

NERVE COMPRESSION BY SIMPLE GANGLIA

A Review of Thirteen Collected Cases

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The precise etiology of the simple ganglion has always been a matter of some dispute. In most of the cases to be described a definite connection with the neighbouring joint or joint capsule was established at operation. On only one occasion did the histology of the excised ganglion resemble that of synovial membrane. However, it is generally accepted that if a synovial herniation becomes loculated as in a Baker's cyst, the lining membrane can undergo a metaplastic change to mesothelium. While the predisposing factors responsible for the formation of ganglia are by no means certain, accumulated evidence suggests that trauma to the joint may be important, and in cases of established osteoarthritis they are common.

Simple ganglia seldom give rise to serious symptoms and indeed their unsightly appearance in the neighbourhood of the wrist and hand is often the sole reason for seeking advice: in these circumstances the diagnosis and treatment are simple. The following collection of cases illustrates a less frequent manner in which they may present, namely by causing pressure on an adjacent nerve and producing a variety of neurological symptoms.

Since the ganglia were found to arise near joints, cases will be described in relation to the elbow and wrist in the upper limb and the knee and ankle in the lower limb. A series of cases of compression of the deep branch of the ulnar nerve in the hand by carpal ganglia is described elsewhere by Mr H. J. Seddon.*

CASE REPORTS

GANGLIA NEAR THE ELBOW

Case 1 (Contributed by Mr O. J. Vaughan-Jackson)—Man aged forty-eight years. Machine oiler. Complained of increasing numbness and tingling in the little finger of the right hand over a period of six weeks. He recalled no specific injury to the limb but had noticed that he had been unable to straighten the elbow fully.

On examination, there was an ill-defined, oval, elastic swelling about 5 centimetres in length within the flexor mass below the medial epicondyle of the humerus. Its lower pole was freely movable from side to side. Pressure on the swelling caused paraesthesiae in the little finger. The nerve felt rather thickened as it traversed the ulnar groove. *Neurological findings: Motor*—There was no wasting but definite weakness of the ulnar intrinsic muscles of the hand and a positive Froment sign. *Sensory*—Anaesthesia of the whole of the little finger and hypoaesthesia of the ring finger. *Radiographs* showed well-marked osteoarthritic changes in the joint (Fig. 1).

Operation—An oval cystic swelling, a simple ganglion, was discovered lying deep to the flexor mass, arising from the deep surface of flexor carpi ulnaris and attached by its upper pole to



FIG. 1

Case 1—Radiographs of the elbow showing osteoarthritic changes.

* See page 386 of this issue.

the medial surface of the olecranon and capsule (Fig. 2). The nerve lay in a narrow groove between the upper pole of the swelling and the medial surface of the olecranon and, after excision of the ganglion, was found to be markedly compressed and attenuated over a distance of 3 centimetres (Fig. 3). Proximal to the point of compression the nerve was oedematous and thickened. The ganglion was excised and anterior transposition of the nerve carried out. *Histology*—The histology of the cystic swelling was that of a simple ganglion.

