

EXPERIENCE WITH VACUUM-ASPIRATION IN ARTIFICIAL INTERRUPTION OF EARLY PREGNANCY

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For the artificial termination of pregnancy, for more than 100 years, the same surgical procedure has been used which involves a relatively great hazard of damage to the uterine wall by the instruments. Another, even more frequent, hazard is ruptures in the musculature which develop during dilatation of the cervical canal to the required width of 15-18 mm.

Only ten years ago suction was first applied to empty the uterine cavity in artificial abortions (Zubeev 1957, Tsaj-Kuang-Tsung 1958, Melks 1960). Information on the new method is so far scarce (Macpanova 1963, Bruchác 1964, Vojta 1964, 1965, Chalupa 1964, Vladov *et al* 1965 and others). It is maintained that the new method renders it possible to evacuate the uterus within a shorter time, with only slight dilatation of the cervical canal, a slight blood loss and a small hazard of uterine damage.

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Received for publication on 24-3-67.

In our country the method of vacuum-aspiration was introduced in 1963. Because the necessary equipment was not produced, we designed our own apparatus (Vojta, Herman 1965) which became the model for subsequent manufacture. In the present report experience with the termination of pregnancy in 350 women of different ages and parity, in different stages of pregnancies, where the termination was granted according to valid laws, is submitted. It answers some questions pertaining to the technique of the operation, so that the latter may have the advantages which are discussed.

Mode of action

The sudden decrease of intrauterine pressure to 0.4-0.6 atmospheres at the lower pole of the human ovum causes a diminution in the size of the uterus, and this diminution proceeds as a contractory wave from the fundus to the isthmus uteri (observation from a slow film in the course of laparotomy, Bruchác 1964). Shortly afterwards the membranes rupture and at first amniotic fluid is aspirated. Subsequent action of the negative pressure gradually causes separation of the placenta and c

cidua. Embryos with a crown-rump length of less than 2 cm are destroyed and their parts become suspended in the amniotic fluid. From larger fetuses we often find only the extremities, spine and skull bones. The main mass of placental tissue remains in toto. In pregnancies of more than 12 weeks the placental septa adhere firmly to the uterine wall and render aspiration of the whole placenta more difficult.

Separation of the decidua is achieved in most pregnancies by moving the aspiration cannula similarly as in curettage from the fundus to the isthmus. We obtain strips of the decidua which can be assembled to form a cast of the uterine cavity (Fig. 1). After evacuation of the uterus the vacuum can act only in a small area surrounding the end of the cannula, while the uterine musculature contracts and the walls of the uterine cavity are in contact.

Results

Technique of vacuum-aspiration.

Different models of apparatuses were published (Cernucha 1963, Bruchác 1964, Chalupa 1964, Vojta 1965, Vladov *et al* 1965), therefore I shall deal only with the important parts of the apparatus for vacuum-aspiration (Fig. 2, 2a).

In artificial termination of pregnancy by vacuum-aspiration the following conditions are important from the technical aspect: 1. Selection of a cannula with suitable lumen, depending on stage of pregnancy. 2. Sufficient negative pressure in the system (0.6-0.8 atm.) and an opportunity to change it. 3. A suitable opening at the end of the cannula.

4. The possibility to observe parts of the embryo and placenta when passing through the cannula.

Dilatation of the cervix. The basic principle in artificial termination of pregnancy is to use the least possible dilatation of the cervical canal to reduce the hazard of damage to the cervical musculature. We found that for the interruption of pregnancies of 6-12 weeks menstrual age cannulae with a diameter of 9, 11 and 13 mm suffice. For dilatation of the cervical canal we use a Hegar dilator 0.5 mm wider.

When deciding what cannula to apply, we use as a basis data on the duration of amenorrhoea and compare them with the size of the uterus assessed by palpation and the length of the uterine cavity by a hysterometer. Despite the fact that sometimes the data on the duration of amenorrhoea are inaccurate, they are usually sufficient as a guide for the required dilatation (Table I). Especially in primigravidae we attempt, as apparent from our group, to perform the operation with a minimum dilatation.

Possibilities of vacuum-aspiration.

It may be surprising that it proved possible to terminate pregnancies above 12 weeks of duration relatively frequently. Because the criterion of amenorrhoea is not always reliable, we compared the possibilities of vacuum-aspiration with the size of the foetus (Table II). Our findings confirm that it is possible to obtain with a cannula 9 mm in diameter fetuses with a body length of 8-10 cm. The operation in these instances takes, of course, longer and is as-

TABLE I

Dilatation of cervical canal related to the length of amenorrhoea in women admitted to interruption of pregnancy by means of vacuum-aspiration

Duration of amenorrhoea days	Dilatation of cervical canal						Total
	-9, 5 mm		-11, 5 mm.		-13, 5 mm.		
	para-0	para-1-M	para-0	para 1-M	para-0	para 1-M	
-56	6	6	3	9	—	2	26
-70	21	32	13	64	—	4	134
-84	11	18	22	57	1	17	126
-98	2	1	18	19	1	10	51
-98	—	—	1	4	1	3	9
?	—	—	—	2	—	2	4
Total	40	57	57	155	3	39	350

TABLE II

Dilatation of cervical canal related to the body-length of fetuses deriving from interruption of pregnancy by means of vacuum-aspiration

Length of fetus	dilatation of cervical canal			Total
	-9, 5 mm	-11, 5 mm	-13, 5 mm	
Not found	39	42	4	85
- 2 cm	4	23	2	29
3 - 4 cm	15	38	3	56
5 - 7 cm	17	37	9	63
8 - 9 cm	2	20	5	27
10 cm -	2	21	17	40
Total	79	181	40	300

sociated with a greater loss of blood than usually.

