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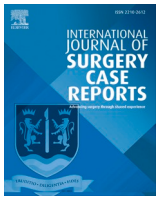

Case report

A case report: New technique of proximal lengthening for treatment of injection induced rectus femoris muscle contracture

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ABSTRACT

Contracture of quadriceps femoris muscle is an uncommon condition in clinical practice. It was suggested that intramuscular injections into the thigh for children are sometimes the cause of this condition.

Case report: The case presents a new surgical technique for the treatment of isolated rectus femoris muscle contracture. The patient is a 6- year-old boy complaining of external rotation of the left leg when he walks and inability to squat.

Clinical examination showed positive Ely's test which indicated isolated rectus femoris muscle contracture. The patient underwent proximal lengthening of rectus femoris muscle.

Discussion: Quadriceps femoris muscle contracture in children can be congenital or acquired. The identified causes of this case are multiple intramuscular injections, trauma or ischemia. The recommended treatment is proximal release in the early stage if contracture is diagnosed and distal lengthening of quadriceps tendon in the late stage. Surgical techniques that preserve continuity of the rectus femoris muscle have better outcomes, and give opportunity for second lengthening surgery if needed. This article presents a surgical technique of proximal rectus femoris muscle release that depends on using the length of the indirect head by transferring its attachment to the distal end of the direct head.

Conclusion: Quadriceps femoris contracture in children leads to limited knee flexion. Proximal release in the early stage gives excellent result. The technique used in this research gives an opportunity to restore knee flexion and a chance for second release if needed.

1. Introduction

Lloyd Roberts, et al. were the first who described six cases of quadriceps contracture in children. The patients in all cases were either premature or new-born babies who suffered from severe illnesses and they needed injections into the thigh [1]. The treatment options were either proximal release in the early stage or distal release in the late stage [8]. The case in this research is a 6-year-old boy came to our private orthopaedic clinic. He has had multiple injections into the thigh. He was diagnosed with isolated rectus femoris muscle contracture. He was treated with proximal rectus femoris lengthening done by a new technique to preserve the normal flexion mechanism of the hip and allow a second lengthening surgery as the tendon is not thinned.

This case report has been reported in line with SCARE2023 criteria [2].

2. Case report

A 6-year-old boy attended our orthopaedic clinic complaining of external rotation gait of the left leg, inability to squat and limping while running. He was born at complete gestational age, normal childbirth. The radiographs showed normal bone components of the pelvis, left hip, femur and leg. The parents of the patient (six-year-old boy) mentioned a history of pneumonia at the age of two that required multiple intramuscular antibiotic injections into his left thigh.

He has no congenital anomalies with no parental history of similar conditions.

Physical examination showed knee flexion about (125) degrees when the hip is flexed Fig. 1, which was remarkably reduced to about (30) degrees when the hip is extended Fig. 2.

Ely's test [3] was positive in the effected side when he was in the prone position. The hip rises when the knee is flexed. This indicates that the rectus femoris muscle is contracted Fig. 3.

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Fig. 1. Knee flexion degree when hip flexed.

Fig. 2. Flexion angle is reduced when hip extended.

Fig. 3. Ely's test is positive in the affected side.

