THE COMPLICATIONS OF DENTAL ANAESTHESIA

BY

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A complication of anaesthesia may be thought of in terms of any incident or series of incidents, affecting the smooth conduct of the anaesthesia and detrimental to the well-being and safety of the patient.

In this paper, the complications of dental anaesthesia will be taken to mean those complications which may arise out of the administration of general anaesthesia to patients in the dental surgery or the dental out-patients' department of a hospital.

Dental patients are subject to those factors which may complicate any surgical procedure carried out under general anaesthesia but they are also exposed to special risks, by virtue of some factors which are peculiar to anaesthesia for dental extractions in the dental chair. These include the absence or inadequacy of pre-operative assessment and preparation, the relationship of the operation site to the airway and the quality of the anaesthesia which is available.

The report on dental anaesthesia by a joint sub-committee of the standing medical and dental advisory committees of the Ministry of Health (1967) deals with the hazards of general anaesthesia in general dental practice. Fifty-one reports of deaths associated with dental anaesthesia during the period 1959–67 are analyzed. The opinion is expressed that concern must continue to be felt until a very much smaller number of deaths can be reported.

Furthermore the report states that morbidity figures for the two million cases anaesthetized in dental surgeries in England and Wales in any one year are hard to assess.

While the more serious complications of general anaesthesia such as hypoxic damage to vital organs or the effects of inhalation of debris into the main air passages may be assessed, minor degrees of damage, for example to the brain, by a shorter and less severe period of hypoxia cannot be readily measured.

Some authorities remain unconvinced of the danger of hypoxia. For example, Coplans (1962) lays stress on the degree of hypoxia. He states that when 10–15 per cent oxygen is inspired, haemoglobin is some 80 per cent saturated in arterial blood and 50 per cent saturated in venous blood after extraction of the body’s normal resting oxygen requirements. This means that 50 per cent of the body’s total oxygen content remains available. On the other hand, when the inspired oxygen concentration is around 5–7 per cent the reduced arterial blood is carrying only enough oxygen to the tissues to meet basic needs and that at a dangerously low partial pressure.

Bourne (1962) takes the view that hypoxia sufficient to produce cyanosis and jactitations does not harm the patient provided it is of short duration and that the blood pressure is well maintained, that is, the brain is copiously supplied with blood. Nevertheless, the relatively narrow margin of error indicated by Coplans’ figures necessitates a degree of accuracy of oxygen delivery not possessed by all dental anaesthetic machines (Parbrook, 1964) and requires a standard of skill which may be beyond the scope of many dental anaesthetists. Further, the degree of fitness of the patient to withstand even short periods of oxygen lack may be difficult to assess in the presence of anaemia or cardiovascular disease which may not be readily apparent. The present trend in dental anaesthesia outside hospital is to supplement or replace nitrous oxide with more powerful intravenous or inhalation agents and to administer sufficient oxygen to meet more than the basic needs of the tissues. It is encouraging that it is no longer considered necessary or even clever to deliberately restrict the oxygen concentration in order to subdue a resistant patient, for so many if not all of the complications of dental anaesthesia as currently practised in these islands are associated with hypoxia.
MINOR AIRWAY COMPLICATIONS

Most anaesthetics in the dental chair are administered via a nosepiece; therefore it is essential that a clearway is kept open from the nares to the glottis if airway complications are to be avoided. Failure to initiate and maintain a good nasal airway will give rise to an uneven and often turbulent anaesthetic which in turn will lead to further difficulties if matters are not rectified.

The patient may not be able to breathe through the nose for reasons such as the presence of a deviated septum, secretions, oedema of the mucous membrane, polypi or, in the child, enlarged adenoid tissue.

Mouth-breathing.