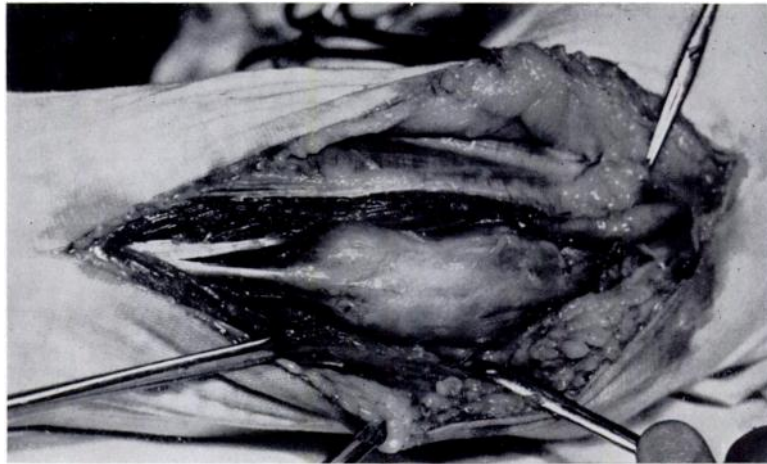


FIG. 2

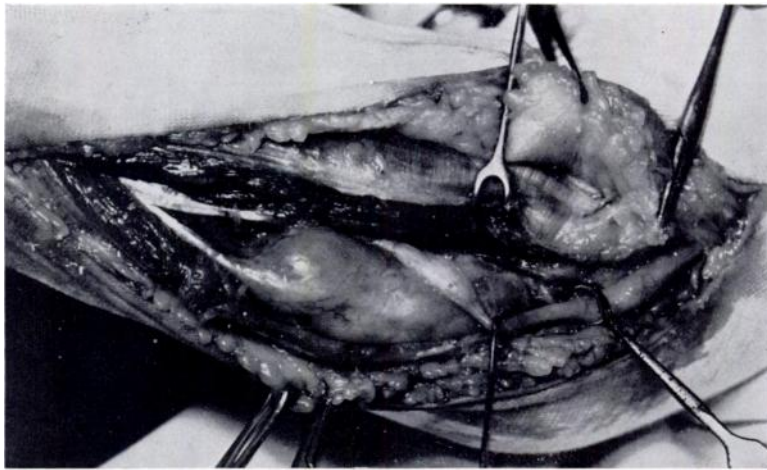


FIG. 3

Case 1. Figure 2—The ganglion exposed showing, just above it, the oedematous nerve lying in the groove behind the medial epicondyle (the position of the epicondyle is indicated by the artery forceps). Figure 3—The ulnar nerve has been mobilised from the groove behind the medial epicondyle. Note, just distal to this, the very narrow groove between the ganglion and the olecranon. Note also the marked narrowing of the nerve in the area of compression.

Progress—Three months after operation there was some objective evidence of sensory recovery but no change in voluntary power.

Case 2 (Contributed by Mr R. G. Pulvertaft)—Man aged twenty-eight years. Pork butcher. Complained of increasing flexion of the ring and little fingers of the left hand of one month's duration, associated with pain radiating from the elbow to these fingers. He himself had noticed a swelling on the inner side of the elbow for the same period.

On examination, there was a firm oval swelling, 1.5 × 0.5 centimetres, in the region of the medial epicondyle of the humerus. *Neurological findings: Motor*—Slight wasting and weakness of all muscles innervated by the ulnar nerve. *Sensory*—Hypoaesthesia in the ulnar cutaneous distribution. *Radiographs* showed no abnormality of the elbow or thoracic inlet.

Operation—A ganglion was found arising from the medial capsule of the joint at the point where the nerve emerged from the ulnar groove. The ganglion compressed the nerve on its postero-medial aspect against the joint. The ganglion was excised and the nerve was transposed.

Progress—There was immediate relief of pain, and a gradual improvement in voluntary power and sensibility was observed. Eight weeks after operation, no subjective or objective disturbance of sensory or motor function was detectable.

Case 3 (*Author's case*)—Man aged sixty-seven years. Labourer. Complained of pain on the inner side of the left elbow radiating to the ring and little fingers, associated with weakness of the hand and numbness of these fingers, for about four weeks. He had sustained a blow on the inner side of the elbow some two and a half years previously and since that time had been unable to extend the elbow fully. Within the last four weeks he had noticed a lump on the inner side of the elbow. *On examination*, there was an oval swelling 3 × 4 centimetres situated below the medial epicondyle of the humerus, mobile in a transverse plane. Palpation of the swelling caused paraesthesiae in the ring and little fingers. There was some thickening of the nerve in the ulnar groove proximal to the swelling. *Neurological findings: Motor*—Marked wasting and weakness of all the ulnar-innervated muscles, intrinsic and extrinsic. *Sensory*—Anaesthesia of a classical ulnar distribution. *Radiographs* showed marked osteoarthritic changes in the elbow joint.

