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Original research article

Comparison of pre-injury and post-op tegner score, lysholm score and pre-injury, pre-op and post-op IKDC score between males and females: ACL reconstruction

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Abstract

Anatomic ACL reconstruction is a concept rather than a technique and can best be described based according to the following four principles. The first principle is to restore both functional bundles of the ACL, the AM and PL bundle. The second principle is that the graft needs to be placed anatomically, with the tibial and femoral tunnel apertures placed within the native ACL insertion sites. All the surgeries are performed by a single orthopedic surgeon. All patients had semitendinosus and gracilis tendon autografts harvested in a similar manner. Single bundle reconstruction technique with quadrupled hamstring autograft is used in every case. In all cases Endo-Button was used for femoral side fixation and preservation of hamstring graft tibial insertion on the tibial side. There was not much difference noticed in the scores in different sexes.

Keywords: Tegner score, lysholm score, IKDC score

Introduction

During the period from 1980-2000, the bone-patellar tendon-bone graft was the most commonly used autograft. Arthroscopic ACL reconstruction was first performed using a two-incision technique, in which the femoral bone tunnel was drilled from the outside-in. Over time, a one-incision technique was adopted, where the femoral bone tunnel was drilled from the inside-out, through the tibial tunnel. When arthroscopic ACL reconstruction was pioneered, 100% of surgeons used a non-anatomic, trans-tibial drilling technique. The transtibial technique, in which the femoral tunnel is drilled through the tibial tunnel, was commonly used in ACL reconstruction until 10-12 years ago. However, several studies have suggested that the transtibial technique might not be able to center the graft near the anatomic center of the ACL, owing to constraints imposed by the tibial tunnel [1].

The ability of the transtibial technique and a tibial tunnel-independent technique (placed transfemoral outside-in) to place the guide pin near the center of the femoral attachment of the anterior cruciate ligament was compared in 12 cadavers. After arthroscopic placement of the guide pins, the femur was dissected and the three-dimensional geometry of the femur, anterior cruciate ligament footprint, and positions of each guide pin were measured. The transtibial guide-pin placement was 7.9 ± 2.2 mm from the center of the 15 footprint (near its anterior border), whereas the independent technique positioned the guide pin 1.9 ± 1.0 mm from the center. The center of the footprint was within 2 mm of an anteroposterior line through the most posterior border of the femoral cartilage in the notch and a proximodistal line through the proximal margin of the cartilage at the capsular reflection. More accurate placement of the femoral tunnel might reduce the incidence of graft failure [2].

High-resolution, multiplanar magnetic resonance imaging and advanced 3-dimensional modelling techniques were used to measure *in vivo* femoral tunnel placement in 8 patients with the transtibial technique and 8 patients with a tibial tunnel-independent technique. Femoral tunnel placement in 3 dimensions was measured relative to the center of the native anterior cruciate ligament attachment on the intact contralateral knee. The tibial tunnel-independent technique placed the graft closer to the center of the native anterior cruciate ligament attachment compared with the transtibial technique. The transtibial technique placed the tunnel center an average of 9 mm from the center of the anterior cruciate ligament attachment, compared with 3 mm for the tibial tunnel-independent technique. The transtibial technique resulted in a more anterior and superior placement of the tunnel compared with the tibial tunnel–independent technique. The tibial tunnel-independent technique allowed for more anatomic femoral tunnel placement compared with the transtibial technique. Single-bundle anterior cruciate ligament

