

Anaesthesia in rhinosurgery

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SUMMARY

The authors present two technics of anesthesia with controlled hypotension in order to reduce bleeding during rhinologic surgery.

The first method is a pharmacological hypotension with trimetaphan (Arfonad R). The second technic is a mechanical hypotension using a breathing machine and halothane.

AS the years go by, nasal surgery becomes a more and more important part of otorhinolaryngology. More and more patients are asking for improvement of their nasal function and their appearance.

Nasal surgery can only be performed if bleeding is reduced to a minimum. The nose, as is the whole face, is the seat of a very much developed vascular network. Moreover the nasal mucosa is also a highly reflexive area. Appaix and Cahier (1964) in their monograph on anaesthesia in otorhinolaryngologic surgery state that the highest percentage of incidents occurs in nasal surgery.

Anaesthesia in rhinosurgery should be directed to: 1. suppression of reflexes and 2. reduction of bleeding.

In the present literature about the subject many techniques are described. There is no single method. In fact each surgical team has developed his own way to reach the same purpose with the lowest possible risk for the patient and the best possible working condition for the surgeon. The present article is a report on two different techniques used by two teams working with the same surgeon at the University Hospital in Nancy.

1. PHARMACOLOGICAL HYPOTENSION

Pharmacological hypotension seems to be one of the possible methods that meet the requirements of nasal surgery i.e.:

- superficial narcosis
- maximal reduction of bleeding and
- rapid postoperative recovery of the patient.

The method is based on the combination of methioplegium and halothane. Methioplegium or trimethiphan (Arfonad R) produces an almost complete disappearance of bleeding and a rather appreciable decrease of postoperative oedema. We have used this drug in combination with halothane in general anaesthesia and in combination with a barbiturate and diazepam (Valium R) in local anaesthesia.

Trimetaphan (Arfonad ^R) is a short acting ganglioplegic agent. Its most interesting effect is a preganglionic blockade. Postganglionic nerve conduction remains unchanged. This "transitory chemical sympathectomy", as Aboulker has called it, results in a general vasodilation.

The volume of the vascular bed is increased and the bloodpressure is lowered. As long as the bloodpressure remains above 50 cms of Hg the venous pressure remains almost unchanged. The precapillary sphincters are opened, the circulation is slowed down, but it remains sufficient. Because of the negative inotropic effect of the drug and the opening of the vascular bed, the bloodflow becomes laminar. Genot (1970) has shown this circulatory effect. The skin remains warm, pink and dry. Capillary flow is well visible. There is a slight decrease in coronary flow, but since peripheral resistance is abolished, the heartwork decreases and oxygen consumption is lowered. The result is a better cardiac function. Pulmonary ventilation is improved by decrease of pulmonary resistance. Glomerular filtration is enhanced as long as the bloodpressure remains above 80 mm of Hg. Below this level, filtration is almost absent, but this effect is easily reversible provided that the kidney-function is not impaired for some other reason.

Technique

Premedication. The evening before Nembutal (^R) is given orally or rectally. The following morning, 1½ hour before operation, a morphine derivate is given i.m. together with a vagolytic drug (Atropine).

Anaesthesia is induced by intravenous administration of a short acting barbiturate (Pentotal) up to 5-10 gr. per kg body weight. Intubation takes place after the injection of a short-acting curare. Then anaesthesia is maintained by means of a mixture of equal parts of O₂ and N₂O. Halothane is added up to a concentration of 1½-2%. Spontaneous respiration is resumed allowing the control of the depth of the anaesthesia.

Arfonad hypotension. Arfonad (^R) is then given in an i.v. drip in a dosage of 1-4 mgr. per minute. This dosage is sufficient to decrease the bloodpressure level several cms of Hg below preoperative level. If a higher dosage is given the bloodpressure level does not fall below a certain threshold but it will take a longer time to raise it to normal again. Before Arfonad (^R) is administered the patient's sensibility is tested.

A vial containing 250 mg of Afonad is diluted with 5 ml distilled water. Those 250 mg are again dituted in 250 ml of a 5% glucose and water solution. Thus 1 ml of the solution contains 1 mg of Arfonad. During the administration of Arfonad the bloodpressure is constantly being measured and recorded. Usually the desired level is reached within 5 minutes. Sometimes the bloodpressure fall is reached at once. The injection of a 30% glucose in water-solution together with a vasopressive drug such as Effortil will rapidly take care of the situation.

As soon as the bloodpressure has reached the 80-90 mm Hg level, the i.v. drip is slowed down. The bloodpressure can thus be maintained at a desired level without falling below a threshold. This threshold varies according to the patient.

