Both of these cases are liable to frequent attacks of *petit mal*, but they assure me that these attacks are not more frequent than they were under the bromide treatment. Both patients say that they feel infinitely better and brighter than when taking bromides. Cases 3, 4, 5 and 6 were, after some months' treatment with luminal, placed on bromide treatment for a fortnight. In all four cases the number of fits increased within two days, and I had to yield to their solicitations to discontinue the experiment. Cases 8 and 9 are two children, both mentally defective. Case 8 showed no improvement when treated with luminal, whilst Case 9 became decidedly worse. Some weeks after the luminal treatment was abandoned, and this child again put on bromides, she began to improve, and during the past three months has not had more than one fit a month.

CLASS B.—Cases with more than Four Fits a Month.

The results of treatment of cases in this class are recorded in the following table. Of the 51 cases, 4 were no better with luminal than with bromides, as evidenced by the number of fits, and 5 cases had an increased number of fits.

Table showing Average Incidence of Fits during Preceding Nine Months under Bromide Treatment, and during the last Three Months of a Year of Luminal Treatment.

No. of Cases.	Bromide Treatment.	Luminal Treatment.
3	15 to 17 fits a month—average 15	Average 3
2	10 to 15 " " " 12.5	" 7.5
16	7 to 10 " " " 9	" 6
30	4 to 7 " " " 5.5	" 4.5

CLASS C.—Fits Occurring One to Four Times a Month.

There were 29 cases in this class, with an average incidence of three fits a month during nine months under bromide treatment, and of 1.2 during the last three months of a year of luminal treatment. Eight of these cases showed practically no improvement, and one was distinctly worse when treated with luminal.

CLASS D.—Fits Occurring less often than One per Month.

There were 15 cases in this class. The average incidence of fits during nine months under bromide treatment was 0.8 a month, and during the last three months of a year of luminal treatment 0.9. Seven cases showed no improvement, and two had fits with slightly greater frequency.

CLASS E.—Fits Occurring in Bouts of Several in Succession not oftener than Once a Month.

Under this heading there were 13 cases. The number of fits in succession during nine months under bromide treatment averaged 4, and during three months under luminal treatment 5. Six cases showed no improvement as to frequency of fits; 3 were somewhat worse. The absolute numbers of fits occurring during a bout is seldom very reliable. The best interpretation of these results would probably be to consider that luminal showed no advantage over bromide treatment. Eight cases of traumatic epilepsy in which the lesion had occurred not less than five years previously were treated with luminal. Of these cases, 7 showed definite improvement under luminal, whilst one patient who suffered from fits occurring in bouts was unaffected.

A study of the results here recorded shows that 36 cases out of a total of 125 were either not improved or deteriorated under luminal treatment, whilst the remainder did better under luminal than under bromide. The cases most beneficially affected by luminal were those with fits occurring at frequent intervals, and the cases least affected were those whose fits occurred in bouts at considerable intervals of time.

The interpretation of these results is a matter of some difficulty; to make the experiment complete it would be necessary to know the frequency with which the fits would have occurred when the patients were observed for lengthy periods in an untreated condition, and this for

obvious reasons was impossible. I hesitate to believe that luminal exercises a selective action on those forms of epilepsy in which the fits occur with the greatest frequency; it appears to be more probable that a class of epileptics exists who are more refractory to bromide treatment than others, such a class would obviously show the greatest number of fits when treated by bromides, at the same time these patients are not less susceptible to luminal than their fellows, and consequently it is with these cases that the drug shows its most marked effect.

The doses of luminal employed have rarely exceeded 6 grains a day of the sodium salt.* Using such small doses I have hitherto been unsuccessful in determining to what degree, if any, it undergoes change in the body. The only method so far available of recovering it from the urine is to shake it out with ether, and when the total weight recoverable in a twenty-four hours' specimen of urine does not exceed 6 grains it is futile to pronounce on the possible destruction of small fractions in the body. The sodium salt was administered on all occasions on account of its solubility, but there is little doubt that in the acid stomach it is converted into the insoluble acid.

It is the rapidity with which the insoluble acid is passed on to the duodenum and its relative dilution with the gastric contents that may, by varying the rapidity of absorption, be responsible for the occasional appearance of slight toxic symptoms such as giddiness and drowsiness. The earliest period after ingestion at which I have been able to demonstrate its presence in the urine is three hours.

