Unusual presentation of more common disease/injury

Unusual mechanism of tendoachilles injury

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Summary

A 67-year-old woman sustained electric shock while using her hair dryer. During this process her left leg shot up in the air following which she could not walk properly with that leg. She attended the accident and emergency and, considering a possibility of an undisplaced fracture of the calcaneum, she was referred to the fracture clinic the next day. She was clinically diagnosed to have tendoachilles rupture and this was further confirmed by an ultrasound scan. Predisposing factors like drug intake or chronic inflammatory arthritis were excluded and she was treated with conservative management.

BACKGROUND

Tendoachilles rupture is a common injury seen in middle-aged athletes. The usual mechanism of injury is sudden push off on the weight bearing foot especially in someone who overexerts themselves while playing occasional sports. Here we present an unusual mechanism of injury caused by sudden uncontrolled jerky contractions caused by electric shock, which caused snapping of the tendon. To the best of our knowledge, this mechanism of injury has not been reported in any previous literature.

CASE PRESENTATION

A 67-year-old woman came to the accident and emergency (A&E) with difficulty in weight bearing following an electric shock. She was using her hair dryer and got an electric shock. This resulted in her left leg shooting up in the air. She did not have a fall and did not bang her leg into the wall or any other object. She complained of pain around her left heel.

In the A&E she was examined. The general examination and vital signs were normal. X-rays of the calcaneum were

Figure 1 The ultrasound scan shows complete rupture of tendoachilles with collection of haematoma between the ruptured ends.

taken on suspicion she might have developed an undisplaced calcaneum fracture. She was put on a below knee back slab and referred to the trauma clinic the next day.

There were no comorbidities except corneal scarring for which she was applying topical chloramphenicol and acyclovir. There was no history of steroid intake. No relevant family history was obtained.

In the clinic, on examination after removing the backslab, there was no active plantar flexion in the left ankle although the toe and knee flexion had normal power. There was a palpable tender gap in the tendon about 4 cm above the insertion. There was no plantar flexion on squeezing the corresponding calf. There were no other joint symptoms suggestive of arthritis and there was no distal neurovascular deficit. Clinically, the picture was favouring a complete rupture of tendoachilles.

INVESTIGATIONS

The patient's blood examination revealed normal levels of inflammatory markers—that is, C reactive protein and erythrocyte sedimentation rate. Serum markers—rheumatoid factor, antinuclear antibody, double-stranded DNA—were negative and ruled out a presence of inflammatory diseases. The serum uric acid was not elevated.

X-rays did not show any bony injury. Ultrasound examination confirmed a full thickness tear in the substance of the Achilles tendon (figure 1).

DIFFERENTIAL DIAGNOSIS

Ankle fracture, ankle sprain, calcaneofibular ligament injury, talofibular ligament injury, Achilles tendinosis, calcaneus bone injuries, gastrocnemius/soleus tear and inflammatory processes.

TREATMENT

The modalities of treatment were discussed with the patient. Considering her age and physical demand, it was decided to treat her conservatively.

She was given a below knee non-weight bearing cast in equinus for 4 weeks.

OUTCOME AND FOLLOW-UP

After the first 4 weeks, the foot was brought to half equinus for 2 weeks and plantigrade position for another 2 weeks, which was also immobilised in a cast. After a total of 8 weeks she was mobilised with a shoe with a heel raise for the next 3 months.

DISCUSSION

Achilles tendon rupture is a common injury mostly seen in middle-aged individuals who overexert themselves playing occasional sports, especially during weekends (weekend warrior). The male to female ratio is 30:1.¹ Sudden loaded plantar flexion of the ankle on full weight bearing, especially while hill running and jumping, causes the tendon to snap.

Other mechanisms are sudden unexpected dorsiflexion injury especially when the person falls from a ladder or falls into a hole. It may also occur following a fall from height with ankle plantar flexed.²

The chance of rupture is increased if there are associations like faulty foot biomechanics, poor lower leg flexibility, poor athletic footwear, inactivity, local steroid injections and rheumatic conditions. Intake of drugs like fluoroquinolones² and anabolic steroids³ have been shown to weaken the tendon. Other conditions also shown to be involved are arteriosclerosis, gout, hyperthyroidism and renal insufficiency.

