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ORIGINAL ARTICLE

Peroneal nerve entrapment at the fibular head: Outcomes of neurolysis

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KEYWORDS
Nerve entrapment syndrome;
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Summary
Background: Common peroneal nerve (CPN) entrapment at the fibular head is the most common nerve entrapment syndrome at the lower limbs. Motor deficits predominate and the risk of persistent functional impairment is the main concern. The objective was to evaluate outcomes of neurolysis and to evaluate the benefits of performing surgery early.
Materials and methods: We retrospectively reviewed the medical charts of 15 patients (mean age, 32 years) treated with neurolysis. The diagnosis was idiopathic CPN entrapment in ten patients, indirect nerve injury with CPN paralysis due to an ankle injury in three patients, and postural CPN compression in two patients. Mean time to management was 7 months (range, 2—18 months).
Results: Mean follow-up after neurolysis was 42 months (range, 25 to 62 months). The outcome was considered excellent in seven cases, good in five cases, and fair in three cases. Mean time to functional recovery was 2.5 months (range, 2 weeks to 6 months). Of the ten patients with idiopathic CPN entrapment syndrome, nine had excellent or good outcomes. The three patients with fair outcomes had ankle injuries or polyneuropathy.
Discussion: Spontaneous recovery can take time and remain incomplete. We prefer to perform surgery between the third and fourth months in patients with persistent symptoms or incomplete recovery, even in forms confined to sensory dysfunction documented by electrophysiological testing. Time to recovery is shorter after surgical decompression than with rehabilitation therapy.
Level of evidence: Level IV, retrospective study

Introduction

The most common nerve entrapment syndrome at the lower limbs is entrapment of the common peroneal nerve (CPN) at the head of the fibula. A motor deficit is the main manifes-

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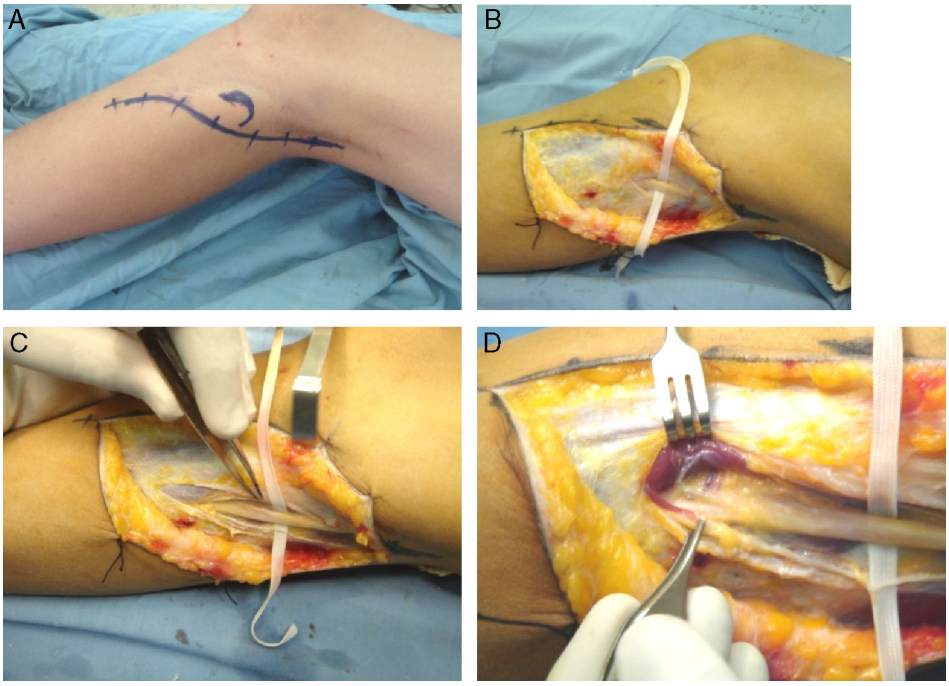

Figure 1 A. Skin incision. B. Identification of the common fibular nerve proximally. C. Incision of the fibular tunnel at the site of compression. D. Release of the nerve as distally as possible, down to the bifurcation into a superficial branch and deep branch.

tation and the risk of permanent functional impairment is the predominant concern. Below the knee, the CPN courses around the lateral aspect of the fibular neck, where it is highly vulnerable to injury. Apart from laceration or stretching of the nerve during fractures or dislocations of the proximal fibula or ankle, idiopathic entrapment syndrome is the most common cause of loss of CPN sensory and motor function.