This is a complication which can lead to delay during induction of anaesthesia, lightening of established anaesthesia or hypoxia when the patient is attempting to breathe through an airway obstructed by the mouth pack. Apart from nasal obstruction, mouth-breathing can be caused by:

1. Premature insertion of the mouth gag or attempts at extraction of teeth before stable anaesthesia has been established. (Particular caution is necessary when a drug such as halothane, which gives early relaxation of the jaw, is being used.)
2. The presence of a mouth prop placed between the teeth before anaesthesia is induced. This obsolete piece of equipment is a relic of the days of “asphyxial” anaesthesia when hypoxic spasm of the jaw made the insertion of a mouth gag difficult if not dangerous.
3. Coplans and Barton (1964) have demonstrated that mouth-breathing can occur during established anaesthesia when the oropharyngeal barrier formed by the apposition of the dorsum of the tongue and the palate is broken. This can be caused by anything which depresses the tongue, e.g. the mouth gag, the operator’s fingers, or the pack.

Treatment of mouth-breathing.

An even plane of anaesthesia should be established before the mouth gag and pack are placed in position and the operation commenced. In frightened or difficult patients the full face mask should be used for induction or an intravenous anaesthetic given. If mouth-breathing persists after the operation has begun and anaesthesia is becoming light, a small amount of a volatile anaesthetic agent may be placed on the mouth pack. As the patient mouth-breathes he will inhale an anaesthetic-laden mixture which may restore nasal respiration. Caution is necessary lest too high a concentration be given or too prolonged an inhalation is allowed, as this may result in an overdose, or coughing and laryngeal spasm.

In cases where these measures fail to establish or re-establish nasal respiration a soft curved nasopharyngeal tube with a proximal flange to hold it in place should be passed into the nose. It should be of such a length that its tip lies behind the tongue and above the epiglottis.

Complications associated with the mouth gag.

If this useful piece of equipment is used carelessly, injury to the lips, tongue, teeth or mucous membranes of the mouth may occur. With modern anaesthetic methods, the relaxed jaw should present no difficulties to the insertion of the gag, nevertheless it is essential that it is carefully placed between the teeth and maintained in position by the anaesthetist until the end of the operation. Special caution is necessary in children and in patients with loose or grossly carious teeth. The preferred type of gag is the Ferguson with Ackland jaws which lie side by side when in the closed position. The jaws of the gag should be placed in the premolar area of the mouth. If the gag is placed too far forward incisor teeth may be displaced, and if too far back access to the mouth will be impeded and damage may be done to the temporo-mandibular joint. The gag should be opened slowly but firmly and the handles held in the palm of the anaesthetist’s hand close to the patient’s ear. This position if maintained will prevent twisting of the blades and displacement of the gag out of position into the buccal sulcus or outside the mouth altogether. Excessive leverage on the mandible by the gag, combined with undue pressure by the dental surgeon, which is liable to occur when lower molar teeth are being extracted, can result in unilateral or bilateral temporo-mandibular dislocation. If the dislocation is detected before the patient is allowed to recover from the anaesthesia, gentle pressure on the mandible in a downward and backward direction is all that is required to
effect reduction. Successful reduction is confirmed by the ability to bring the patient's jaws into occlusion.

**FURTHER AIRWAY COMPLICATIONS**

Obstruction of the main airway especially in the pharyngeal or laryngeal areas, is the bête noir of out-patient dental anaesthesia and can vary from minor degrees of obstruction to total closure of the air passage.

Airway obstruction is a complication for which the anaesthetist and surgeon should be constantly on guard. Every breath must be seen and heard, and minor degrees of obstruction dealt with, immediately they are detected.

**Tongue.**

When the patient loses consciousness there is a tendency for the tongue to fall back against the posterior pharyngeal wall, so occluding the airway. This complication is more likely to occur when the dental chair is tilted back or the patient placed supine. However, it can be prevented by drawing the tongue well forward before the pack is inserted and by the anaesthetist manipulating the jaw in an upward and forward direction by firm pressure behind the angle of the mandible. The dentist should assist in maintaining this position by using his free fingers to pull the jaw forward. This is especially needed when lower teeth are being extracted.

**Tonsils and adenoids.**

Enlarged tonsils and adenoids in children not uncommonly cause respiratory obstruction which may in some cases be severe enough to warrant the use of a nasopharyngeal airway. This must be used with care for it may produce bleeding from adenoid tissue which may cause laryngeal spasm or contaminate the trachea.