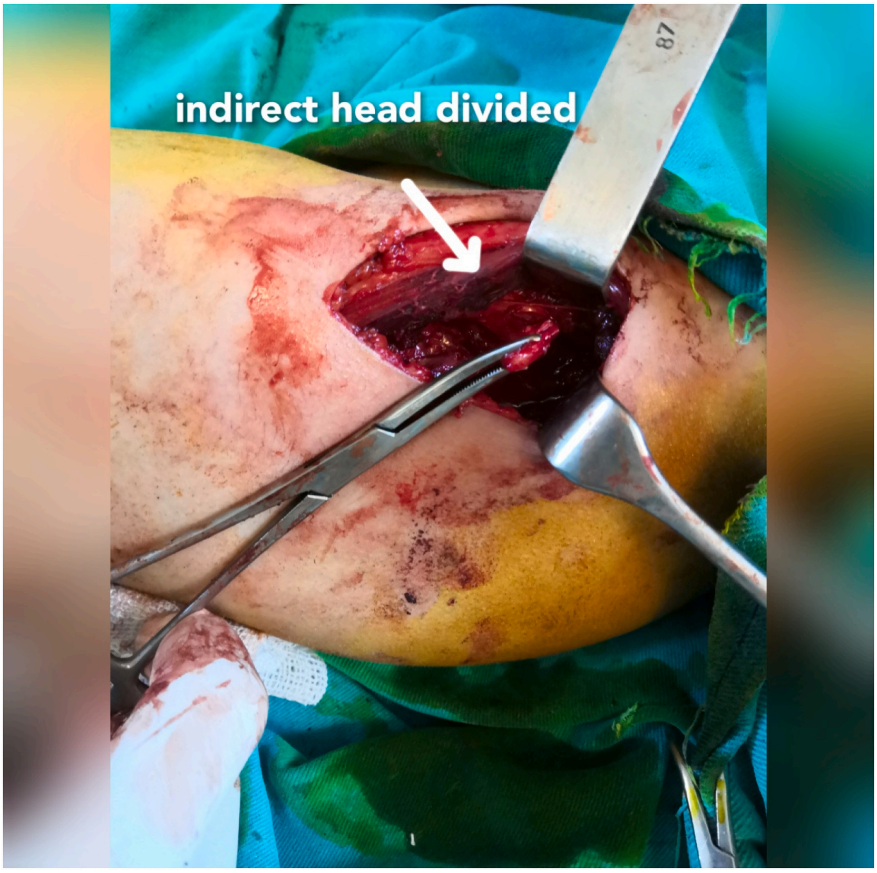

Fig. 4. Indirect head division site.

