RECURRENT LUXATION OF THE ULNAR NERVE.

BY F. J. COTTON, M.D., BOSTON.

THE following examples are presented as belonging to a class of cases which have been definitely described but apparently not often mentioned, perhaps not always recognized. The cases were seen by the writer while acting as out-patient surgeon at the City Hospital.

CASE I. A woman, age twenty-five, fell and struck her elbow. Following on this she had much pain on attempting to use the arm. This state of things continuing for a week, she came to the hospital. Examination showed an elbow slightly puffy and tender all about the joint, but without any evidence of bone-lesions or of effusion into the joint. Attempted motion caused a good deal of pain at the inner side of the elbow, and a tender cord was to be felt lying in front of the internal condyle. On extension of the elbow this cord slipped back behind the epitrochlea to the normal position of the ulnar nerve. The nerve seemed thicker than normal to the feel and when it was rolled under the fingers the patient complained of local pain and of pain referred to the last two fingers and the ulnar side of the hand. This referred pain was, however, not severe, hardly more than was caused by like pressure on the ulnar nerve of the sound side, while the local sensitiveness of the nerve trunk was much increased.

The forward luxation of the nerve occurred with each flexion when a right angle was reached; the nerve slipped back spontaneously with each movement of extension; slight pressure over the internal epicondyle sufficed to prevent the luxation on flexing. The nerve in luxation came forward well in front of the epicondyle. Motion of the arm was painful, the pain, curiously enough, being referred rather to the thumb than to the ulnar distribution, but the prominent subjective symptom was pain at the elbow itself on motion. There was no paresis, no numbness, no paresthesia. The arm was put up in a splint at an obtuse angle, and a pad placed over the internal condyle to guard against luxation of the nerve.

After a fortnight's fixation there was little pain and sensitiveness and somewhat less tendency for the nerve to slip out of place, while the excursion of the nerve in flexion was somewhat less. The pad and bandage were continued, the splint omitted. Massage was begun and light use of the elbow allowed.

The subjective symptoms improved slowly but steadily, and the patient soon discontinued treatment. When looked up four months later, she could use the arm nearly as well as ever and complained only of occasional darting pains in the hand. There was no numbness, no paresis. On palpation, the thickening of the nerve trunk proved to be entirely gone. The nerve still slips out of its normal place when the elbow is flexed, but slips only inward to the tip of the epicondyle, not in front of it. At times on active flexion the patient is conscious of a more decided snapping of the nerve. No further treatment was carried out.

CASE II. A girl of eleven fell and struck the elbow in falling. Three days later she came to the hospital with an elbow slightly swollen but showing no synovial effusion. The bones were intact. Motion of the arm was painful and there was some

spontaneous pain in the middle and ring fingers but no referred pain in the ulnar distribution. On flexion of the elbow the ulnar nerve slipped out of place with each flexion when an angle of 30° beyond the right angle (that is, an angle of 60° of upper arm and fore-arm) was reached, moving inward and forward to a point a little anterior to the internal epicondyle, but the range of the luxation was much less than in the previous case. The nerve trunk was not obviously thickened; on pressure on it there was distinctly increased sensitiveness of the nerve itself, but no referred pain or tingling. This rather unusual insensitiveness was equally to be observed on the sound side. Motion of the injured elbow was only moderately painful.

The arm was put up in an internal angular splint at a right angle, in which position the nerve remained in place. After three days there was practically no pain, much less sensitiveness on manipulation and perhaps slightly less range of the luxation of the nerve. The splint was continued and massage begun. There was a gradual improvement in symptoms till an approximately normal condition was reached, except that the subluxation still occurred in flexion.

In this case there was a history of a fracture at or near the elbow at two years of age, and though there was no deformity to be made out, yet there is no evidence that the recurring subluxation may not have existed prior to the recent injury, though the subjective symptoms were evidently due to the recent hurt.

CASE III was a boy of about ten. Here also the luxation was the result of a fall — three days before — and amounted really only to a subluxation, the nerve not passing beyond the tip of the condyle. The symptoms were only local sensitiveness and some pain at the elbow on motion — there were no signs of damage to the nerve itself. The patient did not return, and the course of the injury is not known.

In searching the literature for recorded cases the writer has found a considerable number, only a portion of which, however, belong to the traumatic class.

Blattmann described a case as early as 1851. Gruber, in 1867, described anatomically, but not clinically, a luxation of the ulnar nerve. The first adequate accounts of the recurring luxation seem to be those of Lutz in 1879 and of Zuckerkandl in 1880.

The cases recorded group themselves into two classes — practically distinct — the "habitual" luxations, where there is no known exciting cause for the dislocation, which may or may not be associated with symptoms, and the traumatic series, where there are almost invariably accompanying symptoms of greater or less severity. The trauma acting as the cause may be direct violence or muscular over-exertion or simply habitual over-use of the elbow.

In all these cases of either class the external anatomical condition is much the same; when a certain degree of flexion is reached the nerve moves inward to the tip of the internal epicondyle, and in the severer cases snaps over it to lie on its anterior surface a centimetre or less in front of its tip only to return to its normal position when the elbow is again extended.

