetes?.....	☐	☐
16. Have you ever been anemic?.....	☐	☐
17. Do you now, or have you recently taken any sort of drugs, pills, medicines, or medications of any kind?.....	☐	☐
If yes, please list.....		
18. Have you ever had epilepsy or convulsions?.....	☐	☐
19. Have you ever had an unpleasant anesthetic experience?.....	☐	☐
20. Have you ever had an unusual reaction to a drug?.....	☐	☐
21. Have you ever been warned against taking a specific medication?.....	☐	☐
22. Do you wear contact lenses?.....	☐	☐
23. Do you wear any dentures?.....	☐	☐
24. Have you had ANYTHING to eat OR drink to-day?.....	☐	☐
If so, what, and when?.....		
25. Women only — are you pregnant?.....	☐	☐

I certify that the above information is true, and I hereby consent to an operation and anesthetic being performed on me.
Also I hereby accept full personal responsibility for payment of all fees for services rendered by Dr. Kay.

Signature of Patient (Parent, Guardian) X.....

Witness.....

FIGURE 2 Preanaesthetic questionnaire.

Step III

The final step in the preoperative screening takes place in the dentist's office. A detailed history is taken from the patient, asking questions from a prepared, printed questionnaire (Figure 2). Blood pressure measurement and examination of the respiratory and cardiovascular systems are also done.

Although I accept patients ranging in age from 5 to 55 years, fully two-thirds are from 15 to 25 years of age. About two-thirds of all patients who present for office anaesthesia are female.

The average duration of an office general anaesthetic is about 1½ hours. In other cases, such extensive dental restorations are required that the patient is kept under general anaesthesia for a full two hours. If more operating time is required, then the patient is scheduled for a second general anaesthetic appointment. Occasionally, I have given an anaesthetic lasting only 5 minutes during which time the dentist extracted one or two teeth from an extremely fearful patient.

Approximately one patient in 120 receives a second general anaesthetic. An interval of at least one month is recommended before a second general anaesthetic is administered.

There is one final fact which may be rather surprising. Nearly 70 per cent of the patients who present themselves at the dental office to have their dental work done under general anaesthesia come for restorations or fillings, rather than extractions, or dental surgery, as might be expected.

I have administered general anaesthetics in the offices of 201 dentists. One dentist has scheduled one day each week for general anaesthetics in his office, while two dentists have scheduled one day every other week. Seven dentists have reserved one day per month for patients requiring general anaesthesia. About 20 dentists have patients for general anaesthetic only occasionally and the balance call me about once or twice a year.

Equipment

The principal piece of equipment is a portable anaesthetic machine, the Haloxair,¹ designed with the assistance of the Canadian Armed Forces (Figure 3). It is a compact unit and easily portable, weighing only 13.6 kg (including the wooden carrying case). In my black bag is an extensive range of equipment including endotracheal tubes and con-

FIGURE 3 Portable Haloxair unit.

nectors, syringes, needles and ampoules of methohexital, Alfathesin, atropine, succinylcholine, gallamine, and halothane. Also found in the black bag are emergency drugs including corticosteroids, antihistamines, various vasopressors, digoxin, aminophylline, neostigmine, dimenhydrinate and doxapram.

To avoid running out of drugs or equipment, I carry duplicates of everything in a second container. Furthermore, I also carry a battery-operated suction apparatus (in the event of a failure of the dental office suction) and a defibrillator, a Birtcher, 225R. As a further precaution, I carry an extra Haloxair back-up unit in my automobile trunk.

Anaesthetic assistant

The assistant who travels with me is a combined receptionist and circulating nurse. My present assistant is a graduate from a Medical Assistant's course taken at one of the private secretarial colleges in Toronto. She is also certified in CPR.

Conduct of anaesthesia

Induction

Upon our arrival at a dental office, my assistant and I carry out specific duties. A relevant history is

taken from the patient as described above and the anaesthetic equipment is set up in the dental operatory.

In preparation for anaesthesia, the dental chair is put into a horizontal position, thus avoiding blood pressure problems from the sitting position.