Mostly a level between 60 and 70 mm Hg is maintained. The lower the blood-pressure the more time it takes to regain its normal level.

At the end of the operation, the i.v. drip is stopped. The bloodpressure remains at its lowest point during the next 10 minutes. It then raises slowly to a level lower than preoperatively. About 2 hours elapse before the bloodpressure becomes normal again. The delay is proportional to the duration of the operation and also to the depth of the bloodpressure fall.

One of the main advantages of Arfonad is that a slow decrease in bloodpressure may be obtained. Young people in general need a much higher dosage than older people, whose dosage has to be kept at a minimum. Patients with an elevated high bloodpressure need to be kept at at least 50% of their normal level (Razminski, 1960). Halothane potentiates methioplegium since it has an effect on peripheral vessels. Vasodilatation usually persists during the whole period Halothane is being given. Pech, Garcin and Cahier (1963) have showed that this technique is without danger. Kidney function remains undisturbed, the brain does not suffer provided the cardiovascular condition of the patient is normal. The method has also some draw-backs. Postoperative bleeding may occur if the blood-pressure rises too rapidly and if the 10-12 degrees head-up tilt is abandoned. It is most likely to occur if some antagonistic drug has been used because of too low a bloodpressure. Contraindications of the method are the usual contraindications of hypotensive anaesthesia such as: emphysema, cardiac or coronary insufficiency, previous myocardial infarction, diabetes mellitus, kidney function impairment etc. The hypotensive technique is not advisable in pregnancy, childhood and old age. A thorough physical examination with the usual laboratory test is of course always necessary. However there may still be some accidents. The one that is most frequently has been described by Aboulker et al. (1966). Along the skin overlying the vein used for the intravenous drip a phlyctenular reaction may occur up to 10 cm of length. The i.v. drip is then removed at once, but only after 2-3 cc of procaine 0,5% has been injected intravenously. The phlyctenular reaction will disappear in about one hour. This complication only occurs when a small superficial vein has been used for the drip. The needle can best be put into a large vein and ought to be washed out with saline or procaine solution before removing it.

Thrombotic indicents have never been noticed.

Overdosage of Arfonad (R) may occur when either the anaesthetist has not been careful enough or the patient's sensitivity has been underrated. If a collaps takes place a 30% glucose in watersolution with a vasopressive drug such as Effortil will then take care of the situation. Those incidents may happen if the patient has omitted to tell that he is taking antihypertensivic drugs or tranquilizers.

The method described has now been known for about 15 years. We must add that in case of Arfonad-administration we never use artificial respiration by means of a breathing machine. As blood is pulled in a lower part of the body hypotension and positive pressure on inspirations seems rather dangerous to us. There may be such a decrease in venous return that this may cause a cardiac collaps. We also

never use neuroleptic drugs together with Arfonad. Those drugs potentiate each other in such a way that hypotension may go out of control. To conclude we may say that hypotensive anaesthesia by means of a ganglioplegic drug is satisfying in most cases provided every care is taken by the anaesthetist. The technique gives a bloodless field and is rapidly reversible. There is noticeable decrease in post-operative oedema.

II. MECHANICAL HYPOTENSION

Anaesthesia is induced as described before. The patient is then intubated with a wired flexible rubber tube. The tubing is connected to the respirator. We are in favour of controlled respiration. Choffat and Picard (1970) showed in a recent paper that a patient breathing spontaneously has a higher PCO_2 as time goes on. The only way to keep PH, PCO_2 , $Sa O_2$ as near to normal as possible is to assist or control respiration.

The machine we use is a Manley respirator. Pressures and flows can be adjusted within certain limits, as can the relation inspiration-expiration. The inflated volume is given according to weight, age and height of the patient and controlled by means of a spirometer. Hypotension is thus obtained by correct adjustment of the breathing apparatus while the hypotensive effect of halothane is being taken advantage of.

Some authors use continuous positive pressure breathing to obtain hypotension. Because of the decreased cardiac output this method seems not advisable to us as we are not able to measure cardiac output as a routine. We therefore prefer to use the effect of intermittent positive-negative pressure breathing i.e. positive pressure on inspiration and negative pressure on expiration. The mean pressure ought to be around zero. Halothane concentration is strictly adjusted to the desired blood-pressure level, usually 60-70 mm of Hg.

