**THE PLACE OF HALOTHANE IN OBSTETRICS**

**BY**

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**SUMMARY**

Experiences with halothane in obstetrics are described and discussed. Its specific action in relaxing uterine muscle is sometimes of value, as in external cephalic version, in operative delivery when manipulations are hindered by uterine hypertonicity, occasionally in manual removal of the placenta, and in acute inversion of the uterus. Halothane is rarely indicated in operations for the removal of retained products of conception.

It is emphasized that the relaxation obtained, unless carefully controlled, may fail to respond to ergometrine and oxytocic posterior pituitary extract. Halothane is not recommended for obstetrical anaesthesia except when uterine relaxation is needed.

The potency of halothane as a relaxant of the pregnant uterus has been amply attested to following both clinical observation (MacKay, 1957; Russell, 1958; Albert et al., 1959) and tocodynamometric studies (Embrey, Garrett and Pryer, 1958; Vasicka and Kretchmer, 1961). The anaesthetist who uses this agent, therefore, must be prepared to consider not only the general effects of the drug on both mother and infant, but also its specific local action—an attribute shared only by ether and chloroform.

If one accepts the principle that advances in the standards of anaesthesia will come only from the educated use of each drug for a specific purpose and the avoidance of agents likely to give rise to more harm than benefit to the individual patient, then the place of halothane in the practice of obstetric anaesthesia is well defined. In this class of patient the anaesthesia produced by halothane is of secondary importance; attention must be directed to the primary response, namely relaxation of the uterus.

**EXTERNAL CEPHALIC VERSION**

Although external cephalic version is undertaken in most obstetric centres, there is considerable divergence of opinion regarding the advisability of performing the operation with the aid of anaesthesia. This is a purely obstetric problem and needs no further discussion here. If, however, the obstetrician, having attempted a version on his unaesthetized patient, requests the assistance of an anaesthetist, the latter must be prepared to provide maximum relaxation of the uterus. Failure to turn a breech in the unaesthetized patient results from one or more of three factors: mechanical; a tense patient who is unwilling to relax her abdominal muscles; a "tight" uterus.

Any technique of anaesthesia will eliminate the difficulty attributable to a tense patient. If the breech is deeply engaged in the pelvis, or the foetal head is firmly entrenched in one horn of a bicornuate uterus, the difficulties of version may be too great even when full uterine relaxation is obtained, and prolonged and excessive attempts at manipulation may prove disastrous for the foetus.

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A "tight" uterus may be indicative of irritability of uterine muscle, accentuated or provoked by repeated manipulations without anaesthesia, or of a remarkably small amount of liquor amnii, resulting in the close application of the uterus to the foetal

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parts. It is in this class of case that relaxation of the uterus is specifically desired.

Version is a non-emergency operation, and it is unwarrantable for the mother to be placed unnecessarily at risk by it. If the patient has taken food or fluid during the 4 to 6 hours prior to the proposed time of anaesthesia, the operation should unhesitatingly be postponed.

It is the practice in this Unit for patients who are booked for external version and for whom anaesthesia is deemed likely, to be requested to attend the hospital at mid-morning and to avoid taking anything by mouth from bedtime the previous night. Half an hour before the proposed time of operation the mother is given atropine 0.6 mg by intramuscular injection. External version is attempted with the patient awake (this is not infrequently successful, though previous attempts in the antenatal clinic had failed). If success does not follow, the patient is brought to the anaesthetic room of the labour ward theatre. Anaesthesia is induced with a 2.5 per cent solution of thiopentone, the average dose used being about 350 mg; then from a Boyle machine, using a Magill semi-open system, with a flow of oxygen 5 l./min and nitrous oxide 5 l./min, halothane is administered. A Fluotec is not used, and is not really necessary, as the operation is so short. The halothane is kept in the appropriate bottle on the machine and the lever is pushed round about half-way to give a vapour concentration of approximately 2 per cent.

