similar prevalence of migraine in each of the four main widely separated areas of the coalfield where cases have occurred.

Allied Vasomotor Disturbances

In view of modern concepts of migraine as a localized cerebral vasomotor disturbance allied to Ménière's disease (Atkinson, 1943) it may be of interest to record the following observations.

Among the 50 men there were eight who described giddy attacks dating from their infection, but none had associated tinnitus or gross deafness for conversational speech. Only one of these had a diastolic blood pressure of over 100 mm. Hg (mean of three readings at rest). All but two of them were migraine sufferers, though the precise chronological relationship between headaches and giddiness was not investigated. Vertigo was thus associated with headache in a quarter of the cases of migraine.

No cases of epilepsy or its equivalents were found among the 50 cases, nor was a family history of such forthcoming in any of them.

In six cases there was complaint of numbness, tingling, and clumsiness of the fingers and hands, often on waking, and usually more severe in cold weather, since the specific infection; but facilities for proper investigation of these phenomena were lacking. A further patient complained of frequent attacks of "cramp" in the legs and hands since his infection.

Significant hypertension, as judged by a mean resting diastolic pressure of over 100 mm. Hg (there were no cases with signs of failure), was found in 6 of the 24 migraine sufferers. Of these, four were over 50 years of age and the youngest was aged 39 at the time of examination. Among the 26 free from migraine only two had significant hypertension. In addition, before this follow-up study was begun, one former patient had died of a stroke at the age of 65, another of cardiac failure following hypertension aged 52, but it is not known whether either of these men suffered from migraine during life.

Discussion

Such a prevalence of hypertension in men of these ages might be found perhaps in 50 men drawn from the general population. However, this finding of hypertension in a quarter of the cases of migraine may be in accord with the views of Gardner *et al.* (1940) that migraine sufferers may become hypertensive in middle life.

The finding of so large a number of cases of migraine among this series, small as it was, does seem to indicate a probable causal relationship between infection with *L. ictero-haemorrhagiae* and migraine. There exist other areas of Britain where this infection is not uncommon, and which offer opportunity for confirmation of this point.

It seems that, if such a causal relationship is established, existing views of the aetiology of migraine may need some modification. Such specific infection is not mentioned in the comprehensive list of causes drawn up by von Storch (1947), nor in the secondary "trigger mechanisms" listed by Friedman and Wilson (1947). Moreover, the latter's insistence upon a primary inherited susceptibility to migraine would appear untenable in the face of such a prevalence as the 48% reported above, even though family histories have been neglected in this study.

It seems possible that migraine may result from the meningitis which is so often a feature of infection with *L. ictero-haemorrhagiae*. This would account for the occurrence of vasomotor disturbances in other regions, if those were also established as a significant sequel to the infection. It may be that follow-up investigation of other types of meningeal infection would throw light on this possibility.

The onset of migraine regardless of age in this series underlines the possibility of this diagnosis being correct even in those presenting symptoms late in life. In areas where infection with *L. ictero-haemorrhagiae* occurs it would certainly seem wise to test the appropriate agglutination reac-

tions before submitting the patient to such procedures as cerebral arteriography.

Summary

The health of 50 men who had formerly been infected with *L. ictero-haemorrhagiae* has been studied.

The prevalence among them of cases of hypertension, and of symptoms suggesting various types of vasomotor disturbance, is recorded. Of these former cases of Weil's disease 48% suffered from migraine. In a control group the prevalence of this disorder was 12%. The difference is of high statistical significance.

The literature on the aetiology of migraine is briefly reviewed and discussed in the light of these findings.

Thanks are due to the miners who so readily co-operated in this study; and to Dr. J. C. Broom, of the Wellcome Research Laboratories, and Dr. R. W. S. Harvey, of the Public Health Laboratories, Cardiff, for performing agglutination reactions in these cases and, with Dr. C. R. E. Freezer, of Church Village Hospital, for help in planning the follow-up of them.

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Medical Memoranda

Thyroid Enlargement and the Crico-thyroid Muscle

The importance of the crico-thyroid muscle has not been stressed in any textbook dealing with diseases of the thyroid gland and the operations carried out for the cure of these diseases. The muscle takes origin from the anterior part of the cricoid cartilage and runs upwards and backwards in two parts—an oblique part inserted into the lower border of the thyroid cartilage in front of the oblique line, and

the horizontal part inserted into the inferior cornu and the lower border behind the oblique line. The nerve supply is the external branch of the superior laryngeal nerve, which comes from the vagus. The nerve runs superficial to the inferior constrictor of the pharynx but deep to the sterno-thyroid muscle; both these muscles are attached to the oblique line on the thyroid cartilage. The diagram makes these details clear.

The function of the crico-thyroid muscle is to tense the vocal cords. Damage to the muscle or its nerve will produce a voice which is incapable of varying its pitch. It can be described as a monotone voice at about F, middle register.

The patients complain that they are unable to sing or alter the pitch of the voice; also, the voice gets tired easily. It is not

- 1, Crico-thyroid muscle.
- 2, Superior laryngeal nerve.
- 3, Internal laryngeal nerve.
- 4, External laryngeal nerve.
- 5, Inferior constrictor muscle.
- 6, Sterno-thyroid muscle.
- 7, Oblique line.

husky, but is slightly tremulous. There is no difficulty in breathing. The trouble can arise before any operation on the thyroid gland, especially in a very large thyroid with an isthmus spreading out over the cricoid and lower part of the thyroid, from direct pressure on the muscle or its nerve. The muscle or nerve may be damaged, or even removed, during the freeing of a large isthmus from the underlying structures. There is a third possibility—that the nerve or muscle may be strangled by fibrous tissue following operation, especially if a clot under the infrahyoid muscle has been allowed to organize.

