POSTURAL INSTILLATION

A METHOD OF INDUCING LOCAL ANÆSTHESIA IN THE NOSE

By A. J. MOFFETT, T/Major, R.A.M.C.

In the induction of anæsthesia for any operative procedure three cardinal principles obtain ; firstly that the surgeon should be enabled without mental or physical distress to the patient to perform such manipulations as he considers advisable, secondly that the necessary degree of anæsthesia should be induced without adding unduly to the immediate or remote risks of the operation, and thirdly that the induction should be by a method designed to give the least possible embarrassment to the operator. Unfortunately no single type of anæsthetic or even combination of anæsthetics fulfils completely these requirements, so that most operations are performed under conditions which are virtually a compromise between the surgeon, the anæsthetist and the patient. The type of operation to be performed, the circumstances in which it is undertaken, the skill and experience of the anæsthetist and surgeon, the condition of the patient and the temperaments of all three are factors which should be, and indeed usually are, considered when deciding upon a suitable anæsthetic.

The difficulties associated with intra nasal operations are largely due to the anatomical peculiarities of the nasal fossae and the paranasal sinuses. The narrowness of the introitus nasi, the complexity of the nasal cavities, the remarkable vascularity and sensitivity of the nasal mucous membrane and the important anatomical relations of the region make it necessary to use every possible means to decrease the difficulties and risks of operative interference. A general anæsthetic has the advantages of rendering the patient unconscious of the operation and the surroundings in which it is performed. It is considered to be quicker yet allows the surgeon to proceed at his leisure, and to a certain extent smooths any roughness in technique and touch. It may, however, be attended by the fear of the anæsthetic itself, the not infrequently unpleasant

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press

sequelae, in no way diminished in nasal cases by swallowed blood, and by the risks both during and after the operation which attend every general anæsthetic. Also, and this is the important factor in nasal operations, it increases the tendency to hæmorrhage. It does not seem to be possible by pre-operative treatment of the nose with cocaine adrenaline or both to obtain the bloodless field associated with local anæsthesia. None the less many surgeons prefer the handicap of hæmorrhage to the strain of working on a conscious person. This strain is imposed by the knowledge that any unexpected development in the progress of the operation may immediately be recognized by the patient as such, that the margin between complete success and complete failure with a local anæsthetic is a narrow one, and that an imperfect anæsthetic will result in pain no matter how skilful the surgeon nor how perfect the operative technique.

It is possible if sufficient cocaine is used to produce a deep degree of anæsthesia in the nose. Unfortunately the amount of cocaine required may also produce alarming or even fatal complications. The chastening articles by Emil Mayer[1, 2] on the toxic effects of local anæsthetics leave little doubt of the risks attending this type of anæsthesia which is generally assumed by the patient and sometimes by the practitioner to be harmless. There is a very considerable variation in the amount of cocaine used in different methods of inducing nasal anæsthesia and also in the patient's reaction to the drug. The latter variation can only be determined by experiment with each particular patient, but the former should be capable of accurate estimation.

The methods in general use in anæsthetizing the nose are :

1. Spraying the nose with a solution of cocaine. This method is generally used for diagnostic or minor therapeutic purposes.

2. Applying the anæsthetic to the surface of the nasal mucous membrane either by plegets of cotton wool soaked in a solution of cocaine, as an ointment, or by packing the nose with gauze wrung out fairly dry.

3. By producing a nerve block by the direct application of the cocaine to the nerves as they enter the nose.

Two or more of these methods may be combined and it is usual to add adrenaline to the solutions. In a normal nose the technique of inducing nasal anæsthesia described by

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press

Hewer[3] should always produce a complete anæsthesia with little risk of cocaine being swallowed. Unfortunately the presence of severe septal deviations or spurs, polypi or pus may make this impossible. It is not unusual to find deflections of the septum so severe that packing or painting of the nose or the introduction of loaded probes on the obstructed side is impossible : similarly the presence of polypi may prevent the loaded probes being placed in correct apposition with the nasal nerves or the spheno-palatine foramen, and will not allow adequate painting of the nasal mucous membrane to be carried out nor packing to be pushed into the depths of the nasal fossae.

