(Dr. G. I. M. Swyer). A further estimate six months later revealed less than 10 units per 24 hours (Dr. G. I. M. Swyer).

A breast biopsy by Mr. Page showed hyperplasia of duct elements and fibrous tissue (Dr. J. F. Heggie). Laparotomy revealed neither uterus nor Fallopian tubes, and the adrenals appeared normal on palpation. Testicular biopsy and mastectomy were refused.

Case 2

The younger brother was first seen in 1950 at the age of 18. He complained of breast enlargement, starting at the age of 17. He had never shaved nor had emissions, but he had experienced erections for one year. His hobbies were those of a boy. He had suffered no injury to or disease of the testicles.

Physically he closely resembled his brother (see Fig. 2). Breasts, penis, testicles, hair distribution, voice, manner, and general appearance were almost identical. His height was 60 in. (152 cm.) and span 63½ in. (161 cm.); head to pubis measured 29 in. (74 cm.) and pubis to ground 31 in. (79 cm.). Two 24-hour estimates of 17-ketosteroid excretions were 8.9 and 17.5 mg. (Dr. A. B. Anderson). Two estimates of F.S.H. excretions were performed: one revealed less than 5 units in 24 hours, and the other between 5 and 10 units in 24 hours (Dr. G. I. M. Swyer).

Further investigations, including testicular biopsy and mastectomy, were refused.

FIG. 3.—Family tree.
H. FAMILY TREE
○ NORMAL
● ABNORMAL

Family History

The father and mother are related, as shown in Fig. 3. The father had one brother and four sisters, and the mother four brothers and six sisters. No abnormality resembling the present condition was known of in the family, nor was

there any history of primary amenorrhoea in the females; all but one of the nine married aunts and uncles have had children.

Case 1 at the age of 22 and Case 2 at the age of 20 were both 161 cm. in height. So far as was known, the female members of the family on both sides were of the same size or taller, and the men with one exception distinctly taller. The two brothers therefore seem to be unusually small.

Discussion

The condition is clearly hereditary in nature. The consanguinity of the parents and the apparent absence of similar abnormality in other members of the family suggest a recessive mode of inheritance.

In the absence of a biopsy, the precise gonadal lesion and the diagnosis must remain in doubt. Ovotestes may have been present, when the diagnoses of hermaphroditism would apply; the failure to find a uterus or Fallopian tubes at laparotomy in the eldest brother is somewhat against this explanation. Testicular hypoplasia is a possibility. The low figures for F.S.H. excretion may indicate a pituitary origin for such hypoplasia, and the tendency to dwarfism—consistent with a deficiency of growth hormones—may therefore be significant. The one high figure for F.S.H. excretion in the elder brother followed a period of testosterone therapy, and may well be a rebound phenomenon. Alternatively, the testicular cells responsible for secretion of the substance inhibiting gonadotrophin production may have been spared in a primarily gonadal hypoplasia.

The mechanism for the development of gynaecomastia in testicular hypoplasia is obscure. Oestrogen excretion has been investigated in a number of cases and found within normal limits (Klinefelter *et al.*, 1942; Heller and Nelson, 1945). Excess of circulating gonadotrophin is clearly not the explanation in these two patients.

Summary

Gynaecomastia has been found in two brothers. Testicular biopsies have not been obtained, and aetiology is uncertain. Ovotestes with hermaphroditism and testicular hypoplasia are possibilities. The condition appears to have been inherited in a recessive manner.

I would like to thank Dr. G. I. M. Swyer for the gonadotrophin assays in these patients, and Mr. C. W. Hall for the photographs.

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Medical Memoranda

A Case of Inversion of the Uterus

Inversion of the uterus is such a rare condition that the following case of inversion of the non-puerperal uterus caused by a fibroid is worth reporting.

The incidence of puerperal inversion is about 1 in 30,000 labours (Das, 1940) and the non-puerperal condition is even more uncommon. Das, in a study of 391 cases of inversion, found that 16.35% were non-puerperal, and McCullagh (1925), in an analysis of 233 cases recorded in the literature between 1911 and 1924, found 15%.

CASE HISTORY

A 0-gravida, aged 35, was admitted to hospital on December 15, 1951, complaining of severe vaginal bleeding for the past seven days. Since the age of 15 her periods had been regular, lasting five days and recurring in a 28-day cycle. The loss was not heavy except on rare occasions, and there was no dysmenorrhoea. Seven days before admission a period had started on the expected date. The loss was very heavy from the beginning and the patient was confined to bed. There were no other symptoms except slight lower abdominal discomfort. She had no pain or nausea, no difficulty on micturition, and no bowel symptoms. On the seventh day her face and hands became numb. Her doctor arranged for her immediate transference to hospital.