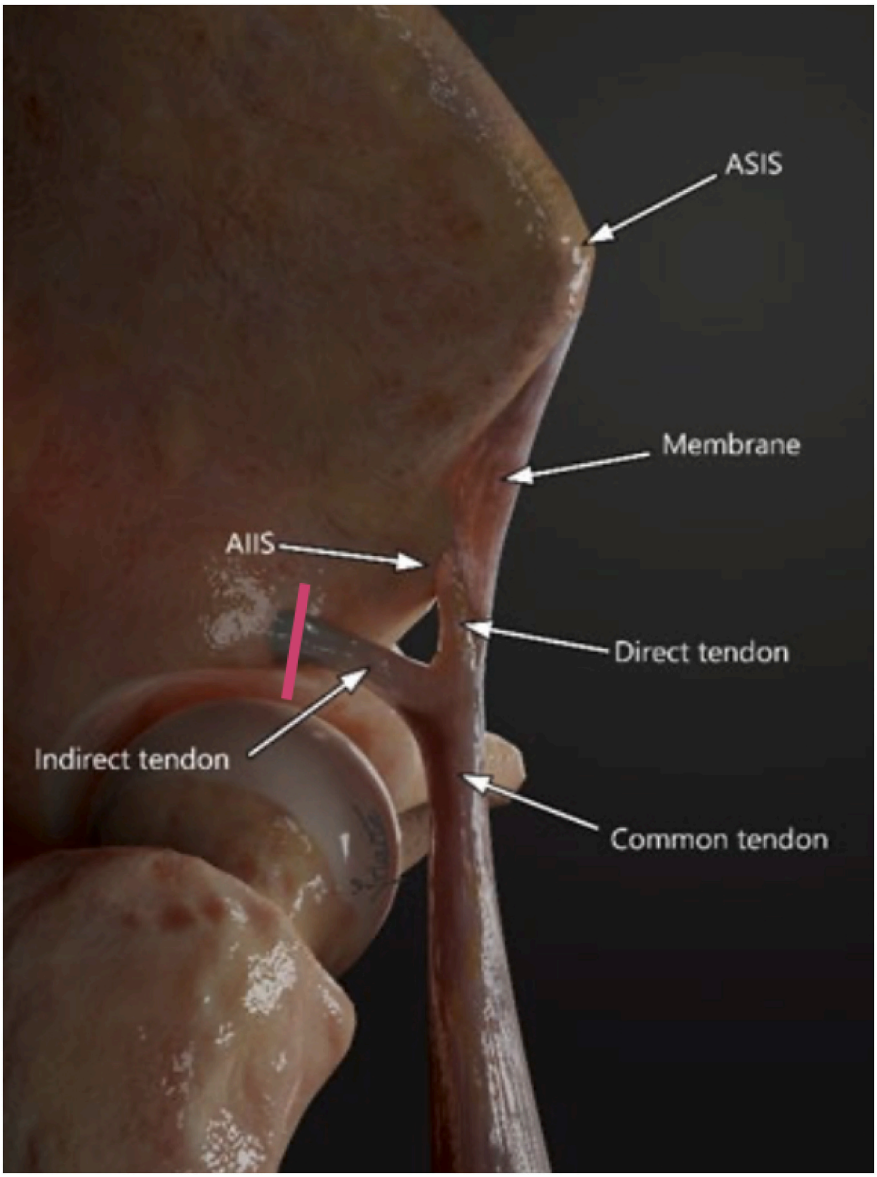

Fig. 5. Indirect head division site.

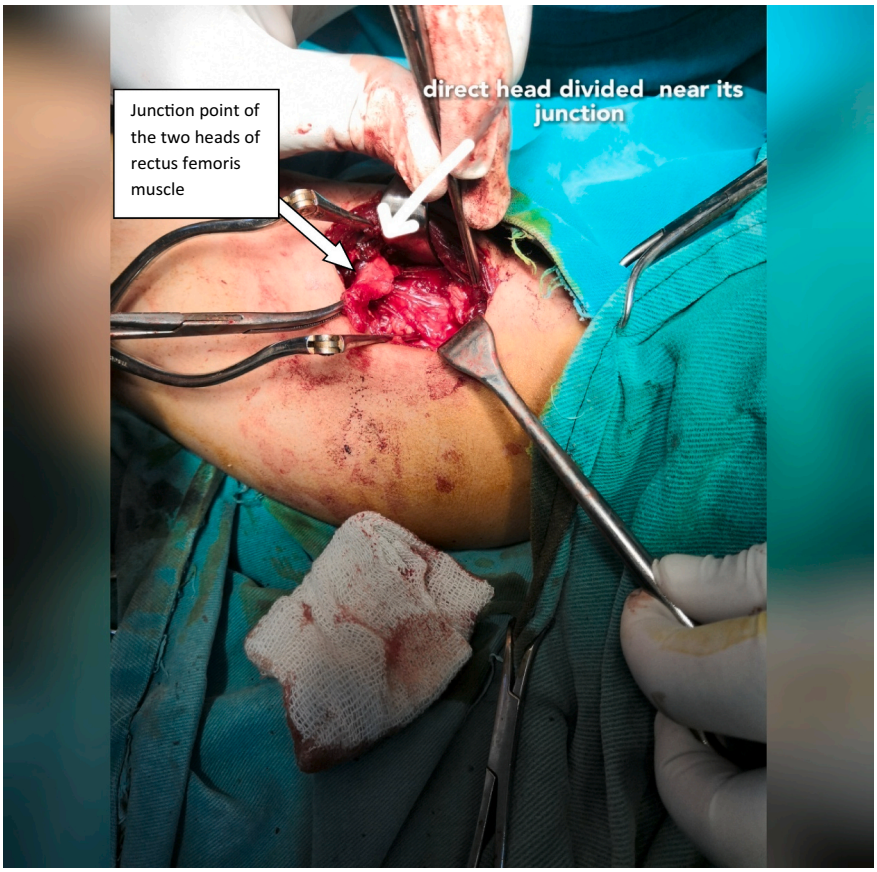

Fig. 6. Direct head division site.