The exceptions to this type — the permanent luxations of the nerve — seem to be very unusual. Schilling reports a case (non-traumatic) where the luxation on one side was permanent, on the other recurrent; a report of Poncet's seems to imply, though it does

not state, a permanent luxation, and the same may be said of Cunningham's report.

Of the congenital or habitual luxation many cases are reported. As to symptoms: in Schilling's case there was marked weakness and considerable atrophy in the muscles supplied by the ulnar; in MacCormac's case there was numbness and weakness enough to prevent work and to necessitate operation; in Zuckerkandl's, local fatigue on exertion; in Poncet's, numbness and pain, etc. On the other hand there are many cases without other symptoms than those following an occasional blow or pressure on the exposed nerve or without any symptoms at all.

Collinet examined 500 patients with a view to settling the frequency of the condition and found 13 in whom the nerve luxated forward in flexion, in 5 of them on both sides. Drouard carried out a like investigation on 200 subjects and found the complete luxation occurring in 3 cases only, though 15 others showed an abnormal mobility of the nerve in flexion.

Part of these cases showed no symptoms whatever, in some there was numbness and tingling in the third and fourth fingers when the elbows rested on a table or when the nerve was struck. In this connection it is interesting to note that wood engravers who rest the elbow in working sometimes develop, according to Bruns,¹ a partial paralysis of the hand muscles, etc., as a result of the pressure of the bench on the ulnar nerve, so it would seem that such symptoms as just described are not quite special to the cases under consideration.

The sum and substance of this list of non-traumatic cases would seem to be that the luxation per se usually gives but little trouble and may exist unknown to the patient, to be found out (as were so many of those described) only by a systematic examination.

To pass on to the traumatic class, we find usually, though not always, a more considerable train of symptoms, least in the cases in which over-use or a single muscular strain is the cause. Cases of this sort are reported by Blattmann, Jalaguier, Holden, Lutz and Lange, which showed no symptoms beyond some pain at the elbow and moderate tingling and numbness (on pressure, or spontaneously) in the parts supplied by the nerve. In Drouard's case, on the other hand, though the nerve was simply snapped out of place by forcible flexion of the elbow, numbness, atrophy, and contractures of the last two fingers developed, leading to almost entire uselessness of the hand. The patient in this case was an alcoholic, and this may have had something to do with the development of the neuritis from relatively slight injury.

Where the trouble has been the result of a fall or a blow, there are usually nerve symptoms, not necessarily severe. In cases noted by Cunningham, Pique, Smith and Tronson, in Anger's case (the result of a dislocation of the elbow), as also in the writer's cases, the symptoms on the part of the nerve which persisted after the local damage had quieted were comparatively slight—occasional pain or tingling and sensitiveness of the nerve-trunk to pressure. In Wharton's case there was a good deal of pain in the distribution of the nerve; in Schwartz's, considerable numbness. In Felkin's case there was, beside the local pain at the elbow, neuralgic pain and numbness, lasting for some weeks, and flexion-contractures of the third and fourth fingers. Annequin reports

paresis of both sensation and motion, Andral loss of sensation in the area supplied by the ulnar, atrophy, and flexion-contracture of the little finger.

In looking over the histories of these cases, we find the nerve symptoms following directly on the injury, and subsiding gradually, more or less independent of treatment. This is important as showing the nerve damage due to the original trauma, not to the irritation from the slipping of the nerve. As to the actual pathological condition which the symptoms represent, the data are scanty. The only autopsy is Schilling's; in this case the nerve and its sheath were considerably thickened for about 4 centimetres of its length at the elbow. In Schwartz's account of his operation he speaks of the nerve being locally thickened and reddened, and Croft found it in his case slightly thickened. In Drouard's case and in one of the writer's there was apparent thickening on palpation.

In Drouard's case, in that of Schilling just noted, in those of Annequin and Andral, and perhaps in MacCormac's, it seems fair to assume secondary degenerative changes in the nerve, but in most of the cases it is probable from the data given that the pathological process is essentially perineural, primarily a damage to the structures enclosing and fixing the nerve with possibly mild interstitial neuritis, rather than any considerable damage to the nerve-fibres.

There has been a good deal of theorizing as to the gross anatomical conditions in these cases as well as in regard to the pathology. As for the congenital or habitual cases, there must evidently be much laxness of all the fibrous tissues closing the groove in which the nerve lies, for Raymonceq's experiments on the cadaver showed that it was necessary to cut away a good deal in order to free the nerve so that it could be dislocated. Given this laxity or absence of the fibrous tissues, the experiments on the cadaver by Zuckerkandl and Raymonceq have shown that the triceps, unless very small, spreads inward enough on flexion to shove the nerve in front of it over the tip of the epitrochlea and this irrespective of the existence of a small epicondyle or of a cubitus varus to favor its easy transit. This spreading inward of the triceps on flexion can readily be demonstrated on the model or on oneself and seems to explain fully enough what causes the recurring luxation when once the nerve is freed.