The objective of this study was to evaluate our results in order to document the usefulness of early surgical neurolysis.

Material and methods

We retrospectively reviewed the medical charts of 15 patients (14 men and one woman) with CPN entrapment syndrome. We did not include patients followed up for less than 12 months or those having direct injuries to the CPN (laceration, contusion, or division by a bone shard after a fibular neck fracture).

Mean patient age was 32 years (range, 17—48 years). A history of low back pain and sciatica was reported by three patients. In addition, three patients had diabetes mellitus and two had chronic alcohol abuse.

Investigations identified a cause in five patients. Forced inversion of the foot with stretching of the CPN was the cause in three patients, including one with a fracture of the medial malleolus and two with lateral ankle sprains. In the remaining two patients, compression of the CPN occurred during prolonged squatting.

The motor deficit was evaluated chiefly by testing the tibialis anterior muscle and fibularis muscles. Subjective sensory symptoms, such as pain and paresthesia were recorded. Sensory and motor function before and after surgery was evaluated according to the British Medical Research Council (MRC) classification system. Of the 15 patients, seven had isolated sensory dysfunction and eight had both sensory and motor dysfunction.

Electrophysiological testing was performed routinely. Sensory potential amplitudes were diminished in 12 cases and motor conduction velocities in seven cases. The electrophysiological findings established that the site of compression was the neck of the fibula.

Time from symptom onset to management ranged from two to 18 months. When the patients were seen within the first months, repeat electrophysiological testing was performed after 1 month to evaluate the extent of recovery. When no evidence of recovery was found, surgery was performed. The nine patients seen more than 4 months after symptom onset underwent immediate surgery based on the clinical ad electrophysiological findings.

Surgery consisted in open release of the CPN. A curvilinear incision was made (Fig. 1) along the biceps femoris tendon proximally then, across the fibular neck distally. The CPN was placed in a noose proximally at the posteromedial edge of the biceps femoris muscle. Then, the CPN was released in the proximal-to-distal direction down to the fibular tunnel, which was opened as distally as possible. Exoneurolysis no more than 5 cm in length was performed in the ten patients with severe CPN compression. A spica cast extending to the foot was worn for 1 week. In patients with motor deficits, exercises to strengthen the tibialis anterior and fibularis muscles and to improve joint range of motion were started at the first visit and continued for a mean of 2 months after surgery.

Table 1 Main characteristics of the 15 patients with common peroneal nerve entrapment syndrome.

Patient	Age (years)	Time to management (months)	Sensory grade	Motor grade (tibialis anterior and lateral fibularis muscles)	Follow-up (months)	Sensory outcome	Motor outcome	Overall outcome
1	28	3	S2	M3	48	S3	M5	Good
2	35	3	S3	M5	38	S4	M5	Excellent
3	40	6	S2	M3	60	S4	M3	Fair
4	45	12	S3	M3	40	S4	M4	Good
5	37	12	S2	M5	48	S3	M5	Good
6	32	2	S2	M3	62	S4	M4	Good
7	30	12	S1	M0	48	S3	M4	Fair
8	35	18	S3	M2	48	S3	M4	Fair
9	31	2	S3	M5	48	S4	M5	Excellent
10	48	5	S3	M5	46	S4	M5	Excellent
11	30	18	S2	M5	32	S3	M5	Good
12	33	5	S2	M2	25	S4	M5	Excellent
13	24	3	S3	M5	28	S4	M5	Excellent
14	20	6	S2	M2	36	S4	M5	Excellent
15	17	2	S3	M5	24	S4	M5	Excellent

Results

No postoperative complications were recorded. Mean follow-up was 42 months (range, 25—62 months). The outcome was considered excellent in seven patients, good in five patients, and fair in three patients (Table 1). Of the ten patients with idiopathic CPN entrapment syndrome, nine had an excellent or a good outcome. Both patients with postural compression had excellent results. Of the three patients with post-traumatic entrapment syndrome, two had fair outcomes with a sensory function grade of S3.