Operation—A ganglion was identified below the medial epicondyle, extending over the deep surface of flexor carpi ulnaris. It was traced proximally to the medial surface of the olecranon. No connection with the elbow joint was established. The nerve was compressed by the ganglion but was also thickened as it traversed the ulnar groove proximal to the ganglion. Anterior transposition of the nerve was performed after excision of the ganglion.

Progress—There was a rapid disappearance of pain and after one month hypoaesthesia and tingling alone remained. One year later, wasting and weakness of the intrinsic muscles was still observed but there was no disturbance of sensibility.

Case 4 (*Author's case*). Man aged sixty-four years. Farm labourer, brother of patient described in Case 3. Complained of numbness and tingling in the ring and little fingers, which had been present for seven weeks and was associated with pain in the forearm and weakness of grip.

On examination, there was some thickening of the ulnar nerve in the ulnar groove. Palpation caused paraesthesiae in the ring and little fingers. No palpable swelling. *Neurological findings: Motor*—Wasting and weakness of all the ulnar intrinsic muscles in the hand. *Sensory*—Hypoaesthesia in the whole of the ulnar nerve distribution. *Radiographs* showed marked osteoarthritic changes in the elbow joint.

Operation—A ganglion lying on the deep aspect of the humeral head of flexor carpi ulnaris was found to be compressing the ulnar nerve. There were several perineural adhesions in the ulnar groove. After excision of the ganglion, anterior transposition was carried out.

Progress—Rapid relief of tingling and numbness. Seven months after operation all the ulnar intrinsic muscles were working strongly and apart from some hypoaesthesia, no sensory disturbance was noted.

GANGLIA AT THE WRIST

Case 5 (*Contributed by Mr J. C. Scott*)—Woman aged nineteen years. Complained of pins and needles in the ring and little fingers of the left hand associated with weakness of grip, cramp and inability to straighten the affected fingers. These symptoms had been present for the past seven months.

On examination, there was no visible or palpable abnormality at the elbow or wrist along the course of the ulnar nerve. *Neurological findings: Motor*—Wasting and weakness of the ulnar intrinsic muscles of the hand. *Sensory*—Hypoaesthesia and hypoalgesia in the ulnar border of the palm, extending distally to the distal joint of the little finger (Fig. 4). *Radiographs* showed no abnormality in the wrist or hand.

Operation—At the level of the pisiform bone a ganglion projecting anteriorly from the wrist joint through the flexor retinaculum was found to compress the main ulnar nerve bundle. The ganglion was excised and the flexor retinaculum divided. *Histology*—The wall of the cyst was formed of acellular, well orientated fibrous tissue, which showed occasional evidence of a synovial lining. There was some capillary proliferation in the fibrous tissue surrounding the cyst. The appearances were consistent with a simple ganglion.

Progress—One year later there was no detectable weakness of the intrinsic muscles and no evidence of sensory disturbance (Fig. 5).

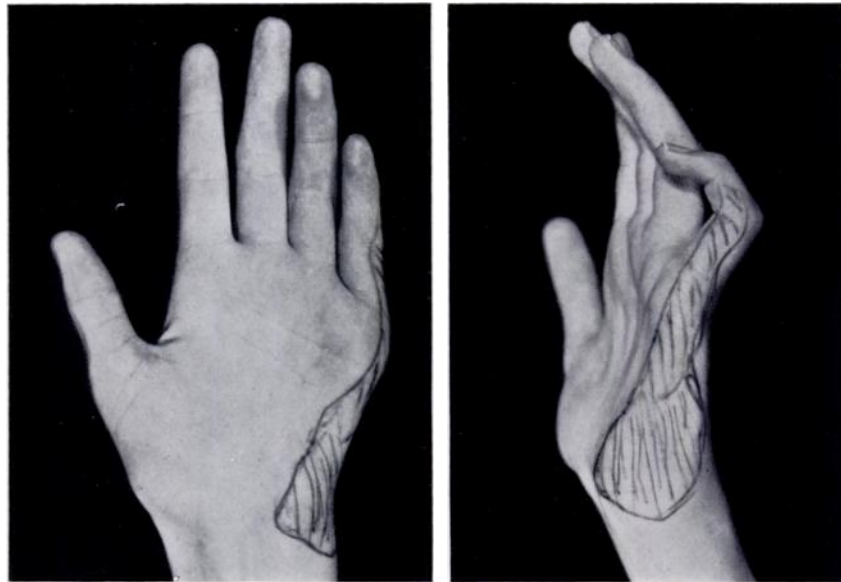


FIG. 4

Case 5—Area of sensory loss and wasting of ulnar intrinsic muscles of the hand with clawing of the fourth and fifth digits.