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reconstructions will be improved if grafts are centered in their anatomical insertions by an independent drilling method versus grafts placed by a conventional transtibial drilling method.
Techniques where the femoral tunnel is placed independently of the tibial tunnel might allow for better placement of the femoral tunnel. Regardless of the technique, there is unanimous support among surgeons for the use of "anatomic" reconstructions using bony and soft tissue remnant landmarks. A survey at a recent international meeting revealed that nearly 70% of the surgeons utilize the anterior medial (AM) portal to drill the femoral tunnel. 22% used both the AM portal technique and the trans-tibial technique to drill the femoral tunnel depending on whether or not anatomic tunnel placement can be achieved with the transtibial technique. No surgeon used only the transtibial drilling technique. This is a significant change in the right direction, but we need to continue to modify our methods to anatomically reconstruct the ACL as more information about structure and function of the ACL becomes available. It is a long and continuing journey to be anatomic [3, 4].
Anatomic ACL reconstruction is a concept rather than a technique and can best be described based according to the following four principles. The first principle is to restore both functional bundles of the ACL, the AM and PL bundle. The second principle is that the graft needs to be placed anatomically, with the tibial and femoral tunnel apertures placed within the native ACL insertion sites. To ensure similar functional properties as the native bundles have, the third principle is to tension each bundle in accordance with the native tensioning patterns from full knee extension through flexion. The fourth and final principle is to customize the surgery for each individual patient by considering the variation in anatomic characteristics, activity level, lifestyle and personal preferences [5].
Distinct knowledge of anatomic landmarks of the femoral and tibial insertion sites is essential to ensure anatomic placement of the bone tunnels, since non-anatomic femoral tunnel position has been shown to be the most common cause of graft failure. Two bony landmarks on the lateral wall of the intercondylar notch are of utmost importance. The lateral intercondylar ridge or "resident's ridge", represents the anterior and superior border of the femoral AM- and PL-bundle insertion sites when the knee is flexed to 90°. The lateral bifurcate ridge, which appears in 80% of cases, separates the origins of the AM and PL-bundle insertion sites and runs perpendicular to the lateral intercondylar ridge. Especially in chronic cases where the bundle remnants may not be visible, knowledge of these land- marks is crucial to placing the ACL graft within the anatomic footprint [6].

Methodology

Our study population will include all patients on whom anterior cruciate ligament reconstruction surgery has been performed using 4 stranded hamstring autograft and preservation of hamstring graft tibial insertion operated. The estimated number would be 52 patients. Case notes would be used to establish all demographic details including mechanism of injury, time to surgery, post-operative immobilization and intra-operative details. Complications are also will be recorded and confirmed with the patients. The functional questionnaire will be both e-mail based and in-person format methods. Patients will be followed up at least 9 months post-operatively. IKDC subjective functional scoring system & The Lysholm score and Tegner pre-operative and post-operative scoring system will be utilized to assess the functional outcome.
All the surgeries are performed by a single orthopedic surgeon. All patients had semitendinosus and gracilis tendon autografts harvested in a similar manner. Single bundle reconstruction technique with quadrupled hamstring autograft is used in every case. In all cases Endo-Button was used for femoral side fixation and preservation of hamstring graft tibial insertion on the tibial side. Indications for surgery were clinically and radiologically confirmed cases of anterior cruciate ligament deficient knees.

Inclusion criteria

1. All the patients who have undergone arthroscopic ACL reconstruction using 4 stranded hamstring autograft and preservation of hamstring graft tibial insertion.
2. Age between 18 to 55 years.
3. Radiologically ACL deficient knee confirmed by MRI.
4. Patients with or without Associated meniscus injuries.

Exclusion criteria

1. Bilateral knee injury.
2. ACL tears associated with fractures.
3. Revision ACL reconstruction.
4. current or prior Infection.
5. Patients who were lost to follow up.
6. Patients with Associated PCL tear.
7. Patients with medical contraindication to surgery.

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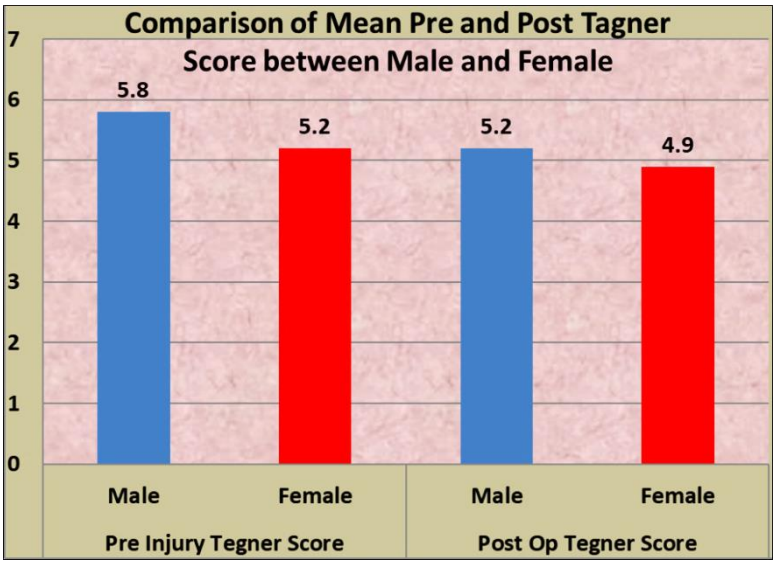
Investigations required for the study

