USE OF EARLY FETAL TISSUES OBTAINED FROM SUCTION TERMINATION OF PREGNANCY

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Summary: Organs were identified in the fetal products of pregnancies of short gestation terminated by the suction method. Various tissues from such fetuses were grown in tissue-culture and some of these cultures were used for the isolation of viruses. This new approach would ensure the supply of human embryonic tissue, essential for certain virological procedures, as suitable fetuses from pregnancies terminated by hysterotomy become less common. Tissues from these early fetuses could also be used for transplantation and developmental studies.

INTRODUCTION

The Fetal Tissue Bank was founded in September, 1957, at the Royal Marsden Hospital by Dr H. E. M. Kay, to collect dead fetuses for dissection and distribute the tissues for transplantation, virological studies, and biochemical and developmental research.
The thymus and liver arc transplanted into patients with immune deficiency, particularly infants.[1] Cultures from various fetal tissues for example kidney, lung, brain, and trachea, are used for the isolation of viruses and for the preparation and safety testing of vaccines.[2]

TABLE I—METHOD OF TERMINATION OF PREGNANCY FOR FETAL TISSUES RECEIVED BY THE FETAL TISSUE BANK ROYAL MARSDEN HOSPITAL

Year	Hysterotomy	Prostaglandin induction	Suction	Spontaneous abortion	Total
1971	529	..	..	..	529
1972	349	50	..	3	402
1973	307	109	..	1	417
1974	198	490	..	7	695
1975	152	535	26	..	713
1976	57	383	228	5	673

For transplantation and virological studies it has been our practice to supply tissues from fetuses aborted by the surgical method. Tissues from fetuses aborted after induction by the administration of prostaglandins do not always produce viable cells in culture. Surgical termination of pregnancy is becoming an increasingly rare event (table I). Therefore we decided to investigate the possibility of obtaining viable tissues from the products of pregnancies that have been terminated by the suction method.

METHODS

Collection of Fetuses

The fetal material was collected from the operating-theatre as soon as possible after pregnancy had been terminated and was brought to the tissue bank on ice. Relevant clinical data were recorded.

Examination of Material from Suction Terminations

A sterile technique was observed throughout. The material was taken to the dissecting room and filtered through gauze. Any organs that could be identified directly or with the aid of a magnifying glass were placed in sterile bottles in tissue culture-medium to await allocation. Speed was essential to avoid contamination and drying out of the organs; however, the tissues from the youngest fetuses were very fragile and care had to be taken not to damage the tissue further.

TABLE II—ORGANS AND TISSUES IDENTIFIED IN 100 EARLY DISRUPTED FETUSES

Tissue	No.	Tissue	No.
Placenta	98	Kidney single	13
Skin	74	Eyeballs	11
Upper limbs	74	Intestine (whole)	10
Lower limbs	61	Intestine (part)	8
Lung	22	Brain	8
Liver	21	Gonads	1
Heart	15	Thymus	1
Kidney pair	14	Adrenal	1

