

Reporting rehabilitation in articular cartilage repair studies of third generation autologous chondrocyte implantation in the knee.

Philip BRIGHT^{1,2}, Karen HAMBLY¹ PhD

¹School of Sport and Exercise Sciences, University of Kent, UK

²European School of Osteopathy, Maidstone, UK

University of
Kent

ESO
European School
of Osteopathy

Background

Autologous chondrocyte implantation (ACI) is a tissue-engineered surgical technique initially developed for articular cartilage repair of isolated chondral lesions of the knee. Third-generation techniques (ACI3) are now available that deliver autologous cultured chondrocytes into the defect using cell scaffolds.¹

Effective programs are necessary for individuals to optimize recovery and avoid mechanical degeneration of the joint surface. The success of ACI3 would appear to be associated with the rigour of subsequent rehabilitation protocols but evidence to support this has not been established. Rehabilitation is lengthy, and there are limited data on return to sports and exercise activities after ACI3 in non-elite-athlete populations.

Jakobsen et al² found that ACI3 studies were generally low in methodological quality according to the Coleman Methodology Score (CMS). Consequently, better-quality design and reporting were recommended when conducting studies in cartilage repair. The standard of reporting and potential improvement since the Jakobsen review has not been explored.

Objectives

The primary objective of this review was to answer the following clinical question:

Has the standard of reporting of rehabilitation improved in ACR studies involving ACI3 to the knee?

A secondary outcome explored if the presence of a rehabilitator or therapist in the investigative team had an effect on scoring of reported rehabilitation.

Methods

A computerized search was performed with the following inclusion criteria: any studies that evaluated or described the process of ACI3 in the knee and subsequent rehabilitation published between 2005 and 2012.

Kon's modified CMS3 criteria was followed for: study size, follow-up, number of different surgical procedures, type of study, description of surgical procedure given, description of postoperative rehabilitation, MRI assessment, histological assessment, outcome criteria, procedure for assessing clinical outcomes, and description of subject-selection process.

The interpretation of rehabilitation scores was as follows:

Well-described: A referenced protocol that incorporated full, staged progression with considerations of extenuating factors.

Not adequately described: A referenced protocol adopted with no discussion of staging or extenuating factors.

Protocol not reported: A brief rehabilitation overview without a referenced protocol or supporting evidence base from the literature.

The review studies retrieved were assessed and rated according to the strength of recommendation taxonomy (SORT).⁴ The SORT level of recommendations range from 1 to 3; the SORT strength of recommendations range from A to C. The evaluation of quality was gauged from highest (1A) to lowest (3C).

The effects of rehabilitator involvement on high or low overall CMS, and surgical and rehabilitation CMS in the original studies was analysed; a high overall CMS was defined as greater than or equal to overall mean CMS.

Results

A total of 117 articles were retrieved from the databases; Twenty-nine studies were included in the final analysis; 22 were original research studies, the remainder were review papers (see Figure 1 for details).

