

Effectiveness of autologous chondrocyte transplantation for hyaline cartilage defects in knees: a rapid and systematic review

Rapid review

P Jobanputra^{1*}
D Parry²
A Fry-Smith³
A Burls³

¹ Department of Rheumatology, Selly Oak Hospital, University Hospital Birmingham NHS Trust and Royal Orthopaedic Hospital NHS Trust, Birmingham, UK

² Health Services Management Centre, University of Birmingham, UK

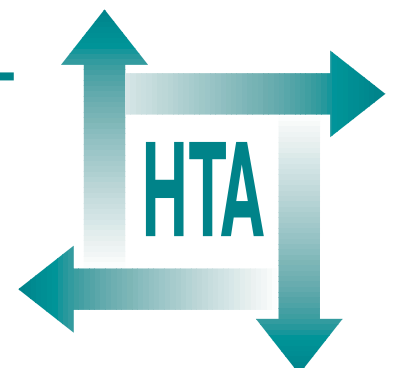
³ Department of Public Health and Epidemiology, University of Birmingham, UK

* Corresponding author

Executive summary

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Executive summary

Background

Proposed service

Autologous chondrocyte transplantation (ACT) is a novel surgical approach used to treat full-thickness cartilage defects in knee joints. Small grafts of normal cartilage removed from the patient's diseased joint are treated in a laboratory to obtain cartilage cells. These cells are cultured to expand the cell population and reimplanted a few weeks later into areas where cartilage is denuded by disease. The aim of this procedure is to restore normal cartilage to the ends of bones and thereby restore normal joint function.

Epidemiology

There are no reliable estimates of the prevalence of cartilage defects in the knee. Lesions are most likely to arise in sportsmen and women as a result of injury. Up to 20% of individuals sustaining a haemarthrosis following a knee injury may have cartilage damage.

Objectives

This systematic review of the available evidence was performed to:

- describe the types of knee disease for which ACT has been applied, the natural history and epidemiology of these conditions, and alternative treatment options
- determine long-term clinical outcomes following ACT and other surgical procedures for knee cartilage defects
- examine the economic evidence and consider the economic gains resulting from ACT.

Methods

To analyse the effectiveness of treatment and the resultant economic impact, a systematic review of the literature, involving a range of databases, was performed. In addition, contact was made with leading researchers and industry. Full details are described in the main report.

Results

Number and quality of studies and direction of evidence

Of 46 identified reports, 17 met the criteria for inclusion in this review. Eight of the included reports were available as abstracts only. At least 2600 patients appear to have been treated with ACT. All included reports were case series with a variable length of follow-up. With one exception, all the studies reported improvement in patient status, usually over a follow-up period of less than 2 years.

Summary of benefits

The outcome of ACT surgery was rated as 'good' or 'excellent' by approximately 70% of patients 2 years after treatment. Approximately 16% of patients required further arthroscopic surgical procedures during follow-up, and treatment was judged to have failed in 3–7% of patients. For comparator treatments, the outcome was rated as 'good' or 'excellent' in 10–95% of patients 2 years after treatment.

Economic review

The reports of two studies, one based in the USA and the other in Sweden, included economic data. Neither study compared ACT with other treatments. Using data from these studies and other sources, it was estimated that ACT performed in the UK would cost £4667 or £8167 for cell culture and surgery, depending on which service provider was used for cell culture. Incremental cost over 2 years, when set against comparator treatments, was estimated to be £3771 or £7271 (base case) for cell culture, surgery and rehabilitation. Using the OsCell facility for cell culture (Robert Jones and Agnes Hunt Orthopaedic and District Hospital NHS Trust), this figure would be £3167.

Conclusions

The reported literature on ACT and comparators is subject to bias because of the inherent weaknesses of case series. In addition, the long-term impact of conventional surgical treatments or no surgical treatment is poorly documented. The cost-effectiveness analysis is similarly limited by the poverty of the effectiveness data on both

ACT and comparators, the lack of long-term follow-up and the lack of empirical data for some of the parameters in the model used.

Recommendations for research

Further studies are required to:

- provide more accurate data on the occurrence of hyaline cartilage defects, including defects that arise acutely and those that are secondary to other types of knee injuries
- clarify the relationship of cartilage defects to clinical symptoms
- evaluate in detail the natural history of cartilage defects diagnosed by modern arthroscopic methods
- compare ACT with other treatments deemed appropriate, based on randomised trials currently in progress or planned
- examine, in prospective randomised trials, issues such as differences in outcome

in patient subgroups (e.g. the suggested poor outcomes in patients with patellar defects), with patients followed for as long as possible

- address the deficiencies in evaluating the clinical outcomes of knee injury and incorporate measures of general health status
- consider study designs, other than randomised trials, that might be used to assess complex interventions such as those required in complex knee injuries.

Publication

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NHS R&D HTA Programme

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The National Coordinating Centre for Health Technology Assessment,
Mailpoint 728, Boldrewood,
University of Southampton,
Southampton, SO16 7PX, UK.
Fax: +44 (0) 23 8059 5639 Email: hta@soton.ac.uk
<http://www.ncchta.org>

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