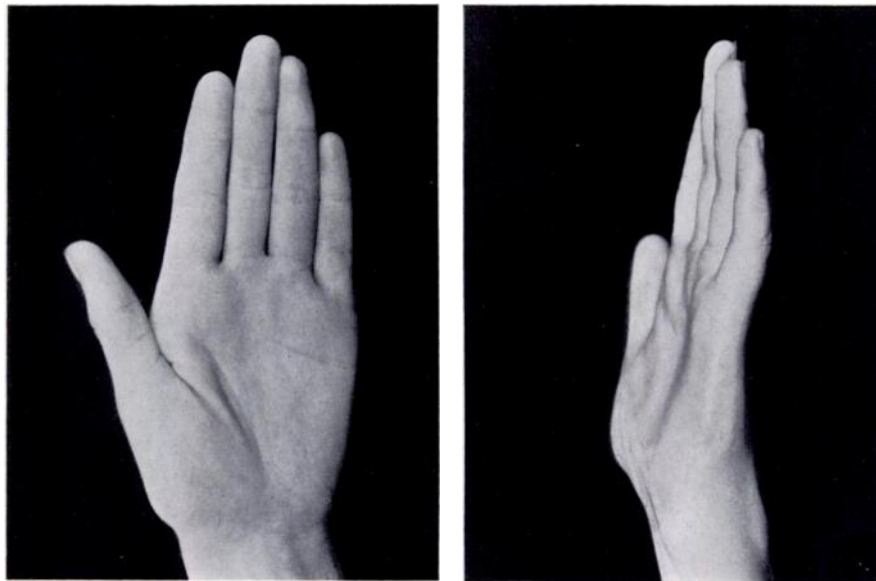


FIG. 5

Case 5—The same hand one year after operation, showing absence of clawing and increase of muscle volume.

Case 6 (*Author's case*). Man aged thirty-three years. Painter. Complained of inability to straighten fully the ring and little fingers of the right hand. He had noticed a swelling in front on the wrist joint and had experienced pain and tenderness in this region. His symptoms had been present for about six months.

On examination, there was a visible and palpable cystic swelling just proximal to the hypothenar eminence lying in the course of the ulnar nerve. *Neurological findings: Motor*—Wasting and weakness of the ulnar intrinsic muscles of the hand. *Sensory*—Hypoaesthesia and hypoalgesia in the cutaneous distribution of the ulnar nerve.

Operation—At operation a spherical cyst about 1.5 centimetres in diameter was found to arise from the margin of the insertion of flexor carpi ulnaris and could be seen to compress the main ulnar nerve trunk against the overlying deep fascia. Its contents were typical of a simple ganglion. The cyst was excised.

Progress—This patient did not return until seven years later, when he complained of a recurrence of the swelling and of the previous symptoms. *On examination*, there was clawing of the ring and little fingers. Proximal to the ulnar styloid there was a smooth cystic swelling not attached to the skin, 1.3 × 2.5 centimetres. Palpation caused tingling and pain radiating proximally to the elbow. *Neurological findings: Motor*—Wasting and weakness of all the ulnar intrinsic muscles of the hand. *Sensory*—Anaesthesia of the hypothenar eminence and medial border of the palm, including the little finger.

Operation—A thin-walled ovoid cyst, 4 × 2 centimetres, was found arising from the anterior capsule of the wrist joint, growing proximally with the main trunk of the ulnar nerve stretched over it. The cyst was excised and the neck coagulated with diathermy. *Histology*—The cyst wall was vascular and the cyst was lined with hyaline fibrous tissue. The appearances were those of a ganglion. No nervous tissue was observed in its wall.