For cases scheduled no longer than one hour, I secure the arm in a Lemco Arm Restraint, a device which keeps the elbow straight, thus obviating the use of an arm board, which could prove to be cumbersome to carry from office to office. With the arm thus secured, I inject the anaesthetic via a 20 gauge needle, one inch long, with short bevel.

For cases lasting longer than one hour, a #20 Venocath or similar soft catheter is used. This is secured and remains in place until the patient recovers consciousness.

Anaesthesia is induced with a sleep-dose of methohexital one per cent, or Alfathesin, given intravenously, followed by atropine 0.5–0.6 mg intravenously, along with gallamine 10 mg, in the same syringe. The atropine generally provides the dentist with a dry operative field. After succinylcholine 60–100 mg, naso-tracheal intubation is performed, usually under direct vision. The vocal cords are sprayed with lidocaine two per cent and a soft, well lubricated, Portex tube is inserted. I use

FIGURE 4 Postanaesthetic patient instruction sheet.

non-cuffed naso-tracheal tubes. The absence of a cuff allows use of a tube of slightly larger diameter. A nasal decongestant is not used.

The anaesthetic machine is connected to the nasotracheal tube, and intermittent positive-pressure ventilation is continued until the succinylcholine-induced paralysis wears off and the patient begins to breathe spontaneously. The patient is now breathing halothane + oxygen + air.

A mouth prop, or a bite block, keeps the patient's mouth open so the dentist may operate. A large gauze throat pack, with a safety string, is inserted by the anaesthetist into the oropharynx to prevent the aspiration of any fluid, amalgam, blood or debris.

During the course of the general anaesthetic, the usual parameters of blood pressure, pulse rate, temperature etc., are recorded, along with the drug dosages and time of administration. The pulsemeter indicates the pulse rate/minute, and it also emits an audible "beep" with each heart beat. An electronic digital thermometer shows the patient's axillary temperature.

For charting, I use a general anaesthetic record sheet of my own design. However, any standard anaesthetic record is suitable.

Recovery from anaesthesia

When the dentist has finished operating, all foreign matter is removed from the oral cavity, from around the tongue, from the cheek pouches, and from the oropharynx. After removal of the throat pack, the oral cavity is reinspected for any residual foreign matter. When the patient begins to swallow, the nasotracheal tube is removed.

The patient remains in the dental chair during recovery. When he is sufficiently awake to depart the dental office with a minimum of assistance, he is

permitted to leave, in the company of a responsible adult.

The duration of the recovery period is very variable, from a few minutes to nearly two hours. The average time from cessation of dental surgery until the patient is able to stand and walk with a minimum of assistance is about 45 minutes. Even though a patient may have awakened quickly, he is still kept a minimum of 30 minutes.

The patient is never left unattended during the recovery. I remain with him until he is able to maintain his airway satisfactorily and he is semi-conscious. Then he may be attended by my assistant or, if he asks, his spouse or friend is permitted into the operatory. My assistant and I remain in the dentist's suite until the patient has been discharged.

Prior to discharge from the dental office, the patient is given a sheet of postoperative instructions (Figure 4) covering rest, diet, driving prohibition, and a request to phone either the dentist or the anaesthetist if he has any questions, or encounters any problems. All of these instructions are repeated verbally to the patient in the presence of the person who is to take him home. Later that same evening, I personally phone each patient to ensure that the postoperative course is running smoothly.

Complications

The complication most frequently encountered is sore throat which usually disappears in a few hours. Rarely, there is some hoarseness lasting for perhaps 24 hours.

Other postanaesthetic complications that have occurred include epistaxis (one patient in 25); nausea (one patient in 12); vomiting (one patient in 90); and muscular stiffness (one patient in 50).

The only fatality in this series occurred in 1979 with a 13-year-old male who had received about one and a half hours of anaesthesia. At the end of the procedure, a temperature rise was noted, and presumptive diagnosis of malignant hyperthermia was made. The patient was immediately taken to hospital by ambulance, treated with external and internal cooling, but did not regain consciousness and died about two hours later following a continuing rise in temperature.