It occurred to me that these difficulties would be overcome if the cocaine were run into the nose with the head in the dependent position and the solution washed over the nasal mucous membrane and the nerves as they entered the nose by placing the head in various attitudes. Modifications of the Lateral Head Low position appeared to offer a method by which this could be accomplished without pain and without the risk of the drug being swallowed, and of an accurate estimate of the amount of the drug used being made. The anæsthetic drug chosen was cocaine ; although it has many substitutes it has no peers. The problem of dose was first considered. It would probably not be unfair to suggest that although the strength of the solution used in the various methods already mentioned is always carefully checked, the actual amount of the drug employed is often unknown. In the method about to be described it was obvious that the unabsorbed portion of the cocaine could not be removed rapidly by the simple withdrawal of probes or packing if untoward symptoms developed. Also some of the solution would probably enter the sinuses whose absorptive properties were unknown. The dose by mouth[4] is $\frac{1}{8}$-$\frac{1}{4}$ grain but can be increased to a maximum dose of $\frac{3}{4}$ grain. Mayer[1, 2] considers that 1 grain to $1\frac{1}{2}$ grains may be used with safety in the nose. Logan Turner[5] considers that it is a good rule not to exceed 1 grain (but on a previous page he recommends packing the nose with gauze wrung out in 10 per cent. cocaine and adrenaline equal parts " as a rule two drachms of the solution will suffice ". That is 120 mins. of a 5 per cent. solution of cocaine or $5\frac{1}{2}$ grains). Thomson and Negus[6] suggest that 1 grain can be safely used as a 5 per cent. solution for a preliminary examination and thereafter stronger solutions and

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press

larger doses may be employed. The toxicity of cocaine appears to be greater for strong solutions. This accounts for the use of " snow " by drug addicts who wish to obtain the maximum effect with the minimum of outlay.[7] Alkaloids injected into the tissues, if retained at the site of injection by interference with the blood supply to the part are adsorbed to the tissue colloids and loose their general toxic effect.[8] For this reason weak solutions used with adrenaline are the safest. Solutions become more toxic and less anæsthetic with keeping,[6] but if used freshly prepared in 0·5 per cent. solutions of sod. bicarb. the anæsthetic property is stated to be enhanced and the toxic element reduced.[7] In my cases the strength of the solution originally used was 1 grain of cocaine hydrochloride to 120 mins. distilled water to which was added one-quarter of its volume of 1/1000 adrenaline hydrochloride. This solution was found to be too weak because the necessary quantity of cocaine was not absorbed by the nose. 90 mins. seems to be about the maximum amount of fluid which will be retained in the nose without an excess running from the nares or into the naso-pharynx when the patient is put in the appropriate operative position. The strength of the solutions was cautiously increased until finally a 3 per cent. solution in 0·5 per cent. solution of sod. bicarb. was chosen. This allows sufficient fluid to cover completely the nasal mucous membrane without exceeding the limits of safety with the amount of cocaine used. The cocaine solution is prepared on the morning of operation and coloured pink to prevent confusion with drugs likely to be injected.

To induce anæsthesia the technique is as follows. The vibrissae around the nostrils are clipped and the patient given a hypodermic injection of morphine tartrate $\frac{1}{4}$ grain one hour before the induction.

The Anæsthetic Mixture. For adult males (who comprised almost all the patients) 60 minims of a 3 per cent. solution of cocaine hydrochloride in 0·5 per cent. solution of sod. bicarb. is ample in all but the largest intranasal proceedings. (Excellent anæsthesia can generally be obtained with 40 minims. The largest amount so far used has been 80 minims.) To this quantity of solution is added one-quarter its volume (usually 15 minims) of 1/1000 solution of adrenaline hydrochloride.

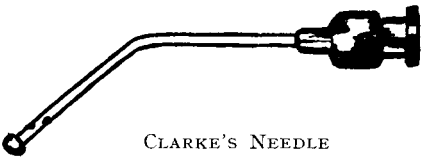
Position. The patient is now placed in the Lateral Head Low position described by Sidney Parkinson[9] as follows.

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press

Postural Instillation

" The patient is seated upon a cot, and beside him are placed one or more pillows. He is then bent down laterally so that his shoulder rests on the far edge of the pillow. The shoulder and the pillow act together as a fulcrum. The head is now bent downwards so as to be inverted in a strictly lateral position. The extent of inversion of the head will necessarily vary with the flexibility of the patient but 45° is probably adequate. The important fact is whatever the degree of inversion the cribriform plate marking the nasal roof is always dependent and level in this position." Placed thus the patient is quite comfortable, but for anæsthetic purposes he is lying not sitting, upon the couch or bed. In practice it is immaterial, but for purposes of description the left lateral position is the first assumed.

The Method of Instillation. About one-third of the anæsthetic mixture is drawn into a 2 c.c. hypodermic syringe to which is attached a blunt solid ended angled needle about 2 inches long and with lateral holes of the type illustrated.



