International Orthopaedics (SICOT) (1993) 17: 342–345

International
Orthopaedics

Entrapment of the superficial branch of the radial nerve (Wartenberg's syndrome)

A report of 52 cases

M. Lanzetta and G. Foucher

SOS Main Strasbourg, 4, boulevard du Président Edwards, F-67000 Strasbourg, France

Summary. *We have treated 50 patients (52 cases) of entrapment of the sensory branch of the radial nerve in the forearm (Wartenberg syndrome) between January 1988 and July 1992. Conservative treatment achieved 71% excellent and good results. Operation was followed by 74% excellent and good results. The indications for each type of treatment are discussed. De Quervain's disease was associated in 50% of cases, and it is important to diagnose Wartenberg's syndrome before operating on the tenosynovitis in order to avoid unexpected postoperative complications and medico-legal problems.*

Résumé. *Cinquante patients présentant 52 névrites de la branche sensitive du nerf radial à l'avant-bras (syndrôme de Wartenberg) ont été traités à SOS-Main Strasbourg entre Janvier 1988 et Juillet 1992. Une ténosynovite de de Quervain était associée dans la moitié des cas. Un traitement conservateur, comportant essentiellement une attelle de repos et éventuellement l'injection de stéroïdes, a été utilisé dans 50% des cas, alors que le traitement chirurgical a été nécessaire chez 46% des patients. D'excellents et de bons résultats ont été obtenu dans 71% des cas traités conservativement et dans 74% des cas traités par libération chirurgicale de la compression antibrachiale. En tenant compte de l'histoire naturelle de la maladie et en réalisant un examen clinique attentif, la valeur et le résultat du traitement choisi sont hautement prévisibles. L'identification du syndrôme de Wartenberg avant d'entreprendre le traitement chirurgical d'une tendinite de de Quervain est essentielle. Elle peut prévenir la survenue de complications post-opératoires imprévues et éviter des conséquences médico-légales.*

Reprint requests to: G. Foucher

Introduction

Entrapment of the sensory branch of the radial nerve in the forearm was described in 1926 [14]. Following Wartenberg's report in 1932 [21], the condition has often been associated with his name, or called cheiralgia (pain in the hand) paraestetica [3, 7, 13, 18]. Other descriptive terms for the syndrome are handcuff neuropathy or watch-strap nerve compression [1, 6, 17], superficial radial neuropathy [2, 15] or neuropraxia [16]. The term wristlet watch neuritis has also been used to describe isolated neuritis of the dorsal branch of the ulnar nerve [19].

Wartenberg's syndrome is not mentioned in major works on peripheral nerve entrapment and is said, in one textbook, to be exceptionally rare [23]. Some more recent descriptions have drawn attention to the disease [5, 7, 8, 10].

Materials and methods

Fifty patients, two with bilateral symptoms, with Wartenberg's neuritis were treated in our hospital between January 1988 and July 1992. This was 0.82% of the total patients referred to the unit during this period.

Ten were men and 40 women with an average age of 45 years at the first consultation (range 20 to 69 years). The condition was considered to be related to work in 4 cases and to trauma in 21 with watch-strap compression in 8, a tight plaster or dressing in 4, and other types of trauma, including scar entrapment after previous operation, in 9. In one case, symptoms arose when the patient wore his watch on the right wrist after an operation on the left side.

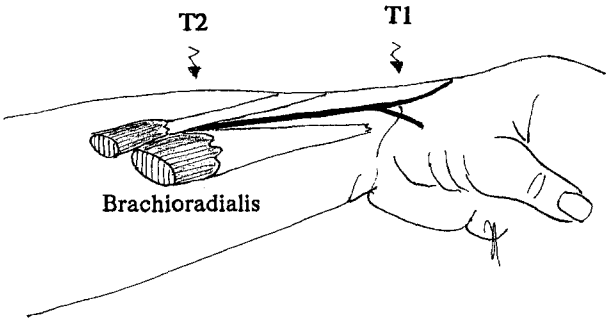

Fig. 1. Drawing showing the level of the positive Tinel's sign in groups 1 and 2

Associated conditions included De Quervain's disease in 26, carpal tunnel syndrome in 8, a ganglion of the first extensor compartment in 2, flexor carpi radialis tendinitis in one, and a Schwannoma of the brachial plexus in one.

Every patient complained of ill-defined pain, numbness or dysaesthesia on the dorso-radial part of the hand. The area of sensory loss or disturbance varied a great deal from the ulnar aspect of the thumb to the whole of the dorsal aspect of the radial half of the hand. There was some limitation of daily or professional activities which was due more to pain than the sensory changes. The duration of symptoms was from 15 days to 21 months.

The patients were divided into 3 clinical groups, according to the site of Tinel's sign (Fig. 1):

Type 1 – over the radial styloid.