Progress—One year later all muscles were working strongly and there was no objective disturbance in sensibility.

Case 7 (*Contributed by J. Crawford Adams*)—Woman aged seventy years. Housewife. Complained of increasing difficulty in using the right hand for fine work such as sewing, for six months. A few weeks before the onset she had fallen heavily on the outstretched hand. Old unreduced fracture of the wrist had been suspected by her doctor because of an obvious deformity.

On examination, the deformity was found to be caused by a tensity cystic swelling immediately lateral to the pisiform bone. *Neurological findings: Motor*—Marked wasting of the ulnar-innervated muscles of the hand (Fig. 6). *Sensory*—Blunting of sensation in the ulnar distribution. *Radiographs* showed no abnormality.

Operation—A typical ganglion, 1.5 centimetres in diameter, was found immediately lateral to the pisiform bone. The part of the ulnar nerve just proximal to its division into superficial and deep terminal branches was stretched tightly over the ganglion. The ganglion was excised; it appeared to arise from the capsule of the piso-triquetral joint.

Progress—Four months after operation there was still marked wasting of the affected muscles, but function was already much improved as indicated by her ability to thread a needle and to resume fine sewing.

Case 8 (*Contributed by Mr H. Osmond-Clarke*)—Woman aged forty-two years. Housewife. Complained of swelling of the left wrist for many years which was a nuisance chiefly in that it interfered with the wearing of a wrist-watch. It gave rise to no symptoms.

On examination, there was a typical ganglion in front of the wrist joint at the level of the proximal crease at the outer side of flexor carpi radialis. No motor or sensory disturbance was detected.

Operation—The ganglion was identified lying to the lateral side of flexor carpi radialis and proved to be about 1.5 centimetres long and 0.8 centimetres broad. It was excised. The point of origin was not definitely established.



FIG. 6

Case 7—Photograph showing wasting, especially of the first dorsal interosseous muscle.

Progress—No further trouble occurred until almost eighteen months later when pain radiating to the tip of the middle finger was experienced. No injury could be recalled. The pain gradually increased and gave way to numbness of the index and middle fingers and hypersensitivity of the thumb. There was also a generalised discomfort in the hand. *On examination*, there was found to be no clinical evidence of recurrence of the ganglion but marked tenderness was noted in the line of the median nerve 1.3 centimetres above the proximal wrist crease, with possibly some thickening in that region. *Neurological findings: Motor*—Slight wasting and weakness of the thenar muscles. *Sensory*—Complete anaesthesia of the tip of the index and middle fingers with hypoaesthesia in the rest of the median area except for hyperaesthesia on the front of the thumb.

Operation—The median nerve was exposed. No abnormality was detected at this stage but during the dissection of the nerve from the surrounding areolar tissue a small tense ganglion, 9×6 millimetres, was found to be indenting its deep surface. No connection with the surrounding tissues could be established. This second ganglion lay 1 centimetre proximal to that found at the previous operation and well towards the midline. It was remarked at the time that the symptoms were identical with that of a median nerve carpal tunnel compression syndrome.

Progress—All subjective and objective disturbance of sensibility disappeared rapidly and eighteen months later no motor or sensory disturbance could be detected.

GANGLIA NEAR THE KNEE

Case 9 (*Contributed by Mr H. L.-C. Wood*)—Man aged fifty-five years. Labourer. Complained of pain and numbness in the left foot, of one month's duration.

On examination, there was a cystic swelling, 1.5×3.5 centimetres below the head of the fibula in the course of the lateral popliteal nerve. The swelling was translucent. *Neurological findings: Motor*—No wasting, but weakness of all the lateral popliteal group. Electrical reactions showed evidence of a partial degenerative nerve lesion. *Sensory*—Anaesthesia of the dorsal aspect of the first digital cleft.

Operation—A ganglion was found firmly adherent to the lateral popliteal nerve and to the capsule of the superior tibio-fibula joint from which it appeared to arise. It was excised.