**Laryngeal spasm.**

Laryngeal spasm is a reflex sustained contraction of the muscles acting on the larynx which results in partial or complete closure of the glottis. This hinders the free access of air to the lungs. When the spasm is partial, the vocal cords only are adducted, but when complete the false cords and the aryepiglottic folds are in apposition as well. The classical sign of partial laryngeal spasm is stridor but it is necessary to emphasize once again the silence of total obstruction, often in the presence of vigorous respiratory movements.

Sometimes, reflex breath-holding occurs at the moment when the forceps are applied to the tooth to be extracted and respiration recommences as soon as the tooth is being withdrawn. With experience this minor and momentary respiratory complication can be distinguished readily from laryngeal closure.

Rees (1963) lists the prime causes of laryngeal spasm in dental anaesthesia as:

1. hypoxia;
2. local irritation by foreign material such as blood, dental debris or irritant anaesthetic vapours.

Careful attention to airway maintenance and the avoidance of low oxygen percentages should largely eliminate hypoxic causes but the combined efforts of the dentist and anaesthetist must be directed towards the prevention of local irritation of the larynx by foreign material such as the pack, blood or teeth fragments.

**Treatment of laryngeal spasm.**

If laryngeal spasm should develop in patients in the dental surgery, treatment should be directed along the following lines.

The mouth and pharynx should be cleared of foreign material using the fingers or a suction apparatus. The jaw should be manipulated in an upward and forward direction and the patient placed in the horizontal and lateral position to facilitate drainage from the mouth. Every dental surgery should be equipped with an effective suction apparatus, powerful enough to remove blood, mucus and teeth fragments from the pharynx rapidly. The dental saliva ejector does not build up negative pressure quickly enough to be of any use in an emergency. Several foot-operated aspirators are available and they are relatively cheap as well as being effective. Once the airway has been cleared, oxygen must be applied to the lungs under pressure and for this purpose the nosepiece must be abandoned in favour of the full face mask. In order to avoid a hasty and often prolonged change over from the nosepiece to facepiece it is convenient to have to hand a portable hand inflator such as the Ambu resuscitator or the Dräger bag. In an effort to break the hypoxic
laryngeal spasm care must be taken not to use excessive pressure, as 70 cm of water pressure may, if it reaches them, damage the lungs (Mushin, Rendell-Baker and Thompson, 1959). In this author's opinion there is no place in the dental surgery for more elaborate methods of overcoming laryngeal spasm, such as the intravenous injection of a muscle relaxant, cricothyroid puncture or emergency tracheotomy. Once the area above the vocal cords has been cleared of debris, attempts at inflation of the lungs by bag and mask should persist. At best, oxygen under pressure will break the hypoxic cycle and at worst in the extreme case the lungs can be flooded with oxygen once the terminal muscle relaxation occurs.

THE ROLE OF THE MOUTH PACK

This is a most important item in the prevention of airway complications in dental anaesthesia, but if it is placed incorrectly or allowed to become sodden with blood or saliva it can become itself a menace to the airway.

Constable (1964), in a paper dealing with the causes of death in the dental chair, lists three main causes of fatality:

1. cardiac failure in persons subsequently found to have some cardiovascular disorder;
2. overdosage of anaesthetic drugs;
3. obstruction of the airway, which according to Constable is almost invariably due to inhalation of the mouth pack.

This latter catastrophe should never be allowed to occur. Drummond-Jackson (1964) advocates the use of moist cellulose flange packs (one for each side of the mouth). These he states are one hundred per cent safe against the inhalation of even the smallest particles, if placed and maintained correctly.

The writer concurs with Dinsdale (1967) that the safeguarding of the airway, as far as the pack is concerned, is primarily the responsibility of the operator. Only he can position and maintain the mouth pack in the most advantageous position, and only he can make the necessary adjustments to it as the situation demands.

Dinsdale (1967) states that the best type of pack is of twelvefold gauze, 3 inches (7.5 cm) wide by 40 inches (100 cm) long for adults and 28 inches (70 cm) long for children.

