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Radiological Aspects and Clinical Results of ACL Ligamentoplasty Using the DIDT Technique: Experience at the Avicenne Military Hospital in Marrakech

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Abstract **Original Research Article**

Purpose: This study aims to determine clinical outcomes of the ACL reconstruction using the 4SHS grafts technique and show its radiological aspects. Materials and Methods: This is a retrospective descriptive study conducted on 25 patients, undergoing ACL reconstruction using the 4SHS technique, in the orthopedic surgery department of the Avicenna Military Hospital in Marrakech. It was carried over a 5 years period from January 2017 to January 2022. Outcomes were determined by numerous postoperative clinical examinations. ***Results*:** The mean age is 34 years, ranging from 22 to 46 years. There was a marked male predominance. The right knee was injured in 68 % of cases. 68 % of the tears occurred from athletic injuries. In 48 % of the cases, the injury occurred from a valgus flexion external rotation mechanism. The mean time from injury to surgery is 8 months. Direct signs of ACL tear were found in all MRI scans performed routinely on all our patients. No perioperative nor postoperative complications occurred. 80 % resumed sporting activities within 8 months. The average Lysholm and Tegner scale score increased from 35 points preoperatively to 85 points postoperatively. Overall the results were satisfactory: 80 % of the patients reported high Lysholm scale scores (good and excellent grades). ***Conclusion*:** Using the 4SHS graft technique we achieved good results in terms of laxity and low morbidity. However, this was a small study which only included 25 patients. A study with greater number of subjects and a longer follow up is necessary to corroborate these results.

Keywords: Ligamentoplasty, Arthroscopy, MRI, ACL Tear.

INTRODUCTION

ACL rupture is one of the most frequent and serious knee injuries, accounting for 6% of all knee traumas [1], particularly in the context of sports, which may occur "without contact" in 70-80% of cases, or during "contact" [2]. The mechanism of injury may be valgus external rotation, abrupt hyperextension or pure forced internal rotation. The aim of our work is to evaluate the short- and medium-term functional results of our series.

METHODS

This is a retrospective study carried out in the Traumato-Orthopaedic Department of the Avicenne Military Hospital in Marrakech, spread over a 5 years period, from January 2017 to January 2022, involving 25 patients with chronic knee laxity secondary tosecondary to ACL rupture. The inclusion criteria were patients with MRI-confirmed ACL rupture. Patients who had undergone ACL ligamentoplasty using the DIDT technique. All our patients were positioned supine on an ordinary table, with the knee flexed at 90° donor site (Figure 1), followed by preparation and calibration (Figure 2), followed by drilling of the femoral and tibial tunnels (figure 3). The graft is introduced into the tibial tunnel through the joint, then into the blind femoral tunnel, at the bottom of which it abuts. Patient data were collected on an information sheet personal history and type of sport practised. Type of sport practised. Functional evaluation was based on the Lyshlom-Tegner functional score.

RESULTS

The average age of our population was 34 years. 24 men and 1 woman with male predominance. 17

patients played soccer, the rest were recreational athletes. The right side of the knee was the most severely affected, with varus flexion and external rotation dominating the lesion mechanism. On MRI of the knee, 17 cases showed total ACL rupture, some with partial ACL discontinuity and others with ACL horizentalization (Figure 4), while 8 patients showed partial rupture (Figure 5), damage to the medial meniscus was observed in 13 patients, and damage to the lateral meniscus in 10 patients (Figure 6). The average hospital stay was three to five days. The average time to return to sport in our series was 8 months. Four patients reported residual pain. Knee instability was reported in only two cases, mainly during exercise. 80% of patients were very satisfied with the surgical result. The mean global score according to the Lysholm and Tegner classification went from pre-op to 35 post-op 85.

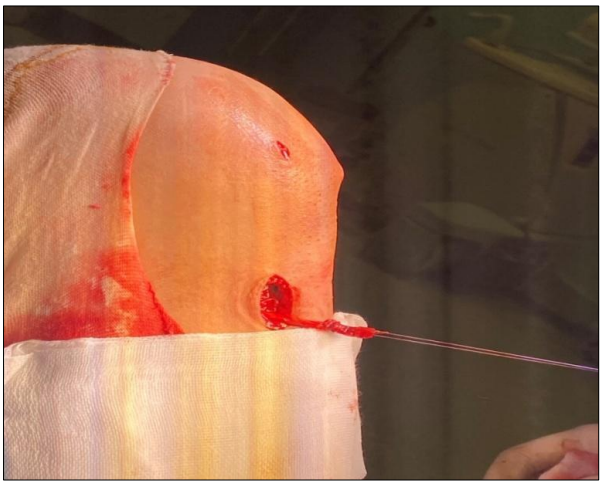

Figure 1: Harvesting grafts from the deep surface of the crow's-feet: dissection of the gracilis and then the semitendinosus using the stripper.

