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Retrospective Qualitative Study

The New Age Gladiator: ACL Allograft Reconstruction Has Low Revision Rates in Patients Over 40

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Abstract

Introduction: The aging population are participating in more athletic and physically demanding activities longer and later in life. Advances in medicine have helped to facilitate these activities as well as treating injuries that come along with such activities. Anterior cruciate ligament (ACL) injuries have always been a devastating injury, but with better surgical procedures and rehabilitation they are merely season ending and not career ending. The debate over the best graft for ACL reconstructions has been ongoing for years and there are numerous studies supporting all types. This study aims to report allografts are an equally viable and effective option for ACL reconstruction in patients over 40 years of age with no difference in re-rupture rates.

Methods: This is a retrospective qualitative study using medical records for patients who underwent an ACL reconstruction by a single provider at Novant Health Orthopedics and Sports Medicine from 2018 - 2022 (n = 104). Of those ACL reconstructions, patients over 40 who had allografts were identified (n = 30). All allografts were bone patellar tendon bone (BPTB) grafts with pre-shaped bone blocks measuring 10mm in diameter and 95 - 100 mm in length provided by Musculoskeletal Transplant Foundation (MTF) biologics. The same sterilization allowash technique was performed on each allograft. All patients followed a specific post operative protocol including physical therapy and weight bearing in a brace immediately post operatively with crutches.

Medical records were reviewed, and patients were contacted via telephone for follow-up information. Data interpreted included demographics, mechanism of injury, pre and post op ROM, pre and post op function, return to sport, complications, re-rupture and subjective instability. The data collected was all categorical and results collated.

Results: See figure 1.

Conclusion: With no patients with a re-rupture, our study provides insight into supporting our hypothesis that patients over 40 years of age can return to physical activity and receive long term benefits from ACL reconstruction using allografts.

Keywords: *Anterior Cruciate Ligament; ACL; Arthroscopy; Joints; Sports Medicine; Allograft*

Abbreviations

ACL: Anterior Cruciate Ligament; BPTB: Bone Patellar Tendon Bone; MTF: Musculoskeletal Transplant Foundation; ROM: Range of Motion; BMI: Body Mass Index; MOON: Multicenter Orthopaedic Outcomes Network; MARS: Multicenter ACL Revision Study

Background/Introduction

The aging population are participating in more athletic and physically demanding activities longer and later in life. Advances in medicine have helped to facilitate these activities as well as treating injuries that come along with such activities. Anterior cruciate ligament (ACL) injuries have always been a devastating injury, but with better surgical procedures and rehabilitation they are merely season ending and not career ending. The older athlete in conjunction has benefited from these advances. However, they are not the same biologic population and may not require as morbid procedures to achieve the same outcome.

The debate over best graft for ACL reconstructions has been ongoing for years and there are numerous studies supporting all types. However, more recently the Multicenter Orthopaedic Outcomes Network (MOON) and Multicenter ACL Revision Study (MARS) studies have evaluated the effectiveness of autografts vs allografts for ACL reconstruction. Based on their analysis autografts have been found to be superior in ACL reconstruction with a lower re-rupture rate. However, most of these studies were done on individuals in younger age groups specifically younger than 40 years of age. Thus, leaving question of the best graft choice for ACL reconstruction in the older patient population.

Allografts have a large advantage over autografts specifically with significantly lower morbidity, which could be extremely valuable in an older population. This study aims to prove allografts are an equally viable and effective option for ACL reconstruction in patients over 40 years of age with no difference in re-rupture rates.

Methods

This is a retrospective qualitative study using medical records for patients who underwent an ACL reconstruction at Novant Health Orthopedics and Sports Medicine in Charlotte, North Carolina. A patient population operated on from 2018 - 2022 (n = 104) by a single orthopaedic sports medicine fellowship trained physician were used. Of those patients, 30 were forty years of age or older at the time of surgery and had allografts used for their ACL reconstruction. All allografts were bone patellar tendon bone (BPTB) grafts with pre-shaped bone blocks measuring 10 mm in diameter and 95 - 100 mm in length provided by MTF biologics. The same sterilization allowash technique was performed on each allograft. All patients followed a specific post operative protocol including physical therapy and weight bearing in a brace immediately post operatively with crutches.

Medical records were reviewed, and patients were contacted via telephone for follow-up information. Data interpreted included demographics, mechanism of injury, pre and post op ROM, pre and post op function, return to sport, complications, re-rupture and subjective instability. The data collected was all categorical and results collated.

