

FETAL LUNG HISTOLOGY IN BETAMETHASONE INDUCED MID-TRIMESTER ABORTIONS

by

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The human placenta is permeable to glucocorticoid substances which are believed to accelerate the development of pulmonary surfactant and will improve the L:S ratio. Liggins and Howie (1972) by the use of betamethasone before actual delivery were able to demonstrate a marked reduction of neonatal death rate from hyaline membrane disease due to lung prematurity.

The present study is on the study of the fetuses procured after induced mid-trimester abortions following intra-amniotic betamethasone. Morphology of the lung has been studied to find out the effect of drug on lungs, if any, at this stage of pregnancy.

Material and Methods

The present study was conducted in the Department of Obstetrics and Gynaecology and Pathology of M.L.N. Medical

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Sixty cases of 14 to 20 weeks pregnancy were taken for induction of abortion by a single dose of 40 mg intra-amniotic betamethasone. Abortion occurred successfully in 8.2 per cent of cases within 96 hours of instillation of the drug. The mean induction-abortion interval was 52.46 ± 8.96 hours.

The fetus was dissected fresh and lung tissue was fixed in 10 per cent formaline and processed. The slides were stained with haematoxyline and eosin and studied to find out the effect of betamethasone on lung maturation in mid-trimester. Special stress was made on condition of bronchial tree, alveoli and blood vessels and presence of air, if any.

Observations

Lung tissue was procured for histology from 36 fetuses. They were from fetuses of different periods of gestation varying from 14 to 20 weeks (Table I), who aborted after betamethasone instillation. Four hysterotomy specimens formed the control group.

TABLE I
Number of Cases and Their Distribution

Weeks of gestation	No. of cases
Study Group	36
14 Weeks	5
16 Weeks	9
18 Weeks	10
20 Weeks	12
Control Group	4
18 Weeks	2
20 Weeks	2
Total	40

14 Weeks—

Lung was almost solid. Alveoli were not formed and bronchial tree was very poorly developed.

16 Weeks—

Bronchial tree was under development and was lined by columnar epithelium, separated by thick septa. Few alveoli were developed and contained air in 1 case. Thickening of arterial wall and endarteritis was present in 8 cases.

18 Weeks—

Bronchial tree was under development and was lined by columnar epithelium. Alveoli were better developed in all cases. Vessels showed intimal proliferation and endarteritis in 8 out of 10 cases. One to two alveoli contained air.

20 Weeks—

Bronchial tree was well developed in 8 cases, but not in others. Alveoli were developed in all the cases. Three cases showed air in alveolar spaces. Blood vessels showed endarteritis and intimal proliferation in almost all the cases. Two of the 20 weeks gestation fetuses took few gasps after birth. The empty rounded spaces seen in the section of lung tissue at 20 weeks were said to have air in them because the spaces were surrounded by a regular endothelial lining.

Control Group—(18 and 20 weeks)

Bronchial tree was poorly defined and was separated by thick septa. Only 2 to 3 alveoli were seen and there was no aeration.

Thickening of arterial walls was present. The Histological changes are summarized in Table II.

Discussion

Liggins and Howie (1972) made a successful attempt to reduce markedly the neonatal death rate from hyaline membrane disease due to lung prematurity, by the use of betamethasone before delivery. In the present study, as betaumethasone was used for abortion, lung histology was studied to know whether the drug in amniotic fluid affects the mid-trimester fetal lung.

TABLE II
Summary of the Histological Changes

Period of gestation	Gross	Alveolar development	Bronchial tree
14 weeks	Solid	Not formed	Poorly developed
16 weeks	Loose alveolar tissue	Few alveoli developed	Under development
18 weeks	Loose alveolar tissue	Alveoli developed in all the cases	Better developed
20 weeks	Aerated lung tissue	Alveoli well developed, few contained air	Well developed in 13% cases, not in all

From the data available on development of fetal lung in normal circumstances (Hamilton and Mossman, 1972), it is evident that upto 16 weeks the lung remains in the phase of glandular development. Canalicular development occurs from 16 to 24 weeks of gestation and alveolar formation occurs after 20 weeks of gestation (Emery, 1969).

In the 4 control cases of 18 to 20 weeks gestation, it was found that bronchial tree was poorly developed, alveoli were occasionally seen and mild thickening of arterial walls was present. The study series of 14-20 weeks gestation revealed the following salient features:

1. Bronchial development from 16th week of gestation.
2. Alveolar formation from 16th week.
3. Aeration of lung tissue at 16 weeks in 1 fetus.

Further, if an attempt is made to find out, how the changes in lung took place, the possibility which appears is that the betamethasone was swallowed by the fetus, absorbed and taken in general circulation to cause directly the maturation of fetal lung. Histological evidence has been provided to substantiate the possible role of glucocorticoid in causing lung

maturation even when administered in midtrimester of pregnancy.

Summary

A histological study was carried out on 40 fetal lung tissues in midtrimester abortions. Thirty-six were of those fetuses, who aborted after betamethasone instillation, four were controls. Changes like bronchial development and alveolar formation were seen in fetuses of 16 weeks of gestation. Aeration of lung was found in one 16 weeks gestation fetus. Morphological evidence to support the view of role of glucocorticoid in causing lung maturation has been provided.

References

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See Figs. on Art Paper I