Of the seven patients who had isolated sensory symptoms, five achieved a full recovery with resolution of the paresthesia and a sensory function grade of S4. In the remaining two patients, mild paresthesia persisted in the distribution of the CPN. Recovery was complete on the first postoperative day in two patients, and mean time to recovery in the remaining patients was 7 weeks. In the five patients with a full recovery, mean time from symptom onset to neurolysis was 3 months (2—5 months), compared to 12 months and 18 months, respectively, in the two patients with an incomplete recovery.

Of the eight patients with combined motor and sensory dysfunction, seven had excellent or good motor outcomes after neurolysis (MRC grade M4 or M5). The remaining patient had chronic alcohol abuse with polyneuropathy and achieved a motor grade of M3. The sensory manifestations resolved fully (grade S4) in five patients; of the remaining three patients, two had persistent pain and paresthesia and one reported no change.

Discussion

Neurolysis of the CPN at the fibular head provides a faster recovery than does rehabilitation therapy. If needed, the source of the compression can be removed. Aspiration of an articular cyst may be required. An intraneural cyst should be removed by intrafascicular neurolysis combined with ligation of the articular branch [1,2]. Superficial fibular nerve entrapment requires release of the tunnel [3,4].

Baron [5] has advocated non-operative treatment combining the elimination of risk factors, rehabilitation therapy, and the use of a brace in patients with severe foot drop. A protective cushion can be placed at the neck of the fibula. Local glucocorticoid injections have also been suggested. Uzenot et al. [6] have stated that surgery can be considered in the absence of recovery after 6 months. Dallari et al. [7], in contrast, have recommended early surgery as soon as the diagnosis is confirmed, regardless of the cause, in order to obtain a full and complete recovery.

Ismael et al. [8] found that the extent of functional recovery increased as time to surgery decreased. In our case-series, the outcome was also dependent on the severity of the neurological deficit and, above all, on the time from symptom onset to surgery. In most cases, surgery was performed within the first 4 months and the outcome was usually favourable. The less favourable outcomes were seen in patients with symptoms for longer than 12 months. These findings support early surgical treatment. When the patient is seen early, we suggest neurolysis between the thirrd and fourth months, if the symptoms persist or the recovery is incomplete, even in forms with isolated sensory symptoms documented by electrophysiological testing. The two patients who presented with severe motor deficits at the onset (M1/M0) underwent neurolysis within 2 months and achieved motor grades of M3 and M4, respectively.

Both patients with CPN entrapment due to prolonged squatting achieved a full recovery after neurolysis, in keeping with a report by Fabre et al. [9].

Excision of a synovial cyst responsible for compression of the CPN has been reported in two patients [1,8]. Rapid pain relief was obtained. Anterolateral leg muscle function recovered gradually and partially after 2 months and a full clinical recovery of sensory and motor function was achieved

within 8 months after surgery in one patient [1] and after nearly a year in the other patient [8].

According to Bahri et al. [10], early treatment is more likely to produce good outcomes in patients with CPN entrapment at the fibular head due to fibrous and inflammatory changes induced by forced inversion of the foot (equinus varus).

Compression of the L5 nerve root can be present concomitantly or mimic CPN entrapment at the fibular tunnel, as considerable overlap exists between the muscles and sensory areas served by these two nerves [1]. In our study, two patients had low back pain with sciatica and both achieved only fair outcomes after neurolysis to release the CPN.

Outcomes of neurolysis are less favourable in patients with polyneuropathy, many of whom have co-morbidities, such as diabetes and/or chronic alcohol abuse [1].

Conclusion

For patients with CPN entrapment at the fibular head, watchful waiting until spontaneous recovery occurs has been advocated. However, spontaneous recovery has been described as delayed and incomplete. We prefer early surgery within the first few months if the symptoms do not start to resolve after the first month.

In our study, surgical neurolysis was not associated with any complications. Time to recovery was shorter than reported previously with non-operative treatment. Consequently, we advocate early surgery in patients who do not achieve a prompt spontaneous recovery.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.otsr.2013.05.004.

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