

Anterior Cruciate Ligament Reconstruction Using Hamstring Graft in a Patient with Achondroplasia: A Case Report

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Abstract

Background: Achondroplasia is a rare autosomal dominant disorder resulting in skeletal dysplasia. Any injury to the anterior cruciate ligament among people already suffering from achondroplasia results in devastating effects. In this report, the outcome of the hamstring graft arthroscopic reconstruction technique for anterior cruciate ligament injury in achondroplasia patients is assessed. The patient in the present case report exhibits the potential for excellent outcomes four months post-surgical follow-up on Lysholm Knee Scoring Scale. This encouraging result, ought to persuade surgeons to use the hamstring graft arthroscopic restoration approach in achondroplasia instances like these. Timely and excellent recovery in such complicated surgical cases, would reduce the obstacle to surgery for several patients with achondroplasia. It would also improve the methods of managing these patients with this particular surgical technique.

Keywords

Arthroscopic Reconstruction, Anterior Cruciate Ligament, Quadrupled Hamstring Graft, Double Suspension Technique

1. Introduction

Achondroplasia is a rare genetic condition of skeletal dysplasia commonly reported with the mutation of the type 3 receptor for a fibroblast growth factor (FGFR3) that affects the normal growth of bones. [1] This autosomal dominant disorder is affecting over 0.2 million people worldwide with an estimated global frequency of about 1 in 15,000 to 1 in 40,000 people each year. [2] The condition is characterized by disproportionate short stature (dwarfism), lordotic lumbar

spine, genu varum, internal tibial torsion, and ligamentous laxity. [3]

The Anterior Cruciate Ligament (ACL) is an essential internal stabilizer that is essential for restrictive hyperextension of the knee joint. Any significant injury to the ACL results in alteration of the kinematic gait. [4] Moreover, it shifts the ambulatory forces to the articular cartilage thus increasing the wear and tear resulting in early degenerative changes. ACL injuries are frequently occurring orthopedic injuries among children and adults without achondroplasia with an annual incidence of 68.6 per 100,000 person-years. [5] These injuries are extremely rare among people with Achondroplasia. Such injury poses devastating effects, especially on the person already suffering from Achondroplasia. [6]

Different surgical techniques are used for the reconstruction of ACL injury of which the ligament reconstruction using either a free bone-patellar tendon-bone (BPTB) graft or quadrupled semitendinosus and gracilis (STG) tendon free hamstring graft is the most popular and frequently used technique. [7] Though the subsequent reconstruction of ACL injury is a common procedure in the general population, limited research has been carried out to determine the injuries to the ACL and the surgical outcome of technique for its management among patients with Achondroplasia. Diagnosis of the anterior cruciate ligament injury was made based on the patient's history, clinical examination, and Magnetic resonance imaging and it was treated by Arthroscopic anterior cruciate ligament reconstruction using a quadrupled hamstring graft. The overall purpose of this case report is to evaluate the functional outcome and role of hamstring graft arthroscopic reconstruction technique for anterior cruciate ligament injury in an achondroplasia patient admitted to Dr. Sulaiman AL-Habib Hospital Suwaidi KSA.

2. Case Presentation

A 29-year-old male patient presented in the Orthopaedic Department at Dr. Sulaiman AL-Habib Hospital Suwaidi KSA, with a history of pain and a sense of giving way right knee while walking. It was started after a twisting injury to the right knee while playing football 7 years ago.

On examination: A short-heightened, young male of normal IQ level, disproportionate trunk and limb ratio with frontal bossing. No apparent swelling or deformity of the right knee joint. The knee was lax with mild medial joint line tenderness. Anterior drawer test and Lachman's test (grade-3) were positive while the posterior drawer test, McMurray test, and varus/valgus stress test were negative. The range of motion was 0 - 120 degrees. The height and weight of the patient were 126 cm and 37.1 Kg respectively.

Radiological Findings: No bony lesion on plain radiograph. MRI showed evidence of complete chronic tear of ACL while the Posterior cruciate ligament, collateral ligaments, and menisci were intact. Irregularity of the articular cartilage mainly of the medial compartment along with small to moderate marginal osteophytes was noted in keeping with secondary degenerative joint disease (**Figure 1**).

Diagnostic arthroscopy confirms our diagnosis while arthroscopic reconstruction of ACL using quadrupled hamstring graft through double suspension technique (endo-buttons for both ends). The patient followed the standard rehabilitation protocol. We used Lysholm Knee Scoring Scale as an outcome measure for 4 months following post-surgery. Based on the Lysholm scale our patient had a score of 95/100 which is excellent in our case. Arthroscopic ACL reconstruction in a young patient with Achondroplasia using an ankle scope resulted in the accurate performance of surgery and excellent functional outcome. Post-operative radiological presentation is demonstrated in **Figure 2**.

