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Technical note

Treatment of painful peripheral neuroma by vein implantation

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Summary Painful neuromas form on cutaneous nerves as a result of trauma, pressure, stretch or entrapment. Since the earliest descriptions of neuromas, proposed treatments have been met with poor results and controversy. The myriad of treatments described include: simple division of an affected nerve, implantation into muscle or bone, silicon sleeves and caps, repeated injection of steroids, end-to-side neurorrhaphy, medication and vein caps to name a few. Due to encouraging recent reports of treatment of painful neuromas by vein implantation, the authors describe a simple technique to achieve this surgical goal. As veins are readily accessible due to their proximity in the neurovascular bundle, they serve as a ready source for grafting. The advantages include minimisation of trauma to bone and muscle as compared with previous treatment techniques and the relative ease of the method.

INTRODUCTION

Painful neuromas form on cutaneous nerves as a result of trauma, pressure, stretch or entrapment. In addition, neuromas can be psychologically incapacitating with resulting reduction in quality of life. Since the earliest descriptions of neuromas, proposed treatments have been met with poor results and controversy. Furthermore the issue of compensation and litigation complicate outcomes. The myriad of treatments described include: simple division of the affected nerve, implantation into muscle or bone,[1] silicon sleeves and caps,[2] repeated injection of steroids,[3] end-to-side neurorrhaphy,[4] medication[5] and vein caps[6] to name a few. The physiology of neuroma formation and subsequent axonal hyperexcitability is being studied and increasingly understood. Sodium channels accumulate abnormally within the axons of neuromas and this alteration may underlie the generation of hyperexcitability with resulting abnormal sensory phenomena.[7] Methods to minimise neuroma formation and axonal hyperexcitability are however not as well understood, thus the countless reported techniques to find a solution.

In a review of the literature, there is one randomized control trial investigating the issue of which treatment method is of most value. Amputation stumps from neuroma removal were capped with epineural ligature, epineural flaps or an epineural graft, with each technique used on 16 nerve endings. Epineural grafts were significantly more effective in preventing neuroma pain in this study group.[8] In a study of 78 neuromas, Dellon[1] trialed implantation of neuromas into muscle bulk, stating an overall excellent result of 82% with a mean follow-up of 31 months. The interest in vein implantation follows several case reports, a detailed clinical study and a laboratory study.[9] The clinical study involves 14 patients with 79% of patients symptom free and the rest with minor residual symptoms, with a follow-up at 15 months.[10]

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TECHNICAL NOTE

The authors have trialed several techniques for nerve implantation into a vein including a single and dual incision approach. With the single incision technique, the vein is clamped and divided with an open ending. The nerve is then inserted into the open end and sutured closed with an appropriate sized non-absorbable suture. The clamp is then removed. This technique is similar to that described by Herbert and Filan.[10] The problem that the authors encountered was that the nerve may retract and pull out of the vein, leading to failure and potential re-neuroma formation. Thus a dual anchoring technique has been developed to help reduce tension on the nerve and subsequent failure.

Figs. 1A–E describe the sequence of events of the technique. An appropriate incision is performed to expose the neuroma and an adjacent normal length of nerve. A vein is next located if possible (Fig. 1A). Following excision of the neuroma to a normal segment of nerve, the surgeon clamps an adjacent vein at a proximal and distal location (Fig. 1B). A small longitudinal slit is made at either ends of the exposed vessel. A suture is fed up the vein from distal to proximal to attach the nerve and pull through (Figs. 1C and D). Once the nerve is fed through the vein it should be checked to make sure no excessive tension is on the nerve that may result in failure of the technique. The slit incisions on the vein are closed making sure that the suture picks up some epineurium to hitch the nerve within the vein (Fig. 1E).

CONCLUSION

The choice of treatment for painful peripheral nerve neuroma depends on the surgeon's experience and what they have attempted previously with success. Although the literature does not give us a definitive answer on the technique of choice, vein implantation has received many encouraging anecdotal reports and successful short series reports. The simple technique described here helps answer the problem of failure that previous authors have encountered with vein implantation.

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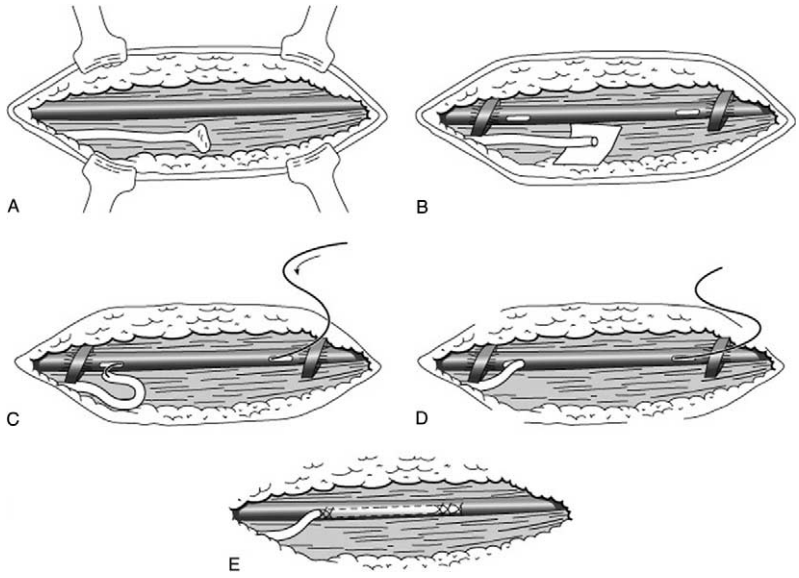

Fig. 1 Operative sequence for vein implantation.

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