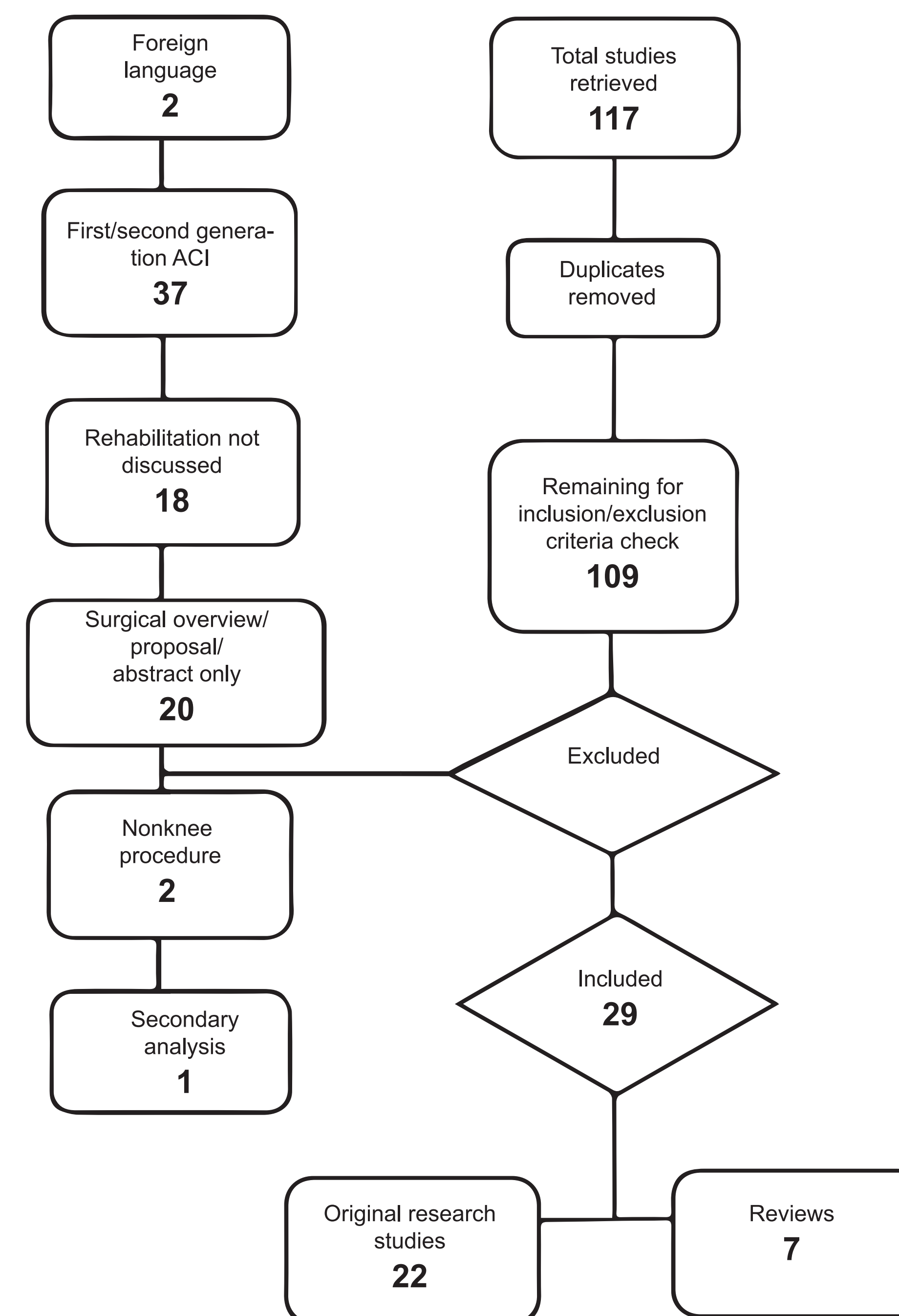


Figure 1: Flowchart illustrating study selection.

There was no significant difference between the CMS scores for surgery and rehabilitation ($P = 0.1$). The odds ratio for a CMS being higher than the mean score was calculated to be 3.33 (95% CI 0.51–21.58) in favour of studies with rehabilitators involved in authorship. Mann-Whitney U indicated a highly significant effect of rehabilitator influence on higher scoring studies for the individual CMS rehabilitation element ($P = .0029$).

Discussion & Conclusions

An improvement in mean CMS was seen compared with previous reviews, but rehabilitation reporting scores were lower than their surgical equivalent. Significant association was seen between studies with rehabilitator involvement and high scores in the individual CMS rehabilitation element.

In order to improve future studies it is recommended that authors ensure rehabilitation protocols and criteria for progression are explicitly referenced in manuscript preparation. Changes and adaptations with regard to individual participants' requirements are needed, and full compliance details should be included as part of the evaluation of outcomes.

The CMS provides a general quality measure but a more specialized tool to report on the quantitative and qualitative aspects of the rehabilitation process could help raise standards. It is recommended that rehabilitation therapists be included as key members of research teams and be involved in the design, implementation, and reporting of future studies.

References

- Bekkers JE, Inklaar M, Saris DB. Treatment selection in articular cartilage lesions of the knee: a systematic review. *Am J Sports Med.* 2009;37(Suppl 1):148S–155S.
- Jakobsen RB, Engebretsen L, Slauterbeck JR. An analysis of the quality of cartilage repair studies. *J Bone Joint Surg Am.* 2005;87(10):2232–2239.
- Kon E, Verdonk P, Condello V, et al. Matrix-assisted autologous chondrocyte transplantation for the repair of cartilage defects of the knee: systematic clinical data review and study quality analysis. *Am J Sports Med.* 2009;37(Suppl 1):156S–166S.
- Ebell MH, Siwek J, Weiss BD, et al. Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *J Am Board Fam Pract.* 2004;17(1):59–67.

Contact details

Philip Bright, Karen Hambly, School of Sport & Exercise Sciences, University of Kent, Medway Building, Chatham, Kent ME4 4AG UK.
pb301@kent.ac.uk, K.Hambly@kent.ac.uk