low thermal death point, the survival of *Salmonellae* in even lightly cooked dishes is difficult to explain. Recent experiments (Report of M.R.C., 1947) with reconstituted dried egg known to be infected showed that the great majority of the organisms were killed by scrambling (producing a temperature of 83° C. for three-quarters of a minute) and in omelette-making (85° C. for one minute). Only when the reconstituted egg was first incubated overnight, so producing a bacterial content of between 10,000 and 1,000,000 per g., were positive cultures obtained after cooking, and then only from an inoculum of no less than 50 g. In view of these findings, and of failure to recover organisms from an experimental pudding of the kind concerned here, the survival of sufficient numbers of bacteria in the incriminated food to cause so high an attack rate in those consuming it remains a mystery.

This outbreak is also of interest on account of the hazardous measures without which the work of the hospital could not have been continued. The only persons forbidden to return to work until after repeated negative stool examinations were food-handlers, a kitchen employee, and two dining-room maids. It was necessary that nurses should return to duty as soon as they were fit to do so, and proof of their freedom from infection was not obtained until some time later: for a few days at least after their return to duty many were probably carriers, and some were shown to be. They were of course fully instructed in the precautions they must take, and evidently observed them faithfully. A greater problem at the height of the epidemic was the nurse with a mild or unrecognized attack of the disease who remained on duty. It is possible that some transmission to previously uninfected patients took place during this brief and strenuous period.

Summary

An account is given of an outbreak of *Salm. typhi-murium* enteritis involving nursing and other female staff and patients in a large general hospital. The vehicle of infection was a lightly cooked pudding containing 200 duck eggs. The clinical features of the disease are described, together with laboratory investigations and the steps taken to control the epidemic.

We are indebted to Dr. Joan Taylor, of the Salmonella Reference Laboratory, for kindly examining five of the strains isolated from patients and confirming their identity.

REFERENCES

- American Public Health Association (1945). *The Control of Communicable Diseases*. New York.
Dack, G. M. (1943). *Food Poisoning*. Chicago.
Report (1947). *Spec. Rep. Ser. med. Res. Coun., Lond.*, No. 260.
Savage, W. G., and White, P. Bruce (1925). *Spec. Rep. Ser. med. Res. Coun., Lond.*, No. 92.

A subcommittee of the Nurses and Midwives Whitley Council has made a report on working conditions in mental hospitals and recommended measures for the achievement of student nurse status. It points out that more qualified staff must be provided if the student is to do only the work that is necessary for gaining practical experience in training. The buildings should be reorganized to provide better facilities for the patients and less needless work for these students. Central teaching units should be established to which students could go for a period of special tuition each year. Training should be supervised by education officers (who should be qualified tutors) in co-operation with the matron and chief male nurse. The period at the preliminary training school should be extended as soon as possible to three months, and some of this time should be spent in wards. Lectures and demonstrations should be given in duty time, and no student should be on night duty for a month before the examination. Students should not be put in charge of wards and should not have to work more than 48 hours a week. Their uniform should be distinctive.

THE MARTIUS BULBO-CAVERNOSUS INTERPOSITION OPERATION

BY

WILFRED SHAW, M.A., M.D.Cantab., F.R.C.S.
F.R.C.O.G.

Surgeon in Charge, Gynaecological and Obstetrical Department, St. Bartholomew's Hospital; Gynaecologist, St. Andrew's Hospital, Dollis Hill

This operation has been devised and advocated by Professor H. Martius, of Göttingen, for the treatment of stress incontinence and of particular types of vesico-vaginal fistula. The principle of the operation is to interpose a graft of tissue obtained from the labium majus between the urethra and bladder above and the anterior vaginal wall below. A vertical incision is made into the labium majus, and the fatty tissues, together with the bulbo-cavernosus muscle, are mobilized to form a cylindrical graft. The upper end of the graft is then cut through in the vicinity of the mons veneris. The posterior attachment of the graft is left intact so that the bulk of the blood supply to its tissue is left undisturbed. A flap of anterior vaginal wall is mobilized laterally until the deep tissues of the labium are exposed. The free end of the graft is then drawn through so that the graft can be interposed and stitched into position. The operation is extremely simple to perform, and the only difficulty seems to be to obtain complete haemostasis.