The drug is, as a rule, well tolerated, and most patients found that they were far brighter and more cheerful after a change to luminal from bromide treatment. In twelve cases, however, the patients complained of giddiness and drowsiness. Five of these patients showed definite affection of the gait, reeling slightly as if under the influence of alcohol. By diminishing the dose of luminal I was able to secure eventual toleration in all but four patients, who complained so persistently of giddiness that the luminal treatment was suspended. Urticarial rashes appeared in two cases at the onset of treatment, but disappeared when it had been continued for a few days.

There has in no case been any signs of the formation of a drug habit, and suspension of the treatment has never given rise to any disturbance. There is a tendency in all cases for the number of fits to increase slightly after the first two months of treatment. I have refrained from increasing the strength of the dose given, as I wished to determine whether this tolerance was a progressively increasing factor, but I found little evidence of this. In a series of 20 cases the average number of fits per month after a month's treatment was 21; after two months, 30; after four months, 36; and after ten months, 32.

It is to be regretted that no English firm has been willing to undertake the manufacture of this important drug, which is at present only obtainable from Germany. The more toxic compound known as dial, which I have endeavoured to substitute for it, is only manufactured in the form of the insoluble acid salt, and the giving of boxes of pellets of a poisonous hypnotic to epileptic out-patients is a measure of doubtful expediency.

RECURRING DISLOCATION OF THE SHOULDER-JOINT.

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DISLOCATION of the head of the humerus from the glenoid cavity of the scapula occurs from congenital, pathological, and traumatic influences; with the two former categories we are not here concerned.

The initial dislocation from traumatism is usually very painful, not so much from the actual displacement as from the reflex muscular contractions, which occur in spasms of great severity, driving the head of the humerus against sensitive structures in the proximity. Once the reposition has been effected, prolonged abstention from

* Luminal is phenyl-ethyl-barbituric acid, a modification of veronal, an ethyl group being replaced by a phenyl radical. It is almost insoluble in water. The sodium salt is readily soluble.

violent movement is advisable. The integrity of the ruptured, or stretched, capsule and ligaments can hardly be re-established under three months, unless by soft, plastic repair tissue devoid of tensile strength.

If, from want of proper rest and adjustment of the injured capsule and ligaments while undergoing repair, or if, by reason of the severity of the primary traumatism, dislocation soon again recurs, those ligamentous structures which are concerned in retaining the bones in position are liable to become permanently elongated, leading to the condition of recurring dislocation.

This chronic disability is not usually painful but it is inconvenient, and when well established it takes place with annoying frequency, often on the most trivial occasion—for example, serving at tennis, throwing a cricket ball, brushing the hair over the occiput, washing the back, stepping unexpectedly off the kerbstone, stumbling in the dark.

The head of the humerus, we are taught by the anatomists, maintains its position by reason principally of the support of the circumjacent muscles. In rest and in gentle and limited movement this may be true, for the tonus of these muscles acts as a constantly approximating factor. In movements of wide range, however, or when the relaxed musculature, taken unawares, is put to sudden strain, the capsule acts as a check ligament, or as a conjoined series of check ligaments, and is indeed the essential feature in maintaining the opposition of the articular surfaces. If the capsule, with its special developments, the coraco-humeral and gleno-humeral ligaments, is too loose, or stretched, or torn, the more lateral attachments and elasticity of the muscles operating the joint, and the insufficient adjustment of the osseous contour permit an unusual degree of mobility of the humeral head in its articular seating.

This *a priori* statement, which is contrary to that generally accepted, that the integrity of the capsule is the prime factor in maintaining the bony elements of this joint in proper juxtaposition, receives support from the fact that in neuropathic affections of the shoulder-joint, as in syringomyelia, or in cervical tabes, the acute distension with mucous fluid leads to rapid relaxation of the capsule and dislocation, frequently apart from and prior to any absorption of bone; although admittedly there is often some degree of hypertonus of the local musculature from infringement of the centripetal sensory paths.

On the other hand, in the Erb-Duchenne type of palsy, or in gunshot wound of the neck involving the upper cords of the brachial plexus, dislocation does not occur, though the arm may fall one to two centimetres. This relative importance of the ligamentous and muscular structures seems to be equally true of most of the other joints.

The musculature of the shoulder, in addition to its tractive action, forms also a firm housing for the joint, except below. Here the capsule is unsupported, and hangs pendent between the teres minor and scapular head of the triceps behind and the subscapularis in front. In abduction it is taut, over what is now a linear aperture between the same muscles. The majority of dislocations take place primarily in abduction, and through this space, the head of the humerus being levered, or pulled, over the lower quadrant of the glenoid articular rim.