CLARKE'S NEEDLE

The blunt end prevents accidental penetration of the nasal mucous membrane and consequent injection of the mixture into it. The nares are now cleansed with spirit. Two or three minims of the mixture are dropped on to the septum in the nostril which is uppermost, and into the little hollow formed by the nasal vestibule on the lower side. The nostrils are then gently squeezed against the septum so that the cocaine solution is pressed on to the mucous membrane of the septum, care being taken that none is squeezed out on to the face. Half the mixture remaining in the syringe is then instilled into each nostril, keeping the needle as close to the floor of the nose as possible. This is facilitated by the angle on the needle. The time is noted and the patient allowed to remain in this position for ten minutes. At the end of that period another third of the mixture is instilled in a similar manner, the patient is instructed to pinch his nostrils firmly to prevent the solution running out, and then rolls over on to

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press

his face without raising his head which is now supported in a level position by a pillow under his face. After ten minutes spent in this position the patient, still pinching his nostrils, resumes the lateral head low position this time upon the right side, and the remainder of the cocaine is instilled into the nostrils. A few sniffs with the nostrils pinched while in this position exhausts some of the air from the sinuses and allows small quantities of the solution to enter. This position is also maintained for ten minutes. At the end of this time the patient lies upon his back. Any unabsorbed solution falls to the back of the nasal fossae and completes the anæsthesia in that region. With the quantities advised it is rare for the patient to taste the cocaine at any time, proof that all the solution is used in anæsthetizing the nose and that none is swallowed, for swallowing is wasteful, dangerous and unpleasant.

For sub-mucous resection of the septum a small quantity of a 1 per cent. solution of procaine with 4 minims of 1/1000 sol. of adrenaline hydrochloride to the ounce is injected into the columella and anterior part of the floor of the nose. The epithelium in this area does not absorb the cocaine. Operative procedures are performed whenever possible in the recumbent position. With more extensive operations upon the sphenoids and ethmoids the patient is propped up by a special back rest so that any blood may run out of the nostrils. Upon the completion of the operation the patient is returned to the ward in the recumbent position. He is put to bed and immediately given a pint of hot sweet tea to accelerate the excretion of the cocaine by the kidneys[8] and to restore the fluid content lost by sweating.

The effect of this prolonged steeping of the nasal mucous membrane in the cocaine and adrenaline mixture is to allow it to penetrate into every nook and cranny of the nasal fossae and to produce a deep and lasting anæsthesia. This would appear to result from the action of the cocaine not only upon the nerve endings but also upon the nerve trunks as they enter the nose. The constrictive action upon the vessels is such that especially in the upper part of the nose the nasal mucous membrane is shrunk down upon the bony structures in a manner reminiscent of dissecting-room preparations. Operations are consequently bloodless and painless to a degree which I have been unable to obtain by any other method.

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press

Other advantages are:

1. The exact quantity of cocaine employed is known.
2. It is applied in dilute solutions.
3. The cocaine is applied in small quantities at a time so that any susceptibility (which is manifest immediately or not at all)[10] can be noted before a toxic dose is given.
4. A small quantity of cocaine is needed to produce the analgesia.
5. None of the solution is swallowed but all is utilized in the nose.
6. It is administered in a position most favourable for the prevention of untoward symptoms.
7. Its effectiveness is not lessened by anatomical variations in the nose.
8. The administration requires no particular skill.
9. The patient is spared unpleasant packing and probing of the nose.

I have now used this method of anæsthetizing the nose in forty cases for operations varying from sub-mucous resection of the septum to endo-nasal operations on the frontal sinuses and extensive procedures upon the ethmoid labyrinth and sphenoidal sinuses. A possible disadvantage is the difficulty which would be experienced in removing the mixture from the nose should alarming symptoms develop. It seems unlikely that this would occur with the dilute solutions and small quantity of cocaine used. So far no unpleasant reactions of any sort have been noted. The time necessary for the induction of the anæsthesia ensures that the cocaine has a proper opportunity to act. It should be regarded as a feature rather than a fault of the technique.

I am indebted to Major L. T. Clarke, R.A.M.C., for the design of the needle used and for his assistance in the administration of many of the anæsthetics.

REFERENCES

[1] MAYER, EMIL, "Anæsthesia in Nose and Throat Work," *J. Amer. Med. Ass.*, 1921, lxxvii, 17, October 22nd.

[2] MAYER, EMIL., "Toxic Effects following the Use of Local Anæsthetic," *J. Amer. Med, Ass.*, 1924 876, March 15th.

[3] HEWER, LANGTON, "Recent Advances in Anæsthesia and Analgesia," 1939.

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press

[4] MARTINDALE, "The Extra Pharmacopoeia."
[5] TURNER, A. LOGAN, "Diseases of the Nose, Throat and Ear," 1936.
[6] ST CLAIR THOMSON and NEGUS, "Diseases of the Nose and Throat," 1937.
[7] WATSON-WILLIAMS, E., "Cocaine and its Substitutes," *Brit. med. J.* 1923, ii, 1018, December 1st.
[8] DIXON'S "Manual of Pharmacology".
[9] PARKINSON, H. SIDNEY, "Non-Traumatic Ventilation of the Nose and Sinuses," *J. Laryng. and Otol.*, 1939, liv.
[10] BALLENGER, "Diseases of the Nose, Throat and Ear," 1938.

https://doi.org/10.1017/S0022215100006782 Published online by Cambridge University Press