is invaded by bile-containing matter from the duodenum, it hastens to relieve itself of such abnormal contents through the oesophagus. The fact that free hydrochloric acid may, as would be expected, be present in the stomach contents, makes it highly improbable that the vomiting is due to excessive microbial accumulation and activity in the stomach, such as might result from stagnation of mucus, etc., in a quiescent viscus.

To recapitulate:

1. A certain proportion (27 per cent.) of patients with gastric ulcer vomit while on exclusively rectal feeding.
2. In some instances this may be due to oral infection, while in others it may possibly be the reflex result of rectal injections.

A CASE OF HERNIA OF THE BLADDER ASSOCIATED WITH AN INGUINAL HERNIA,

WITH REFERENCE TO THREE OTHER RECENT CASES.

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THE non-recognition of the complication which forms the subject of the following paper has not infrequently led to the most disastrous results. The danger is largely due to the possibility of such an association not being constantly borne in mind during the performance of a radical cure, whether of inguinal or femoral hernia. For this reason I am induced to publish these notes and illustrations.

During the period 1898-1900, a single case of hernia of the bladder associated with an oblique inguinal hernia, as usual on the right side, occurred at University College Hospital, London. It was successfully operated on by Mr. Bilton Pollard, whom I wish at once to thank for so readily permitting me to publish not only the notes I made as Surgical Registrar, but also the diagrams (Figs. 2-5) suggested by him to illustrate the mode of occurrence of many of these associated herniae. Fig. 1, which has been very cleverly drawn, from a rough sketch I made at the operation, by Mr. Shiells, of the firm of Messrs. Bale, Sons, and Danielsson, will serve to show the appearance presented when the hernial sac was opened, the protrusion of the bladder forming a prominence, spherical in shape, bulging into the back of the sac. The notes of the case are as follows:

Clinical History.—The patient was a fat, healthy-looking boy, aged 2½ years, admitted on January 10th, 1899, into University College Hospital, under Mr. Bilton Pollard's care, for radical cure of a good-sized inguinal hernia on the right side, said to descend to the bottom of the scrotum. After admission the hernia was, on one occasion only, noticed to have entered the scrotum. On the day of the operation (January 16th) there was no hernial protrusion evident. The right external abdominal ring was large enough to admit the tip of the little finger; nothing unusual was detected in the inguinal canal. The left external ring was not enlarged.

Operation.—Under chloroform, Mr. Pollard made the usual skin incision along the line of the inguinal canal, and after slitting up the aponeurosis of the external oblique muscle, a thin-walled hernial sac was fully exposed. The small vas deferens having been isolated the hernial sac was opened and found empty, but bulging into the back of it, over its lower half or two-thirds, was seen to be a globular swelling, about seven-eighths of an inch in diameter. The sac was carefully turned off this rounded prominence, and found to be cyst-like, of a faintly pink tint, and finely striated on its surface, the appearance of muscular fibres at once suggesting a protrusion of the bladder, devoid of peritoneal covering now that it had been freed from the hernial sac. Further examination showed it to be coming through the enlarged internal abdominal ring. The protrusion was found to lie internal to and partly behind the neck of the hernial sac, and then, escaping from the internal ring, to have invaginated itself as a finger-like process into the back of the sac, thus accounting for the spherical prominence bulging into the posterior wall when the sac was slit open.

Further confirmation of Mr. Pollard's diagnosis was obtained on passing a sound per urethram into the bladder, and so on readily into the protrusion. On removing the sound, this protrusion could be partly drawn out of the wound. As a point of some interest, perhaps, it may be noted that a fine white fibrous band (? part of the spermatic fascia) was seen to pass across the front of the sac, ending below in the tissue covering the testicle, but not into the testicle itself. Above, this band appeared to pass into the abdomen.

Completing the account of the operation, the sac was divided below the level of the bulging apex of the bladder protrusion. This is the stage depicted in Fig. 1, the muscular fibres only being visible, of course, when the sac was reflected off the protrusion. The edges of the sac were sutured. Then, holding aside the spermatic cord and carefully depressing the bladder, so as to avoid entanglement in the stitches, Bassini's

operation was performed in the usual way, five silk stitches being used to unite the back of Poupart's ligament to the conjoined tendon of the internal oblique and transversalis muscles. The spermatic cord was laid upon the new bed thus formed, which also served to safely cover in the bladder.

