The use of urea diuresis has allowed the introduction of a very simple closed-drainage system and has eased post-operative nursing problems.

The prevention of mild water intoxication with consequent absence of post-operative disorientation is a valuable help to the patient's recovery.

The post-operative difficulties of patients suffering from congestive cardiac failure have been considerably eased.

A trial of this type cannot be done without team-work and co-operation from many people, especially when undertaken in an already busy peripheral hospital. I therefore find it a great pleasure to thank the following members of the staff. Mr. A. A. MacKelvie, in whose unit this trial was done and whose advice, criticism, and enthusiasm for the project have been invaluable. Drs. R. Rankin and P. S. Macfarlane, of the pathology department, who have so willingly helped with the increased burden of the investigations and reports on the pathological specimens. Drs. D. Beaton and A. W. Laing, of the anaesthetic staff, who, in addition to providing excellent anaesthesia, have secured many samples of blood for culture and given much help with the intravenous drips. Drs. M. Phillips and M. Fenton, the house-surgeons, who have given ungrudging help with the day-to-day care of the patients and the extra routine involved. Mr. J. Hunter and staff of the pharmacy department, who have provided the urea at any time, night or day. Finally, I wish to thank Sisters Kekstadt and Chisholm, who, along with their nurses, have provided the care and attention which has meant so much in the successful recovery of their patients.

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Hungary has given Algiers equipment for a 100-bed hospital. It includes radiographic and electrocardiographic apparatus, medical instruments, 100 beds, 300 mattresses, bedding, and clothing for both doctors and nurses. The hospital is intended for the treatment of internal diseases.

VESICO-VAGINAL FISTULA

A SERIES OF 27 CASES

BY

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Social ostracism can be borne, but the constant dribbling of urine wears away any morale. There are no more grateful patients than those who, cured of a vesico-vaginal fistula, can return to a normal life. The lesion is rare in Britain but common in other countries. Table I shows the difference in aetiology between Western and other countries. In the latter the patients tend to be

TABLE I

Author	Country	Aetiology of Vesico-vaginal Fistulae		
		Gynaecological	Obstetric	Others
Moir (1961) ..	Britain	145	62	18
Russell (1956) ..	Britain	30	19	1
Miller and George (1954) ..	U.S.A.	232	43	17
Foda (1959) ..	Egypt	25*	191	4
Werneck (1950) ..	S. America	16	333	7

* Includes those due to caesarean section but not those due to neoplasm or radium.

resistant to antenatal care and to complain only of major gynaecological symptoms.

Material.—The present series of 27 vesico-vaginal fistulae were seen in women of Southern Arabia. They were treated in Aden, either at the R.A.F. hospital or the Queen Elizabeth Hospital, and were only part of those treated in the colony over a two-year period. Two of the patients were brought to Aden in labour and were delivered at the maternity clinic; the other pregnancies and deliveries took place in up-country villages.

Aetiology

Table II shows that 21 of these patients laboured for over 48 hours and Table III shows in more detail the length of labour. Cephalopelvic disproportion is a

TABLE II

Labour 48 Hours or Less		Labour Over 48 Hours	
Spontaneous Vertex Deliveries	Complicated Deliveries	Spontaneous Vertex Deliveries	Complicated Deliveries
3	Breech .. 3 Transverse lie .. 1 Bladder-stone .. 1	11	Transverse lie .. 3 Craniotomy .. 2 Shoulder delay .. 2 Perineotomy .. 1

TABLE III

	0-24 hr.	24-48 hr.	3-4 days	5-6 days	7-15 days
Labour	4	4	10	1	8
Delivery-incontinence interval	8	3	6	3	7

major factor in the aetiology of these difficulties and the subsequent fistulae. Twenty-six of the patients were below 4 ft. 11 in. (150 cm.) in height, the smallest being 4 ft. 6 in. (137 cm.). The exception was a woman of 5 ft. 4½ in. (164 cm.) with a true conjugate of 10 cm. who had a transverse lie with a prolapsed arm. None showed external evidence of rickets, nor was any rickety pelvis found at examination under anaesthesia. All had

*Present address: Western Infirmary, Glasgow.