A pack of 40 inches long is necessary in order to provide for adequate packing and at the same time allow sufficient length to remain outside the mouth. Dinsdale insists on at least 5 inches (12 cm) of pack being outside the mouth at all times. The method of packing is that advocated by Coplans and Barton (1964) which consists in placing layers of gauze in such a way as to isolate the operation site without unduly depressing the tongue. The vulnerable area of the pack—where leakage of air, blood or debris is liable to occur—is at the sides where the edges of the pack touch the buccal walls.

CONTAMINATION OF THE TRACHEA

By oesophageal or stomach contents as a result of regurgitation or active vomiting.

Coplans (1962) drew attention to the hazard of regurgitation associated with such conditions as hiatus hernia, achalasia of the cardiac or oesophageal pouch. Coplans quotes O'Mullane's (1954) view of this problem and his conclusion that an unobstructed airway and an upright position are important safeguards against this hazard. The writer has seen regurgitation occur in deep anaesthesia or following the administration of a muscle relaxant but he has not observed it in over 18,000 dental cases, the majority of whom have been anaesthetized in the supine position.

Active vomiting during induction of anaesthesia as distinct from silent regurgitation is a much more frequent hazard and if this complication occurs while the patient is in the sitting position a disastrous invasion of the trachea by stomach contents is highly likely.

It is common knowledge that it takes the normal stomach some 4-5 hours to empty after the ingestion of solid food. It is not so common knowledge that the emptying time is prolonged by such factors as the ingestion of glucose, traumatic shock or fear and anxiety such as would be engendered by the prospect of a visit to the dentist.

It is essential to enforce rigidly the rule that no anaesthetic will be administered to any patient who has taken food within the previous four hours. When dealing with children it is particularly important to question the parents and if possible the child itself as to the nature and quantity of the food last eaten as well as the time...
since eating. Wolfson (1963) found that postoperative vomiting occurred in 10 per cent of patients and he considers swallowed blood to be an important contributory factor.

By overspill from an area of diseased lung, as, for example, by the contents of a bronchiectatic cavity.

This is fortunately a rare occurrence, but it is necessary to be on the lookout for the occasional bronchiectatic who has not had the benefit of postural drainage and who presents for the removal of an infected tooth.

By blood and tooth fragments.

These are the most important source of foreign material liable to be aspirated into the trachea and the prevention of such accidents is the responsibility of both dentist and anaesthetist.

Among the factors associated with the anaesthetic which increase the risk of the inhalation of debris are hypoxia, coughing, struggling or mouth breathing. Those associated with the surgery are prolonged operating time, multiple extractions and excessive haemorrhage. The extraction of molar teeth is more likely to result in aspiration than the extraction of incisor teeth.

The anaesthetist and dentist can control some of these factors and there is no doubt that a well-oxygenated, tranquil patient is one in whom the likelihood of tracheal contamination is reduced.

Brock (1947) reported on 363 cases of lung abscess. Twenty-five of these (7 per cent) followed dental extractions and he gave four main causative factors:

(1) multiple extractions;
(2) septic teeth with heavy gum infection and tartar masses;
(3) obstructed respiration during anaesthesia;
(4) the upright position of the patient in the dental chair.

Opinion continues to be sharply divided on the question of the posture of the patient in relation to the hazard of the inhalation of debris, etc.

Macintosh (1964) at a symposium on anaesthesia for the ambulant patient stated that any operation within the mouth is a constant menace to the airway. Foreign bodies have but little way to travel to excite laryngeal spasm or to invade the airway, and the sitting position may be followed by grave consequences. Huddy (1966) put forward the view that the abandonment of the sitting position would prevent a proportion of cases of pulmonary abscess resulting from the inhalation of teeth or blood clot which he says are so much more likely to occur when teeth are extracted in the sitting position.