Two patients had prolonged apnoea following succinylcholine injection. By exclusion, the diagnosis of atypical serum cholinesterase was made. I allowed the dental procedure to go to its conclusion,

continuing with intermittent positive pressure breathing, via the naso-tracheal tube, throughout the operation. In both patients, spontaneous respirations resumed after about one and a half hours. However, I left the tube in place and transported them to the hospital by ambulance. In the hospital emergency department, the tube was removed while a staff anaesthesiologist was standing by. Both patients were quickly discharged home. Subsequent tests confirmed the diagnosis of atypical serum cholinesterase.

About two or three times a year, extreme difficulty is encountered when an attempt is made to insert the tracheal tube through the nose, so oral intubation is performed.

Only once was I absolutely unable to intubate a patient, either nasally, or orally. After recovery from the succinylcholine the patient was allowed to awaken, without proceeding with the dental work.

Discussion

Office anaesthesia for dentistry is frequently associated with a high volume of patients undergoing short procedures in sometimes questionable facilities. My practice has a low volume of patients, who have relatively longer procedures performed in safe surroundings. Some anaesthetists have established their own dental operatories to which a dentist can bring his own patients. Since I specifically travel to the dental office, the dentist can now operate in the comfort of his own workplace, using equipment with which he is familiar, and aided by assistants who know his idiosyncrasies. The patient, who already has a high level of fear, does not have to endure the additional trauma of "going to the hospital." Therefore this type of practice represents a feasible and safe alternative. It should enjoy wider popularity among anaesthetists.

I would like to conclude by quoting from a paper by Dr. Eric Webb.²

"If the otherwise well-trained anaesthetist fails to go out from his cozy operating room and meet the challenge of office dentistry, the field is left by default to either the poorly trained physician, or the dentist who may be tempted to essay surgery and anaesthesia simultaneously. This we do not condone. In either case, the patient is poorly served, and anaesthesia slips backward, not forward.

"Oral surgery can be accomplished safely and comfortably for all concerned under general anaes-

thesia in the proper office environment. This environment includes a dentist who appreciates the anaesthetist's problems, and an anaesthetist who is competent, and specially equipped for the task at hand.

"To insist on admitting these patients to hospital is not always practical.

"To deny the comfort of general anaesthesia is unnecessarily cautious and indeed cruel."

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Résumé

L'anesthésie dentaire itinérante en cabinet privé fait l'objet de la présente communication. Au cours des dix-huit dernières années, l'auteur a administré avec l'aide d'un technicien entraîné plus de 10,000 anesthésies générales dans 200 cabinets de dentiste.

L'indication la plus fréquente de l'anesthésie générale a été la peur suivie des considérations économiques et de commodité pendant les traitements prolongés, le bas âge et l'absence de coopération. Les services ont été plus souvent en demande pour la dentisterie de restauration que pour la chirurgie dentaire.

Les patients dont l'âge s'échelonnait entre 5 et 55 ans ont été acceptés après examens par leur médecin de famille. Avant l'intervention, chaque patient a reçu un feuillet d'instructions, un coup de téléphone et a complété un questionnaire pré-anesthésique.

L'appareil principal utilisé a été un Haloxair portatif. Après induction par la voie veineuse et intubation nasotrachéale, de l'halothane dans l'air enrichi par l'oxygène a été utilisé pour le maintien. Après l'intervention, on a rencontré les complications transitoires suivantes: maux de gorge, rigidité musculaire, nausées et vomissements, épistaxis. Un patient qui présentait un hyperthermie maligne non diagnostiquée préalablement fut transporté immédiatement à l'hôpital mais mourut malgré la thérapie. Deux patients souffrant d'apnée causée par la succinylcholine furent transférés à l'hôpital une fois l'intervention terminée.

Cette expérience de dix-huit années montre qu'on peut administrer l'anesthésie générale en toute sécurité dans les cabinets de dentiste si on choisit bien les patients et si on porte attention aux détails techniques.