generally contracted small pelvis. This was confirmed radiologically in 14 cases. The true conjugates varied between 8 and 10 cm., with one exception of 11.5 cm. where the fistula followed a breach delivery. Eight were primiparous. Six of the multiparae had never produced a live child, one having had four successive stillbirths. Of the present pregnancies 26 ended with the delivery of a dead child, the other in a neonatal death within 24 hours of delivery. There was no case of twins. It was not possible to obtain the weights of these babies, but Table IV shows the weights of 110 consecutive

TABLE IV

	No. of Cases	Average Weight of Baby		
		lb.	oz.	g.
1. Normal deliveries and low forceps ..	64	6	4½	2,850
2. Obstructed labour high forceps caes- arian section for disproportion ..	39	6	6	2,890
3. Breech deliveries	7	6	7	2,920

Arab babies delivered at the Aden Maternity Clinic. Although lighter than the average European child, the Arab one is not diminutive: further, there is no great difference between those in group 1 and those in group 2 (who are the mothers likely to develop vesico-vaginal fistula following prolonged labour).

The interval between delivery and the development of urinary incontinence is shown in Table III. Four of the patients who developed incontinence within 24 hours of delivery had traumatic deliveries: three of the remainder were relatively old multiparae and one was primiparous. The patients who delivered breeches developed incontinence between three and seven days later; those who had craniotomies carried out did not become incontinent for five and seven days respectively.

Clinical Details

All the fistulae were vesico-vaginal, but nine also involved the urethra. There were no vesico-uterine or uretero-vaginal fistulae. No patient had more than one urinary fistula, but three had a coincident recto-vaginal fistula. Only two of the fistulae were so small as not to admit a finger, the others admitted two or three fingers. Many had the anterior bladder wall prolapsing through them, but there was no case of the complete inversion of the bladder described by Moir (1957). There was usually some vaginal fibrosis at the level of the fistula, but the obliteration of the vagina by adhesions which occurs in Northern Arabia as a consequence of packing the vagina with rock salt in the puerperium (Kingston, 1957) was not seen.

The majority of the patients showed a distaste for further child-bearing, and at least one did not return to her husband on leaving hospital. Two, however, were anxious to attempt further pregnancies. Hysterosalpingography was carried out on them after repair of their fistula. This revealed normal uterine and tubal outline with peritoneal spill.

Drop-foot was seen in one patient. It had been present since her labour several months before and did not respond to physiotherapy.

Treatment

Although psychologically distressed by their condition the patients were fit. They were not anaemic, and the highest blood urea found was 51 mg./100 ml. Three

had a positive Wassermann reaction, and their syphilis was treated before operation was undertaken. One gave a history of repeated infection of the urinary tract. The traditional Arab panacea is the application of heat to the affected area, and this patient's abdomen and loin were covered with burn scars: none had apparently attempted vaginal cautery. Every patient with a vesico-vaginal fistula was offered operation: the majority accepted, but a few refused although they recognized that there was no other cure.

It is generally advised that no operation should be attempted for at least three months after labour, not only to allow the tissues to recover from that trauma but also to let spontaneous closure take place if it is possible. Most of these patients were first seen about three months after delivery, but a few waited for a year or more.

Operation was carried out under general or spinal anaesthesia. It was preceded by a five-day course of sulphonamides to counteract any local or urinary infection present. Most of the fistulae were easily accessible, but the edges of a few were adherent to bone, which added considerable difficulty to the repair. Where there was a fibrous stricture of the vagina at the level of the fistula it was divided. Incisions were made to elongate the fistula either longitudinally or transversely, depending on its size and situation. The bladder and vagina were then separated, but not widely, after removal of any dense scar tissue which was present. The bladder wall was stitched with catgut, care being taken not to pass the needle through the vascular bladder mucosa. The adequacy of the repair was tested at this point by passing 10 oz. (284 ml.) of sterile water into the bladder: additional stitches were inserted at any sites of leakage. The vaginal edges were coated with vertical mattress nylon stitches, lateral relaxation incisions being made where required. A catheter was kept in the bladder as a landmark during the operation. It identified the urethra and helped to prevent the anterior bladder wall prolapsing through the fistula. The latter was important, as in a large fistula an inaccessible edge may be difficult to define and a chronically prolapsed indurated bladder mucosa may be mistaken for it. The accompanying photograph shows a typical vesico-vaginal fistula with the catheter in position.

