Tendinous flexor carpi radialis: a case report

D Reghunathan, B Satheesha Nayak, S Surendran*, N Kumar, S Rao Sirasanagandla

Abstract

Introduction
Flexor carpi radialis is a muscle of the superficial group of muscles, in the anterior compartment of the forearm. Normally, it takes origin from the medial epicondyle of the humerus and is inserted into the palmar aspect of the base of the second metacarpal bone and gives off a slip to the third metacarpal in the same aspect. This study reports a case of tendinous flexor carpi radialis.

Case report
Here we present a case with most of the flexor carpi radialis (except for a few muscle fibres close to the origin) being replaced with the tendinous portion.

Discussion
The action of flexor carpi radialis is in combination with the other muscles acting at the wrist joint. Some of the actions include flexion, abduction and circumduction that involve the flexor carpi radialis. Any change in the normal anatomy of the muscle would affect the normal actions at the wrist.

Conclusion
The knowledge regarding the variations in this muscle would prove beneficial to physiotherapists and, also, clinicians. Other main clinical implications of flexor carpi radialis are in grafts. The clinical and applied aspects have been discussed in this report.

Introduction
There are eight muscles in the anterior compartment of the forearm, five in the superficial and three in the deep group. Of them, the flexor carpi radialis (FCR) is a superficial muscle, taking origin from the ventral surface of the medial epicondyle of the humerus, from the common flexor tendon. It runs distally, towards the radial side of the forearm to get inserted into the palmar aspect of the base of the second metacarpal bone and through a slip to the third metacarpal bone. The muscle becomes tendinous halfway through its insertion. There could be additional slips given off to the fourth metacarpal too. This muscle is involved in the flexion at the wrist joint along with the flexor carpi ulnaris. It is involved in abduction at the wrist joint when acting along with extensor carpi radialis longus and brevis. The actions at the wrist joint are of utmost importance in our day-to-day activities and variations, as the one mentioned in this report could possibly result in a change in the efficiency of the actions at the wrist joint. This study reports a case of most FCR being replaced by the tendinous portion.

Case report
During a routine anatomy dissection of the front of the forearm, in an approximately 50-year-old cadaver, the FCR was seen to have a short muscle belly close to the origin and the rest of its length was tendinous till insertion (Figure 1). The muscle belly usually converts into a tendon once it reaches halfway distally, on its course towards insertion into the metacarpals. In this case, the total length of the FCR from the point of origin to insertion was calculated to be 284 mm. The muscle part when measured was a mere 84 mm. The muscle belly when seen from its deeper aspect had a tendinous structure. Hence, the initial muscular portion was only present in the superficial aspect and the FCR on its entire length was tendinous in its deep aspect. There are various reports stating the existence of FCR brevis6–9, but there were no reports of tendinous FCR reported so far based on our literature search, which makes this variant case of FCR the first to be reported.

Discussion
The involvement of FCR at the movement of the wrist joint is well-known and the normal anatomy of it is well documented. The action of FCR is in combination with the other muscles acting at the wrist joint. Some of the actions include flexion, abduction and circumduction that involve the FCR. The functional importance of FCR is also well-known. It is reported to possess half the strength when compared with the flexor carpi ulnaris. According to Friden et al.7, the flexor carpi ulnaris muscle fibres are more prone to variation in their length in comparison with the muscle fibres of the FCR. This might be a point to say that the variation explained in this case report is one of the rarest cases, and we did not come across any such variation being reported so far.

Structural implications
One of the main clinical implications of FCR is in grafts. The uses of tendons of the FCR in various reconstructive surgeries that involve the wrist and hand have been well-documented owing to its dispensability6–13. The common use of the tendon of FCR is in the interpositional graft in the treatment of arthritis of the first carpometacarpal joint and also in opponensplasty5,11, in which, part of the tendon or the entire tendon may be used. In cases, such as the one presented here, the increase in length...
of the tendon might possibly provide more connective tissue if required in certain cases, where the entire tendon is used. On the contrary, if there is partial use of the tendon done, the reduced bulk of the muscle fibres in this case, might not be able to provide the support as by the normal stature of FCR. The knowledge of such variant formations of FCR could help physiotherapists plan better while helping in the rehabilitation post reconstructive surgeries, involving the tendon of FCR for the surgery.

Biomechanical implications

There could also be a possibility of alterations in the biomechanics at the wrist joint due to the imbalanced structure of the FCR. The decrease in the muscle fibres could possibly lead to the reduction in the effective action of the FCR. During flexion at the wrist, the action is brought about by the FCR along with the flexor carpi ulnaris. According to Werner et al., the wrist FCR forces were calculated and they found that the peak FCR forces were seen in circumduction action and in other actions such as extension-flexion, radial-ulnar deviation and dart throw movements. The involvement of the FCR is seen in most of the actions and even though its presence is expendable, any change in the normal composition of the tendon and muscle proportion would lead to changed performance of actions at the wrist joint.

Conclusion

The knowledge of such cases would be of precise importance to physiotherapists dealing with rehabilitation cases where the incompetence of the FCR could be mistaken for neuronal issues, owing the incompetence to the decreased muscle fibres in it. Even in reconstructive surgeries and opponensplasty, variations as the one presented here should be considered in order to avoid the post surgical recovery delay and regaining essential expected performance at the wrist joint.

References