Coplans (1962) believes that if foreign material is present in the pharynx its inhalation into the lungs is probably more likely in the upright position, but the vital step of the passage of that material from mouth to pharynx is incomparably more likely in the supine than the upright position. The writer believes that a true upright position of the patient is seldom attained in the dental chair. As Fry and Earl (1950) point out, “in order to prevent aspiration in the sitting position the patient must be kept upright so that blood and debris tends to pool in the front of the mouth and not run backwards into the pharynx”. However, more often than not the mouth of the anaesthetized patient is inclined in a backward and downward direction due to manipulation of the mandible to keep the airway clear and the degree of backward tilt required to give operative access. A similar view was expressed by Hewitt as far back as 1901. Furthermore, in the lightly anaesthetized patient the act of extracting upper teeth can cause head retraction sufficient to allow blood and debris to flow back towards the pharynx. When this occurs with the patient upright, respiratory and gravitational forces will cause aspiration unless prevented by good packing and adequate suction.

Scott (1952), in work which has received little enough recognition, has compared the sitting and supine position (with 30° head-down tilt) with regard to the risk of aspiration of debris. He injected 3 ml of radiopaque oil into the mouth, near the molar teeth, at the side of the pack, with the patient anaesthetized but before surgery began. Chest radiographs were taken on recovery from the anaesthetic. Of the 100 patients who were sitting in the dental chair 25 inhaled some oil into the trachea. In a further 50 cases, supine with 30° head-down tilt, only one patient inhaled the oil. Scott concluded that with a patient on an operating table with 30° head-down tilt, only one patient inhaled the oil. Scott concluded that with a patient on an operating table with 30° head-down tilt blood and other debris will tend to pool in the posterior pharynx and this “sump” will accommodate all but excessive amounts at a lower level than the larynx.
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There will, therefore, be little chance of invasion of the trachea due to gravitational forces.

Love (1963), in a similar though small-scale investigation in children, obtained comparable results to those obtained by Scott. Radiographs were taken of the throat and upper chest to ascertain the immediate fate of the contrast medium. When the subject was in the sitting position with no protective mouth pack 3 ml of contrast medium placed in the area of the last molar tooth had three possible fates.

1. The contrast medium remained in the mouth. This occurred when the patient was kept bolt upright, without head retraction or slumping.
2. Contrast medium collected mainly in the upper oesophagus and some spilled over into the trachea.
3. Contrast medium, acted upon by both gravitational and inhalational forces, invaded the trachea.

When the patient was supine with 5–15° head-down tilt on an operating table, and again in the absence of a pack, the fate of the contrast medium was as follows.

1. Accumulation of contrast medium occurred in palatal and posterior pharyngeal areas which were now the most dependent parts.
2. Some aspiration of contrast medium occurred but a large proportion was retained in the pharyngeal sump.
3. In two cases lying horizontal with no head-down tilt some inhalation of oil took place, but a substantial amount still was retained in the palatal and pharyngeal areas.
4. In five cases in which a throat pack was inserted prior to the injection of the oil into the mouth, only one showed radiological evidence of inhalation.

From this admittedly incomplete radiological study some cautious conclusions may be drawn.

1. If debris passes the throat pack, posture alone will not prevent inhalation especially if the foreign material is fluid. Blood in droplet form can be inhaled as a result of normal respiration. Coughing or struggling will greatly increase this risk.
2. Solid material acted upon by gravity will fall to the most dependent part—in the case of the supine patient with head-down tilt, the palatal and pharyngeal areas.
3. When the patient is upright and the pack is bypassed, debris will again fall to the most dependent part, which is now the region of the larynx. Further, when the patient is upright both respiratory and gravitational forces will operate to bring about aspiration.

Love (1963) has recommended the following measures to decrease the likelihood of inhalation.

1. Tranquil anaesthesia, with absence of hypoxia, mouth-breathing, struggling or slumping. (The last cannot occur with the patient supine on an operating table.)
2. A suitable throat pack must be inserted and maintained in its optimum position throughout the operative procedure.
3. Surgery should be relaxed and unhurried and aided by good illumination of the operative field.
4. An efficient and reliable suction apparatus should be used when there is danger of an excessive accumulation of blood or debris and especially when molar teeth are being extracted.
5. Vigilance by both operator and anaesthetist against the possibility of inhalation must be increased in the presence of any surgical or anaesthetic difficulty.
6. The patient should be carefully positioned in the immediate postoperative period so that blood and other foreign material will be encouraged to flow from the mouth. If the operation is performed with the patient supine it is a simple matter to position him in the lateral position with head-down tilt to achieve this end.