Results

Demographics

There were 17 females (57%) and 13 males (43%). The average age of the patients was 49 years old (range 41-64). Two patients had a BMI > 40. Two patients had prior knee surgery, ipsilateral ACL reconstruction and partial meniscectomy.

Surgery details

27 (90%) patients had surgery more than 30 days after injury. 22 (73.3%) patients had ACL reconstruction with a partial meniscectomy. The average surgical time was 71 minutes (52 - 100 minutes). 19 (63.3%) patients had some form of osteoarthritis in the knee, with 4/19 (21.1%) having significant degenerative changes of Outerbridge classification of 3 or 4.

Surgery results

18 (60%) patients had increased ROM compared to pre-op, 7 (23%) had a decreased ROM, and 5 (17%) maintained the same ROM at last follow up. Last follow up visit was on average of 219 days from date of surgery (22 - 656 days).

Follow-up survey

Follow-up phone calls yielded a 57% phone response rate (17/30). There were no reruptures, infections or complications in these respondents. All patients reported that their knee function returned to baseline. 15 (88%) felt their knee was stable, while 2 (12%) noted subjective laxity. When asked to rate their overall surgery and recovery, 14 (82%) were very satisfied, 2 (12%) were satisfied, and 1 (6%) patient neutral. 80% (8/10) of people who were interested in sports prior to injury returned to their activities. Seven (41%) reported they weren't interested in sports prior and did not take up sports after ACL reconstruction.

Demographics	
Female	17 (.57)
Male	13 (.43)
Average Age (range: 41-64)	49 years old
BMI >40	2
Prior Knee Surgery	2 (ipsilateral ACL reconstruction, partial meniscectomy)
Surgery Details	
Surgery >30 days after injury	27 (.90)
ACL reconstruction with partial meniscectomy	22 (.73)
Average surgical time (range 52-100 min)	71
Osteoarthritis in knee Significant degenerative changes of Outerbridge classification of 3 or 4	19 (.63) 4 (.21)
Surgery Results	
Range of Motion compared to pre-op Increased ROM Decreased ROM Maintained ROM	 18 (.60) 7 (.23) 5 (.17)
Follow- Up Survey	**n = 17**
Re-ruptures	0
Infections	0
Complications	0
Knee function returned to baseline	17
Knee stability	15 (.88)
Knee Laxity	2 (.12)
Overall surgery and recovery rating Very satisfied Satisfied Neutral	 14 (.82) 2 (.12) 1 (.06)
Previously interested in sport Returned to sport activities	10 8 (.80)
Not previously interested in and did not take up sports after ACL reconstruction	7

Figure 1

Discussion

Graft choice is a continued debate in the orthopaedic community. We continue to search for the most appropriate choice that produces great outcomes with minimal complications. Allografts have been used successfully for decades, however there is mounting evidence

that autografts may be superior, especially in survivorship. Rerupture rates can be as high as 50% in the first postoperative year [1] and is considered a catastrophic failure. We have used the data from a small patient population to demonstrate that allografts are a viable option with equal survivorship in the older population. Our data suggests that patients can benefit long-term with BPTB allograft reconstructions without the increased morbidity from an autograft with equal survivorship. Previous findings have found that BPTB allograft was favorable to BPTB autograft with regards to return to preinjury activity and anterior knee pain [2], which is supported by our data.

There is a lack of allograft survivorship research delineating across age groups. In a study of 418 patients comparing revision rates with different allograft tissue types in ACL reconstruction, there was a 3% revision rate using allografts, specifically a 5% (3/58) revision rate in BPTB allografts [3]. The average age of this population was 39 (+/- 12), which was much younger than our targeted population.

Data from the MOON study shows that the odds of a patient tearing an ACL graft in comparison to a patient 10 years older is 2.3 times higher, but the older population was not studied, with a mean age of 27. Data showed that patients age 40+ had a re-rupture rate between 0 and 1.7%, providing reason to believe that patients over 40 can have a very low incidence of re-rupture with allograft [4]. This is supported by our data which shows a 0% re-rupture rate in patients over 40.

As a small-scale retrospective review, there are some limitations to our findings. An expansion of the study to a greater number of patients is needed to provide higher validity to the study findings. Also, with an average follow-up time of 219 days, future collection of follow-up data is needed to provide further analysis of long-term benefits of allograft ACL reconstruction [5-9].

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