

Revision Anterior Cruciate Ligament Reconstruction Graft Choice Impact on Outcome in the MARS Cohort

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7 **ABSTRACT**

8 **Background:** Most surgeons believe that graft choice for ACL reconstruction is an important
9 factor related to outcome. Although graft choice may be limited in the revision setting based on
10 previously used grafts, it is still felt to be important.

11 **Hypothesis:** The purpose of this study was to determine if revision ACL graft choice predicts
12 outcomes related to sports function, activity level, OA symptoms, graft re-rupture, and
13 reoperation at two years following revision reconstruction. We hypothesized that autograft use
14 would result in increased sports function, increased activity level, and decreased OA symptoms
15 (as measured by validated patient reported outcome instruments). Additionally, we
16 hypothesized that autograft use would result in decreased graft failure and reoperation rate 2
17 years following revision ACL reconstruction.

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19 **Study Design:** Prospective cohort study; Level of evidence, 2.

20 **Methods:** Revision ACL reconstruction patients were identified and prospectively enrolled by
21 83 surgeons over 52 sites. Data collected included baseline demographics, surgical technique
22 and pathology, and a series of validated patient reported outcome instruments (IKDC, KOOS,
23 WOMAC, and Marx activity rating score). Patients were followed up for 2 years, and asked to
24 complete the identical set of outcome instruments. Incidence of additional surgery and
25 reoperation due to graft failure were also recorded. Multivariate regression models were used to
26 determine the predictors (risk factors) of IKDC, KOOS, WOMAC, Marx scores, graft re-rupture,
27 and reoperation rate at 2 years following revision surgery.

28 **Results:** 1205 patients were successfully enrolled with 697 (58%) males. Median age was 26.
29 In 88% this was their first revision. 341 (28%) were undergoing revision by the surgeon that had
30 performed the previous reconstruction. 583 (48%) underwent revision reconstruction utilizing an
31 autograft, 590 (49%) allograft, and 32 (3%) both autograft and allograft. Median time since their
32 last ACL reconstruction was 3.4 years. Questionnaire follow-up was obtained on 989 subjects
33 (82%), while phone follow-up was obtained on 1112 subjects (92%). The IKDC, KOOS, and
34 WOMAC scores (with the exception of the WOMAC stiffness subscale) all significantly improved
35 at the two year follow-up time point ($p < 0.001$). Contrary to the IKDC, KOOS, and WOMAC
36 scores, the two year MARX activity scale demonstrated a significant *decrease* from the initial
37 score at enrollment ($p < 0.001$).

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39 Graft choice proved to be a significant predictor of 2 year IKDC scores ($p=0.017$). Specifically,
40 the use of an autograft for revision reconstruction predicted improved score on the IKDC
41 [$p=0.045$; Odds Ratio (OR) = 1.31; 95% confidence intervals (CI) = 1.01, 1.70]. Knee sports
42 and recreation score on the KOOS demonstrated higher scores in the setting of an autograft for
43 revision reconstruction ($p=0.037$; OR=1.33; 95% CI=1.02, 1.73). For KOOS subscale quality of
44 life (QOL) autograft also predicted improved scores ($p=0.031$; OR=1.33; 95% CI=1.03, 1.73).
45 For the KOOS symptoms and ADL subscales, graft choice did not predict outcome score. Graft
46 choice also proved to be a significant predictor of 2 year Marx activity level scores ($p=0.012$).

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48 Graft re-rupture was reported in 37/1112 (3.3%) of patients by their two year follow-up: 24
49 allografts, 12 autografts, and 1 allograft + autograft. Use of an autograft for revision resulted in
50 patients 2.78 times less likely to sustain a subsequent graft rupture than if an allograft was
51 utilized ($p=0.047$; 95% CI=1.01, 7.69).

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53 **Conclusions:** Improved sports function and patient reported outcome measures are obtained
54 when an autograft is utilized. Additionally, autograft type shows a decreased risk in graft re-
55 rupture at two years follow-up. Surgeon education regarding the findings in this study can result
56 in potentially improved revision ACL reconstruction results for our patients.

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