On admission she was found to be extremely exsanguinated. Her temperature was 97.8° F. (36.6° C.), pulse rate 116, and blood pressure 115/65. Haemoglobin

was 22%. There was no abdominal tenderness or guarding. Vaginal examination revealed a swelling, about 5 in. (12.5 cm.) in diameter, arising from the vault and filling the cavity of the vagina. She was bleeding freely.

She was examined under general anaesthesia after transfusion. The fundus of the uterus was not palpable on bimanual examination and there was no cervical rim. The swelling in the vagina was irregular and had the consistence of a fibroid. The diagnosis of complete inversion of the uterus associated with a submucous fibroid was made. It was difficult to distinguish between the uterus and the tumour, and, for this reason and because of the poor condition of the patient, it was decided to attempt to replace the uterus instrumentally. A biopsy confirmed that the tumour was a fibroid. An Aveling repositor was inserted and the vagina packed with acriflavine and glycerined gauze.

During the next three days the repositor and pack were removed daily, but on each occasion there was severe haemorrhage. The uterus remained inverted. On the third day the repositor was abandoned, but the vagina was repacked daily in an attempt to control the bleeding. In all, 15 pints (8.5 litres) of blood was given by transfusion during these days. On the fourth day the temperature rose to 99.6° F. (37.6° C.) and a high vaginal swab was taken; this subsequently grew *Bacterium coli* and haemolytic streptococci. During the next 10 days 11,500,000 units of penicillin and 18 g. of streptomycin were given.

On the sixth day her general condition had improved and she was again examined under general anaesthesia. A Schuchardt incision was made. The fibroid was gripped with a vulsellum, and by using considerable force the uterus and the fibroid were delivered out of the vagina. The uterus was elongated and completely inverted, and there was no cervical rim. The fibroid was 4 in. (10 cm.) in diameter, was submucous and sessile, and was attached to the fundus of the uterus. There was still profuse bleeding from the endometrium. The capsule of the fibroid was incised all round about 1 in. (2.5 cm.) from the uterine wall and the fibroid was enucleated from its bed. The uterus was replaced digitally without difficulty by pressing on the centre of the fundus. As soon as the uterus was in its normal position haemorrhage ceased.

Convalescence was uneventful. There was a blood-stained vaginal discharge for three days and thereafter no loss at all. The patient did not complain of pain or discomfort. Her temperature rose to 101° F. (38.3° C.) on the two evenings following operation and then remained normal. She was discharged 17 days after operation, the haemoglobin then being 78%. The uterus was slightly enlarged, anteverted, and not tender. The cervix was patulous, and the external os could admit two fingers. There was no vaginal discharge.

Pathological examination of the fibroid showed it to be 4½ by 3 in. (11.4 by 10 cm.) in diameter, with the typical whorled appearance on cross-section.

COMMENT

The cause of inversion in this case was undoubtedly the uterine fibroid. There were no symptoms except haemorrhage and it was not possible to determine when inversion had occurred. The patient firmly denied having had any pain.

In considering treatment, her age and general condition at the time of both operations were taken into account. Infection was slight and did not complicate the issue. Vaginal hysterectomy would have been practicable, but as she was only 35 conserva-

tion of the uterus was thought to be desirable. Replacement with Aveling's repositor was attempted before it was appreciated that the fibroid was larger than the uterus. Myomectomy presented no difficulty once the fibroid had been defined, and manual replacement was then easy.

I wish to thank Mr. John Beattie and Mr. Kenneth Watson for permission to publish this case.

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Air Pollution and Bronchitis

The results recorded in the interesting paper by Pemberton and Goldberg (1954) agree with the results of a similar analysis carried out by the Social Medicine Research Unit of the Medical Research Council. This analysis covered the five years 1946-50, but, unfortunately, only 15 county boroughs were equipped with lead peroxide instruments for the measurement of sulphur dioxide pollution throughout that period, and only 24 county boroughs gave an alternative measure of sulphur pollution (SO₂, as a dissolved impurity in deposit gauges). Notwithstanding this, the correlation coefficients we obtained were very similar to those given by Pemberton and Goldberg, at least so far as males aged 45-64 years were concerned. ($r=0.51$, using the first index of pollution; $r=0.32$, using the second. Average figures for the five years were studied.) Like the two authors, we felt that the pollution records were unsatisfactory—particularly in view of the considerable variation between stations in the same county borough.

Because of this, and because of the very few towns involved, we tried to find some better and more universal measure of the amount of atmospheric pollution to which the inhabitants of towns and cities were subjected. It was

Relationship between the consumption of domestic coal per acre in 1952 and the average annual death rates from bronchitis of males aged 45-64 years for the three years 1950-2, in the 83 county boroughs of England and Wales. Correlation coefficient = 0.59 ($P < 10^{-6}$).