The treatment of a pre-operative case is careful partial thyroidectomy, to give the muscle or nerve a chance of recovering. There is no useful treatment for a post-operative case. From the above remarks it is clear that before partial thyroidectomy the patient's voice should be carefully studied, and if abnormal an examination by a competent laryngologist should be carried out. I feel that when confronted with the crico-thyroid syndrome after operation many surgeons with a limited experience of thyroid surgery have wrongly assumed that the recurrent nerve has been damaged.

Two patients of mine illustrate the mild trouble resulting from crico-thyroid inefficiency. Both had a very large thyroid, with a husky voice, and had some difficulty in breathing. One was a school mistress in a primary school, the other a local manager of an insurance company. After partial thyroidectomy the latter had complete restoration of his voice, while the first had a crico-thyroid syndrome four years later. She has some difficulty in talking to her classes for more than half an hour, but she agrees with me that lectures and talks lasting more than half an hour are rarely appreciated by the audience.

Many people in this country are incapable of altering the pitch of the voice; also many have no appreciation of pitch alteration in a voice or musical instrument. It seems that the former suffer from some congenital trouble in the crico-thyroid, just as the latter suffer from internal ear trouble.

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Ruptured Uterus with Survival of Extrauterine Twin

The following unusual case is thought to be worthy of record.

CASE REPORT

A native woman was admitted to the Zomba African Hospital at 5 p.m. on October 17, 1952. She stated that she had been in labour 32 hours. About midnight on the 16th–17th, during strong contractions with no advance, the pains seemed to cease, being replaced by a continuous pain in the abdomen, especially in the flanks. She was a slim woman in the early thirties, a 2-para. There had been no trouble with the previous labours, although the babies had been large.

On admission she was seen by the sister, who reported that urine had been passed just before examination. The sister carried out a vaginal examination. The vulva was oedematous. What appeared to be a rectocele could be seen in the vaginal orifice. The vertex was felt in mid-cavity. No os could be felt, but the head seemed to be covered by a layer of tissue almost corresponding to a thin well-taken-up cervix. The sister thought this membrane to be part of the "rectocele," although she could not understand why she was unable to pass her fingers between it and the head at a higher level. There was no vaginal bleeding.

The patient was seen by me an hour later. She was ill, but her condition was fair and she was not unduly shocked. The abdomen was distended and tender. There was a visible tumour rising above the pubes, so resembling a distended bladder that I could not accept the African mid-wife's assurance that the patient had again passed urine, and catheterized her myself. The catheter entered easily, with-

drawing a little urine with no effect on the tumour. It thus became evident that this was the uterus. Above it, foetal parts lay immediately under the abdominal wall. Ruptured uterus was confidently diagnosed, no further vaginal examination being performed. In view of the prominence of the uterus and absence of external bleeding it was expected that the body of the child had passed out of a posterior rent, leaving the head jammed in the pelvis.

After anti-shock therapy, and with intravenous saline running, the abdomen was opened. There was a moderate amount of blood in the peritoneal cavity. A transverse anterior tear of the lower segment of a well-contracted uterus was seen with a T extension through the cervix into the vagina. A small full-term dead foetus was removed from the abdomen complete with placenta and membranes. It was then noticed that there was a large tumour behind the uterus responsible for pushing it forward. This proved to be the back of a second child lying in the occipito-anterior position with the head well down in the pelvis, in an apparently unruptured amnion. The amnion was slit and the child delivered. To our amazement it was alive and cried immediately. The membranes had to be peeled from the rectosigmoid, the left broad ligament, posterior surface of the uterus, the sides of the pelvic cavity, and coils of small intestine, within a mass of fibrinous peritoneal adhesions. The placenta, however, was not adherent. Its amniotic surface was normal, but the decidual surface was covered over by a membrane except along a narrow pedicle, not more than 3 cm. wide, through which the vessels ran into its substance.

It is to be regretted that the origin of the pedicle was not accurately noted owing to the presence of oozing and the necessity for haste. The impression was that it arose from the mesosigmoid, but it may have been from the region of the left broad ligament, which is more likely. It was the only impediment to easy removal of the placenta. Sub-total hysterectomy was performed, with repair of the cervix and vaginal vault. The patient stood the operation well. One pint (570 ml.) of blood was given next morning, and she made a smooth recovery. The baby, a female, was normal in all respects and weighed 5 lb. 2 oz. (2.3 kg.). It was seen at intervals up to three months after leaving hospital and was thriving. Thereafter, as commonly happens in African practice, mother and child were lost sight of.

COMMENT

The probable course of events was that the twin, surviving from a tubal rupture, developed with the head in the pelvis. When labour began, its head prevented entry into the pelvis of the presenting part of the intrauterine twin, with consequent rupture of the overstretched anterior aspect of the lower segment. The abnormal appearance of the placenta of the extrauterine gestation is difficult to explain, except on the basis that at the time of tubal rupture the decidual contact of the foetus with the tube was not entirely lost, and as it grew the placenta was gradually drawn out from the tube *pari passu* with repair and reperitonization of the rent, the process also continuing over the decidual surface, finally forming a pedicle of the remaining contact.

It is a remarkable coincidence that two days later another full-time extrauterine child was delivered alive in this small hospital dealing with about 500 births in a year and with no previous records of such an occurrence. In this case the mother was unfortunately lost owing to severe persistent bleeding from the placental site as a result of possibly unwise separation of its attachments to the viscera, from the shock of which she failed to recover. The infant was a female weighing 4 lb. 2 oz. (1.9 kg.) also without obvious abnormality. It was also thriving on discharge from hospital.

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