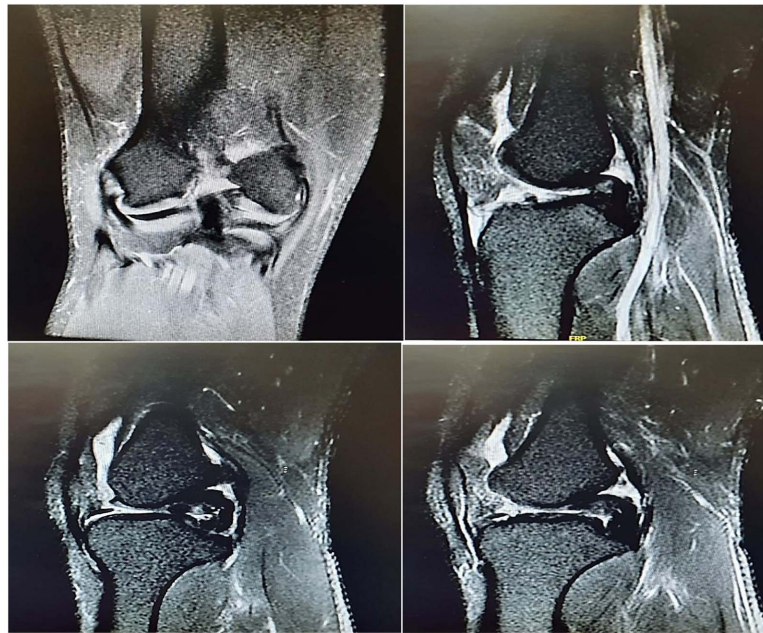


Figure 1. Pre-operative MRI findings of the knee joint of the patient.

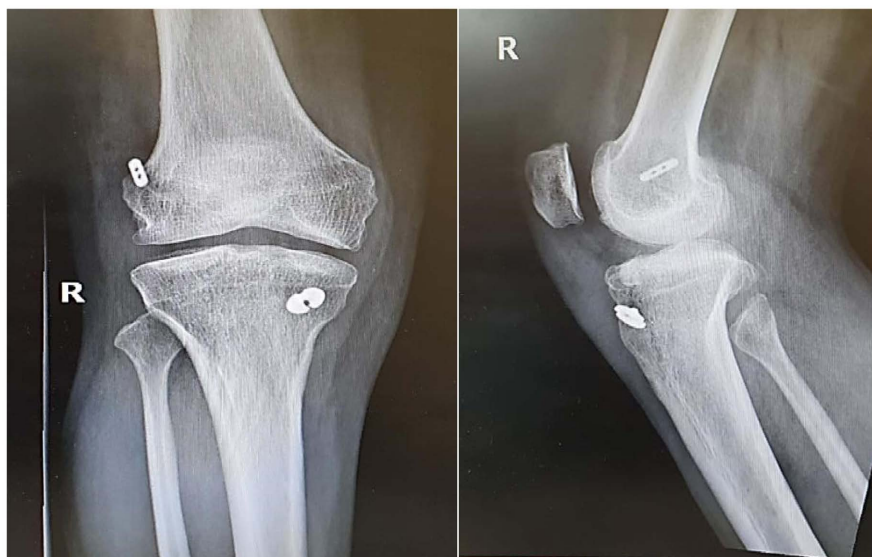


Figure 2. Post-operative radiological outcome presentation on AP and Lateral knee.

3. Discussion

Achondroplasia is the being rare genetic condition affecting about 1 in 15,000 to 1 in 40,000 people each year around the globe. Injuries to the ACL and its reconstruction among people with Achondroplasia are extremely rare and a complicated procedure. [8] The hamstring graft arthroscopic reconstruction technique is the most widely used existing standard-of-care surgical technique for the management of ACL tears among people without Achondroplasia. [7] [9] [10] Our present case study is the first of its kind in this patient population and the prevalence of Achondroplasia is 0.7 per 10,000 among Saudi children. [11] Moreover, to the best of our knowledge, this successful intervention has not been used previously.

In the present study patient had disproportionate short stature and a narrow A-shaped Intercondylar notch, a feature of Achondroplasia patients. [1] Also, the average height of an adult male with Achondroplasia is 131 centimeters which are 126 cm in our patient. [6] The biggest challenge we faced in operating this case was the size of the conventional knee scope which is too big for the small size of the knee joint in our patient. Furthermore, the search for information related to arthroscopic management of a patient with Achondroplasia did not reveal any standardized surgical concept for dealing with this situation. So we anticipated this problem before surgery and planned to use an ankle scope instead of normal knee scope. In this case, we used a 2.7-mm ankle scope, and the whole procedure went smoothly. Secondly, the patient hamstring graft was also thin so we did augmentation of the hamstring graft with fiber tape. The final graft size was 6.5 cm thick, graft length was 5.75 cm and the intercondylar notch was narrow so to avoid impingement, notchplasty was performed in this case. Excellent functional outcome was observed after four months of surgery using the Lysholm Knee Scoring Scale.

4. Conclusion

Our case report will create awareness about how to deal with the challenges during Arthroscopic reconstruction of the anterior cruciate ligament in a patient with Achondroplasia.

Consent

Written and informed consent was obtained from the patient before the creation of this report. All-purpose and benefits of this report to others were also explained.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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