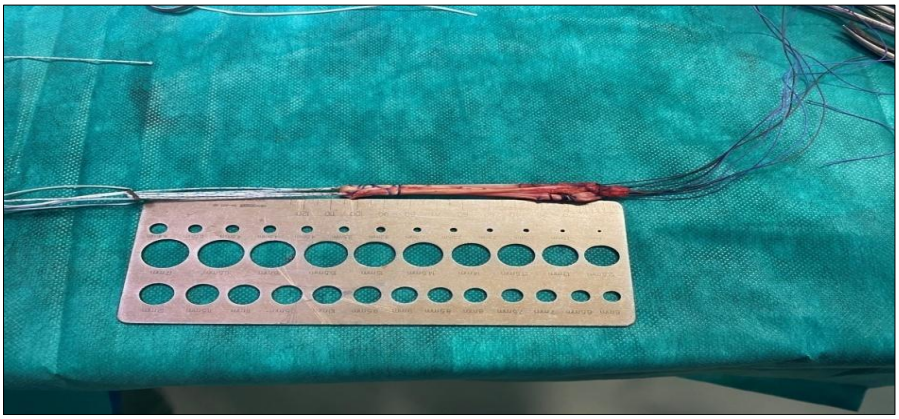

Figure 2: Assembling the two DIDT tendons into 4 strands.

Figure 3 : Result after femoral tunnel drilling

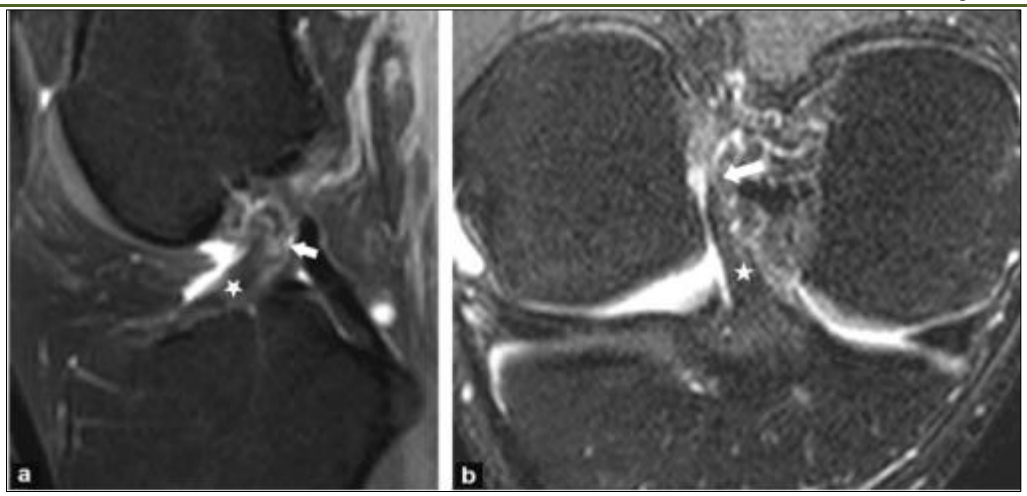

Figure 4: MRI image showing discontinuity of the anterior cruciate ligament (ACL).

Sagittal plane (a) and coronal oblique plane (b) in proton density with fat saturation: complete rupture of the ACL confirmed by arthroscopy. The fibers of the distal part of the ACL remain visible (white star). There is a complete interruption of the ligament at mid-height (white arrows). The ACL is horizontalized.