Progress—Six months later there was no evidence of motor or sensory disturbance.

Case 10 (*Contributed by Mr P. H. Newman*)—Woman aged sixty-seven years. Housewife. Complained of weakness and swelling of the left foot over a period of four years. Four months previously she had "sprained" her ankle.

On examination, there was an ill-defined swelling situated in the proximal third of the anterior compartment of the leg, deep to the deep fascia. *Neurological findings: Motor*—Complete paralysis of all the lateral popliteal innervated muscles with the exception of the peronei, which were normal. *Sensory*—Anaesthesia of the dorsal aspect of the first digital cleft. *Radiographs* showed no abnormality of the knee or superior tibio-fibula joint.

Operation—Lying between the tibialis anterior and the extensor digitorum longus a small cystic swelling was found extending up to the superior tibio-fibular joint. The neck of the sack ran anterior to the interosseous membrane and crossed in front of the anterior tibial nerve. The cyst was excised. *Histology*—The fibrous capsule of the superior tibio-fibular joint presented numerous small cysts extending through to the surrounding muscles. The cysts did not show a synovial lining and their structure was similar to that seen in a ganglion.

Progress—Three months later there was no evidence of return of voluntary power in the paralysed muscles but pain had disappeared completely and sensibility was almost normal.

Case 11 (*Author's case*)—Man aged forty-four years. Storekeeper. Six years before had complained of pain in the left leg radiating down to the great toe which became so severe that he was unable to get about. He recalled no specific injury to the limb. He had in-patient hospital treatment with physiotherapy for eight weeks and was then able to return to duty with complete disappearance of symptoms. One year later he had a further attack of pain which was relieved by similar treatment. Five years later he noticed a lump behind the outer side of the knee.

On examination, a hard tender swelling, 1×3 centimetres, was palpable in the course of the lateral popliteal nerve proximal to the head of the fibula. There was also a diffuse soft swelling, 6×3 centimetres, arising below the head of the fibula (Fig. 7). Palpation caused local pain and pain radiating in the distribution of the lateral popliteal nerve. *Neurological findings: Motor*—Slight weakness of the peronei only. *Sensory*—Anaesthesia in the distribution of the lateral popliteal nerve (Fig. 7). *Radiographs* showed no abnormality in the knee or superior tibio-fibula joint.

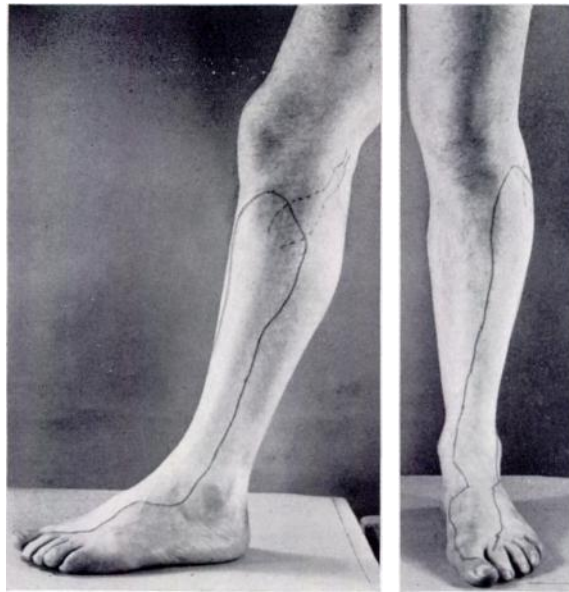


FIG. 7

Case 11—The continuous outline shows the area of sensory loss. The stippled outline shows the extent of palpable swelling.