Type 2 – just distal to the brachioradialis muscle belly at the point of exit from the deep fascia; the mean distance proximal to the radial styloid was 8.8 cm.

Type 3 – a combination of types 1 and 2.

Patients with compression from their watch-strap or a tight plaster were in type 1 or 3, those with no history of trauma and not associated with De Quervain's disease or a ganglion were in type 2, and those with an associated tenosynovitis in the first extensor compartment, or a ganglion, were in types 1, 2, or 3.

A double positive Tinel's sign indicated either two-level compression at mid-forearm and radial styloid, or a single compression with regeneration of the nerve distal to it; a triple Tinel's sign indicated two-level compression and the level of nerve regeneration. The site of compression and the level of reinnervation could only be distinguished by successive examinations; in these cases the peripheral Tinel's sign tended to migrate distally with time.

Finkelstein's test [9] was positive in all patients with De Quervain's disease; a false positive test was elicited in some patients when only nerve entrapment was present without an associated lesion in the first compartment. The provocation test [5] for entrapment of the superficial branch of the radial nerve was positive in 81%.

Electrodiagnostic tests were used in 12 cases with normal results in 6. In 2 decreased sensory conduction was present, and in 2 others there was evidence of an underlying polyneuropathy. In 6 cases diagnostic nerve blocks were carried out.

Twenty-nine patients (30 hands) were treated conservatively including removal of a tight watch-strap, splinting and, in 3 cases, steroid injection at the site of entrapment. Twenty-three cases were operated on, including 2 after failure of conservative treatment. Operation was reserved for patients in whom the compression was considered to be long-standing and without distal progression of Tinel's sign. In most cases, a neurolysis of the superficial branch of the radial nerve was carried out through a vertical incision, 3 cm long, at the proximal level in the forearm, combined in some cases with a distal horizontal incision for first extensor compartment release [11]. In 5 patients who had associated De Quervain's disease, a first extensor compartment release and tenosynovectomy without neurolysis was carried out, carefully avoiding traction on the nerve. Microsurgical internal neurolysis was not performed.

After operation, the patients were encouraged to begin early movement to prevent recurrence of compression or traction lesions due to the formation of adhesions.

Results

Forty-four (45 cases) of the 50 patients (52 cases) treated were followed up at an average of 10 months (range 2 to 55 months). Relief of pain, especially during daily activities, was recorded and used as a criterion to differentiate between excellent, good, fair and poor results. Recovery of sensation was not considered to be a critical factor as patients often reported an excellent subjective result, even if sensation was not fully restored.

Conservative treatment was excellent in 54%, good in 17%, fair in 21% and poor in 8%. The two cases with a poor result were operated on. Operation achieved an excellent result in 65%, good in 9%, fair in 22% and poor in 4%.

The only patient with a poor result after operation had developed Wartenberg's syndrome after a distal fracture of the radius treated in a very tight plaster; she also had associated signs of median nerve compression. After neurolysis of the superficial branch of the radial nerve and hemiresection of the head of the ulna, she developed a reflex sympathetic dystrophy.

Four of the five patients treated by simple release of the first extensor compartment for De Quervain's tenosynovitis had a rapid and complete recovery from the compression of the superficial branch of the radial nerve at the radial styloid. The fifth patient also recovered, but 4 months later complained of recurrent paraesthesia on the dorsum of the hand with a positive Tinel's sign at mid-forearm level. Electromyography demonstrated no sensory recording at the upper third of the forearm after thumb stimulation, indicating entrapment at mid-forearm level. She was treated by rest and splinting and recovered completely in 10 weeks.

Discussion

When Wartenberg's syndrome is not associated with any other condition, Tinel's sign can usually be elicited in the forearm, on average about 8.8 cm

proximal to the radial styloid. Entrapment is due to scissoring or traction on the superficial branch of the radial nerve in the fascia joining the tendons of brachioradialis and extensor carpi radialis longus, and is exacerbated by pronation of the forearm or ulnar deviation of the wrist.

If Tinel's sign is positive over the radial styloid process, there is either external compression on the overlying skin or a contact reaction around the first extensor compartment. At this level the nerve is very superficial, with a branch over the compartment in 43% of cases, and it is easily exposed to external stimuli or compression.

In the double compression syndrome, a proximal and distal Tinel's sign are combined. A slight compression due to a watch-strap can decompensate a nerve which is compressed proximally [20, 22]. It has also been suggested that the opposite can occur [4], when distal entrapment impairs retrograde transport of trophic substances to the nerve cell. The neurone will then decrease the production of essential material to the axon which makes the proximal part of the nerve more vulnerable to compression.

In some cases associated with De Quervain's disease, the nerve could be adherent distally as a result of reactive oedema and ulnar deviation of the hand produces traction on the nerve due to the limited tendon movement. A second entrapment results with a second Tinel's sign.