LOCAL ANAESTHESIA

The use of general anaesthesia does not exclude the simultaneous use of local anaesthesia. The highly reflexive mucosa needs to be anaesthetized locally. This is obtained by means of cottonwool tampons, soaked in 5% xylocaine. After a few minutes these are removed and a few cc xylocaine 1%-adrenaline 1 : 100.000 are injected. It has been reported several times that adrenaline in combination with halothane may cause multifocal ventricular extrasystoles and sinusoidal tachycardia. Halothane alone however can in high dosage depress the myocardium and may be the cause of extrasystoles. Other authors (Sironi and Appiani, 1959; Casaer, 1961) did not report any incidents on combining adrenaline and halothane. We too used this combination several thousand times without any incident whatsoever. The adrenaline concentration never exceeded 1 : 100.000 however and the total dosage was not more than 10 cc at a time or 30 cc per hour. More important to as seems to be a good ventilation. Like others we think that CO_2 -retention is the real cause of trouble. In case of arytmia some authors recommend the injection of béta-blocking agents. We wonder if this does not mean adding

insult to injury. In our opinion stopping the halothane administration at once and ventilating the patient with pure oxygen is more advisable than administering another drug.

RÉSUMÉ

Les auteurs présentent deux techniques d'hypotension contrôlée, l'une pharmacologique, l'autre mécanique, permettant d'assurer la réduction du saignement au cours d'interventions rhinoplastiques.

L'hypotension pharmacologique est basée sur l'action ganglioplégique fugace de Trimetaphan (Arfonad^R) et la technique en est décrite.

L'hypotension mécanique est basée sur l'utilisation judicieuse d'un respirateur à volumes et débits réglables associée à l'action hypotensive propre du Fluothane. Le respirateur est réglé de telle façon que les pressions positives et négatives sont alternées réalisant une pression moyenne égale à 0.

Les deux techniques utilisées par deux anesthésistes différents, mais travaillant avec le même chirurgien, donnent une égale satisfaction. L'hématome et l'oedème post-opératoires sont peut être moins importants avec l'Arfonad, mais les résultats ultérieurs ne sont pas affectés.

ZUSAMMENFASSUNG

Bis vor kurzem wurde die Lokalanaesthetie als „ideal“ betrachtet. Jedoch, die Entwicklung der Allgemeinanaesthetie, deren Methoden und deren Vielfalt erlauben es sie mehr und mehr in der Nasenchirurgie anzuwenden.

Die Autoren beschreiben zwei verschiedene Methoden zur Erreichung der notwendigen Blutdrucksenkung. Zwei Anaesthetisten, mit demselben Chirurgen arbeitend, beschreiben zwei verschiedene Methoden zur Erreichung des selben Zieles. So wird ein Vergleich möglich.

Im Falle der zuerst beschriebenen Methode wird der Blutdruck mittels eines ganglioblockierenden Mittels gesenkt. Trimetaphan (Arfonad) ist das benützte Medikament. Die Technik, die spontane Ventilation u.a. zur Überwachung benützt, wird beschrieben.

Die zweite Methode, die mechanische Ventilation mit Hilfe eines Beatmungsapparates zur Voraussetzung hat, benützt die blutdrucksenkende Wirkung des Halothans.

Beide Methoden haben ungefähr das gleiche Ergebnis. Jedoch ist zu bemerken das im Falle des Trimetaphan der Blutdruck langsam nur die Normalwerte wieder erreicht nach beendigter Operation. Das postoperative Ödem und das Hämatom ist wesentlich geringer als bei der mechanischen Ventilation-Halothan Methode. Die Endresultate jedoch sind in beiden Fällen dieselben.

REFERENCES

1. Aboulker and Feuvrier, 1966: À propos de 1000 cas d'anesthésie générale avec hypotension provoquée en O.R.L., *Ann. Otolaryng.*, 83, 110-113.

2. Cahier, S. and Lacombe, S., 1962: Indications actuelles du Fluothane en O.R.L. *Anesth. et Analg.*, 19, 120-128.
3. Choffat, P. and Picard, J. M., 1970: Hypercapnie et modalités de la ventilation de l'opéré. *Anesth. Analg. Réan.*, 27, 861-870.
4. Genot, M., 1970: Le traitement actuel des dissections aortiques. Thèse Méd., Nancy, 102.
5. Pech, A., Garcin, M. and Cahier, S., 1963: Hypotension contrôlée par l'association methioplégium-fluothane. *Méd. et Hyg.*, 611, 611.
6. Radziminski, A., 1960: Traitement chirurgical des fibromes nasopharyngiens. *Ann. Otolaryng.*, 77, 574-583.

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