Surgical treatment of compression of the lateral antebrachial cutaneous nerve

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We describe an operation to relieve compression of the lateral antebrachial cutaneous nerve at the elbow. Between 1987 and 1997 we operated on seven patients, one with bilateral compression. In two the compression was associated with injury to biceps. A longitudinal or a transverse incision was carried out and the nerve was released from the deep fascia. Partial excision of the biceps aponeurosis was undertaken in the patients who did not have injury to biceps; some additional procedures were required for those patients with injuries. All patients had symptomatic relief.

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Although many nerve-compression syndromes in the upper limb are common, some are rare, posing difficulties in both their diagnosis and treatment. Compression of the lateral antebrachial cutaneous nerve (LACN) at the elbow, first described by Narasanagi in 1972¹ and later by Hale² as "handbag paraesthesia", is uncommon. With the exception of the article by Bassett and Nunley³ in 1982 presenting a series of 11 patients and their updated series of 15 patients in 1998,⁴ only sporadic cases have been reported in the literature,^{1,2,5-8} making a total of 25. To date, only 17 cases of surgical treatment for compression of the LACN at the elbow have been described;^{1,3-7} two additional cases in which operation was required have been attributed to direct injury to the LACN at the elbow during phlebotomy⁹ and to compression from a glomus tumour.¹⁰

We report the surgical treatment of eight new cases of compression of the LACN at the elbow, carried out by the same author (DLV).

Anatomy – zones of entrapment. The LACN is the terminal sensory branch of the musculocutaneous nerve, the fibres of which originate mainly from the C5 and C6 roots of the lateral cord of the brachial plexus. After supplying coracobrachialis, biceps and brachialis, the nerve continues its course between brachialis and biceps, under the lateral margin of the biceps tendon, until finally it pierces the deep fascia to become superficial. At the level of the cephalic vein the nerve divides into anterior and posterior branches innervating the radial aspect of the anterior and posterior forearm.^{11,12}

There is a high risk of compression in two sites in the course of the nerve. The first is where it enters the coracobrachialis muscle; compression is aggravated here by the movements of abduction and external rotation. The second is where it emerges from the lateral side of the biceps tendon, before piercing the deep fascia during movements of pronation and supination with the elbow extended. Both motor and sensory disorders are observed in cases of compression at the level of coracobrachialis, whereas purely sensory symptoms are noted after entrapment of the terminal branch.¹²

Patients and Methods

Between 1987 and 1997, nine patients were diagnosed with compression of the LACN at the elbow. Two responded to conservative management, including immobilisation, and the remaining seven patients had surgical treatment. One of these had bilateral compression, thus raising the number of cases to eight. There were five women and two men, with a mean age of 54 years (42 to 80). Apart from the patient with bilateral compression, the affected side was always that of the dominant hand.

All patients presented with pain over the lateral aspect of the lower arm and elbow. In some this was in addition to ill-defined dysaesthesia on the lateral aspect of the forearm. The onset of symptoms was gradual and only progressive aggravation caused the patients to seek medical advice. In two, symptoms were associated with injury to biceps; one had sustained an avulsion of the distal attachment of five months earlier and the other had had a rupture of the tendon of the long head of three months before (Fig. 1). Most of those without a history of trauma, reported other compression

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Fig. 1

Localisation of pain (arrow) in a patient who had sustained a rupture of the tendon of the long head of biceps.

syndromes of peripheral nerves in the same upper limb, including neuropathies of the radial and median nerves at the elbow in three and carpal tunnel syndrome in two.

Clinical examination revealed a zone of maximal tenderness located on the anterolateral aspect of the arm, at a distance of 2 to 4 cm above the elbow crease, as well as pain distributed over the lateral forearm on firm palpation. Symptoms were aggravated when the forearm was pronated and the elbow extended.

Electrodiagnostic tests^{5,13,14} were carried out on four out of the six patients in whom symptoms were not associated with injury. Sensory-nerve conduction studies were positive in half. In two patients, the diagnosis was confirmed by the injection of local anaesthetic, according to the technique described by Olson.¹⁵

Initial treatment included immobilisation in 90° of elbow flexion along with non-steroidal anti-inflammatory drugs, or infiltrations of corticosteroids and local anaesthetics applied over a mean period of three months. Only two patients responded to conservative management and were excluded from the study. Surgical release was carried out between four and eight months after the initial diagnosis, when non-operative treatment had failed to relieve symptoms.

Operative treatment. In the initial patients, as well as in those with injury to biceps, a longitudinal incision was made over the lateral border of the biceps tendon, proximal to the elbow crease. A transverse incision was used in the last four patients, after careful palpation of the anterolateral aspect of the lower arm to localise the point of maximal tenderness. The nerve was identified and released from the deep fascia in the patients without injury to biceps and examined during pronation of the forearm and extension of the elbow. In all severe compression was observed from the lateral edge of the biceps aponeurosis which in one patient resulted in the formation of a neuroma in continuity. Release was combined with partial excision of the biceps aponeurosis at the level of compression in these patients (Fig. 2). Excision of post-traumatic fibrosis causing retraction of the nerve was carried out in the patient with rupture of the long head of biceps; neurolysis as well as reinsertion

Fig. 2a

Fig. 2b

Photographs showing a) excision of a triangle from the lateral edge of biceps aponeurosis and b) decompression of the underlying LACN.

of the avulsed distal tendon with the use of a tendon graft, was undertaken in the second patient with injury to biceps.