There may be overlapping innervation of the lateral cutaneous nerve of the forearm and the superficial branch of the radial nerve, or the former may even replace the latter, which explains the variation in sensory disturbance. Compression of the superficial branch of the radial nerve must be recognised before operating for De Quervain's disease or removing ganglia from the first extensor compartment. Persistence of pain, paraesthesiae or Tinel's sign might be attributed to the effects of the operation rather than the preexisting condition, with consequent medico-legal implications.

Wartenberg's syndrome was associated with tenosynovitis in the first compartment in 50% of our cases, compared with 17% previously reported [5].

When Tinel's sign is positive at the radial styloid due to external compression, and when symptoms have been present 3 to 6 months, conservative treatment can give satisfactory results. When symptoms are troublesome and have persisted for more than 6 months, response to conservative treatment is slow and often unsatisfactory. When there are two distinct Tinel's signs and no signs of improvement, proximal neurolysis is recommended; this, together with distal release, is indicated when De Quervain's disease is also present. Similarly, when there is an association between De Quervain's disease and contiguous compression of the superficial branch of the radial nerve, simple release of the first extensor compartment and tenosynovectomy can result in full recovery.

Wartenberg's syndrome occurs more frequently than might be expected, and is probably too often misdiagnosed as De Quervain's disease or, in the presence of this condition, is not diagnosed at all. Prompt recognition and repeated clinical assessments allow the correct treatment to be chosen, and make it possible to avoid the pitfalls which have been described.

References

1. Bierman HR (1959) Nerve compression due to tight watchband. New Eng J Med 261: 237–238
2. Braidwood AS (1975) Superficial radial neuropathy. J Bone Joint Surg [Br] 57: 380–383
3. Chodoroff G, Honet JC (1985) Cheiralgia paresthetica and linear atrophy as a complication of local steroid injection. Arch Physical Med Rehabil 66: 637–639
4. Dahlin LB, Lundborg G (1990) The neurone and its response to peripheral nerve compression. J Hand Surg [Br] 15: 5–10
5. Dellon AL, Mackinnon SE (1986) Radial sensory nerve entrapment in the forearm. J Hand Surg [Am] 11: 199–205
6. Dorfman LJ, Jayaram AR (1978) Handcuff neuropathy. JAMA 239: 957
7. Ehrlich W, Dellon AL, Mackinnon SE (1986) Cheiralgia parestetica (entrapment of the radial sensory nerve). J Hand Surg [Am] 11: 196–198
8. Eversmann WH Jr (1982) Entrapment and compression neuropathies. In: Green DP (ed) Operative hand surgery. Churchill Livingstone, New York, pp 990–992
9. Finkelstein H (1939) Stenosing tendovaginitis at the radial styloid process. J Bone Joint Surg 12: 509–540
10. Foucher G, Greant P, Sammut D, Buch N (1991) Névrites et névromes des branches sensitives du nerf radial. A propos de quarante-quatre cas. Ann Chir Main 10: 108–112
11. Littler JW (1977) Reconstructive plastic surgery. The hand and upper extremity. Philadelphia, Saundres (Converse) 6: 3446
12. Mackinnon SE, Dellon AL (1985) The overlap pattern of the lateral antebrachial cutaneous nerve and the superficial radial nerve. J Hand Surg [Am] 10: 522–526
13. Massey EW, Pleet AB (1978) Handcuffs and cheiralgia parestetica. Neurol 28: 1212–1213
14. Matzdorff P (1926) Zwei seltene Fälle von peripherer sensibler Lähmung. Klin Wochenschr 5: 1187
15. Rask MR (1978) Superficial radial neuritis and De Quervain's disease: report of 3 cases. Clin Orthop 131: 176–178
16. Rask MR (1979) Watchband superficial radial neurapraxia. JAMA 241: 2702

17. Smith MS (1981) Handcuff neuropathy. Ann Emerg Med 10: 668
18. Sprofkin RE (1954) Cheiralgia parestetica – Wartenberg's disease. Neurol 4: 857–862
19. Stopford JSB (1922) Neuritis produced by a wristlet watch. Lancet 1: 993–994
20. Upton ARM, Mc Comas AJ (1973) The double crush nerve entrapment syndromes. Lancet 2: 359–361
21. Wartenberg R (1932) Cheiralgia Parestetica (Isolierte Neuritis des Ramus superficialis nervi radialis). Z Ger Neurol Psychiatr 141: 145–155
22. Wilgis EFS, Murphy R (1992) The significance of longitudinal excursion in peripheral nerves. Hand Clin 2: 761–766
23. Wilson SAK (1941) Neurology. Baltimore: Williams & Wilkins 1: 327