The divided external oblique aponeurosis was sutured with silk, and the skin incision with horsehair. The cyanide gauze dressing used was changed, two days later, for gauze and collodion, the child having soiled the original dressing with urine. The patient was discharged, with the wound soundly healed, on the twenty-second day after the operation.

Fig. 1.—Semi-diagrammatic, prepared from a sketch at Mr. Pollard's operation for radical cure of a right inguinal hernia, into the back of the sac of which a protrusion of the bladder was found bulging. [H. J. Curtis.] For the sake of clearness, the spermatic cord and other unnecessary details have been omitted. Beneath the skin incision and fat are seen, successively, the slit up and reflected edges of the aponeurosis of the external oblique muscle, the internal oblique muscle, escaping from beneath which, through the enlarged internal abdominal ring, is the hernial sac here shown opened out after its lower extremity has been cut off. Bulging through the posterior wall of the sac is seen a rounded swelling. On reflecting the sac off this, it was found to be finely striated and evidently muscular on its surface, and to be a protrusion of bladder herniated through the internal ring, internal to and slightly beneath the true hernial sac, invaginating the posterior wall so as to produce the appearance here figured. The course of events is rendered still clearer by a reference to the series of diagrams (Figs. 2-5).

REMARKS.

Points of interest in connexion with this case are:

- I. The mode of origin and the frequency of occurrence of such combined herniae.
- II. The possibility of diagnosis of such an association prior to, or during, the operation for radical cure.
- III. The right treatment of this condition.
- IV. The result of treatment in four other cases, hitherto unrecorded.

I.—The Mode of Origin.

The explanation in some of these cases of associated herniae is illustrated by the diagrams (Fig. 2-5) suggested by Mr. Pollard, who has kindly allowed me to have them reproduced. In Fig. 2 the normal condition is seen, the peritoneum ($x y z$) passing off from the fundus and side of the bladder (B) on to the side of the pelvis, to cross the oval gap marked R , through which the future inguinal hernia will escape. In the case of an oblique inguinal hernia this gap (R) corresponds with the internal abdominal ring.

In Fig. 3 the escape of the hernial protrusion ($x y z$) through the internal ring is seen to have commenced.

Should the peritoneal covering of the bladder for any reason be more adherent than usual, say, at the spot (*z*), then with the descent of the inguinal hernia and deepening of the hernial pouch, there will result a dragging outward and downward of the part of the bladder to which the peritoneum is abnormally adherent. This bulging or protrusion of the bladder is seen at Fig. 4 to be just entering the internal abdominal ring. Further protrusion of the bladder, *pari passu* with the descent of the inguinal hernia, is shown in Fig. 5, the pouch of the bladder (*p*) passing through and distending the internal ring, and then invaginating the posterior wall of the hernial sac; it thus comes to appear as a prominence bulging into the hernial sac when the sac is opened from the front in performing a radical cure. Fig. 5 therefore diagrammatically represents the condition found in Mr. Pollard's case, shown also in Fig. 1. The ligature (*l*), dotted in, illustrates the position in which the sac of the inguinal hernia is tied during the first part of the radical cure.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

The diagrams (Figs. 2-5), suggested by Mr. Bilton Pollard, illustrate the mode of occurrence in many cases.

In addition to the above explanation, applicable both to men suffering from the various causes of chronic bladder distension and to otherwise healthy children, McAdam Eccles, in his valuable work on *Hernia*, suggests that there may be a peculiar factor at work. "The bladder is normally surrounded by, and its muscular wall often infiltrated with, fat. This perivesical fat is continuous with the adipose tissue which extends along the spermatic cord and with that which passes up into the region of the kidney. It would appear that in some examples of hernia of the bladder, there has been a drag upon the bladder wall by this fat as it lies in the inguinal canal, and so there has come to be formed a hernia of the lateral wall of the viscus in much the same way in which a ventral hernia is sometimes formed in the linea alba."

The same writer estimates that hernia of the bladder is associated with probably 1 per cent. of inguinal herniae, and attention will subsequently be called to a case in which the bladder was found in the sac of a femoral hernia.