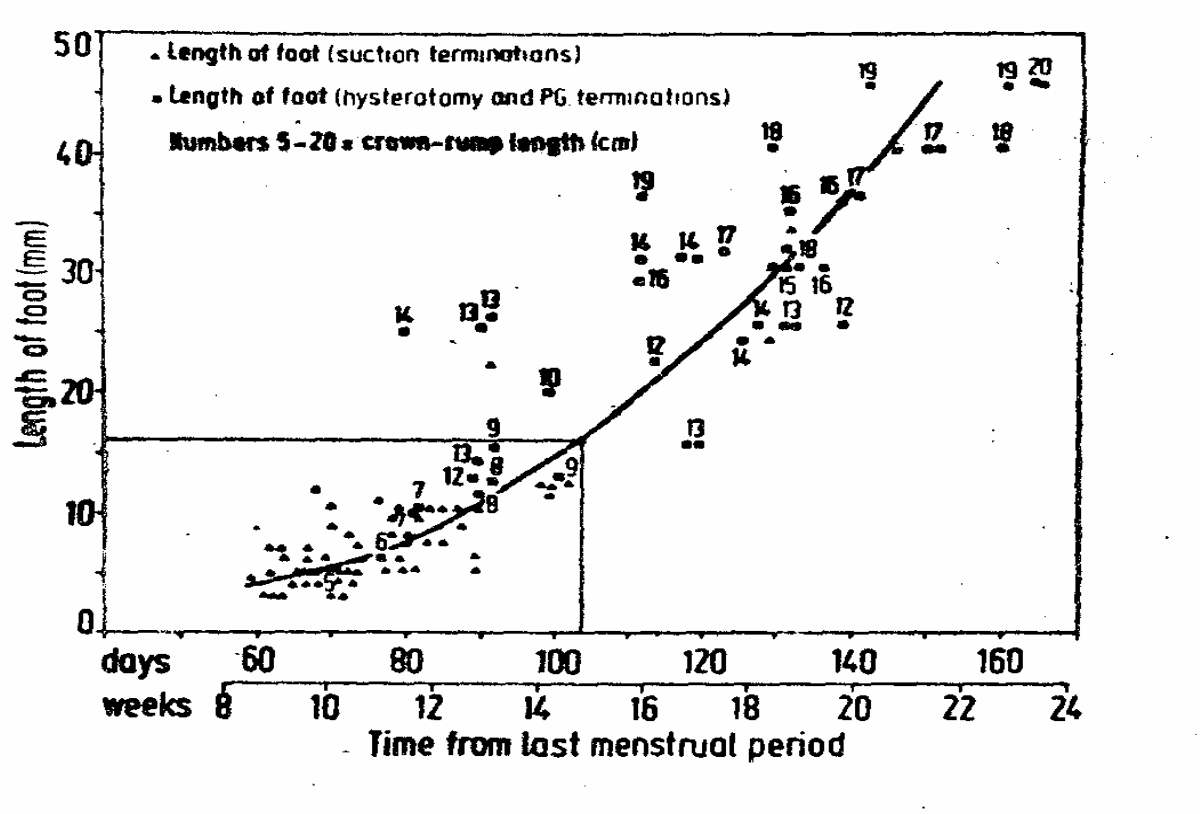
RESULTS

Organs identified in a hundred products of the termination of pregnancy by the suction method are listed in Table I The foot length was compared with the duration of gestation according to the history and the foot lengths of whole fetuses of known crown-rump length were included for comparison (see accompanying figure).

The most important part of the work was to find out whether viable tissue-cultures could be produced. The tissues that have proved viable in culture are listed in Table III. Contamination which sometimes occurred could be controlled by the use of selected antibiotics in the culture.

TABLE III—TISSUE-CULTURES FROM EARLY FETUSES

Organ	Growth
Intestine Nose and trachea Brain	Satisfactory growth
Kidney	Grew well, yield small
Skin and muscle	Good outgrowth of fibroblasts in 3 days
Liver	Confluent monolayers formed
Adrenal	Viable monolayer cultures
Placenta	Successful cultures established
Lung	Good growth maintained on passage



Correlation between crown-rump and foot lengths and their relation to gestation-time. These data show that the gestation-time of fetal tissue from a suction termination can be estimated from the length of a foot. The gestation-time of an intact fetus is estimated by crown-rump length. P.G = prostaglandin

DISCUSSION

If material obtained from the terminations of pregnancies by the suction method is to be used in studies of developmental biology, it will be important to know the gestation-time as accurately as possible. The use of length of foot as a measure of gestation-time in disrupted fetuses was first suggested by Shepard in l969.[3] The crown-rump length has been used as a measure of the gestation-time of whole fetuses for many years.[4] We confirmed in our material that crown-rump length and foot length are correlated, thus validating the use of length of foot to measure the gestation-time of pregnancies terminated by the suction method.

We initiated the investigation to find out whether it would be worthwhile to obtain the products of larger numbers of disrupted fetuses to identify organs for various purposes. It is clear from this preliminary study that work on viruses which depends on successful cultures of fetal tissue can be continued if there are adequate supplies of fetal tissue from the pregnancies terminated by the suction method. Some of these pregnancies have gestation-times as short as eight weeks, and in these cases it is sometimes extremely difficult to identify fetal organs and the tissues are very fragile.

A thymus was identified in only one of the products of suction termination in this preliminary series. Recently another thymus has been identified and Dr G. Janossy (Imperial Cancer Research Fund Laboratories, London) reported a yield of at least 3 x 10^8cells with a viability of 71%. Thus such material can improve the prospects for thymus transplantation. The liver has been identified in material from these young fetuses and so the use of this early fetal tissue as a source of fetal liver for cases of severe combined immune deficiency could be explored. The results of successful liver transplants in patients with severe combined immune deficiency were given by Buckley.[5] An analysis of all the data available showed the importance of the use of fresh liver suspensions, and at the moment the storage of liver for future transplantation cannot be recommended. The livers from the youngest fetuses were the ones associated with the best prognosis for the recipient. We believe that more intensive efforts to dissect and identify organs in the products of suction terminations will prove worth while.

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