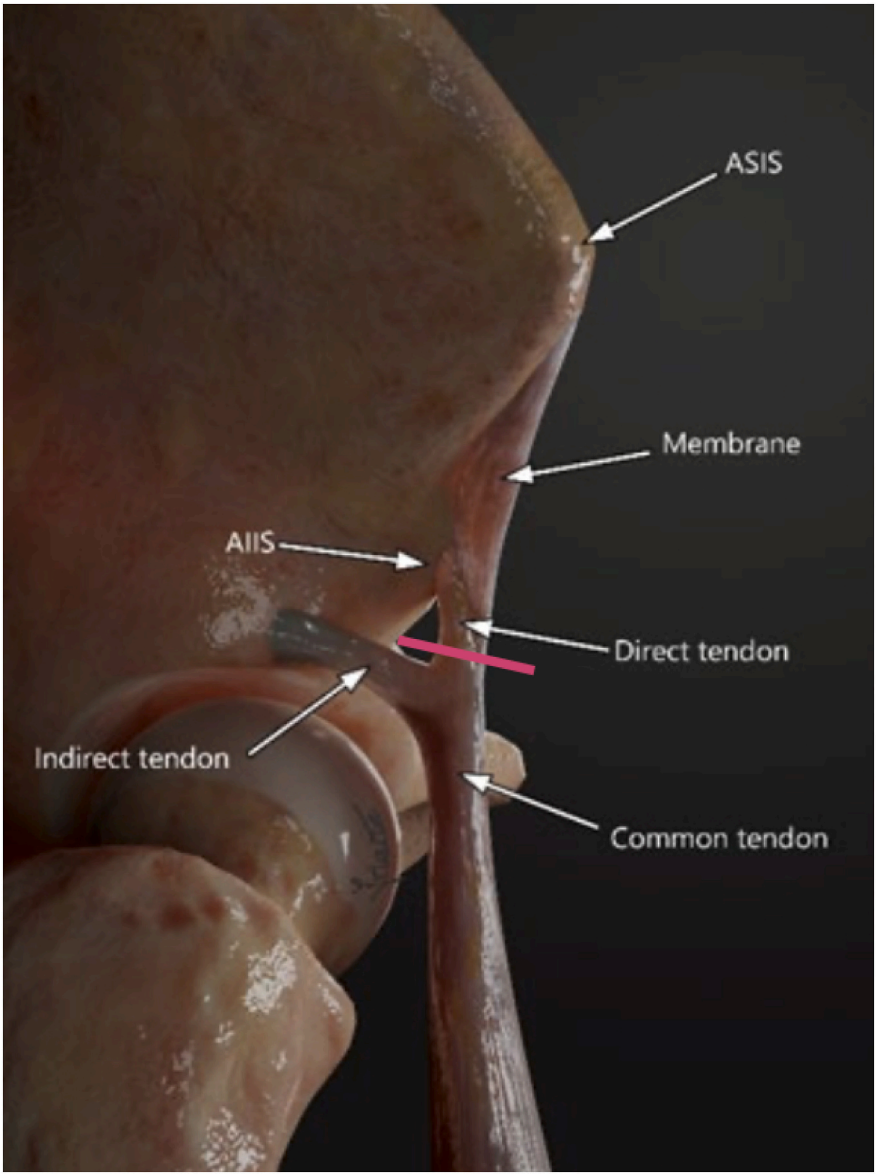

Fig. 7. Direct head division site.

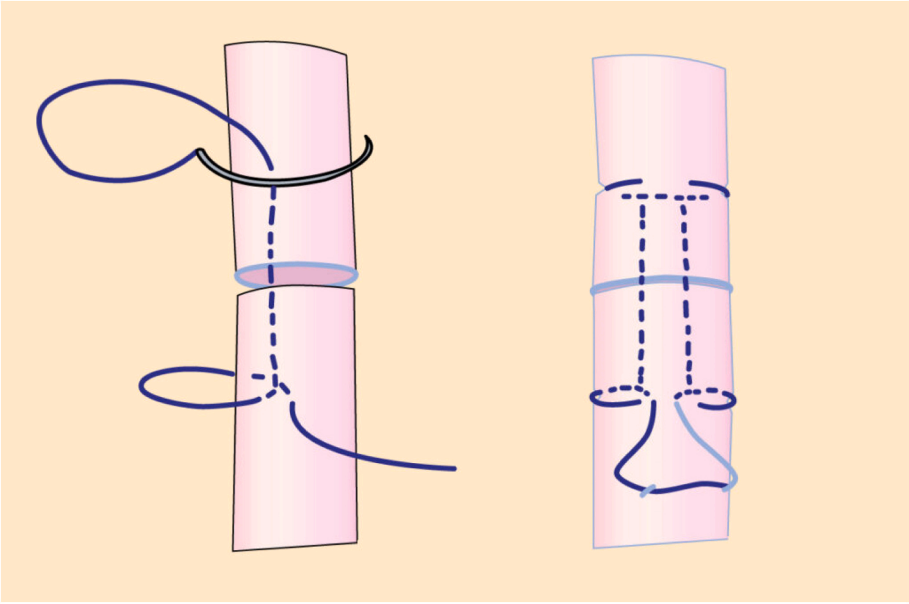

Fig. 8. Locking loop technique.