In this case report, the electric current caused the sudden violent contractions of the calf muscles resulting in snapping of the tendon when the same was done against resistance while the patient was standing. It is reported in literature that electric current causes powerful contractions of the muscle strong enough to produce fractures and dislocations.^{4 5} If electric current of sufficient magnitude is conducted through a living body, its effect will be to override the tiny electrical impulses normally generated by the neurons, overloading the nervous system and preventing both reflex and volitional signals from being able to actuate muscles. Muscles triggered by an external (shock) current will involuntarily contract, and there is nothing the victim can do about it.⁴

Clinical diagnosis

The patient usually presents with a painful defect in the tendon and difficulty in the push off phase of the gait, which requires strong plantar flexion of the ankle. Despite the straightforward history and physical, about 25% of Achilles tendon ruptures are missed during the patient's first visit.⁶

There are a few tests to diagnose the tendoachilles injury:

- ▶ The Simmonds' test (also called the Thompson test or Simmonds–Thompson test) is used to test for the rupture of the Achilles tendon. The patient lies face down with feet hanging off the edge of the bed. If the test is positive there is no movement of the foot (normally plantarflexion) on squeezing the corresponding calf signifying likely rupture of the Achilles tendon.
- ▶ The O'Brien needle test⁶ inserts a needle 10 cm proximal to the calcaneal insertion of the Achilles tendon. With passive dorsiflexion of the foot, the hub of the needle will tilt rostrally when the Achilles tendon is intact.
- ▶ With the Copeland test⁷ the patient lies face down on the examination couch. The knee is flexed to 90 and a sphygmomanometer cuff is applied around the bulk of the calf muscle. The cuff is inflated to approximately 100 mm Hg with the ankle plantar flexed. The ankle is passively dorsiflexed by pressure on the sole of the foot. If the Achilles tendon is intact the column will be seen to rise approximately to 140 mm Hg. But if the tendon is disrupted, only flicker of movement is seen on the mercury column.

Confirmation of diagnosis

If the clinical diagnosis is in question, especially in partial ruptures of the tendon or compensation by the toe flexors, an ultrasound examination or a MRI scan will confirm the diagnosis. Ultrasound scanning will show an intact Achilles tendon as a hypoechogenic ribbon-like image contained within two hyperechoic bands. When torn, the distal stump will be grossly thickened and contain an irregular echogenic

pattern. The site of the tear will also show a hyper-echogenic area consistent with a partially organised haematoma.⁸ MRI is a better investigation to diagnose the partial tears. The sagittal T1 images can differentiate fat from haemorrhage. It will show high-signal intensity at a rupture site filled with oedema and haemorrhage. In contrast, sagittal T2 images are best for delineating the size of the gap and the condition/orientation of the torn fibres.⁹

Tendoachilles injury sustained in this case report occurred following a mechanical phenomenon. Electric current, especially from a house hold source (ie, a hair dryer) usually is of low frequency type and is known to produce powerful muscular contractions.

Management

Treatment is by a choice of conservative or surgical management depending upon the age and patient's physical demand. Typically, both non-operative and operative treatment options are offered to patients with particular emphasis on the benefits and risks of each procedure.

The non-surgical management consists of non-weight bearing plaster cast/brace given in gravity equinus for the first 4 weeks followed by bringing the equinus to neutral over the next 4 weeks gradually.¹⁰

The surgical management consists either percutaneous¹¹ or open repair of the ruptured tendons.

The complications after surgery include skin necrosis, wound infection, sural neuromas, adhesions of the scar to the skin and the usual anaesthesia risks. Problems with wound healing remain the most common and most difficult to manage given the degree of avascularisation around the heel cord. The re-rupture rates following non-operative and operative treatments are highly variable. Several more recent literature reviews and meta-analyses showed re-rupture rate ranging from 12–21% following non-operative management and around 2% following operative management^{13–15}.

Learning points

- ▶ Tendoachilles can rupture secondary to electric shock.
- ▶ If a patient presents with a history of electric shock, the surgeon should bear in mind tendoachilles rupture during the secondary survey.

Competing interests None.

Patient consent Obtained.

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