For the treatment of stress incontinence the thick tissues of the graft act as a supporting shelf by pushing up the urethra and the neck of the bladder. In the treatment of vesico-vaginal fistula the bladder is repaired in the usual way and the graft is utilized partly to prevent leakage of urine and partly to separate the sutured bladder from the anterior vaginal wall. I have employed the operation in a small series of cases, the details of which are here given.

Case 1

A primipara aged 53 had suffered from stress incontinence for a year. She had been married for 20 years and her child was aged 19. The menopause had occurred four years previously. The pelvic organs were normal. There was a slight descent of the lower part of the anterior vaginal wall. The meatus was patulous and urine leaked away when the patient coughed.

A Martius operation was performed in July, 1948. A midline incision was made in the anterior vaginal wall, together with lateral incisions from the end of the vertical incision near the meatus.

FIG. 1.—Martius operation. An incision has been made in the right labium majus and a graft of tissue containing fat and the bulbo-cavernosus muscle has been mobilized.

flaps were dissected away to expose the urethra and the neck of the bladder, and on the patient's right side the vaginal wall was undermined towards the region of the labium majus. An incision about 4 in. (10 cm.) long was made through the tissues of the right labium majus extending downwards from the level of the clitoris. The tissues of the labium were opened up and the bulbo-cavernosus muscle, together with the fatty tissues, was dissected away from the mesial skin of the labium (Fig. 1). A cylindrical pedicle graft was then fashioned from the fatty muscle tissues. The graft was mobilized on each side and cut across in the vicinity of the mons veneris.

An opening was now made between the vaginal wound and the exposed area within the labium majus. No difficulty was experienced at this stage of the operation. The free end of the graft was drawn through this opening and interposed below the urethra and the neck of the bladder (Fig. 2). It

FIG. 2.—Incisions have been made in the anterior vaginal wall and vaginal flaps have been dissected away from the midline. On the right side the tissues intervening between the raw surface in the vagina and the wound in the right labium majus have been divided and the Martius graft is being drawn through. Subsequently it is sutured into position below the urethra and bladder.

was sutured into position with catgut sutures to form a broad shelf of fatty and muscle tissue. The wounds in the vagina and in the labium majus were now closed with interrupted catgut sutures. Great care was taken to obtain complete haemostasis within the wound of the labium majus. Convalescence was uneventful. The end-result was not regarded as satisfactory, for the patient still had some stress incontinence after the operation, although there was an improvement.

Case 2

A primipara aged 58 had complained of stress incontinence for the last 20 years. Ten years previously I had performed a vaginal operation for stress incontinence with excellent results until one year ago, when the symptom recurred. She had been married for 33 years and her child was aged 26. The vaginal walls and the cervix were well supported, but there was a slight dropping of the lower part of the anterior vaginal wall.

A Martius operation was performed on July 15, 1948. In this case the end-result was excellent and the patient is completely free of symptoms.

The same technique was used in each of these two cases. In one the operation was successful and in the other it was a partial failure. Personally, I have much difficulty in believing that a shelf of fatty and muscle tissue is sufficient in itself to support the urethra and the bladder neck to prevent the development of stress incontinence.

Case 3: Vesico-vaginal Fistula

This patient, a married woman aged 52, developed a vesico-vaginal fistula 28 years ago. Unsuccessful operations had been performed in 1921 and 1925. Although the patient had been seen at frequent intervals since 1925 she had always refused further surgical treatment, but in November, 1948, she changed her mind.

