

## INTRACUTANEOUS NEUROMA FOLLOWING DIVISION OF DIGITAL NERVES

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The diagnosis of an intracutaneous neuroma should be considered in any patient who presents with a tender swelling in the skin following previous penetrating trauma in the line of a digital nerve. If the condition is recognised it may be possible to excise the neuroma and carry out a direct repair of the nerve under the operating microscope. Treatment of the well established intracutaneous neuroma may require wide excision of the abnormal tissues and a nerve graft. We present our experience with 3 illustrative cases.

**Case 1.** A 9-year-old boy was seen 5 months after a dog had bitten his left middle finger. He had a tender, thickened scar on the dorsum of the finger and no treatment was undertaken. Subsequently a discrete lump appeared within the scar which later broke through the surface discharging matter and left a papilliferous swelling. An ellipse of skin containing the papillary swelling was excised 26 months after the original injury. It was noted at operation that the dorsal branch of the digital nerve terminated in the cutaneous papillary lesion (Fig. 1). Histological examination confirmed that a nerve trunk was in continuity with the central papillary swelling (Fig. 2), which consisted of nerve bundles surrounded by dense fibrous tissue. There was marked hyperkeratosis, papillomatosis and acanthosis, with elongation and branching of the rete ridges. The dermis covering the neuroma was fibrotic, and in some areas nerve bundles were in contact with the dermal papillae. Following excision of the neuroma healing was uneventful and the local tenderness disappeared.

**Case 2.** A 48-year-old man was seen 23 months after sustaining a knife wound at the base of the right thumb. He complained of a tender swelling at the site of the cut, and loss of sensation distally on the same side of the thumb. Examination revealed a raised smooth nodule, 4 mm in diameter, within a healed scar, which was the site of sharply localised tenderness (Fig. 3). There was distal anaesthesia on the same side of the thumb.

A diagnosis of intracutaneous neuroma was made. This was confirmed at operation, when the mass was found to arise from the divided end of the ipsilateral digital nerve of the thumb (Fig. 4). The nodule was excised with an ellipse of skin, and the digital nerve was repaired directly under the operating microscope with interfascicular sutures of 10/0 nylon (Fig. 5).

Histological examination showed the nodule to consist of numerous interlacing nerve bundles within an elevated area of sclerotic dermis. The fibres connected deeply with a well defined portion of digital nerve and had established an abundant supply to the covering layer of acanthotic hyperkeratotic dermis (Fig. 6).

Sensation has now returned to the distal thumb and the patient has undergone tendon grafting to reconstitute the flexor pollicis longus tendon divided at the time of the initial injury.

**Case 3.** A 30-year-old man dropped a large stove on his right ring finger in 1976, and was treated conservatively for a contused laceration. He gradually became aware of a soft tissue swelling in the site of the injury, which was tender and increasing in size. Three years

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FIG. 1. Case 1. Drawing made from a photograph of the excised lesion to show the papilliferous intracutaneous lesion and the digital nerve attachment.



FIG. 2. Case 1. Histological appearance of the excised lesion.

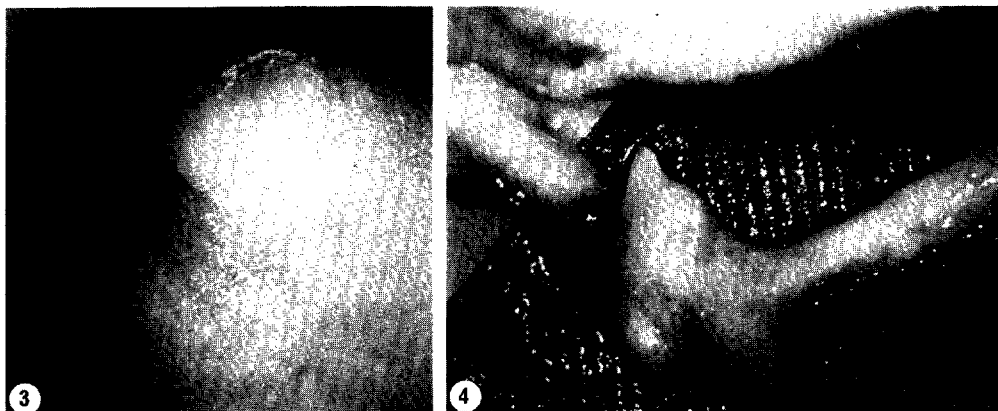


FIG. 3. Case 2. Cutaneous swelling over the base of the thumb.