Our analysis was based on the comparison of recovered parts of the extremities, skeleton, spine of fetuses and their length with the bodylength of Jirásek's collection of intact fetuses obtained in artificially induced abortions using Uher's and Jirásek's method (1964).

Conditions of operation and its duration. The evacuation of the uterus in early pregnancies up to 8

weeks takes 20-60 seconds. In pregnancies of older standing it usually does not take more than 2-4 minutes. The time of operation depends to a considerable extent on the negative pressure applied. Some authors recommend to use a vacuum of 0.4-0.6 atm. (Melks 1962, Cernucha 1963, Bruchác 1964, Chalupa 1965. We have found that suction with 0.8-1.0 atmosphere does not cause damage to the uterine wall, is not associated with complications and is much shorter (Table III).

TABLE III
Duration of Vacuum-aspiration and its relationship to stage of pregnancy

Weeks pregnant group	Duration of vacuum-aspiration					Total
	-30 sec.	-60 sec.	-90 sec.	-120 sec.	-4 min.	
5 - 8 weeks	24	14	2	—	—	40
9 - 10 weeks	8	7	10	5	1	31
11 - 14 weeks	3	8	10	5	3	29

Cannula. There are many types of cannulae which differ as to the material from which they are made and also by the localisation, shape and size of the opening at the end of the cannula. So far, most frequently, metal cannulae are used. Their great disadvantage is that we cannot control, during vacuum-aspiration, whether and which parts of foetus were already removed from uterus. We ourselves use cannulae from

relatively large opening (Vojta, Fig. 3).

Failure of method. As failures of the method we can reckon those cases where it does not prove possible to evacuate the uterine cavity completely and where residue remains. In our cases failures were not recorded in any terminations of pregnancy under 10 weeks' duration. In few cases of later pregnancies (Table IV)

TABLE IV
Failure of method

Case No.	Age	Parity	Amenorrhoea, duration of	Body-length of foetus	Hegar Dilator No.	Remarks
1.	19	0/1	94 days	10 cm	10	Residue
2.	44	6/7	102 days	12 cm	11, 5	Ovum forceps
3.	19	0/1	91 days	12 cm	11, 5	Ovum forceps
4.	19	0/1	98 days	11 cm	12	Ovum forceps
5.	17	0/1	98 days	14 cm	11, 5	Ovum forceps

hardened glass (Sial).

Fear of possible damage to the uterus made some authors place the opening of the cannula on its side before the end (Melks 1964, Lesjuk 1964, Bruchác 1964, Andreev 1965). This localisation of the opening is sometimes a disadvantage, in particular in more advanced pregnancies with firmer membranes. Their rapid rupture is rendered possible more readily by a bevelled cannula and a

the failure was due to the use of a too narrow cannula and inadequate negative pressure for removing the placental septa from the uterine wall. Most of the cases were diagnosed in the course of the operation, as we saw in our glass cannula that the entire ovum was not aspirated.

Discussion

In our country artificial termination of pregnancy is done only in

hospitals after a preceding permission, following the law of 1958. In the course of years, residents acquired considerable skill which led to a decline in complications such as perforation of uterine wall, profuse loss of blood etc. But even the hitherto used technique does not rule out fatalities though performed by an experienced doctor.

All authors agree that vacuum-aspiration, as compared with the standard method of evacuation of the uterus, has the main advantage of being very rapid and that it reduces the hazard of possible damage of the uterus to a minimum. So far no case of perforation of the uterine wall by vacuum-aspiration has been published, (26,000 cases).

All previous papers are unanimous in describing relations between the vacuum-aspiration method and small blood loss (Melks 1962, Cernucha 1963, Bruchác 1964, Lesjuk 1964, Vojta 1964). This is true but little emphasis is laid on the fact that the blood loss depends on the conditions which render it possible to ensure the evacuation of the uterine cavity as rapidly as possible. Because we found that there exists a direct relationship between the speed of the operation and the amount of blood loss, we did not enforce the principle that the termination must be always completed by a single method. In pregnancies above 11 weeks' duration where after aspiration of the amniotic fluid the separation of the placenta is difficult, we grip the part which protrudes from the cervix with an ovum forceps and evacuate it by means of the latter. Then we complete the operation

again by suction. Thus a slight dilatation of the cervix will suffice even in pregnancies above 12 weeks.

Melks and other authors assumed that if vacuum-aspiration is to be successful it is essential to allow air penetrate into the uterus. This concept is incorrect. The penetration of air would be undesirable. Sometimes it is necessary to withdraw the cannula from the uterus and reintroduce it. This happens when we use a cannula with a small orifice the surface of which is too small for the vacuum to rupture the membranes, or if the opening is blocked by a part of the foetus.

Incomplete evacuation of the uterus is prevented if after completing the operation we suck the uterine cavity by means of a cannula with a smaller diameter. Complications in puerperium, such as metritis, adnexitis etc. are according to our experience less frequent than after other methods.

Summary

A review, of 350 cases of artificial termination of early pregnancies provides evidence that it is possible by means of vacuum-aspiration to evacuate the uterus using slighter dilatation of the cervical canal than in commonly used methods.

In pregnancies up to eight weeks operation takes usually 20-60 seconds. In pregnancies above nine weeks we prefer to use a greater vacuum — 1 atmosphere — and if necessary combine vacuum-aspiration with evacuation of the placenta by means of an ovum forceps.

Complications after vacuum-aspira-

tion in the puerperium are not more frequent than when a standard method is used. We did not record any perforation of the uterus.

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Figs. on Art Paper I