As for the smallness of the condyle, and more especially the cubitus varus, alleged as a cause, it is evident that neither of these can more than present a favorable condition. There seem to be only 2 cases where there was actually a cubitus varus (Zuckerkandl, Poncet). The writer's second case had had a fracture, but there was no deformity.

As to the action of trauma in producing the condition, it may be assumed that some of these cases had naturally weak or lax fibrous attachments in this region, but in approximately normal elbows a good deal of tearing must accompany the loosening up of the nerve. Jalaguier says at least the fibrous arch of origin of the flexor ulnaris must be torn, and Annequin, in the description of his operation, actually notes such rupture and also the finding of torn shreds of fascia higher up. It would seem that the rupture may result either from the tearing of the tissues by muscular overaction or from the ripping force of a blow from without.

The treatment carried out in these cases has been

¹ Bruns; *Neurol. Centralblatt*, 1895.

either fixation with or without massage, or operation. Nine cases are reported in which an operation was carried out.²

The operation has usually aimed at the re-formation of the groove to contain the nerve. Either fibrous tissues have been trimmed out and loosened to make the groove in which the nerve was laid (Annequin, Poncet, Smith) or the edge of the triceps has been carried across and hitched to the internal epicondyle, leaving the nerve beneath the bridge so formed (Croft, Smith) or a slip of fascia, dissected up from the covering of the epitrochlear group of muscles, has been carried outward and stitched to the triceps (Schwartz). Croft, beside forming a groove, stitched the nerve sheath down and Jopson laid the nerve in a groove made in the triceps, stitching the fascia over it. Andral, for some occult reason, resected two or three centimetres of the nerve; the function of the nerve returned, but the luxation was not cured.

The other operations were all successful in curing the luxation. In some of the cases the surgical interference was followed by increased symptoms of nerve irritation; luckily these symptoms proved only temporary (Croft, Jopson).

It is impossible to study the recorded cases without coming to the conclusion that the operation is one for the luxation only, and can cure only such symptoms as are really due to the luxation. The chance of a cure of the luxation itself by conservative methods is poor; only one such success is reported (Plicque), but in many other cases, including the writer's, conservative treatment has brought about a relief of all symptoms, at least as soon, probably, as if the region of the damage had been stirred up by an operation, and the persistence of the luxation has not seemed to be of any moment. Where the nerve damage is directly due to the irritation of the constant dislocation, or where symptoms on the part of the nerve persist unduly long after the first effects of the trauma have worn off, the question of operation comes up. The operative treatment seems, so far as it goes — that is, for the luxation — to be without notable drawbacks and effective, but the writer is impressed with the notion already voiced by Quenu in his paper on the subject, that it is the nerve symptoms, not the luxation in itself, that should first be considered in deciding between conservative and operative treatment.

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Medical Progress.

RECENT PROGRESS IN NEUROLOGY.

BY PHILIP COOMBS KNAPP, A.M., M.D., BOSTON.

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MYELITIS.

HOCHE,¹⁰ recognizing that the term "myelitis" has often been applied to conditions which were not of inflammatory origin, has undertaken a series of experiments to determine more accurately the real nature of certain of the changes in the spinal cord. In the first series of experiments he produced embolism of the spinal arteries by the injection of aseptic substances into the aorta of dogs, using lycopodium, Kamala seeds, the pollen of typha japonica, etc. Such emboli caused hemorrhagic infarctions and necrosis of tissue in about thirty hours. This resulted in the formation of cavities which did not resemble those of syringomyelia. In the necrosed tissue were many granular cells, which were derived from leucocytes, neuroglia cells or connective-tissue cells, the large cells being always derived from connective tissue. The neuroglia showed a very sluggish tendency to produce new tissue to replace that destroyed, but the new tissue was chiefly of connective-tissue origin. The walls of the arteries plugged reacted to the mechanical and perhaps to the chemical nature of the emboli, and were thickened and infiltrated with small cells, which also invaded the perivascular tissue. The reaction varied with the substance injected. In a second series of experiments he injected cultures of various bacteria, Frankel's diplococcus, staphylococcus aureus, bacterium coli commune, etc. The changes differed from those of the first series in the presence of mycotic emboli, and the more intense and more diffuse cell infiltration about the smaller blood-vessels, with many foci of round cells about the infiltrated vessels. There were also foci of leptomenigitis, especially after the injection of the bacterium coli commune. The alterations did not extend beyond the region of the cord reached by the bacteria, showing, therefore, that they were not due to the action of substances in the circulation produced by the bacteria. The changes were very similar to those of acute infectious myelitis in man. Acute myelitis, in the strict sense of an acute inflammation, is applicable only to a very limited group of cases of infectious origin. In the later stages of various pathological processes changes occur not unlike those of true inflammation, such as the formation of granular cells, the occurrence of swollen axis cylinders, etc.; and we very rarely have an opportunity to observe in man the early stages of any of these processes, in which stages alone can the true nature of the process be determined. We must exclude all cases of central softening from thrombosis in tubercular and syphilitic arteritis, the changes from compression, the rare changes from embolism, the cases of ischemic necrosis, as in caisson

¹⁰ Archiv für Psychiatrie, xxxii, 209, 975, 1899.