

PERCUTANEOUS AMNIOTOMY AS A METHOD OF INDUCTION OF LABOUR IN ABNORMAL PREGNANCY

by

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Percutaneous amniotomy, followed by injection of hypertonic saline or glucose as a method of induction of labour, has been found useful in: (1) vesicular mole; (2) intrauterine death; (3) missed abortion; (4) therapeutic abortion; (5) lethal foetal malformations with or without hydramnios.

Vaginal amniotomy with administration of various substances, such as, formalin and soaps, is an age-old method of induction of labour. But it was given up for its complications like sepsis and haemorrhage. The new method of percutaneous amniotomy, followed by injection of hypertonic saline in the uterine cavity, was carried out by Stamm and De Watteville in 1954 and injection of 5 per cent glucose by Brosset in 1958.

In 1961 Csapo published a work on the mechanism of onset of labour. He propounded the theory of progesterone block which will be referred to later.

In 1962 Bengtson gave a theoretical basis to this method by hormone excretion studies in 13 cases of missed

abortion. At the same time Cassmer studied hormone excretion after foetal death. He cut the umbilical cord in a case of therapeutic abortion. As a result the foetus died but the placenta continued functioning. He showed that 3 days after foetal death the urinary oestrogens had fallen to 30 per cent of their previous values and oestrogen from the placenta had disappeared. On the other hand, pregnanediol excretion had fallen much less within 3 days after foetal death and the output was still 87 per cent of the previous value. This indicates that, if the foetus dies before the placenta, the production of oestrogen ceases before that of progesterone. However, when the foetus and the placenta die simultaneously, as in saline induced therapeutic abortion, the placental production of oestrogen and progesterone falls rapidly and simultaneously.

Csapo, in his work on the mechanism of onset of labour, found that myometrial activity varied directly according to the ratio V/PM where 'V' stands for uterine volume and 'PM' for progesterone content of the myometrium.

In the case of missed abortion, the retention of dead foetus is facilitated by reduction in the volume of the uterus. The smaller the volume the lesser the amount of progesterone re-

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quired to maintain the pregnancy. The myometrial activity can be triggered by increase in the volume of the uterus, or decrease in the progesterone content of the myometrium or both.

He has also found that in human beings the placental progesterone had a local inhibiting action on the myometrium. The activity of myometrium and its response to oxytocics depends on the ratio of non-placental to placental uterine surface. Thus the increase in the volume of the uterus can act in 3 ways (i) changing the ratio of non-placental to placental uterine surface, (ii) increasing the excitability by stretching the muscle fibres and (iii) increasing the tension in the uterus.

Thus Csapo and Bengtson have shown that injection of hypertonic saline into the amniotic cavity for therapeutic abortion results in:

- (1) Degenerative changes in the syncytio-trophoblast;
- (2) Decrease in placental and systemic blood progesterone;
- (3) Rise in spontaneous active amniotic pressure;
- (4) Increase in the oxytocin sensitivity of the uterus;
- (5) Stimulation of labour like uterine activity within 24 hours;
- (6) Terminating the pregnancy in 33 hours.

By injecting progesterone in the myometrium they were able to arrest the saline-induced abortions, establishing the theory of progesterone block.

Inspired by these studies, we carried out percutaneous amniotomy

with injection of hypertonic saline to induce labour in abnormal pregnancy.

Method and Material

During the period of March '62 to January '65, percutaneous amniotomy, with injection of hypertonic saline or glucose, was used in 30 cases to induce labour or abortion at K. E. M. Hospital, the total number of confinements during the same period being 12,510, giving the incidence of 1 in 417.

The indications for induction are given in Table I.

TABLE I
Indications

	No. of cases
Vesicular mole	12
Intrauterine death	7
Missed abortion	7
Therapeutic abortion	2
Anencephaly with hydramnios	2
Total	30

It will be noticed that the maximum number of cases was those of vesicular mole.

Criteria for selection of cases

(1) Uterus should be at least 16 weeks' size so that it is easily accessible; but if it is smaller, then one has to do vaginal injection through the posterior fornix as was done in 2 cases in this series.

(2) The diagnosis of missed abortion, intrauterine death, foetal lethal anomaly and vesicular mole should be established beyond doubt by clinical, laboratory and radiological investigations.

(3) Cervix should be unripe, that is, thick and internal os should be closed. This is necessary to exclude spontaneous attempt at abortion.

The following investigations were carried out before the amniotomy was performed:

- (a) Routine urine and haemoglobin;
- (b) Bleeding and clotting time to exclude hypofibrinogenemia;
- (c) Blood grouping and cross matching.