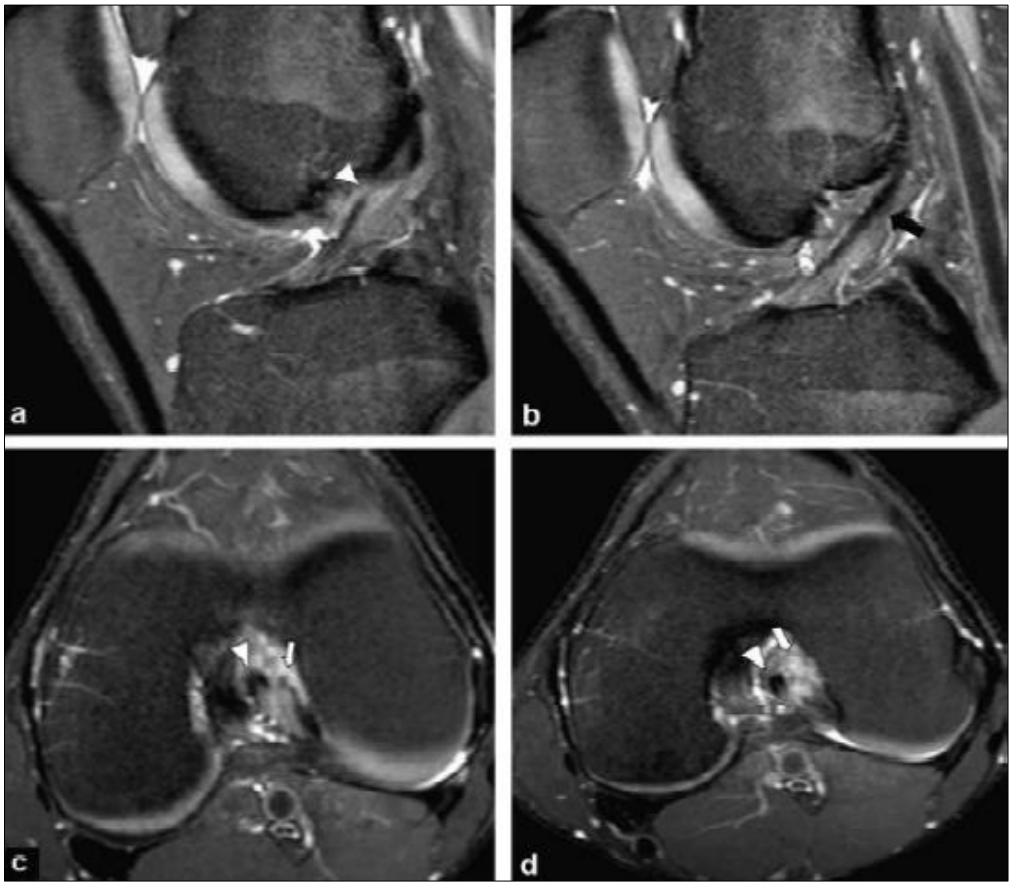

Figure 5: Partial rupture of the posterolateral bundle of the anterior cruciate ligament

a) Sagittal PD fat-sat section: presence of a discontinuity in the fibers of the posterolateral bundle of the ACL. (White arrowhead); **b)** Sagittal PD fat-sat: in the same patient, another section shows continuity of fibers (black arrow); **c)** Axial PD fat-sat: the anteromedial (white arrowhead) and posterolateral (white arrow) bundles are visible; **d)** Axial PD fat-sat: the anteromedial bundle (the white arrowhead) is complete and the posterolateral bundle is discontinuous, its hypersignal indicating a rupture.

Figure 6: MRI of the knee sagittal plane in proton density with fat saturation (DP FS) "bucket-handle" fissure of the lateral meniscus accompanying a complete rupture of the anterior cruciate ligament (ACL) with arthroscopic confirmation

DISCUSSION

Chronic anterior laxity of the knee is now a common nowadays a frequent entity in orthopaedic surgery especially in sports traumatology. MRI is the mainstay of this diagnostic tool, particularly which, above all, enables us to search for associated lesions [3].

Epidemiologically, we report that there was no great difference between the data from our series and those from the various teams concerning the average age of patients.

Geoffroy *et al*., [4] (21 years), Hammami M *et al*., [5]. (2.73 years), El Hassib J *et al*., [6]. (32 years) and Mourad Aoui *et al*., [7]. (28 years). This phenomenon of a peak at this young age is linked to the fact that this type of injury occurs during violent trauma in active sportsmen and women. Concerning gender: there was a clear predominance of males in our series, which is consistent with data reported in various studies [1-8]. On clinical examination, the Lachman test and the anterior drawer were positive in 100% of cases. Together, these two signs have an overall specificity of 98% for ACL rupture. This is in line with the results reported in the literature. Radiologically, MRI is the reference imaging technique, ideally performed 3 to 4 weeks after the trauma [10], to confirm the suspected diagnosis of ACL rupture, two major direct MRI signs in favour of ACL rupture; partial or total discontinuity and horizontalization of the distal ACL fragment [11], Indirect signs of ACL rupture include: anterior subluxation of the lateral tibial plateau in relation to the femur, verticalization of the PCL, distension or buckling of the patellar tendon [12, 13]. Post-operative follow-up to arthroscopic DIDT was characterized by a low complication rate, with no patient in our series having experienced any complications. Rousseau and al [8], had 1 case of arthritis, Gerometta [4]. 2 cases of hemarthrosis and Ghouzlane *et al*., [9], had 3.5% of these patients with arthritis and 2.2% with deep vein thrombosis. After the operation, resumption of sporting activity should be gradual. It is not recommended before 6 months post-operatively for training and 8 months for competition.