Within 3 to 4 minutes conditions are suitable for the operation to be attempted. The foetal heart is auscultated and the manipulation begins. As soon as the foetal head has been guided to the pelvic brim or, if the attempt is unsuccessful, the moment that defeat is acknowledged, both the halothane and the nitrous oxide are discontinued, a No. 3 black Guedel-type airway is inserted, oxygen alone is administered for about a minute and the patient is allowed to awaken. Return to consciousness invariably occurs within 5 minutes of the end of operation. The foetal heart is rechecked, evidence of vaginal bleeding sought, and the patient is then returned to bed and, if the obstetric condition permits, she is allowed to go home an hour or two later.

In the course of twelve months, fifty-five patients have been anaesthetized in the Unit by the writer, using the method described. No significance can be attached to the "success rate" of the operation, as this depends primarily upon the obstetrician's selection of patients.

Furthermore, as Neely (1961) has pointed out, the incidence of failed version is higher in the primiparous patient. However, failure to produce uterine relaxation was never, according to the evidence of the obstetricians, the factor leading to abandonment of the operation in the series reported here. On the contrary, the profound relaxation obtained made it necessary to emphasize the importance of performing the version very gently.

There has been one perinatal death attributable to external cephalic version performed under anaesthesia.

CASE 2603/60. This was a multiparous patient at 34 weeks gestation. Version was performed successfully, without excessive force having been exerted, but was followed by the loss of 600–700 ml of blood per vaginam. The patient became profoundly shocked and blood was rapidly administered. When the third pint of blood was being transfused the patient's condition was satisfactory but the foetal heart rate was indicative of foetal distress. Caesarean section was performed and a Type I placenta praevia was noted. The infant was in poor condition at delivery and died aged 9 hours. The pathologist assigned the cause of death to prematurity and atelectasis.

OPERATIVE DELIVERY

Under conditions of modern obstetric practice, it is extremely difficult to imagine any situation in which halothane is required as an item of the routine technique of general anaesthesia for forceps delivery. The only exception is the case of a mid-cavity forceps delivery undertaken at the end of a long dysfunctional labour, when a constriction ring is discovered after the operation has started.

Similarly, enhanced uterine relaxation is rarely desired during Caesarean section. A constriction ring or a tightly moulded uterus (as, for instance, in the presence of a transverse lie) might occasionally cause difficulty during extraction of the infant.

CASE 3430/60. This is the only section for which halothane was given by the writer. The mother, who had had a previous Caesarean section, was at 38 weeks gestation, and had had a very slight accidental haemorrhage 2 days before operation. When the abdomen was opened the membranes were found to be bulging through the uterine scar, the myometrium was extremely irritable, and the obstetrician found great difficulty in entering the uterus and in extracting the infant. The standard technique of anaesthesia described elsewhere was in use (Crawford, 1962).
Halothane was poured into the appropriate bottle on the Boyle machine, the lever was pushed to the "Full on" position and hyperventilation with 5 litres of oxygen per minute was continued. The uterus was seen to relax in 90 seconds and delivery of the infant was rapidly effected. The halothane administration was discontinued after the infant's head had been delivered and no difficulty with uterine contraction ensued. The I-D interval was 11 minutes and the infant's A-C score was 8/8 (Crawford, 1962).

Halothane is likely to be of service more frequently in cases of breech extraction. Should the intra-uterine manipulation be impeded by hypertonicity of the uterus, then halothane may be used to assist the obstetric manoeuvres. Under such circumstances, if the patient is not already anaesthetized, induction of anaesthesia should be effected with thiopentone. Endotracheal intubation is, of course, strongly to be recommended in these cases. The halothane is administered solely for its relaxant property, and the relaxation will be sought over a very short period. If halothane were used for induction of anaesthesia, the time factor involved would be likely to lead to a dangerous tissue accumulation of the drug; adequate excretion of the agent following completion of the obstetric manoeuvre would be delayed and inadequate uterine contraction with consequent postpartum haemorrhage would threaten. Administration of halothane should be started only when the patient is anaesthetized and should cease as soon as enhanced uterine relaxation is no longer required. As Embrey, Garrett and Pryer (1958) and Vasicka and Kretchmer (1961) have shown, the response of the uterus to halothane is extremely rapid, as is its response to withdrawal of the drug, but the latter will, of course, depend upon the duration of halothane administration preceding the withdrawal.

Recourse to oxytocic agents is of little avail in the face of profound uterine relaxation produced by halothane. Albert and his co-workers (1959) have drawn attention to the ineffectualness of Pitocin (oxytocic posterior pituitary extract) in this situation, and Russell (1958) has remarked on the similar failure of ergometrine to produce uterine contraction until the halothane administration had ceased.