In the case now recorded the form of protrusion is decidedly rare, the bladder being only covered with peritoneum derived from the sac of the inguinal hernia into which it protruded. The bladder has also been known to descend without a covering of peritoneum, and without bulging into the hernial sac. In the commonest variety, according to McAdam Eccles, the inner wall of the sac of a direct or an indirect inguinal hernia is partly represented by the peritoneum covering the postero-lateral aspect of the bladder, the viscus lying at the side of the sac, and not in reality forming part of its contents, as in Mr. Pollard's case.

II.—The Possibility of Diagnosis of this very Serious Complication of an Inguinal Hernia either before or during the Operation.

In the majority of instances the diagnosis is only made at the operation undertaken for radical cure. In some cases,

however, a cyst-like swelling, dull on percussion, and which can be emptied by steady pressure, sometimes causing a desire to micturate, has been observed in immediate relation with the inguinal hernia. In other cases, without such additional swelling, the attention of the surgeon may be drawn by the patient to the fact that some difficulty in micturition occurs only with the descent of the inguinal hernia, not if this is kept in position by a truss.

In the first of these rare conditions confirmation of the presence of a hernia of the bladder should be sought for by observing the effect of steady pressure in reducing the size of the cyst-like swelling; and whether such swelling be present or absent, a sound should be passed per urethram into the bladder, and so on into any protrusion. In such a case the end of the instrument can be felt immediately beneath the skin.

Diagnosis before operation by means of the sound thus passed was successful in Dr. Taylor's recently recorded case, to which a brief reference will presently be made.

III.—The Proper Treatment of such Associated Herniae.

(a) When the presence of the bladder is recognized, as in the case reported, after carefully isolating from it the sac of the inguinal hernia, a radical cure, for example, by Bassini's method, should be performed as usual, gently depressing and so protecting the protrusion of the bladder by means of a spatula, during the passage of the deep stitches used to unite the deep aspects of Poupart's ligament to the conjoined tendon of the internal oblique and transversalis.

In uniting the aponeurosis of the external oblique muscle, and in closing the external abdominal ring, great care must be taken not to dip the needle too deeply, as is sometimes done in order to take up a few fibres of the internal oblique muscle, and thus bind down the weakened aponeurosis to that muscle. In doing so, it would be quite possible for a stitch, passing deeper than was intended, to enter the bladder in its unusually superficial position (see Section IV).

(b) If the bladder is seen to be wounded at the operation the incision must be closed by Lembert's sutures, and the radical cure proceeded with as usual, allowing, however, for deep drainage for forty-eight hours, so as to run no risk of leakage and septic peritonitis.

(c) Evidence of the bladder having been wounded may not be present until some time after the patient has left the operating theatre—it may be an hour or two or a day or so. Any such evidence will necessitate the immediate opening up of the wound and treatment according to general surgical principles, to prevent the occurrence of septic peritonitis.

Lockwood¹ records the following instructive cases:

1. Michel's case,² in which the accident was recognized by the passage of blood with the urine. Thirty hours after the operation the wound and the abdomen were opened and the bladder successfully sutured.

2. Macready, in operating upon a femoral hernia, unwittingly ligatured a bit of the wall of the bladder. No leakage occurred at first, but afterwards some urine ran from the wound, but ceased of its own accord.

3. Johnson Smith, in detaching an unusually large piece of fat from the sac of a right inguinal hernia, made an aperture into a finger-like prolongation of the bladder. The aperture, admitting the little finger, was closed with two or three silk sutures. Some months later lithotripsy was successfully performed by Lockwood, two small calculi having been seen through an endoscope. No traces of silk ligature were found in the detritus.

IV.—The Result of Treatment in Four other Cases hitherto Unrecorded.

The gravity of this condition of hernia of the bladder in association with an inguinal hernia, especially when unrecognized because of its possibility not being borne in mind, must be obvious, and will be emphasized by the following brief reference to four other cases, one of which was successfully operated on by Mr. Pollard some years ago at the North-Eastern Hospital for Children, Hackney Road, the other three being operated on within about the last two years elsewhere by other surgeons, and dying from septic peritonitis.

In one case the protrusion of the bladder was excised in mistake for the hernial sac.

In one case the protrusion of the bladder was excised.