Post-operatively, continuous bladder drainage was kept up for two weeks, and the stitches were removed a week after that. Those fistulae which required transverse elongation to bring the edges together produced some shortening of the vagina after repair, but

Typical vesico-vaginal fistula. The catheter can be seen in the bladder, and the anterior and posterior edges of the fistula can be identified.

this was felt to be a small price to pay for urinary continence. In one case the bladder edges only could be brought together without vaginal support. This healed, leaving a fistula less than half the size of the original; but the patient discharged herself before further repair could be attempted. In two cases there was complete separation of urethra and bladder, with closure of the former at the vesical end. Reconnexion was carried out, as Mahfouz (1957) advises, by removing the scar tissue between them, undermining both, and bringing their free edges together with catgut.

Every fistula was much smaller after one attempted repair, and some were closed. It was recognized that a second attempt was best left for two or three months, but it was not usually possible for the patients to return to hospital once they had gone home. Re-suture, therefore, was carried out as soon as it was seen to be required. In those fistulas which had been reduced to one fingerbreadth it was often possible to use only nylon stitches. The only serious post-operative complication was that of gross haematuria in one patient. This was thought to have been due to infection of the bladder wound, which broke down. A few patients had residual stress incontinence after repair, but this cleared up within a week or two. All were advised to avoid intercourse for two months after leaving hospital.

Results

The following were the results: Six primary repairs. Eleven which healed after two or more repairs. Four ureterocolic transplants—one carried out because of inaccessibility of the fistula, the others after attempted vaginal repair. Two cases in which the patients refused to have more than the first operation and left hospital uncured. One patient had unsuccessful attempts at repair both transvaginally and transvesically; she refused ureteric transplant. One patient had had her pelvic outlet inexpertly enlarged by a Yemeni "midwife"; the urethro-vesico and recto-vaginal septa were all destroyed, leaving her with a cloaca ("perineotomy" in Table II). It was not possible to reconstitute these, so a new anus was constructed with what muscle remained, and the urethra and introitus were closed in two layers. Two patients were operated on shortly before I left Aden, and the completion of their treatment was not seen.

Prognosis

Once these patients had gone home no follow-up was possible because of the distances involved. Some, however, stayed close to the hospital for a few weeks before returning up-country, and none showed evidence of breakdown of the repair during that time. The outlook for these patients must be poor. They are likely to acquire another fistula at their next confinement or die in obstructed labour (Lister, 1960): there is no knowing how often this may happen in isolated villages.

Discussion

Mahfouz (1938) describes this sequence: in a labour which becomes difficult, owing to disproportion or abnormal presentation, the uterine contractions increase in strength and threaten to force the presenting part through the brim. The membranes protrude unduly in the vagina and premature rupture occurs. In consequence of this early rupture and disproportion the full

force of the contractions is exerted directly on the foetus, and the presenting part is forced against the brim of the pelvis, or gets tightly impacted in it. The vesico-vaginal septum and the cervix (if not fully dilated) are tightly compressed against the back of the symphysis pubis. The uterus in such cases usually passes into a state of tonic contraction which prevents any remission of pressure on the soft parts, and the tissues undergo necrosis and slough away. The duration of compression is usually very long, but a fistula has developed after three hours of such pressure. If the obstruction is at the brim the neck of the bladder and part of the upper third of the urethra seldom escape compression. If impaction occurs in the cavity or arrest at the outlet the entire urethral canal lies in the plane of compression, in some cases the urethra sloughs completely. Even if such a delivery is completed with instruments, a fistula which follows this may be a necrotic one owing to the sustained pressure rather than to any trauma of the actual delivery.

Moir (1961) says of the obstetric fistulae which he has treated that "almost all the cases which have been referred to me have been caused by the failure of the attending doctor to detect disproportion—pelvic contraction, hydrocephalus, and the like—with the result that he attempts to deliver the baby with forceps when vaginal delivery is impossible." MacLennan (1954) describes a series of 134 cases of contracted pelvis delivered in Glasgow in 1953: all had a true conjugate of less than 10 cm. and a few had rachitic flattening of the brim. In 34 delivery occurred spontaneously; of the others, 47 required assistance with forceps and 51 caesarean section; there were two breech deliveries. The perinatal mortality was 4.5%. If Arab women would avail themselves of obstetric care more fistulae and perinatal deaths could be avoided. This has been shown in Egypt, where the incidence of necrotic fistulae fell after the institution of methodical antenatal care and maternity clinics in 1919. Great distances separate some of these women from maternity clinics, but tradition separates many even further from the obstetric facilities available.

