PATHOLOGY OF RUPTURED PLANTARIS

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Very little is known of the exact pathology of the lesion described as "ruptured plantaris" because the condition does not require operation and its morbid anatomy is therefore seldom seen. The following case report shows, however, that actual rupture of the belly of the plantaris muscle does occur, and that its clinical features tally exactly with the textbook descriptions of "ruptured plantaris."

Case Report

Sgt. X., aged 31, was admitted to hospital after an accident in which he had been thrown from a motor-cycle while travelling slowly. He complained of severe pain in the left calf region, and was under the impression that he had received a direct blow on the calf. Further questioning showed that he had slid across the road and been brought to a stop by the sole of his left foot hitting the kerb, thus producing forcible dorsiflexion of the ankle.

Examination revealed no evidence of direct injury to the calf, and there was no bruising. He was tender over the whole of the upper third of the leg posteriorly, but acutely so over the site of the plantaris muscle. There was a transverse incised wound over the tendo Achillis $2\frac{1}{2}$ in. long, 3 in. above the ankle-joint. There was no other injury.

The wound was excised under gas-oxygen anaesthesia; the incision involved skin and fascia only, the tendo Achillis being exposed but showing no evidence of damage. On the medial side, a little deeper in the wound, it was noticed that the plantaris tendon was lying slack, and gentle traction upon it resulted in the delivery of the entire tendon and half the muscle belly ruptured transversely about its middle. The lower end of the tendon was detached and the whole removed. The wound was sutured.

Pain in the calf persisted for 2 to 3 weeks and staining of the skin of the leg by effused blood, with some oedema, appeared 3 days after the injury. Dorsiflexion of the ankle beyond a right-angle was painful for 4 weeks and was relieved by raising the heel of the boot. Physical treatment was aided in the early stage by local infiltration with novocain. (Campbell, 1938; Smiley, 1939.)

The wound over the tendo Achillis, which allowed the inspection of the plantaris tendon, was presumably incidental, as the deeper structures showed no sign of injury. The plantaris must therefore have been ruptured by indirect violence applied in dorsiflexion of the ankle.

Discussion

The clinical features of "ruptured plantaris" are well known. The average age of 8 cases seen by me was 30, and it is essentially a lesion of relatively young healthy tissues. Classically, a tennis player reaching back for a shot produces a forced dorsiflexion of his ankle; a sudden pain occurs, and he thinks he has been struck on the calf by his partner. Pain increases during the next few hours, and swelling of the leg followed by bruising is seen in 2 to 3 days. A painful acutely tender area over the plantaris muscle belly in the upper third of the calf is present at first, but later pain is felt only when the ankle is dorsiflexed beyond the right angle. The period of recovery lasts about three weeks.

The pathology of the lesion is the subject of much doubt. It is variously supposed to be a subcutaneous rupture of the plantaris tendon, a partial or complete tear of the muscle fibres or the musculo-tendinous junction of the plantaris, or a rupture of some fibres of the soleus or gastrocnemius muscles. The case described shows that, sometimes at least, the symptoms are produced by rupture of the plantaris muscle belly, and the following facts and observations support the view that the clinical syndrome is always so produced.

The plantaris is absent in 7.5% of subjects, according to Gruber, quoted by Quain (1892). Pilcher (1939) found the muscle absent or rudimentary in 16 of 100 consecutive post-mortem examinations, and states that the deficiency is more common in women than in men. The frequency of occurrence of the plantaris muscle is thus compatible with its presence in every case showing the classical clinical picture of rupture.

Greater tension per unit area is developed in the plantaris on forced dorsiflexion of the ankle than in the other calf muscles, because the length of the plantaris belly is only one-

fifth of the total length of muscle and tendon; whereas one-half the total length of the soleus and gastrocnemius is composed of muscle fibres. I exposed the tendon in a number of cases for use as a graft in the repair of hernia, after the method described by Pilcher (1939). In each case, when the ankle was fully dorsiflexed the plantaris was seen to be as taut as a bow-string, while the tendo Achillis still showed elasticity. It seems reasonable to postulate, therefore, that in healthy tissues the sequence of events in increasingly violent dorsiflexion of the ankle is: (1) partial tear of the plantaris; (2) complete tear of the plantaris; (3) rupture of the other calf muscles in addition, or the tendo Achillis. Where the tissues are not healthy the order may be altered, as seen in the easy rupture of the tendo Achillis of elderly or syphilitic subjects. The first two of the above possibilities are the lesions occurring with the strain causing the "ruptured plantaris" syndrome.

An attempt was made to rupture the plantaris in a fresh young healthy cadaver by seizing the tendon with a haemostat and pulling. This caused rupture at the point seized, but when local damage was prevented by looping the tendon round a wooden peg, strong traction caused the muscle to tear through the middle of its belly. This, together with the findings in the case described, proves the weakest part of the muscle to be its contractile fibres.

The site of tenderness in 8 cases of "ruptured plantaris" seen by me was over the plantaris muscle belly. This is strong evidence pointing to the muscle itself as the site of the lesion.

Conclusion and Summary

The lesion described as "ruptured plantaris" is in fact a partial or complete tear of the fleshy fibres of the plantaris muscle. The case report correlates the clinical syndrome with a complete rupture of the plantaris muscle belly. The anatomical features of short muscle belly and long tendon cause this muscle to be subjected to greater tension than the other calf muscles—a fact which is well demonstrated by exposure at operation. The weakest part of the muscle is its belly, as proved by the experiment in the cadaver and the findings in the case described. The classical type of trauma causing the lesion in healthy tissues, together with the location of tenderness, distinguish plantaris rupture from other similar lesions.

I am indebted to Lieut.-Col. A. F. L. Shields, commanding officer of the hospital in which the case occurred, for permission to publish it.

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Medical Memoranda

Cavernous Sinus Thrombosis

There can be no doubt that treatment with penicillin has considerably improved the prognosis of cavernous sinus thrombosis. In a leading article in the *Lancet* (1945) it was pointed out that "chemotherapy is likely to cure just that type of case where the outcome was formerly almost hopeless—spread of infection from anterior veins draining a septic lesion of the face—because a lesion here is plainly visible, and any divergence from routine healing, or signs of more deep-seated mischief, become rapidly obvious, so treatment can be begun in time." In addition, treatment with penicillin may result in a cure even when its administration has been delayed for any reason, and Johnstone (1945) has reported a case in which administration was not begun for 10 days, and yet the patient was completely cured.

It may be of interest to record the following case, in which penicillin was not given until 6 days after the onset of the illness, and in which recovery was complete.

CASE HISTORY

Miss A., aged 23, a ledger clerk, was admitted to hospital on the evening of Jan. 12, 1945, as a case of erysipelas. The illness had begun suddenly on Jan. 8, with headache, limb pains, and vomiting. On the 9th she was put to bed, and since the afternoon of the 11th had been given a total of 6 g. of a sulphonamide. On examination she had an area of erythema extending from the right cheek to the forehead and spreading across the nose. It was extremely tender