In the fourth case stitches used to close the hernia wound were passed too deeply, and were found only at the necropsy to have caught up the bladder, which was recognized at the operation, but was concealed, rightly, during the passage of the sutures.

[After the present paper had been written the record of a very interesting successful case, by Dr. E. C. Taylor, appeared in the *Lancet* for June 6th, 1903.]

What has been said will serve to point the moral that unrelaxed vigilance must be observed in every case, and during every stage, of a radical cure of hernia, whether inguinal or femoral, the bladder, as already stated, being occasionally found in the sac of a femoral hernia.

REFERENCES.

¹ *The Radical Cure of Hernia, etc.*, 1893. ² *Med.-Chir. Trans.*, 1894, vol. lxxvii.

THE NECESSITY OF SHORTENING LARGE NERVES WHEN AMPUTATING.

By WALTER G. SPENCER.

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It is usual after tying the vessels, to draw out the large nerves from the surface of the stump and cut off a piece. The following brief notes of cases which have been under me in the Westminster Hospital show that when this procedure has been omitted, there has been an indefinite delay to the patient's recovery. The patient has been hindered from wearing an artificial limb and from returning to work, has had continuous pain in the stump, and has had to submit to minor operations and finally to a resection of the affected nerves.

Amputation is done nowadays only as a last resource, and the patient's condition is generally bad. Therefore, haste is essential, yet the minute or two required for shortening large nerves is indispensable.

In some of the cases described below the flaps were doubtless in a bruised condition owing to the accident, or had beforehand been undermined by suppuration, so that healing by first intention could not be obtained. Nevertheless, all the cases at length definitely healed, and when seen, no case showed a pointed or ulcerated stump. The whole of the chronic trouble was connected with the nerves. Besides the primary amputation scar, all the cases presented several secondary scars, of which the patients could not give an entirely clear account. Some may have been the result of making counter openings, or for removing fragments of bone, or have followed ulceration and sloughing. But others, according to the patients, were made to relieve the pain, presumably attempts to dissect out the ends of the nerves. If so, these operations had failed from being too limited. In all the cases it was clearly necessary to expose the nerves well above the mass of scar tissue in which they were most intimately involved.

CASE I.—A man, aged 54, had had a Chopart's amputation done for a crushed foot two years before. Healing was delayed until two fragments of bone escaped. He had not been able to put the foot to the ground. The stump was extended on the leg, the main scar and several small scars were excessively tender. A Syme's amputation was done and the nerves well shortened. In the stump the posterior tibial nerve and its branches were enlarged and matted together in the scar tissue. Later on I saw the man walking well with an artificial foot.

CASE II.—A young man was playing football when he fractured his patella. The patella was wired, the knee-joint suppurated, and pus extended up into the thigh. The thigh was amputated about the middle, and subsequently the bone was resected. When first seen the man was highly excitable; attempts to handle the stump sent him off in painful convulsions. One could see the main and several secondary puckered scars. I resected the sciatic nerve at the lower border of the gluteus, and dissected its large bulbous end out of the scar. The man's nervous symptoms disappeared, the stump could be freely handled, and an artificial limb could be worn, although I am afraid that it was not of much assistance owing to the shortness of the stump.

CASE III.—A man was shot through the ham and developed a popliteal aneurysm, for which, about ten days after the injury, the popliteal artery was ligatured in the upper part of its course. Gangrene followed, and the thigh was amputated through the lower third. Very shortly after healing he was supplied with an artificial limb. Having been a very muscular man the stump wasted, so that on admission he was wearing full-length trousers doubled up and wrapped round the stump within the excessively large bucket of the artificial limb. This may have aided in the development of the nerve end-bulb, for the scar had become gradually painful, and the pain had spread up the sciatic nerve. About 4 in. of the sciatic nerve was resected; a large bulbous end was densely connected with the amputation scar. After waiting six months the man was refitted with an artificial limb which he could use well.