We decided to do proximal lengthening of the rectus femoris muscle. In this technique, the indirect tendon length was used to achieve muscle lengthening without weakening the muscle tendon. The surgery was performed under general anaesthesia. The patient was prepared in supine position.

We used (Smith-Petersen) approach then developed the interval between the tensor fasciae latae muscle laterally and the Sartorius muscle medially.

The lateral femoral cutaneous nerve was protected during the surgical procedure. We exposed the rectus femoris muscle origin with the two heads (Direct and Indirect).

The Indirect head insertion was isolated and separated from its attachment to the superior lateral acetabulum. The joint capsule left intact Figs. 4, 5.

Then we isolated and divided the direct head proximal to the point where the two heads join together Figs. 6, 7.

The next step was to suture the proximal end of indirect head to the distal end of the direct head that we cut transversely with (polydioxanone) (PDS II) suture size (0). The suture technique was (locking loop suture) Fig. 8. The improvement in knee flexion was immediate and the knee flexed to (110)degrees approximately Fig. 9.

The tendon suture was fixed with the hip fully extended and the knee at maximum flexion.

The wound was closed and drain was used. A long posterior splint was applied from ankle to upper gluteal region. The drain was removed after 24 h and the patient was discharged. After three weeks the splint was removed and the patient started physiotherapy program.

After (6) months, the patient is able to fully squat and knee flexion is about (110) degrees. The patient has been following a physiotherapy program since then Fig. 10.

3. Discussion

Contracture of quadriceps muscle was believed to be congenital rather than iatrogenic. Chiu (Chiu SS) [4] noticed this condition in two pairs of identical twins. Hnevkovsky [5] described quadriceps contracture and pointed out that the contracture is either idiopathic or fibrosis due to injection into the thigh.

Gunn DR [6] mentioned the association of fibrosis with injections into the thigh, and suggested that quadriceps contracture predispose for patella dislocation.

Sasaki, T [7] studied sixty-five patients with quadriceps contracture where mainly the rectus femoris muscles were operated on. They used three different methods and found that the most satisfactory results were obtained by the technique of Sartorius plasty and the release of the fibrosis.

According to (Crenshaw AH Jr) [8], the treatment is proximal release in the early stage and distal release in the late stage.

Guerado E [9] described a technique for proximal lengthening of rectus femoris by suturing the distal ends of the reflected and straight heads together. When we use this technique, the tendon will not be thinned, and a later second lengthening is possible.

The used technique in this research is similar to Guerado's technique but our method depends on saving the myotendinous junction between the indirect head and the body of the muscle and dividing only the direct head from the muscle, then we use the length of the indirect tendon to get a better movement and the natural myotendinous junction is protected, which helps the patient regain physical functions.

The patient had a remarkable improvement in his daily life routine; he is now able to run, squat and walk normally.

Consent

Written informed consent was obtained from the patient's parents for

Fig. 9. Knee flexion degreeat the end of surgery.

Fig. 10. Patient is able to fully squat.

publication of this case report according to the journal's policy. A copy of the written consent is available for review from the Editor-in-Chief of this journal.

Funding

The author declares that there is no funding source was received to write this manuscript.

Ethical approval

Ethical approval is not required for this case in our health care system, because I am licensed orthopaedic surgeon in my country and I treated the medical case in private hospital and this surgery does not require ethical approval in our health care system.

Registration of research studies

N/A.

Guarantor

The Guarantor is the one or more people who accept full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Dr. Ahmed Edris.

CRediT authorship contribution statement

Ahmad Edris M.D.: conception, investigation, acquisition of data, writing, reviewing and editing.

Hadeel Aswad M.D.: investigation, acquisition of data, writing, reviewing and editing.

Declaration of competing interest

The author declares that they have no conflicts of interest to disclose.

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