The anterior vaginal wall was deeply scarred and there was a small vesico-vaginal fistula in the region of the neck of the bladder. The operation was performed on Nov. 19, 1948. A vertical incision was made in the anterior vaginal wall, with lateral extensions on each side just below the urethral meatus. Lateral vaginal flaps were fashioned and dissected clear. The fistula was exposed, scar tissue was excised, and the fistula was closed with a preliminary purse-string suture followed by two layers of Lembert sutures through the bladder wall.

A Martius graft was then prepared from the tissues of the right labium majus and the graft interposed in the usual way.

A small drainage-tube was left in the wound in the labium majus. The patient was nursed on her back with a self-retaining catheter and continuous bladder drainage for 10 days. The wound in the vagina healed by first intention and the fistula was cured. Nevertheless, in spite of the presence of the Martius graft the patient still has stress incontinence.

FIG. 3.—Method of fashioning a new urethra. Modification of the Gray-Ward technique. The bladder opens direct into the vagina and the urethra has disappeared completely. The straight line demarcates the flap fashioned from the vaginal wall. The dotted lines represent the positions of the incisions made later.

FIG. 4.—The flap of vaginal wall has been drawn down from above so that it is hinged just above the site of the vesico-vaginal fistula.

Case 4

A married woman aged 24 developed a vesico-vaginal fistula after a forceps delivery and was referred to me after she had been operated upon at least five times without success. There was a large vesico-vaginal fistula about $\frac{1}{4}$ in. (1.25 cm.) in diameter situated at the junction of the urethra with the bladder neck. The patient was operated upon on July 26, 1948. A vertical incision was made in the anterior vaginal wall and lateral flaps were dissected away from the urethra and the bladder in the usual way. Mobilization of the bladder and urethra was extremely difficult. The fistula was exposed, scar tissue was excised, and the edges of the fistula were freshened. A sound was passed along the urethra into the bladder and the fistula closed with three

FIG. 5.—The vaginal flap is now sutured to the edge of the incisions located by the dotted lines in Fig. 3. In this way a tube is formed which acts as a new urethra.

FIG. 6.—The next step is to employ a modification of the Gray-Ward technique to provide a flap of skin to cover the raw surfaces. The dotted lines indicate the position of the incisions made on the inner surface of the labium minus. The flap is drawn laterally and the labium minus split along the whole of its length.

infected, and probably, through pressure, they prevent any tendency to leakage of urine by direct support of the fistula area.

Case 5

A multigravida aged 49 had suffered from stress incontinence for 23 years. Operations for prolapse had been performed on two previous occasions, the last 12 years ago. In 1947 a successful operation for repair of a Douglas-pouch hernia was carried out and a plastic vaginal operation was performed to treat the stress incontinence. The symptom persisted, and it was found subsequently that the urethra was damaged. Two unsuccessful operations were performed to repair the urethral fistula, in one of which suprapubic drainage was employed.

The patient was admitted to hospital in May, 1948. The whole of the urethra was absent and the neck of the bladder opened direct into the vagina. She was treated for 10 days with penicillin and urinary antiseptics, and on June 4 I per-

layers of interrupted catgut sutures. The first two layers were arranged longitudinally, while the third layer was placed transversely, the bladder being drawn down to cover the vertical layers. A Martius graft was then fashioned from the right labium majus and interposed between the urethra and the bladder above and the vaginal wall below. The wounds in the labium majus and in the vaginal wall were then closed with interrupted sutures.

The patient was nursed on her back and a self-retaining catheter was kept in the bladder for 10 days and the bladder drained continuously. Convalescence was excellent and the healing was by first intention. The patient was cured of stress incontinence, but she became pregnant almost immediately afterwards, following which the stress incontinence recurred.

