CASE REPORT

Rupture of a flexor pollicis longus repair in a body builder through the use of an electronic muscle stimulator

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Involvement of tendons in hand lacerations is common, and immediate treatment involves exploration and primary repair. A programme of protected rehabilitation to allow healing and prevent rupture must follow. An unusual case is reported of tendon rupture in a body builder caused by use of an electronic muscle stimulator. Body builders should be warned about this mode of rupture, which has not been previously reported, during their rehabilitation.

Rupture after tendon repair is not uncommon.^{1–4} Although there are many causes of rupture, the most common is removal of the splint to undertake activities that should be avoided. We report an unusual case in which a body builder underwent primary repair of a flexor pollicis longus tendon laceration. Although the patient was compliant and followed the advice given by the surgeons and hand therapists, use of an electronic muscle stimulator resulted in tendon rupture. A review of the literature was unable to identify this as a previously reported cause of tendon rupture.

CASE REPORT

A 24-year-old, right-hand-dominant banker sustained a laceration of his left thumb with a kitchen knife. The patient was a keen body builder and non-smoker and had no relevant medical history. Examination revealed a 2 cm laceration on the volar aspect of the left thumb, midway between the metacarpophalangeal and interphalangeal joints. The finger tip was well perfused and sensation was intact, but the patient was unable to flex his thumb at the interphalangeal joint. Surgical exploration revealed 100% division of the flexor pollicis longus tendon. This was repaired with a modified Kessler technique using 4/0 prolene core sutures and 6/0 nylon for the epitendinous repair. The hand was placed in a dorsal slab for immediate protection at the end of the procedure, and this was replaced with a dorsal thumb thermoplastic splint on the second postoperative day when the patient was reviewed by the hand therapists.

An early active mobilisation rehabilitation programme^{1–4} was initiated by the hand therapists, and regular reviews confirmed uneventful recovery. Being a body builder, the patient was concerned about losing muscle bulk through disuse atrophy. He therefore purchased and started to use an electronic muscle stimulator (Rio Body Builder; Dezac Ltd, Cheltenham, Glocs, UK). The gel and pads were applied to the upper arm area, overlying the biceps muscle as per instructions, with the stimulation level set to an intermediate muscle bulking level. Recovery continued despite this until the 18th postoperative day, when the patient felt a snapping sensation in his left forearm while using the stimulator. After this he was unable to flex his left thumb at the

interphalangeal joint. This loss of function was confirmed on clinical examination when the patient presented 3 days later, and re-exploration another 2 days later revealed flexor pollicis longus rupture, with the proximal part of the tendon being identified at the level of the A1 pulley. Unfortunately the two ends of the tendon could not be approximated, and the first stage of flexor pollicis longus tendon reconstruction by insertion of a size four silicon rod had to be undertaken. The second stage of the reconstruction was later successfully undertaken, and the patient has now regained normal function.

DISCUSSION

Tendon involvement in hand lacerations is common, and treatment comprises exploration and primary repair. Many different types of repair exist, such as simple suture, modified Becker, horizontal mattress, four strand, and modified Kessler.^{3–5} Although each of these has its own success rates, all these patients undergo a careful postoperative rehabilitation programme with hand therapists that aims to minimise rupture rates. Most studies evaluating acute flexor tendon repair and early mobilisation report a rupture rate of 3–6%,² but this can be as high as 17% in the case of flexor pollicis longus repair.⁴ However, it must be noted that most cases of rupture occur because of poor compliance with treatment; these patients undertake inappropriate activities with the affected hand often after having removed their splint.²

The patient described in this report was fully compliant with treatment. He followed the advice given to him and did not remove the splint, nor did he undertake any physical activities with the involved hand. However, he did not realise that using an electronic muscle stimulator in the upper arm region may also cause damage to his recently repaired tendon. The muscle stimulator instructions do suggest seeking medical advice before its use, especially if recovering from recent surgery, but this advice was ignored.

Electronic muscle stimulators work by initiating low amplitude currents that are transmitted to the underlying nerves. At voltages above threshold, action potentials are initiated in the motor nerves and result in contraction of the respective muscles. Although this is usually localised to the muscle in close proximity to the applied stimulator pad, in the case of our patient the pad overlying the biceps muscle was also successful at stimulating sudden contraction of the flexor pollicis longus muscle belly. This was probably via the median nerve, with resulting rupture of the recently repaired tendon. Although rupture occurred after the muscle stimulator had been used on several occasions, the patient's history suggests a direct link. Hence, those patients who are keen not to lose muscle bulk during the rehabilitation period must be warned of the potential risks of using such stimulators.

What is already known on this topic

- Involvement of tendons in hand lacerations is common, and immediate treatment involves exploration and primary repair.
- A programme of protected rehabilitation to allow healing and prevent rupture must follow this.

What this study adds

- We report an unusual case of tendon rupture in a body builder caused by use of an electronic muscle stimulator.
- Body builders should be warned about this mode of rupture, which has not been previously reported, during their rehabilitation.

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Figure 1 Roald Bahr.