FIG. 8

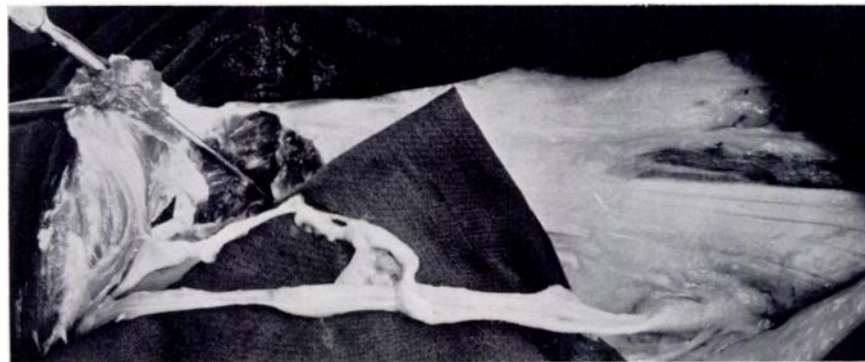


FIG. 9

Case 11—Figure 8 shows a stage during excision of the ganglion. Figure 9—After excision of the ganglion, showing the nerve flattened and attenuated.

Operation—A cystic ganglionic swelling involving the lateral popliteal nerve was discovered. It was 10 centimetres long \times 2.5 centimetres in diameter at its widest part (Figs. 8 and 9). It had insinuated itself *between* the nerve bundles. When the swelling had been dissected from the nerve it was found to originate in the superior tibio-fibula joint. During excision, which was difficult, some nerve fibres had to be sacrificed. *Histology*—The histological features were those of a ganglion, its walls consisting of mucoid connective tissue surrounded by a layer of denser fibrous tissue. No synovial lining was present.

Progress—There was a complete lateral popliteal paralysis after operation. One year later there was no anaesthesia and the peronei had fully recovered. There was no certain recovery in the other muscles of the lateral popliteal group. Pain had disappeared.

GANGLIA NEAR THE ANKLE AND FOOT

Case 12 (*Contributed by Mr Lloyd Williamson*)—Woman aged forty-six years. Housewife. Complained of lump on the inner side of the left ankle which had been present for two months and which had recently become painful. It was associated with a feeling of numbness in the heel. *On examination*, a tense, ill-defined elastic swelling 3 centimetres in diameter was felt below the medial malleolus. It was not tender, but pressure caused a feeling of numbness on the medial side of the heel. *Neurological findings: Motor*—No wasting or muscle weakness detected. *Sensory*—Hypoaesthesia localised to the under surface of the heel. *Radiographs* showed no abnormality in the ankle or foot.

Operation—A ganglion becoming superficial between the tendons of tibialis posterior and flexor digitorum longus was found to compress the deep surface of the neurovascular bundle, which was stretched over it. The ganglion passed down to the ankle joint but had no obvious connection with it. Complete excision.

Progress—Six weeks later there was no subjective or objective disturbance of sensibility.

Case 13 (*Contributed by Mr E. A. Nicoll*)—Woman aged forty-seven years. Housewife. Complained of intermittent attacks of severe pain in the right forefoot for almost a year. During the attacks the pain was severe enough to interfere with normal activities. There were periods of complete remission of pain. She later noticed alteration of sensibility on the dorsal aspect of the first digital cleft.

On examination, there was a suspicion of fullness at the proximal end of the first metatarsal interspace on the dorsum of the foot, associated with exquisite tenderness in this area. Pain was so intense that adequate examination was impossible. She was unable to bear weight on the foot. After an infiltration with procaine, the symptoms disappeared rapidly. *Neurological findings: Motor*—No muscle wasting or weakness detected. *Sensory*—Hypoaesthesia on the dorsal aspect of the first digital cleft. *Radiographs* of the foot showed no abnormality.

Operation—A tense ganglion was found beneath the deep fascia between the first and second metatarsal bones compressing the digital nerve with its accompanying vessels. A segment of the nerve was removed in excising the ganglion. The ganglion was traced proximally as far as possible but no connection was established with any joint. The dorsal approach, however, limited a full exploration.

Progress—There was an immediate relief of symptoms. Six months later, however, the ganglion recurred and presented as a visible swelling on the dorsum of the foot (Fig. 10). On this occasion it was symptomless and was ruptured by digital pressure.



FIG. 10

Case 13—Showing recurrence of the ganglion at the site of excision.