1. Routine pre-operative investigations.
2. Pre-operative MRI of ACL deficient Knee.

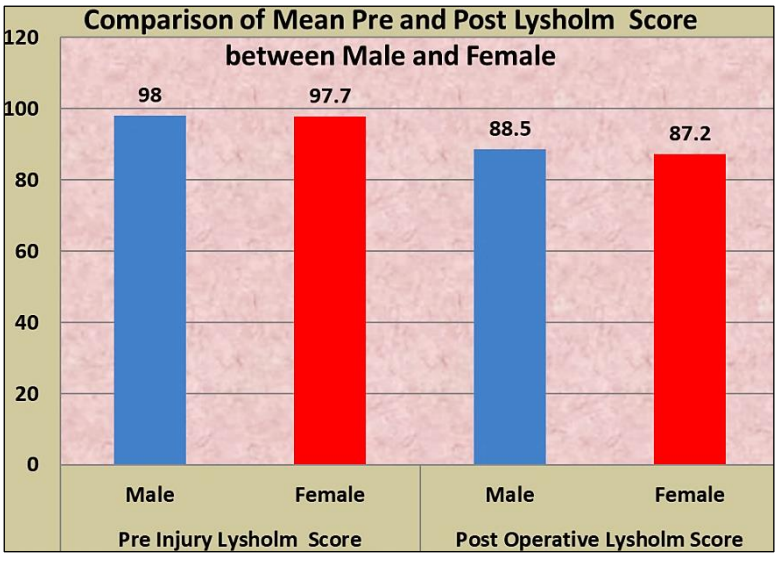
Results

Table 1: Comparison of Pre-injury and Post Op-Tegner Score, Lysholm score and Pre-injury, Pre-Op and Post-Op IKDC score between males and females

		N	Mean	SD	Min.	Max.	't' value	P value
Pre-Injury Tegner Score	Male	42	5.8	1.208	4	8	2.333	0.133
	Female	10	5.2	1.033	4	7		
Post-Op Tegner Score	Male	42	5.2	1.094	2	7	0.713	0.403
	Female	10	4.9	.876	4	6		
Pre-Injury Lysholm Score	Male	42	98.0	2.300	94	100	0.114	0.737
	Female	10	97.7	2.452	94	100		
Post-Operative Lysholm Score	Male	42	88.5	7.881	55	100	0.208	0.650
	Female	10	87.2	9.028	64	100		
Pre-Injury IKDC Score	Male	42	92.9	7.718	70.1	100.0	0.610	0.438
	Female	10	95.0	5.678	83.2	100.0		
Pre-Operative IKDC Score	Male	42	35.4	9.018	19.5	66.0	0.255	0.616
	Female	10	37.2	12.435	17.9	60.1		
Post-Op IKDC Score	Male	42	82.4	10.945	45.8	99.9	0.823	0.369
	Female	10	78.3	19.735	35.0	94.6		



Graph 1: Sex difference of Pre-injury and Post Op Tegner score



Graph 2: Sex difference of Preinjury and Post Op Lysholm score

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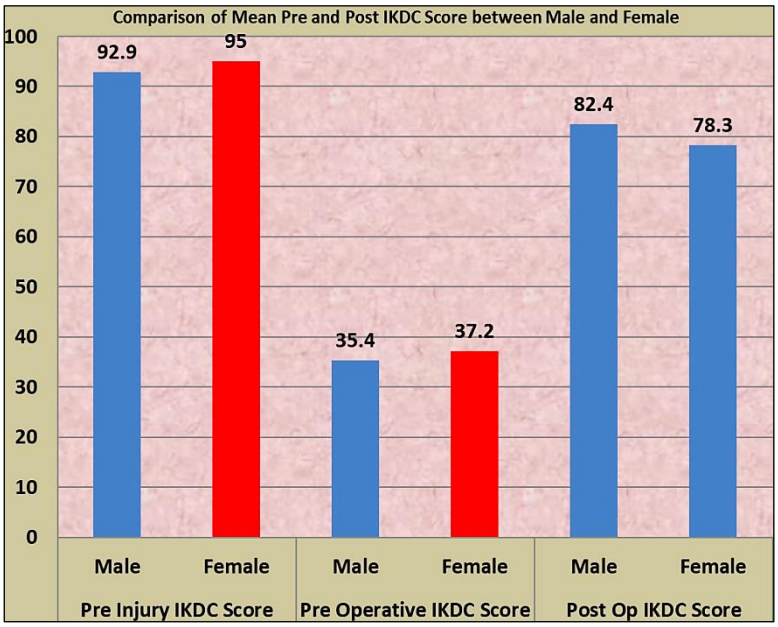