This type of fistula is notoriously difficult to close, and it is my impression that the Martius graft was most useful for this particular case. The fatty tissues of the graft do not necrose easily or become

formed a plastic operation for repair. I used a modification of the Gray-Ward technique which I have always found satisfactory for this type of case (Fig. 3). A rectangular flap was marked out in the anterior vaginal wall above the level of the neck of the bladder, dissected clear of the bladder, and brought down to form the posterior wall of the new urethra (Fig. 4). Vertical incisions were made through the vaginal wall on each side of the site of the new urethra. The edges of the rectangular vaginal flap were then sutured to the inner cut edges of these vertical incisions (Fig. 5). Those who employ the technique know that this part of the operation is extremely simple, but it is also well known that much difficulty is usually experienced in covering the raw surfaces with healthy vaginal tissue.

The case seemed eminently suitable for a Martius graft, and this was taken from the tissues of the right labium majus in the usual way and then sutured into position so that it covered the whole of the raw surface. In this particular case the graft could be sutured high up over the exposed bladder. The next step was to cover the raw surface with skin. Again I used a modification of the Gray-Ward technique. The right labium minus was split longitudinally from its base (Fig. 6). The base was easily defined because the tissues had been separated during the interposition of the Martius graft (Fig. 7). The line of cleavage between the two layers of skin which form the labium minus can be found without much difficulty. In this way a broad sheet of skin was available to cover the raw surface of the vaginal wound. It was necessary to mobilize the skin of the labium minus by means of a transverse incision near the clitoris end. The skin derived from the labium minus was then sutured into position and the raw surface completely covered (Fig. 8). The wounds healed by first intention and the patient was free of stress incontinence, but the symptoms recurred after she had been at home for a few months.

FIG. 7.—This flap of skin is drawn laterally. At this stage of the operation a Martius graft was interposed below the urethra and bladder.

FIG. 8.—The raw surface is now covered by the flap of skin which has been dissected clear and has been illustrated in Fig. 7. As a result of the procedure the dimensions of the right labium minus have been greatly reduced.

The patient was re-admitted to hospital and I performed a fascial-sling operation on October 15, 1948, utilizing a strip of

fascia lata taken from the thigh and using drill-holes through the pubic bones. The Martius graft was found to be healthy and there was no difficulty in separating the vaginal wall from the subjacent fatty tissues. The wounds healed by first intention and the patient is now free of stress incontinence and feels satisfied that she is completely cured at last.

Case 6

A multigravida aged 33 was admitted to hospital on April 4, 1949, suffering from a vesico-vaginal fistula. She had had a difficult forceps delivery in 1946, after which a vesico-vaginal fistula had developed. Five attempts had been made to repair the fistula, which was situated at the junction of the urethra and bladder, but all had been unsuccessful. One attempt had been made by the transvesical route. The general condition of the patient was good. A fistula was located in the anterior vaginal wall near the neck of the bladder and the surrounding tissues were scarred almost to cartilaginous hardness.

The operation was performed on April 6, with the patient in the lithotomy position. Vaginal flaps were dissected away from the anterior vaginal wall and the fistula exposed. Tedious dissection was necessary to free the urethra and bladder of scar tissue and to remove as much scar tissue as possible. The fistula was closed by two series of Lembert sutures introduced in the usual way. The Martius graft was then fashioned from the right labium majus and interposed between the urethra and bladder above and the anterior vaginal wall below. During the operation there was considerable blood loss and a blood transfusion was given. The patient was nursed on her back with a self-retaining catheter for 10 days. Recovery was uneventful and at the time of writing the patient was completely continent and had not developed any stress incontinence.

This case is fairly typical of the results of repeated efforts to repair a vesico-vaginal fistula. My own impression is that the chances of successful cure without the employment of a Martius graft were problematical, and I am convinced that the successful result was due in great measure to the use of the graft.

Case 7

A multipara aged 47 was admitted to hospital on April 20, 1949, complaining of urinary incontinence. Two years previously she had been operated upon at another hospital for prolapse, after which she had developed stress incontinence. A second operation had been performed to cure this, the vaginal route being employed. Subsequently the incontinence had become continuous. A urethro-vaginal fistula was then found at the right side of the urethra about $\frac{1}{4}$ in. (0.6 cm.) above the external meatus.

