CASE REPORT

Rupture of the flexor digitorum superficialis muscle belly during isometric weight training

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SUMMARY

Isometric weight training is a well-recognised technique used by fitness trainers to increase muscle strength. We report a case of a flexor digitorum superficialis muscle belly rupture that occurred during this form of muscle training. Rupture of the belly of the forearm flexor muscles is rare. When the muscle undergoes tractional force in isometric weight training, there is a potential for it to rupture and result in the formation of a haematoma. This can lead to raised intracompartmental pressures which would require treatment with urgent fasciotomy. An awareness of this potential injury mechanism will help with early recognition and appropriate treatment.

BACKGROUND

Isometric weight training is a well-recognised technique used by fitness trainers to increase muscle strength.¹ We report a case of a spontaneous rupture of the flexor digitorum superficialis (FDS) muscle belly that occurred as a consequence of isometric muscle training. Muscle belly rupture may, in turn, lead to bleeding and, when severe, compartment syndrome can also occur.^{2 3}

CASE PRESENTATION

A 21-year-old, left hand dominant fire-fighter was undertaking isometric weight training while at work. This involved holding 40 kg weights in each hand with his arms hanging straight by his side. With this form of training, no sudden movements, lifts or repetition were required. During this exercise, he experienced a sudden pain in his right forearm and felt what he described as a 'pop'. On examination, there was a palpable depression in the forearm at the site where he had experienced pain during the training exercise. He had altered sensation in the hand in the distribution of the ulnar nerve, with weakness and pain on flexing both the ring and the little fingers. The forearm compartments were soft and the pain was in proportion to the injury. Compartment syndrome was excluded on clinical grounds and therefore, compartmental pressure measurements were not required.

INVESTIGATIONS

An ultrasound scan was performed, which demonstrated a 15 mm gap in the FDS muscle belly at a point 10 cm proximal to the wrist (figure 1). The ulnar nerve was reported as being in continuity but with associated surrounding haematoma.

Figure 1 Ultrasound image of the volar aspect of right forearm. The dotted line indicates a tear to the flexor digitorum superficialis muscle with a gap measuring 15 mm.

TREATMENT

Intraoperatively, the ulnar nerve was explored and found to be intact. A tear to the FDS muscle belly was identified, corresponding to the preoperative clinical and ultrasound findings (figure 2). The haematoma was evacuated and the wound was washed and then closed. The patient's symptoms were attributed to neuropraxia of the ulnar nerve that had occurred as a result of sudden traction at the time of the injury and the subsequent compressive haematoma.

OUTCOME AND FOLLOW-UP

At 1 year following the injury, the patient was pain free and had recovered normal function in his hand.

Figure 2 Intraoperative view showing the 15 mm tear within the flexor digitorum superficialis muscle belly proximal to the wrist joint on the volar surface of the right forearm.

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DISCUSSION

A rupture to the muscle belly of the flexor tendons to the fingers is a rare injury. Tendons consist of densely packed type 1 collagen and therefore are able to withstand significant longitudinal force.⁴ On the other hand, muscles are highly vascular and if a tear occurs as a result of traction, bleeding will occur. If not recognised and treated, this may lead to compartment syndrome.^{2,3}

In 1983, Bird *et al*⁵ reported a case of a 31-year-old woman with rupture of the forearm flexor muscles due to vigorous weight lifting. Choi *et al*² in 2008 described a case of a 3-year-old girl who sustained a traction injury to her flexor digitorum profundus (FDP) muscle while playing tug-of-war, resulting in a tear of the musculotendinous junction of the index finger FDP muscle belly. Both cases resulted in haematoma formation leading to raised intracompartmental pressures and compartment syndrome of the upper limb requiring fasciotomy.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Komi PV, Viitasalo JT, Rauramaa R, *et al*. Effect of isometric strength training of mechanical, electrical, and metabolic aspects of muscle function. *Eur J Appl Physiol Occup Physiol* 1978;40:45–55.
- 2 Choi G, Huang JL, Fowble V, *et al*. Volar forearm compartment syndrome following flexor digitorum profundus muscle rupture in a 3-year-old girl. *Am J Orthop (Belle Mead NJ)* 2008;37:E108–9.
- 3 Gwynne Jones DP, Theis JC. Acute compartment syndrome due to closed muscle rupture. *Aust N Z J Surg* 1997;67:227–8.
- 4 Standring S. *Gray's Anatomy*. 40th edn. Churchill Livingstone, Elsevier, 2008:119.
- 5 Bird CB, McCoy JW Jr. Weight-lifting as a cause of compartment syndrome in the forearm. A case report. *J Bone Joint Surg Am* 1983;65:406.

Learning points

- Isometric weight training can cause rupture of the forearm flexor muscle belly.
- Haematoma in the forearm can lead to compartment syndrome causing raised intracompartmental pressures requiring urgent fasciotomy.
- An awareness of this potential injury mechanism will help with early recognition and appropriate treatment.

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