A new clinical test in diagnosing quadriceps tendon rupture

BM JOLLES, R GAROFALO, L GILLAIN, C SCHIZAS

Hôpital Orthopédique de la Suisse Romande, University of Lausanne, Lausanne, Switzerland and
Centre Hospitalier Universitaire Vaudois, University of Lausanne, Lausanne, Switzerland

ABSTRACT

INTRODUCTION Extensor mechanism ruptures might be easily overlooked and misdiagnosed, and delayed diagnosis of quadriceps tendon rupture is frequent. However, the literature recommends early surgical repair within 72 h.

PATIENTS AND METHODS This paper describes a new simple clinical diagnostic test that directly evaluates the integrity of the distal 5 cm of the quadriceps tendon itself. It consists of inserting a needle in the tendon, proximal to the suspected rupture and mobilising the knee joint.

RESULTS The suspected ruptured quadriceps tendons with a positive 'needle' diagnostic test were confirmed intra-operatively.

CONCLUSIONS This minimally invasive and easily available technique should be considered in the diagnostic work-up and treatment planning of patients with suspected tears of the quadriceps tendon.

KEYWORDS

Knee injuries – Tendon injuries – Diagnostic techniques and procedures – Tendons, para-articular

CORRESPONDENCE TO

B. Jolles-Haeberli, Hôpital Orthopédique de la Suisse Romande, 4 Avenue Pierre Decker, 1005 Lausanne, Switzerland
T: +41 (0)21 545 06 29; F: +41 (0)21 545 06 25; E: Brigitte.Jolles-Haeberli@chuv.ch

Quadriceps tendon tears are usually seen in patients older than 40 years of age and are probably secondary to decreased vascularity of the tendon.¹ The tendon tear may occur secondary to trauma, or may occur spontaneously in patients with systemic conditions such as diabetes mellitus, gout, systemic lupus erythematosus, rheumatoid arthritis, end-stage renal disease, prolonged systemic steroid use or hyperparathyroidism.²

Patients who suffer from this injury complain of a painful and swollen knee. They are unable to walk without some sort of assistance and usually hold their leg as straight as possible. Despite these clinical signs, misdiagnosis are frequent – ranging from 39% to 67%.^{3–5} A gap in the tendon may not be convincingly palpable, and the patient's ability to raise his/her leg straight with use of the medial and lateral patellar retinaculum or iliotibial band may convince the inexperienced observer that only a few fibres of the tendon have been ruptured. However, the results of the repair may be compromised if the delay to surgery exceeds a few days^{5–7} and no clinical diagnostic test has been described to date.

Inspired by the O'Brien test for complete rupture of the Achilles tendon,⁸ the purpose of this study was to describe a new minimally invasive test that directly determines the

integrity of the quadriceps tendon in its five distal centimetres.

Patients and Methods

With the patient lying in the supine position, the skin of the knee is cleaned with antiseptic. Using aseptic technique, a 25-gauge needle is inserted at a right angle through the skin of the thigh, at a midline point, 5 cm proximal to the superior border of the patella (Fig. 1). The needle is inserted gently through the skin until further resistance is felt, so that the needle's tip is just within the substance of the quadriceps tendon but without transfixing it. The precise level of insertion of the needle is not critical as far as it is not in the tendon. A passive knee flexion and extension movement is then performed, and the movement of the hub of the needle is observed.

Two distinct types of response may occur. One response (negative test) is swivelling of the needle about its pivot point in the skin which indicates that the tendon is intact throughout its distal 5 cm (Fig. 2). If no swivelling of the needle is observed (positive test), this indicates loss of continuity of the extensor apparatus (quadriceps tendon between its insertion and the position of the needle; Fig. 2).

Figure 1 Lateral view of the thigh demonstrating the point of insertion of the needle, at a right angle through the skin, at a mid-line point 5 cm proximal to the superior border of the patella.

The method was evaluated with two patients, at the emergency department and intra-operatively, after informed consent, the healthy knee being the reference for comparison.

Results

As seen from the tests done in our emergency department (Fig. 2), the ruptured quadriceps tendons, suspected with a positive new diagnostic test, were confirmed intra-operatively (Fig. 3).

Discussion

No clinical diagnostic test was found in the literature to the best of our knowledge and the simple and minimally invasive test described here for quadriceps tendon rupture was found to be very useful in our department.

The high rate of misdiagnosis³⁻⁵ has not decreased with the introduction of ultrasound and MRI investigations. In addition, these examinations are costly and time consuming in an emergency department. The reasons for delayed diagnosis are probably multifactorial but the consequences important since the outcome could be severely affected.⁷ McGrory² described two clinical methods for checking active knee extension. He recognised their limitations, as

Figure 2 Swivelling of the needle on passive flexion (A) of the left shank indicating that the tendon is intact. No movement on passive flexion and extension (B) of the right shank indicating the quadriceps tendon rupture.

often the patient refuses to extend the knee actively due to the associated pain. He, therefore, recommended to aspirate the haematoma and inject local anaesthetic. In this case, the test proposed here is easier. In addition, this new test will not be positive in the case of anterior cruciate liga-

ment rupture, collateral ligament sprains or meniscal tears which are commonly associated with swollen knees.

It should be noted that this new test would also be positive in a patellar tendon rupture. However, in that case, the straight leg raising movement is usually impossible, but not always because of a potential intact lateral and medial retinaculum. This additional manoeuvre might be another indicator but cannot be taken as a positive direct sign of a patellar tendon rupture. In addition, Siwek and Rao⁵ showed that 80% of patellar tendon ruptures occurred in patients less than 40 years old and that 88% of quadriceps tendon rupture in patients older than 40 years of age.

Conclusions

This minimally invasive and easily available test should be considered in the diagnostic work-up and treatment planning of patients with suspected tears of the quadriceps tendon.

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