The above conditions may be difficult to maintain in some cases. Therefore, if difficulty is anticipated and particularly if the operation is going to be prolonged, then intubation of the trachea should be performed as recommended by Danziger (1962; 1967, personal communication).

BRAIN DAMAGE AND THE ROLE OF POSTURE

Hypoxic cerebral damage has a variety of causes which in the dental patient may include:

1. intentional or accidental reduction in oxygen content of the inspired gas mixture;
2. airway obstruction;
3. pre-existing cerebrovascular disease, e.g. vertebro-basilar insufficiency in the elderly;
(4) cardiac arrhythmias and arrest;
(5) hypotension.
Reduction in oxygen supply should be eliminated by efficient anaesthetic methods in which sub-oxygenation is eliminated.

Goldman (1962) states that the majority of cases of delayed recovery and brain damage reported following dental anaesthesia are due to patients being forced to withstand minimal quantities of oxygen over a period of time.

Pre-existing cerebrovascular disease should be suspected by careful history-taking and observation and if necessary physical examination of the patient.

Sudden cardiac arrest due to pre-existing cardiovascular disease is, fortunately, a rare occurrence in the dental chair, but incipient coronary thrombosis may be precipitated or arise coincidently. In children, cases of aortic stenosis are particularly liable to sudden cardiac standstill and they should not be anaesthetized unless full facilities for cardiac resuscitation are at hand.

CARDIAC ARRHYTHMIAS
The possibility of alteration of normal cardiac rhythm during dental anaesthesia has assumed greater importance since halothane has become established as the main adjuvant to nitrous oxide. In practice most observers believe that halothane is a safe drug in dentistry when used in relatively low concentration and for a short period. Nevertheless it is advisable when using this agent to monitor the heart action (Goldman 1962).

Forbes (1966), in an investigation into cardiac irregularities during halothane anaesthesia for dental surgery, has shown that 13 per cent of patients developed an abnormal rhythm apparently related to the vagotonic action of halothane. The sensitization of the myocardium by halothane to exogenous adrenaline is well known and it is probable that endogenous adrenaline from reflex sympatho-adrenal stimulation may have the same effect (Black et al., 1959).

Forbes (1966) mentions, among factors which can cause increased sympathetic activity, pre-operative anxiety, laryngeal stimulation during light anaesthesia, and hypercarbia, all of which may occur in dental patients.

Shanahan (1966) has reported the fatal outcome of a dental anaesthetic administered to a very nervous child. According to an annotation in the Lancet (1966) this could possibly have been due to cardiac irregularity associated with extractions under halothane anaesthesia proceeding to ventricular fibrillation.

The work of Kaufman (1965) throws some light on the mechanism of cardiac irregularity associated with the extraction of a tooth or the prick of a needle. He showed that the peridontal injection of lignocaine prevented the abnormal rhythm in most cases, especially when upper teeth were being extracted. Protection was less when lower teeth were being extracted. This is presumably due to the less effective absorption and spread of the local anaesthetic agent in the lower jaw.

HYPOTENSION
It is around the question of brain damage resulting from hypotension per se that much current interest and discussion centres.

Bourne (1957, 1966) has stated that "fainting" will continue to be the main danger in dental anaesthesia until the traditional upright position of the patient is finally abandoned. Bourne is supported in this view by Pownall (1966) who said that "every anaesthetist who puts the interest of his patient first should refuse to give an anaesthetic unless he is able to place the patient in the horizontal position".

Other authorities take the contrary view (Goldman, Cornwell and Lethbridge, 1958). Driscoll, Christenson and White (1959) have shown that when sodium thiopentone is administered in the sitting position there is no significant fall in blood pressure. Indeed in a seated patient who is calm the blood pressure may rise 10-15 mm Hg after induction of anaesthesia.