Graph 3: Sex difference of Pre-Injury, Pre-Op and Post-Op IKDC score

Discussion

This rating scale was developed by a panel of internationally well-recognized orthopedic surgeons. It initially included 7 parameters related to the knee, reflecting both impairment and disability. Patients were graded in 4 different grades-normal, nearly normal, abnormal and severely abnormal, for each of these parameters, and the worse grading determined the final outcome. Later on, the IKDC system was supplemented with a questionnaire with different subjective factors such as symptoms, sports activities, and ability to function. The reliability, validity and responsiveness were found to be good. The IKDC rating system is well documented according to all the analyzed properties [7].

At face value, the domains covered by the IKDC appear to represent elements that are likely to be important to patients. It shows adequate internal consistency and has no floor or ceiling effects across mixed groups of patients with knee conditions. The IKDC has been shown to be responsive to change following surgical interventions, highlighting its usefulness in this patient population.

Despite demonstrating face validity, the lack of patient contribution to item selection indicates that content validity cannot necessarily be assumed. The relatively long recall period associated with 3 of the items may be a problem for some patients. The use of 1 aggregate score to represent symptoms, activities and function may mask deficits in 1 domain [6].

The IKDC involves minimal administrative and respondent burden, and can be easily scored in the clinic using the online scoring sheet. However, clinicians using the online scoring system need to keep in mind that the normative data provided are from a particular population, and may not be representative of their individual patient's population [8].

Psychometric evaluation supports the use of the IKDC in research for a variety of knee conditions. As some versions of the IKDC published online contain subtle differences in the wording of instructions and items, researchers should ensure that they utilize the version published as a component of the 2000 IKDC Knee Forms to ensure that findings of psychometric properties still apply, and that comparisons can be made with previous studies. Administrative and respondent burden would not limit research use, although researchers should be diligent in checking for missing data.

The Lysholm score was first presented in 1982. It was further developed and refined to include only subjective items. The score now consists of 8 different items on a 100-point scale with 25 points each attributed to instability and pain. An activity-grading scale was added. Different activities put different demands on the knee, and different patients strive to carry out different activities. Thus, it was considered necessary to grade activities in a standardized way. The main advantage of the activity scale is not to compare different patients, but to note changes in activity level in the same person at different times. With this scale, the pre-injury level and the present and desired activity levels can be defined [9].

The score should be regarded in relation to the activity level. Patients who have reached the desired high activity level and have a high score may have better function than patients with a high score but a low activity level, for example patients who are not fully rehabilitated or those who have adapted to their disability. The Lysholm-Tegner rating system is well documented according to all the analyzed properties.

The Lysholm-Tegner scale is a freely available measure that is able to detect change following nonsurgical and surgical intervention. It is considered to have face validity by orthopedic surgeons.

Content validity cannot be assumed, as the items included in the Lysholm scale were surgeon derived.

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The Lysholm scale was developed as a clinician-administered tool, which increases the potential for interviewer bias if the patient-reported outcome is applied as intended.
Minimal administrative and respondent burden makes the Lysholm scale attractive for clinical use. The lack of floor and ceiling effects across different knee conditions suggests that the Lysholm scale is useful for tracking improvement with intervention as well as deterioration over time in patients with various knee pathologies. However, clinicians should consider the impact of inadequate reliability in evaluation of individuals [10].
The Lysholm scale is reliable for use in research on ligament and meniscal injuries, chondral injuries, and patellar dislocation. It is important that researchers consistently utilize the same scale version. Researchers should be aware that the psychometric properties may change between different administration methods, ensure consistent administration within and between studies, and be aware that clinician and patient ratings may differ substantially.

Conclusion

- In our study we decided to choose IKDC scores and Lysholm-Tegner score as both these were reliable, tested, validated for patient reporting and internationally accepted and most widely used scores to report functional outcome.
- There was not much difference noticed in the scores in different sexes

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