MANUAL REMOVAL OF RETAINED PLACENTA

The obstetrician occasionally finds it difficult to insert his hand into the uterus to deliver a retained placenta. In many of these cases, frequent attempts to express the placenta, or repeated administrations of ergometrine, have resulted in the formation of a constriction ring or in tight contraction of the cervix. In these cases, halothane may be used with advantage to provide relaxation of the uterus. However, as in the cases of operative delivery, the agent should be used as a uterine relaxant and not as a means of providing anaesthesia. Once more, anaesthesia should be induced with thiopentone—again, intubation is to be recommended—and halothane administration should cease the moment that the operator's hand emerges with the placenta from the uterine cavity. It is preferable to have these patients placed in the lithotomy position before the induction of anaesthesia and to encourage the obstetrician to proceed with the catheterization and preparation as soon as the patient is satisfactorily anaesthetized. During the three or four minutes of preparation, uterine relaxation will have been achieved. Ergometrine will be given intravenously as soon as the placenta and membranes have been removed, but the obstetrician should be advised to keep the uterus under bi-manual control during the two or three minutes that it takes for the halothane-induced relaxation to be reversed. If it is necessary to continue the anaesthetic to allow a perineal repair to be carried out, then it is strongly urged that a maintenance agent other than halothane be used for this part of the operation.

During the year under review, twenty-seven patients have been anaesthetized by the writer for a manual removal of placenta. On six of these occasions the technique of hypoaesthesia (Crawford, 1959), using a mixture of pethidine, levallorphan and promethazine, was successfully employed. In the remaining twenty-one cases the method described above was used. Little effort was made to select cases, but on the whole the thiopentone-halothane technique was preferred if considerable effort had been made to express the placenta, or if more than one dose of ergometrine had been given to the mother. In “flying squad” cases, when the prospects of vomiting and regurgitation were feared, hypoaesthesia was preferred.

ACUTE INVERSION OF THE UTERUS

In this uncommon condition, uterine relaxation might be called for if prolonged inversion has re-
suited in the formation of a constriction ring proximal to the congested fundus.

Of the two patients with uterine inversion who were encountered during the year under review, one, who had been diagnosed as having a retained portion of placenta, was anaesthetized with thiopentone and halothane. Replacement of the uterus was easily managed, the halothane was withdrawn and no difficulty with contraction or haemorrhage resulted. The second patient was given a thiopentone, nitrous oxide and oxygen sequence and again replacement of the uterus was easily carried out, though repeated “dimpling” of the fundus was a cause of considerable worry for some time. Had the tendency to re-inversion persisted, halothane would possibly have been administered in an effort to give the “irritable” myometrium time to settle.

EVACUATION OF RETAINED PRODUCTS OF CONCEPTION

Although halothane might be considered as being an admirable agent in cases of diagnostic curettage, its unfettered use cannot be advocated for curettage of a pregnant uterus. The longer the period of gestation prior to abortion, the more likely is it that the use of halothane will lead to unsatisfactory uterine contraction and hence to additional haemorrhage. For the very small proportion of cases in which uterine relaxation is required, the technique of anaesthesia should follow closely that described for manual removal of the placenta; after induction with some other agent, such as thiopentone, halothane should be administered only to aid the dilatation of a tightly constricted cervix and, as soon as curettage is started, the halothane should be withdrawn to ensure that the subsequently administered ergometrine will be able to exert its maximum possible effect.

DISCUSSION

It is undoubtedly true that anaesthetists will continue “to get away with” the indiscriminate use of halothane in obstetric cases. It is the practice in most hospitals for the responsibility for obstetric anaesthesia to be shared by the entire anaesthetic department and, memories being short and observation rarely acute, little opportunity arises for individual assessment of significant results. It is usually the function of residents in anaesthesia and gynaecology to treat patients who have aborted, and here inexperience is likely to encourage perseverance with faulty techniques.