According to the authors, the average time to return to sport after ACL surgery varies between 7 and 9 months, and was 8 months in our serie.

CONCLUSION

Chronic anterior laxity of the knee is a frequent complaint in orthopaedic surgery, especially in sports traumatology.

Diagnosis is based on a combination of clinical examination, MRI and, finally, surgery to confirm the diagnosis and treat the ligament injury. Several surgical techniques have been described in the literature for ACL repair, with the hamstring technique becoming the most common.

REFERENCES

1. Quisquater, L., Bollars, P., Vanlommel, L., Claes, S., Corten, K., & Bellemans, J. (2013). The incidence of knee and anterior cruciate ligament injuries over one decade in the Belgian Soccer League. *Acta Orthop Belg*, *79*(5), 541-546.
2. Rodineau. (2014). Les mécanismes de rupture du ligament croisé antérieur. Journal de Traumatologie du Sport, 31.3, 149–52.
3. Amghar, J., Yahyaoui, M., Benhammou, M., Aharram, S., & Agoumi, O. (2019). A. Daoudi Interet de la fixation femorale par l'ultraboutondans

la reconstruction arthroscopique du lcatechnique didt. Service de traumatologie orthopédie A, CHU Mohammed VI, Faculté de Médecine et de Pharmacie, Université Mohammed Premier, Oujda, Revue Marocaine de chirurgie Orthopédique et Traumatologique N°78 Année 2019.

4. Gerometta, A., Khiami, F., Lutz, C., Lefevre, N., Herman, S., Thoreux, P., ... & Fazilleau, F. (2015). Return to sport after anterior cruciate ligament reconstruction in 239 athletes. *Orthopedic and Trauma Surgery Review*, *101* (8), e19.
5. Hammami, M., & Sahnoun, N. (2020). Ligamentoplastie du ligament croisé antérieur du genou chez le sportif: étude rétrospective à propos de 80 cas dans le Département d'Orthopédie de Tataouine, Tunisie. *Pan African Medical Journal*, *36*(1).
6. El Hassib, J., & Latifi, M. (2008). Résultats des ligamentoplasties (LCA) du genou au CHU Mohammed VI. Thèse de médecine, N° 42, faculté de médecine et de pharmacie Marrakech.
7. Aoui, M., Dahech, F., Sahnoun, N., Ali, R. M., Jarboui, A. M., Ghribi, M., ... & Keskes, H. (2022). Reconstruction du ligament croisé antérieur selon la technique de Mac Intosh modifiée par Jaeger: étude rétrospective de 80 cas au service d'orthopédie et traumatologie CHU Habib Bourguiba, Sfax, Tunisie. *Pan African Medical Journal*, *43*(1).
8. Rousseau, R., Labruyère, C., Kajetanek, C., Deschamps, O., Makridis, K., & Djian, P. (2016). Evaluation of complications and adverse events after anterior cruciate ligament reconstruction comparing 2 types of graft. *Revue de Chirurgie Orthopédique et Traumatologique*, *102* (8), S289.
9. Ghozlane, L., Tamalet, B., Peyre, M., & De Lécluse, J. (2023). Étude comparative de l'évolution précoce des ligamentoplasties du LCA par autogreffe aux ischio-jambiers versus autogreffe au tendon rotulien, Saint-Maurice Cedex.
10. Asfari, S., Chuzel, Q., Bordet, B., & Pialat, J. B. (2020). L'imagerie d'un LCA traumatique. *Journal d'imagerie diagnostique et interventionnelle*, *3*(6), 409-421.
11. Mellado, J. M., Calmet, J., Olona, M., Gine, J., & Sauri, A. (2004). Magnetic resonance imaging of anterior cruciate ligament tears: reevaluation of quantitative parameters and imaging findings including a simplified method for measuring the anterior cruciate ligament angle. *Knee Surgery, Sports Traumatology, Arthroscopy*, *12*(3), 217-224.
12. Klass, D., Toms, A. P., Greenwood, R., & Hopgood, P. (2007). MR imaging of acute anterior cruciate ligament injuries. *The Knee*, *14*(5), 339-347.
13. Sandra, L. (2002). Moore, Imaging the Anterior Cruciate Ligament', *The Orthopedic Clinics of North America*, *33.4*, 663–74.