Operation was performed on April 22. Lateral flaps of the vagina were dissected away to mobilize the urethra and the bladder. The fistula in the urethra was exposed and was closed by two series of Lembert sutures placed longitudinally, a self-retaining rubber catheter having previously been introduced into the urethra and bladder. A Martius graft was then fashioned from the tissues of the right labium majus and interposed in the usual way, particular care being taken to suture the graft accurately over the repaired fistula. The patient was nursed on her back with a self-retaining catheter kept in position for 10 days. She made an uninterrupted recovery, and at the time of writing was completely continent without any stress incontinence having developed.

Conclusion

This small series of cases illustrates the use of the Martius graft in operations on the lower part of the anterior vaginal wall, with particular stress upon operations for the cure of urinary fistulas. The operation cannot be regarded as a satisfactory method of treatment for simple cases of stress incontinence, although one success has been recorded and evidence from the other cases suggests that the Martius graft should not be utilized for the treatment of stress incontinence alone. On the other hand, for plastic opera-

tions involving the repair of urethro-vaginal and vesico-vaginal fistulas the graft should be regarded as being of the greatest value. The last four cases in this small series required formidable operations which I should not have undertaken with any degree of optimism without employing the graft. The results have been so good that I have thought fit to draw attention to what I regard as the extraordinary value of the method in vaginal surgery.

THROMBOSIS OF THE INTERNAL CAROTID ARTERY

BY

T. G. ILLTYD JAMES, M.Ch., F.R.C.S.

Surgeon, Central Middlesex Hospital

"Hemiplegia from occlusion of the intracranial branches of the internal carotid artery is one of the most frequent clinical pictures met with in general practice and yet apparently one of the rarest from obstruction of the main arterial pathway in the neck. When one considers that these vessels are frequently ignored, both in clinical and pathological studies, it is not unlikely that many such conditions are overlooked. I would urge that in all cases presenting cerebral symptoms of vascular origin the main arteries of the neck be carefully examined for a possible diminution or absence of pulsation. Obstructive lesions of these vessels are apparently rare, but it seems certain that cases are overlooked from failure to make clinical and pathological examinations from this point of view."

Thus wrote Ramsay Hunt in 1914. In reviewing the literature of carotid occlusion he referred to thrombosis due to injuries of the neck—e.g., stab wounds and gunshot wounds—from disease of the vessel wall such as atheroma, or from extension of thrombosis from the innominate artery or the aorta, the result of atheroma or aneurysm. His thesis deals almost entirely with thrombosis of the common carotid, but he had no doubt regarding the possibility of involvement of the internal carotid artery alone, and he refers to a case reported by Brissaud (1898) in which hemiplegia in a man of 47 followed thrombosis due to annular endarteritis involving the upper part of the internal carotid artery. A precise clinical diagnosis of thrombosis of the internal carotid artery alone awaited the introduction by Moniz *et al.* (1937) of carotid arteriography. His demonstration of four cases in a series of 537 angiographies was followed by reports from others—Löhr (1936), Chao *et al.* (1938), Siegert (1938), Sorgo (1939), Hultquist (1942), Govons and Grant (1946), and others. Andrell (1943), in reporting nine cases, gave an excellent and detailed review of the literature, and Wolfe (1948), reporting another case, summarized recent knowledge. These reviews indicate that thrombosis of the internal carotid artery is not infrequent as a cause of neurological disturbance. The occlusion has been attributed to arteriosclerosis or to thrombo-angiitis obliterans, but in many instances the cause remains obscure. Further studies are necessary, and for this reason three cases that have been under observation during the last two years are reported.

Case 1

A man of 42 was admitted to another hospital on September 14, 1947, with headache and difficulty of speech. He had been quite well until three days before, when he suddenly felt giddy; he fainted, and on coming round had severe frontal headache. Next day he had difficulty in forming words and found that he