It seems unlikely that conception could occur through a cervix bathed in urine, but several cases have been reported in the presence of a vesico-vaginal fistula (Moir, 1957; Lister, 1960). This took place in one patient in the present series.

It is remarkable that only one case of drop-foot was seen, as those conditions in labour which lead to the production of a vesico-vaginal fistula also favour the onset of drop-foot. Brown and McDougall (1955) describe this lesion of maternal birth palsy in the distribution of the peroneal branch of the sciatic nerve. It varies in severity from paraesthesiae to complete anaesthesia along the distribution of the fourth and fifth lumbar nerves, with paresis or paralysis of the glutei and calf muscles. It may be unilateral or bilateral. They attribute it to the compression in labour of the lumbosacral nerve cord by the foetal head. It may occur after spontaneous or forceps delivery. All of their cases were in women of 5 ft. 0½ in. (154 cm.), or under, who had delivered babies between 7 and 10 lb. (3,175 and 4,535 g.) in weight: large babies for small women. Mild cases usually recover spontaneously within two to three months, however, and some of the present patients may have forgotten about it or thought the symptoms were not worth mentioning.

Summary

Twenty-seven vesico-vaginal fistulae are presented. Cephalopelvic disproportion is shown to play an important part in their causation.

Treatment was by vaginal repair in 17 cases, transplantation of the ureters in four, and reconstruction of the anus with closure of the vaginal introitus in one case. Three patients left hospital before their treatment was finished, and the completion of treatment was not seen in two cases.

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SERUM ELECTROPHORETIC CHANGES IN POLYMYOSITIS

BY

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The diagnosis of muscle disorders is ever a difficult clinical problem, and, even with the aid of a muscle biopsy, electromyography, and appropriate biochemical tests, the clinician may be forced to accept the unsatisfactory label of a "myopathy of undetermined aetiology."

Walker and Benditt (1950) and van Sande (1954) have suggested that serum electrophoresis is of value in the diagnosis of polymyositis. We believe a study of the proteins to be useful not only in diagnosis but for a better understanding of the nature of this disease. In support of this contention we report a group of six cases of proved polymyositis.

Method.—For this electrophoretic study we used Kohn's (1958) cellulose acetate technique, 5 μ l. of serum being applied under current (120 v. constant) on strips 12 by 2.5 cm. for one and a half hours. The barbitone buffer was pH 8.6 and ionic strength 0.05. The protein staining was done with 2 g. of Ponceau S. (G. T. Gurr) in 30 g./1,000 ml. trichloroacetic acid, while the glycoproteins were stained with Feulgen-Schiff, according to Bodman (1957). The quantitative evaluation was done with a reflectance densitometer (Chromoscan). Normal values are shown in Figs. 1 and 2.

Case 1

A 26-year-old West Indian man was admitted to Maida Vale Hospital under the care of Dr. S. Nevin on December 20, 1960, with a history of muscular stiffness and pain of three months' duration, starting in his legs and spreading to his upper limbs.

On examination he showed some generalized muscular wasting, more particularly of the shoulder-girdles and both hands. There was considerable muscle tenderness and weakness, and he was unable to sit up unaided or lift his head from the pillow. The limb-weakness was more proximal than distal, but he had flexure contractures of both elbows and fingers. He also had purulent bronchitis and a generalized lymphadenopathy. A diagnosis of polymyositis was made, and on December 22 the right deltoid muscle was examined with a needle electrode; the findings were those of myositis. A serum electrophoretic strip on

the same day (Fig. 3) revealed a considerable rise in the γ -globulin, followed by a decrease in the albumin fraction; 24 hours previously the E.S.R. had shown only a fall of 4 mm. in one hour (Westergren). Muscle biopsy of the medial head of the triceps on the right side was thought to be consistent with polymyositis.

Six days after admission he was started on prednisone 40 mg. daily, and by March, 1961, it had been reduced to 20 mg. daily. Further serum electrophoretic studies on January 2, 1961, showed changes similar to the initial strip,

FIG. 2. — Normal glycoproteins.

FIG. 1.—Proteins in normal serum.

FIG. 3.—Case 1. Electrophoretic strip. December 22, 1960 (see Table).

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