There have been few published reports in which the routine use of halothane prior to obstetric delivery has been encouraged. Sheridan and Robson (1959) state that they use halothane for induction of anaesthesia for Caesarean section, adding that they discontinue its sustained administration as soon as the infant has been delivered, thereafter maintaining anaesthesia with a mixture of nitrous oxide and oxygen (in the proportion of 7:2) plus intermittent doses of halothane. They claim to have noted no significant increase in post-partum haemorrhage referable to the halothane.

Brown and Woods (1958) in reporting on the use of halothane for sixteen Caesarean sections, claim that “uterine contraction and retraction are not affected”.

Despite these reports, however, it would seem advisable to discourage the use of halothane as an anaesthetic agent for the obstetric patient. It appears much more rational, and far safer for the patient, to regard the drug as being primarily a uterine muscle relaxant, and to reserve its employment for cases of external cephalic version and for those phases of operation during which intra-uterine manipulation, or the removal of the placenta, demand greater ease of accessibility to the uterine cavity.

REFERENCES


**SOMMAIRE**

Des expériences avec l'halothane en obstétrique sont décrites et débattues par l'auteur. Son action spécifique de relâchement du muscle utérin peut parfois être de valeur, p.ex. lors de césions céréphales externes, d'accouchement opératif, quand les manipulations sont entravées par l'hypertonie utérine, et à l'occasion, lors du détachement manuel du placenta et lors de l'inversion aigue de l'utérus. L'halothane n'est que rarement indiqué lors d'opérations en vue de l'élimination de produits rétention d'une gestation. Il faut mettre l'accent sur le fait que le relâchement obtenu,—à moins d'être très prudemment contrôlé—peut manquer de répondre à l'ergométrine et à l'extrait oxytocique posthypophysaire. L'halothane n'est pas recommandable pour l'anesthésie obstétrique sauf si l'on a besoin de relâchement utérin.

**ZUSAMMENFASSUNG**


Hervorgehoben wird, daß die erzielte Relaxation—es sei denn, daß sie sorgfältig kontrolliert wird—auf Ergometrin und wehenfördernder Hypophyseenhinterlappensubstanz nicht anspricht. Das Halothan ist für geburtshilfliche Anästhesiewecke nicht zu empfehlen außer für den Fall, daß die Erschaffung der Gebärmutter vonnöten ist.

**BOOK REVIEW**


This book comprises the proceedings of an international symposium held in the spring of 1960. It is primarily concerned with the inhalation of toxic particles and vapours and does not directly deal with anaesthetic vapours. There appear to have been no anaesthetists amongst the 252 participants. Although much of the symposium was concerned with solid particles, it included a number of subjects of interest to the anaesthetist. Unfortunately the book has undergone a long gestation period and much of the material may now be found in journals if not in textbooks.

The first section deals with anatomy and physiology and commences with an extremely readable review of Dr. West's studies on the extent of laminar flow in the human respiratory tract. One may also enjoy Mr. Pattle's account of his now classical studies of the lining complex of the alveoli. It appears that the surface tension of this layer may be the principal factor preventing atelectasis and it has shown to be deficient in "hyaline membrane disease". In the same section Dr. Davies gives an excellent summary of the structure and dimensions of the respiratory tract. A useful table lists the mean diameter, length, cross-sectional area, volume and number of each component from the mouth to the alveoli.

The second section is concerned with factors governing particle retention. The contributions in this section would be particularly valuable to anaesthetists who are interested in the possibility of administering drugs in aqueous solution by aerosol. The subject is covered in considerable detail and a study from Israel demonstrates the increased particle retention during general anaesthesia. Pneumococci were used as tracers but the increased recovery from the lungs of the anaesthetized subjects is not without direct interest.

There is a contribution from Drs. Hatch and Swann on the absorption and storage of vapours and gases in relation to cardiorespiratory performance. After considering theoretical aspects, they report studies based on end-tidal analysis of ether, acetylene and carbon monoxide. Although they consider only two or three body storage compartments, their studies are nevertheless of considerable interest. Finally, Dr. Dalhamm describes a method of studying the cilia in living animals, which would appear to be suitable for investigation of the effect of anaesthesia on ciliary action. The remaining thirty-two contributions are not of immediate interest to the anaesthetist.

The book is well produced and contains a useful author index. However, the brief subject index does not do justice to the wealth of information within the book. Some papers are in French and German but carry an English summary.

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