After operation the upper limb was immobilised with the elbow flexed at 90° for five to seven days, followed by a return to previous daily activities once the sutures had been removed. An exception was made for the patient with the reconstructed distal tendon, who remained splinted with the elbow flexed and the forearm supinated for five weeks. The patients were examined regularly during the postoperative period and relief from pain, the quality of the wound, the range of movement of the elbow, as well as subjective satisfaction were assessed. The mean follow-up was 67 months (21 to 136).

Results

There was complete relief of pain and elimination of dysaesthesia except in the patient with a neuroma in continuity, who experienced significant, but not complete, relief of pain and some residual dysaesthesia on the lateral side of the forearm.

Transverse incisions gave the best aesthetic result. Seven, three longitudinal and four transverse, of the eight incisions healed well, whereas one longitudinal incision led to a hypertrophic scar.

All patients had recovered a full range of movement of the elbow and full function by one month after surgery, with the exception of the patient with simultaneous reconstruction of the distal biceps tendon whose full recovery was delayed until three months. Six of the seven patients, including the one with bilateral compression, were satisfied with the result of the procedure; the patient with the neuroma was only partially satisfied.

Discussion

Our study describes differing approaches and procedures for the operative treatment of seven patients with compression of the LACN. A high index of suspicion is necessary for the diagnosis. Symptoms are usually attributed to lateral epicondylitis, compression of the median nerve or cervical radiculitis.^{3,5} Entrapment of the superficial sensory branch of the radial nerve should also be included in the differential diagnosis.¹⁶ The coexistence of more than one compression neuropathy further complicates the diagnosis. Most patients in our series had a history of compression neuropathy at the elbow or the wrist, but a common aetiology for multiple compression syndromes of peripheral nerves has not been demonstrated.

Electrodiagnostic tests,^{5,13,14} although described as simple and reliable, gave false-negative results in half of our cases even when specific studies were carried out with the elbow extended and the forearm pronated. Since only a limited number of patients had electrodiagnostic evaluation, the accuracy of the study cannot be judged. By

Fig. 3

Anatomical dissection revealing a neuroma in continuity (asterisk) of the LACN at the point of emergence from biceps. At the level of the elbow crease the nerve passes deep to the median cubital vein (arrow).

contrast, local infiltration¹⁵ of anaesthetic was of value and confirmed the diagnosis in two doubtful cases.

Suspicion is raised by a detailed history, but the diagnosis of compression of the LACN at the elbow is primarily based on meticulous clinical examination in combination with manoeuvres such as pronation of the forearm and extension of the elbow which exacerbate the condition. Electrodiagnostic tests are additional diagnostic tools which may reveal several conditions and allow differential diagnosis. The combination of a characteristic history with a positive clinical and electrodiagnostic examination is diagnostic of compression of the LACN.

The exact point of exit of the nerve from the biceps tendon is important. Some authors hold the view that the nerve follows a course under cover of the lateral edge of the tendon as far as the interepicondylar line.^{15,17} Meticulous clinical examination of our patients, however, indicated that it emerged from the lateral aspect of the biceps tendon, 2 to 4 cm above the elbow crease. This was confirmed by our surgical findings and the observations on a cadaver study which we carried out (Fig. 3).

The transverse incision, which we used in half of our cases, was centred over the point of maximal tenderness, facilitating release of the nerve from the deep fascia and excision of the triangular segment of the biceps tendon when needed. As a transverse incision gives a better aesthetic result than a longitudinal one, we believe it to be the preferable approach. Accurate preoperative diagnosis and exact localisation of the point of maximal tenderness are prerequisites, since the transverse incision does not allow extensive exploration.

Non-traumatic cases were attributed to irritation of the nerve from vigorous activity where it was fixed by the fascia and compressed by the lateral edge of the biceps tendon, especially in positions of combined pronation and extension.^{3-7,12} Our surgical findings confirmed this view.

In the two patients with injury to biceps symptoms were initially attributed to the injury and not to a concomitant lesion of the nerve, but careful clinical examination revealed compression of the LACN at the elbow. Intra-operative findings included fibrosis around the nerve in the area of the avulsed distal biceps tendon, and retraction of the nerve as a result of muscle contraction in the patient with the rupture of the tendon of the long head.

The outcome was satisfactory in all except the patient with the neuroma in continuity who was only moderately satisfied. The only case of neuroma of the LACN which has been reported in the literature had an unsatisfactory result after initial microsurgical reconstruction, leading to a second procedure, at which the neuroma was resected and the nerve buried in a nearby muscle.⁹ Our patient, however, had partial relief of pain after operation and did not require an additional procedure.

No patient needed a second operation for persistent symptoms.

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