CASE IV.—A farm labourer, aged 64, had had an amputation through the middle of the right arm three years before. The knives of a chaff-cutter had sliced off the hand and forearm up to the elbow, and the rollers had bruised the arm. The bone was afterwards resected. The stump had been throughout painful, and latterly attacks of pain seemed to

spread from the stump across the chest at the level of the second and third intercostal spaces. The stump presented secondary scars besides the main one, the soft parts were rather in excess and oedematous. The whole was very tender. There was no tenderness above the clavicle. An incision was made along the anterior axillary border, the axillary artery and vein well separated and ligatured, and then the three cords of the brachial plexus were resected just below the clavicle. Tracing them downwards, they ended in a mass of scar tissue, but were quite free from the bone, and all was removed by an oval incision. After healing the stump was painless, and there was no tenderness above the clavicle. But he continued to have paroxysms of pain in the chest, which were relieved by inhalations of nitrite of amyl. The patient had a high pulse tension, and his arteries were tortuous, but not specially so, not more than might be expected in a man of his age and class. There was nothing to be found abnormal in his heart. These attacks were regarded as angina pectoris. As to their connexion with reflex irritation from the stump or with ascending neuritis I remain doubtful.

CASE V.—A girl, aged 19, had injured her knee when about a year old, and eighteen months later an amputation through the upper third of the leg was done. Subsequently, she said, eight further operations were done, and there were numerous small scars on the stump, one in particular was over the course of the sciatic nerve in the lower third of the thigh. The stump had always remained painful, and she had got about on a kneeling pin. I made a Stephen Smith's amputation through the knee-joint, and followed up the sciatic nerve to the middle of the thigh, where it was resected. If the highest scar above mentioned was made in order to expose and divide the sciatic nerve, then the nerve had completely reunited, but was surrounded by fibrous tissue adherent to the scar. Following the nerve down, the external and internal popliteal nerves were traced into the scar tissue, the external popliteal ended in a large bulb about the level of the head of the fibula, and was closely adherent to the primary amputation scar, the internal popliteal nerve ran into a mass of scar tissue continuous with some of the secondary scars.

CASE VI.—A man, aged 20, had a Syme's amputation done for a foot crushed on the railroad about nine months ago. After some ulceration definite healing occurred at the end of fourteen weeks from the operation. The stump had remained painful, and it was impossible to bear weight on it. Besides the main scar, there was a bluish irregular scar from ulceration of the heel flap. Tenderness was felt in the course of the posterior tibial nerve as high as the middle of the leg and up the anterior tibial for 2 in. After amputating through the lower third of the leg by lateral flaps, I shortened the posterior tibial as high as the middle of the leg, and dragged out the anterior tibial for 2 in. In the part removed the much enlarged posterior tibial could be followed down into a mass of scar tissue attached to the scar at its inner end, where it formed a large bulb. On the anterior tibial was a small bulb, and this adhered both to the scar and to the lower edge of the tibia.

The result in Cases v and vi is good, in both a useful painless stump.

BRACHIAL NEURALGIA.

By ROBERT M. SIMON, M.D., F.R.C.P.,

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Up to within the last few years I have never seen or heard of a case of this description, but, since a personal experience, I have met with some half-dozen cases, though I have been unable to find in any book anything like an adequate description of the disease. Neuralgic pains affecting some of the branches of the brachial plexus are sufficiently common in aneurysm, cancerous growths in the thorax or axilla, and in aortic disease; but brachial neuralgia not symptomatic of these causes is a rare condition, and one of such extremely painful nature as to demand more than the very perfunctory attention it has received. It is questionable, however, if the term "neuralgia" is a proper one to employ, for the majority of these cases are not cases of neuralgia, but rather of perineuritis and secondary pain. The brachial plexus is derived from the four lower cervical and the greater part of the first dorsal nerves, and occupies a position amongst the muscles of the lower part of the neck and the upper part of the arm which renders it especially liable to suffer from injury to these muscles or to the fibrous tissue which surrounds them, and in all my cases, without exception, there has been history of some such injury. According to the textbooks, brachial neuralgia may occur in the course of ill-health, especially when associated with a rheumatic or gouty tendency; but I have been unable in my own experience or on inquiry from others to learn of such a case. It is quite possible that a depressed condition of health may predispose to its occurrence, but some violence is always necessary to its development.

CASE I.

An intimate friend of my own—a doctor—who had been much overworked and was in consequence in a bad state of health, became conscious, after playing rounders with some children, of a slight amount of pain near the bicipital groove of the humerus; the pain was not very