Brierley and Miller (1966) describe a fatal outcome one month following a dental anaesthetic in which there was no evidence of circulatory arrest, and the patient was in a semi-recumbent position during the anaesthesia and operation. Pathological examination of the brain showed damage which was considered to be evidence of a severe reduction in cerebral blood flow during anaesthesia. These workers conclude that the clinical, physiological and neuropathological findings in the case described indicate that "fainting" can
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account for no more than a minority of these fatalities and that abandoning the seated position would not automatically eliminate the risk of cerebral ischaemia.

Brierley and Miller promulgate possible causes of hypotension in lightly anaesthetized patients, who have had no premedication and in whom there has been no attempt to intubate the larynx.

(1) Hypoxia.

(2) Overdosage of anaesthetic. In this reported case halothane was the main agent. The anaesthetic technique was stated to be impeccable.

(3) Reflex stimuli.

A hypotensive episode can be initiated by stimuli from, for example, the mouth pack, the dental prop or the extraction of the tooth itself. After the stimulus, peripheral vasodilatation begins, the blood pressure falls, aggravated by the upright position, and as a result of gravitational pooling in dependent parts cerebral hypoxia occurs. It is concluded that hypotension in the seated position can be detected if rate and volume of the arterial pulse are checked frequently. An altered heart rate and a reduced pulse volume are danger signs whose presence means that the patient must be tilted into a horizontal position without delay.

With regard to Bourne's concept of fainting Brierley and Miller (1966) state that if hypotension occurs when the patient is already unconscious then it cannot be truly described as due to "fainting". True fainting would occur at induction and would be characterized by hypotension with reduction in heart rate, pallor, sweating and respiratory irregularities, and would be synonymous with a vasovagal attack and syncope.

Under anaesthesia, the above signs may be absent, and according to de Wardener and his associates (1953) the fainting reflex disappears at a light level of anaesthesia.

Smith (1966) is convinced that hypotension can occur in the horizontal position and states that adoption of this position should not absolve the anaesthetist from observing the pulse throughout. Hypotension can occur without cyanosis or change in respiration.

Wolf and Siris (1937) gave sphygmomanometric evidence of hypotension during surgical operations in three patients under local anaesthesia and one under general anaesthesia. Hypotension occurred at the moment of a strong stimulus (division of major nerve roots). All patients were in the sitting position. Consciousness was not regained and death occurred after 2-3 days. The brain pathology was of an ischaemic nature and the authors conclude, "blood pressure sufficient to nourish the brain when the patient is in the recumbent position may be inadequate when the patient is sitting up".

Whether one agrees with the views of Bourne (1957, 1966) that hypotension is due to the common fainting attack occurring while the patient is seated upright in the dental chair or not, his statement that sudden unaccountable collapse in healthy young patients is totally alien to his experience of such patients anaesthetized in the horizontal position in the operating room cannot be lightly dismissed. There is no doubt that whatever the cause of the hypotension, its outcome in terms of the disability or death of the patient is greatly influenced by the upright position traditional to dentistry.

It is likely that the main reason why the traditional seated position of the patient has not yet been abandoned in favour of the supine position (with or without head-down tilt) is the fear that by so doing the risk of aspiration of debris into the trachea would be increased. This anxiety has been underlined by Danziger (1967, personal communication) who writes, "I don’t normally intubate for short operations performed in the upright position. . . . I would have to revise my ideas if the supine position became general, in the direction of more frequent intubation."

The postural element in hypotension should be eliminated. The writer believes that all dental patients undergoing general anaesthesia should be placed in the supine position with 10-30° head-down tilt. He further believes that by so doing the hazard of aspiration in the unintubated patient is not increased provided the conditions mentioned previously in relation to contamination of the trachea can be met.

Poor risk, excessively nervous patients, and those in whom anaesthetic or surgical complications are envisaged, should be referred to special clinics or hospital out-patient departments where skilled endotracheal anaesthesia is available Bourne (1964).
REFERENCES