DISCUSSION

Etiology and pathology—It has been recognised for some time that a simple ganglion arising from a joint can cause compression of an adjacent nerve and interfere with its conductivity causing motor and sensory disturbances in the distribution of the nerve. Two typical reports of this condition were furnished by Walley in 1933 and De Sanctis in 1931. In the former the lateral popliteal nerve at the knee, and in the latter the ulnar nerve at the elbow, were compressed by ganglia arising from the superior tibio-fibula joint and elbow joint respectively.

In 1936 Ellis recorded two cases of ganglia in the sheath of the peroneal nerve in which a "cystic degeneration" of the nerve sheath was said to have occurred, giving rise to compression symptoms. The important characteristics of these cysts were that they lay within the sheath of the nerve trunk, displacing the nerve bundles, were lobulated, and had the macroscopic and microscopic features of simple ganglia. He referred to thirteen similar cases reported in the Continental literature. Most of these were histologically similar in every respect to ganglia. In a case reported by Wadstein (1931), the histology was described thus: "The cystic wall is made up of a cystic material that conveyed a definite impression of a synovial tissue. No nervous elements were found in the wall. It is in all probability a ganglion." However, the earliest case reported, that of Hartwell in 1901, from the pathological description was undoubtedly a schwannoma. At least two other reported cases were, from the evidence, probably schwannomata (Sultan 1921, Zaar 1926).

The distinction between cystic degeneration of the nerve sheath and a simple ganglion seems to be anatomical rather than pathological, one being intraneural and the other extraneural. In Case 11 it is important to note that the ganglion was found to have penetrated the nerve sheath although a clear connection with the joint was established.

Those who consider that a ganglion of the nerve sheath is a separate entity maintain that trauma to the nerve is an important etiological factor. The ulnar nerve at the elbow is probably subjected to injury more frequently than any other peripheral nerve and yet traumatic ulnar neuritis is not associated with such a cystic degeneration. The evidence suggests, therefore, that the distinction between these two conditions may be artificial. In both the ganglion may arise from the neighbouring joint or may even be due to extra-articular synovial remnants unobliterated at the time of embryonic joint formation.

Diagnosis—The predominant symptom in half of the cases was pain in the distribution of the nerve. Next in frequency were muscle weakness or symptoms of numbness and tingling. Five patients volunteered the information that they had a "lump" and in nine instances a swelling was palpable. In Cases 4, 5 and 13 there was no palpable abnormality along the course of the nerve. The pain in Case 13 was comparable to that experienced with a glomus tumour and in the absence of any palpable swelling this might well have been the cause.

Treatment—The treatment of choice is undoubtedly excision of the ganglion and, when there is a connection with the neighbouring joint, cauterisation of the stalk. In those cases in which the ganglion has become firmly adherent in the nerve or has penetrated the nerve sheath as in Case 11, puncture is probably the safest course of treatment even though it may mean a recurrence later, because damage to the nerve fibres can occur during excision. In three of the four cases in which the ganglia occurred in relation to the elbow joint, there was an associated hypertrophic osteoarthritis of the joint, and, while the ganglion undoubtedly aggravated the ulnar neuritis, in two instances there was ample evidence of a lesion proximal to the site of compression. A striking contrast is provided by the remaining cases of compression in which no demonstrable arthritic changes were present in the adjacent joint.

Prognosis—The interruption of nerve conductivity in these instances is due to simple compression. The severity of the nerve lesion is dependent upon the degree and duration of

the compression. When compression is relieved conductivity is usually completely restored. The rate and quality of recovery depends on whether the lesion is predominantly a neurapraxia or axonotmesis.

SUMMARY

1. Thirteen cases are reported of nerve compression by a ganglion. At operation a connection between the ganglion and the neighbouring joint was established in many instances.
2. It is suggested that so-called ganglia of the nerve sheath and simple ganglia are anatomical varieties of the same entity.
3. The treatment of choice is excision of the ganglion. If this procedure is technically difficult, puncture is advisable.
4. Recovery of sensibility after operation was good. Motor recovery was poor when damage to motor fibres occurred during excision of the ganglion or when paralysis had been present for more than eighteen months.

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