Procedure

Usual preoperative preparation was carried out, 1/100 gr. of atropine with 100 mgm. of pethidine was given half an hour before the induction. Plain rubber catheter was passed into the bladder and kept in place. Fundus was palpated and 1 per cent novocaine was infiltrated into the skin and subcutaneous tissues, about 2 fingers below the level of the fundus in the midline. A small nick of about 1/4 inch was made in the skin and subcutaneous tissues. The uterus was fixed in the midline by an assistant and then the paracentesis trocar and cannula was introduced into the uterus through the nick. The trocar was removed and a long maleable cannula was passed through the outer cannula into the amniotic cavity. This long cannula was fitted with a bivalve connection and amniotic fluid was aspirated. Aspiration was done till no more fluid came out; about 70 to 100 cc. were aspirated except in cases of hydramnios where more fluid could be aspirated, and no fluid could be aspirated in vesicular mole. Then 25 per cent hypertonic saline was injected into the amniotic

cavity; about 50 to 100 cc. more than the amount withdrawn from the uterus and till the uterus was felt to become tense, both the cannulae were removed and one skin stitch was inserted. In 5 cases, instead of the cannula, a lumbar puncture needle was used where the uterus was of 5 months or more in size with intrauterine death, missed abortion or hydramnios. Also in these cases no nick was made in the skin. In vesicular mole one should use a cannula, otherwise it is difficult to push the fluid in and there is also the likelihood of saline entering the vessels.

In cases of toxæmia, hypertension and cardiac disease it is better to use 50 per cent glucose rather than hypertonic saline. In 3 cases in the present series — 2 of toxæmia and 1 of mitral stenosis — 50 per cent glucose was used.

In the postoperative period patients were given antibiotics as a routine and pulse was kept 1/2 hrly. for 4 hours. All were discharged by the 8th day, except one, who aborted on the 7th day. It was a case of dead foetus with cervical fibroid.

The period of amenorrhoea in cases of intrauterine death varied from 24 to 40 weeks, with the size of the uterus varying from 20 to 38 weeks, indicating reduction in size except in one case where it corresponded to the period of amenorrhoea.

In missed abortion this period ranged from 18 to 28 weeks with the size of the uterus varying from 12 to 24 weeks. It was reduced in all cases.

In vesicular mole the uterine size was bigger in all except one where

amenorrhoea was of 20 weeks and the size was 16 weeks.

The amount of fluid removed from the uterus ranged from nil in vesicular mole to 450 cc. in hydramnios. The amount of 25 per cent saline injected ranged from 14 to 400 cc.

This method was successful in all cases and the time interval between injection and abortion varied in various conditions as seen from Table II.

TABLE II
*Time Interval between Injection
and Abortion*

Vesicular mole	10½ hrs.	to	48 hrs.
Intra-uterine death	6½ hrs.	to	46 hrs.
Missed abortion	8 hrs.	to	48 hrs.
Therapeutic abortion	24 hrs.	to	60 hrs.
Anencephaly	12 hrs.	to	30 hrs.

The average of all the cases comes to 29.3 hrs. In 2 cases of intrauterine death pitocin drip was given for 3 successive days prior to saline injection without any effect, indicating that this method works where pitocin fails.

Complications

The complications which are likely to occur during the injection of saline are headache, thirst, paraesthesia, haemolysis and rise in blood pressure. These are likely to be due to hypertonic saline from the uterus passing into the circulation and producing osmotic changes and increased sodium content. These can be avoided by taking proper care while injecting and also by not injecting fluid in excess. In 2 cases of missed abortion the blood pressure had increased by 20 mm. systolic, and 10 mm. diastolic, with increase in pulse rate.

Further, the polyethylene tube may break inside or get kinked. This will make it difficult to inject the saline. In the first case of this series, a case of intra-uterine death following accidental haemorrhage, after the saline was injected the tube was being withdrawn when it broke inside. Luckily, however, on the next day when she delivered the tube came out with the baby.

Postoperative complications which are likely to occur are amniotic fluid embolism, gas gangrene, fever, infection in the uterus or peritoneum. In none of the cases of the series did any of these complications develop. Only in one case there was fever from the third day of injection but that was due to typhoid. Thus these complications can be prevented by taking proper precautions. These are:

- (i) Not injecting saline where membranes are leaking.
- (ii) Proper injection of saline.
- (iii) Antibiotics in the postoperative period.

Result

This method was 100 per cent effective in this small series.

Gorm Wagner *et al.*, reported 330 cases of amniotomy with a success rate of 89 per cent.

The other advantages of this method are:

- (i) It is a simple and safe method.
- (ii) It does not require elaborate instruments.
- (iii) It does not require anaesthesia except local infiltration.
- (iv) Blood loss is minimal.
- (v) The uncomfortable feeling

which occurs in pitocin drip which goes on for hours is avoided.

(vi) Hysterotomy is avoided in big uteri where pitocin drip fails as also in vesicular mole which is difficult to evacuate, when six months' size and the os is closed. Thus it avoids a scar in the uterus.

(vii) Morbidity is much less as compared to other methods.

Thus percutaneous amniotomy is a better method of induction of uterine contractions in abnormal pregnancy where the foetus is dead or abnormal. It will also be a good method for evacuation of vesicular mole where the cervix is thick and closed.

Summary

(1) Percutaneous amniotomy was used in 28 cases and vaginal amniotomy in 2 cases for induction.

(2) Besides the routine indications, it was used also in cases of vesicular mole.

(3) It was effective in all the cases.

(4) Complications during the injections were rise in blood pressure in 2 cases.

(5) Postoperative complications were nil.

(6) It is a better method of induction as compared to others.

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