The textbooks consulted recommend that recurring dislocation of the shoulder should be treated by stitching up the torn capsule, tightening the loose area, or resecting the redundant part, in addition, of course, to the repair of any obvious bony deformity which may be present. As a rule this is not easy, and it is not always successful. Another type of operation has been devised to meet the exigency (Openshaw). In this the tendon of the subscapularis is severed, the capsule is opened, the head dislocated, and about half the articular surface sawn off in a nearly vertical plane. The opposing surface of the glenoid cavity is obliterated. This leads to fibrous union of the central portions of the articular surfaces, which, with active and passive movements, later develop into a short, strong ligament holding the bones in association. The conception of this operation is scientific, but it disables the joint for a long time. Furthermore, unless the patient applies himself with assiduity and fortitude to the vigorous after-treatment indicated, a firm fibrous or bony ankylosis remains, with very deficient mobility, though certainly dislocation will not occur again.

In my last five cases the following operation has been

performed with entirely satisfactory results. It is devised on the principle of strengthening the suspension of the limb at the site and by means analogous to those of a normal joint.

Operation.

An anterior incision is made in the delto-pectoral sulcus, from the clavicle as far down, if necessary, as the insertion of the deltoid. This muscle is now well reflected, exposing the anterior and lateral aspects of the capsule and permitting digital access to the posterior. With the arm in abduction to relax the deltoid a drill of large size is driven antero-posteriorly through the humerus, medial to the tendon of the biceps and through or close to the insertion of the subscapularis tendon; this about the level of the middle of the articular surface of the head. The drill passes backwards horizontally and emerges through the great tuberosity behind. It perforates easily, as the bone, excepting the superficies, is of a loose cancellous texture. The diameter of this tunnel should be about 1 cm.

By inserting the finger between the deltoid and posterior part of the bone the drill can be felt emerging. Any vessels severed are tied and the wound temporarily covered. The capsule of the joint is not opened. A long incision is now made on the lateral aspect of the thigh, exposing the fascia lata for its full length. A strip of this fascia is excised, about 30 cm. (or 12 in.) long and about 4 cm. (or 1½ in.) broad. The fascia lata incision is sewn together and the thigh wound closed. The excised strip is now rolled or folded up into a compact cord and sewn with a running stitch of linen thread or silk into a firm ligamentum teres.

The shoulder operation area is again exposed. A silver wire with a loop, or a pliant probe, is used to draw a strong linen thread through the tunnel, and this in turn being fixed to the extremity of the artificial ligament pulls it antero-posteriorly through the bone. The arm must be abducted and rotated to give the maximum space between the deltoid of the humerus, otherwise manipulation is difficult and the posterior exit of the tunnel not of easy access.

A small incision is now made on the upper aspect of the clavicle lateral to the coracoid process, exposing the bone, from which the soft parts are freed. With a curved pair of pressure forceps passed in front of the clavicle and burrowed through the deltoid the posterior extremity of the artificial ligament is pulled up and slung over the clavicle. By again directing the forceps from the anterior incision through the tissues (avoiding the coraco-acromial ligament, which can be felt) and causing the forceps to emerge posterior to the clavicle, the artificial ligament is drawn once more into the original operation area. Both ends are seized in forceps, drawn taut (with the arm at an angle of 45 degrees from the side), overlapped, and sewn securely together with silk or linen thread.

Thus a firm figure of 8 ligament is made to suspend the humerus through, approximately, its axis of rotation in the movement of abduction, to a fixed osseous buttress above. This ligament interferes in no wise with rotation or excursions of normal limitations. While permitting rolling of the articular surface it prevents descent of the head, which is the first tendency towards ordinary dislocation whether due to paretic musculature or stretched ligaments.

Any looseness of the capsule (and this cannot often be demonstrated) is repaired by taking in a reef, usually in front and below. This can be done by raising a ridge in the line of the fibres, transfixing its base with a continuous mattress suture of linen thread, further strengthened by a running continuous suture along the summit of the ridge.

The operation is considerably abbreviated by employing two or three strands of strong silk as the suspensory material. This was done in one case with equally good result. There is, however, a possibility that the thick alien material may give trouble in the course of time. The arm is well supported in a sling and rested for six weeks. Gentle movement only is advisable for three months.

Note: This paper was read on October 29th, 1920, at a British Medical Association meeting in Cape Town. The cases and operations referred to were performed and recorded on the clinical history cards and operation books of the S.A. Military Hospital, Richmond, Surrey, in 1917-18-19, and in the Wynberg Military Hospital, Cape Province, in 1920. By the mail from Europe of about November 8th, 1920, an article in the *Zentralblatt für Chirurgie* delineates a somewhat similar operation recently successfully tried on one case, an epileptic.