FIG. 4. Case 2. Proximal end of divided nerve seen entering neuroma, and distal end of nerve, at operation.



FIG. 5. Case 2. Direct suture of the nerve ends after excision of the neuroma.

FIG. 6. Case 2. Histological appearance of the excised lesion.

after the accident he sought medical advice at the request of his employer, because there was impairment of grasp which made him unable to carry out his job.

On examination there was a soft tissue swelling approximately  $4 \times 5$  mm in size, overlying the ulnar digital nerve of the ring finger at the level of the proximal interphalangeal joint. Sensation distal to the tumour was markedly reduced.

The tender area was explored and the tumour found to be an intradermal neuroma. The

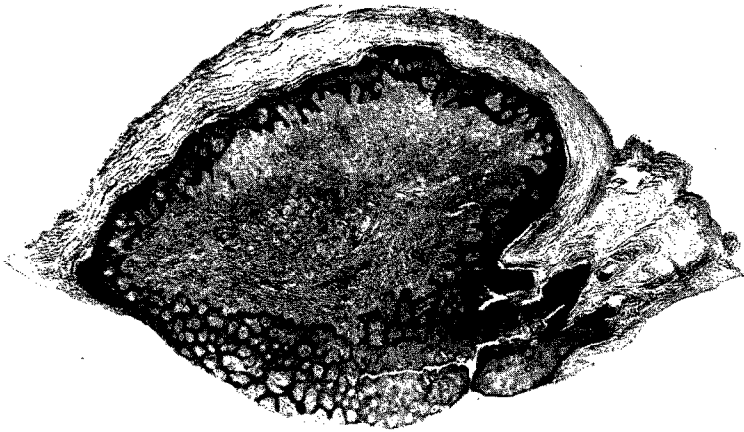


FIG. 7. Case 3. Histological appearance of the excised lesion.

pedunculated portion of tumour enclosed the end of the proximal segment of the divided digital nerve. The histological features were similar to those observed in the previous cases (Fig. 7). The nerve ends were excised back to normal tissue leaving a gap that could not be closed by direct suture. A lateral antebrachial cutaneous nerve graft was used to bridge the defect, and sutured in place with interfascicular sutures of 10/0 nylon using the operating microscope.

When seen 2 months later, the patient reported complete relief of the local hypersensitivity and objective assessment revealed some improvement in sensation.

#### DISCUSSION

Following complete division of a peripheral nerve, degeneration occurs throughout the whole length of the distal segment, and at the distal end of the proximal segment. Intense activity of the Schwann cells and fibroblasts occurs at the distal cut end (Seddon 1972). These cells proliferate towards the proximal cut surface in an orientated manner to meet the streams of axoplasm from the regenerating end of the divided axon. There are therefore strong influences which favour restoration of continuity of the divided nerve (Harkin and Reed, 1969). This situation differs from that occurring after a surgical amputation in that all the tissues have been sectioned at the same level and it is usual for the healing nerve end to become embedded in non-neural tissue, such as skin, which is healing simultaneously (Sunderland, 1978). In addition, there is no distal nerve segment to receive and guide the axonal outgrowths from the cut proximal end. Even so, we have been able to find only one reference to an intracutaneous amputation neuroma (Bunnell, 1964).

We have not been able to find any other reports in the literature of intracutaneous neuromas occurring after division of digital nerves. These 3 cases appear to be unique in the behaviour of the proximal nerve segments, which remained and proliferated within the skin despite the presence of a distal nerve segment to receive and attract the axonal outgrowths.

Awareness of this condition enables the correct diagnosis to be made preoperatively, so that careful dissection can be carried out to preserve as much as possible of the nerve ends and allow repair by direct suture or nerve grafting under the operating microscope.

*We thank Dr Margaret Esiri for reviewing the histological appearances of all 3 lesions and Mrs Angela Christie for the drawing reproduced in Figure 1.*

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