National University Hospital

Concomitant meniscus injury has higher likelihood of achieving minimally clinical important difference (MCID) after anterior cruciate ligament reconstruction

Kamaraj Thirukumaran[1], Kennan Yeo[1], Mok Ying Ren[2], Yee Han Dave Lee[2], Zi Qiang Glen Liau[2]

[1]Yong Loo Lin School of Medicine, National University of Singapore, Singapore

[2]Department of Orthopaedic Surgery, National University Hospital, Singapore

Conflict of interest

Authors declare no conflict of interest.

Introduction

- ACL injury is associated with concomitant meniscus tears up to **63%**[1] of the time
- Patient outcomes can be evaluated using patient reported outcome measures (PROMs)
- Previous studies[2,3] have explored this but no consensus in literature
- Analysis with statistical and clinical significance (MCID - Minimal clinically important difference)
- MCID
  - "Smallest increment of improvement after treatment that a patient is likely to consider important"[4]
  - Measure of clinical efficacy of a treatment

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Aims

- Identify MCID values 1-year and 2-year post operatively in patients undergoing ACLR
- Effects of pre-operative factors in achievement of MCID

Methods

- Single tertiary hospital between 2000-2022
- Retrospective study reviewed at pre-op, 1- and 2-years post surgery
- Multiple surgeons (Associate consultant and above)
- **Clinical outcomes scores**
  - SF 36 MCS/PCS
  - Lysholm
  - Knee Osteoarthritis Outcomes Score (KOOS score)
- **MCID calculation**
  - Distribution method – 0.5 SD of difference in scores
- Difference between pre-operative and 2-year scores using Mann-Whitney U test

Results

Demographics

N = 474	
Age, mean [95% CI]	27.1 [26.2, 28.0]
BMI , mean [95% CI]	24.3 [23.9, 24.6]
Gender	
Male	341 (71.9%)
Female	133 (28.1%)

Results

PROM difference between pre-op and 2y post op

PROMs	Pre-op Mean	2y Post-op Mean	Net change	p-value
Lysholm Score	72.8 [71.3, 74.3]	92.7 [91.8, 93.5]	19.9 [18.2, 21.5]	**p < 0.001****
KOOS Symptoms	74.3 [72.6, 76.0]	91.5 [90.4, 92.6]	17.4 [15.4, 19.3]	**p < 0.001****
KOOS Pain	77.8 [76.3, 79.4]	95.8 [94.2, 95.8]	17.4 [15.7, 19.1]	**p < 0.001****
KOOS ADL	82.8 [81.3, 84.3]	96.4 [95.8, 97.0]	13.9 [12.3, 15.5]	**p < 0.001****
KOOS Sports and Recreation Function	36.8 [34.3, 39.3]	79.0 [76.6, 81.4]	42.1 [38.7, 45.5]	**p < 0.001****
KOOS QoL	41.2 [39.2, 43.2]	77.4 [75.3, 79.5]	36.7 [33.8, 40.0]	**p < 0.001****
SF-36 PCS	43.2 [42.5, 43.9]	54.5 [54.0, 55.0]	11.5 [10.6, 12.4]	**p < 0.001****
SF-36 MCS	51.0 [50.1, 51.9]	57.5 [56.9, 58.2]	6.5 [5.5, 7.6]	**p < 0.001****

Results

MCID values and achievement %

PROMs	1-year MCID threshold	1-year MCID % achievement	2-year MCID threshold	2-year MCID achieved%
Lysholm Score	9.1	87.6	9.1	88.4
KOOS Symptoms	10.0	77.8	10.7	76.8
KOOS Pain	9.1	81.4	9.6	81.0
KOOS ADL	8.4	86.1	8.7	81.9
KOOS Sport and Recreation Function	16.1	90.9	18.7	84.0
KOOS QoL	15.0	86.1	16.1	85.0
SF-36 PCS	4.7	89.0	4.8	89.2
SF-36 MCS	5.9	69.4	6.2	70.4

Results

Multivariate analysis

Variable	PROMs	Odds of achieving MCID OR [95% CI]	p value
Meniscal pathology	KOOS ADL	0.613 [0.376, 1.00]	**p = 0.001**
	KOOS Sport & Recreation function	0.426 [0.091, 0.347]	**p = 0.002**
	KOOS QoL	0.178 [0.091, 0.347]	**p = 0.002**
	SF-36 PCS	0.511 [0.272, 0.961]	**p = 0.035**
Pre-operative scores	Lysholm score	0.885 [0.854, 0.917]	**p < 0.001**
	KOOS symptoms	0.977 [0.964,0.990]	**p < 0.001**
	KOOS pain	0.970 [0.953, 0.987]	**p < 0.001**
	SF-36 PCS	0.947 [0.908, 0.988]	**p = 0.011**
	SF-36 MCS	0.944 [0.921, 0.967]	**p <0.001**
BMI	KOOS ADL	0.902 [0.849, 0.959]	**p < 0.001**
	KOOS Sport & Recreation function	0.992 [0.865, 0.981]	**p = 0.011**
	SF-36 PCS	0.885 [0.820, 0.954]	**p < 0.001**

Factors for increased odds of MCID achievement ($p < 0.05$)

- Presence of concomitant meniscus pathology
- Lower pre-operative scores
- Lower BMI

Discussion

(1) Lower pre-operative scores

- Ceiling effect[5]
  - Patients with **higher** scores have **lower** room for improvement
  - Benefit of ACLR better felt **more** by patients which a lower PROM pre - operatively

- Copers vs non-copers[6,7]
  - Copers : patients that can return to a previous level of activity without instability, usually do **NOT** need surgery
  - Non copers: patients unable to return to their previous level of activity, need surgery
  - Patients with lower PROMs = non-coper = higher chance of achieving MCID

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Discussion

(2) Presence of meniscal injury

- Consistent with **Ulstein et Al's study**[8] which shows greater improvement in KOOS subscales from pre-op to 5 years follow up in patients with concomitant meniscal injury
- Why?
  - Presence of concomitant injury leads to lower preoperative score – possible confounder
  - Possibility that ACL + concomitant injuries might overshadow meniscus injury, but MCID achievement is still higher

(3) Lower BMI

- Increased weightbearing leads to poorer healing
- Poorer completion rates of PROM surveys[6,7]
- Poorer activity and motivational levels[6,7]

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Limitations & Conclusion

Limitations

1. Further sub-group analysis
   - Time to operation
   - Morphology of meniscus injuries
2. Difference in preoperative and post operative rehabilitation regimes

Conclusion

1. ACLR leads to increase in all PROMs ($p < 0.05$) after 2 years
2. Majority of the patients achieve MCID at 2 years
3. BMI, pre-operative score and concomitant meniscal involvement are predictive factors of ACLR MCID achievement at 2 years

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