

Effect of body mass index and osteoarthritis on outcomes following arthroscopic meniscectomy: A prospective nationwide study



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ABSTRACT

Background: Current evidence suggests limiting arthroscopic meniscectomy to those patients with no or early arthritis however outcomes of arthroscopic meniscectomy with patients of a higher body mass index (BMI) are not as widely available. The aim of this study was to determine if patient reported outcome scores for arthroscopic meniscectomy are adversely affected by the degree of knee osteoarthritis or patient BMI.

Methods: All patients who underwent arthroscopic meniscectomy within the NHS in Scotland between the 6th of February and 29th of April 2012 were audited as part of the Scottish Government Musculoskeletal Audit and were eligible for inclusion within this study. A total of 270 patients returned both their pre-operative and post-operative EuroQol 5Q5D5L descriptive questionnaire and Knee injury and Osteoarthritis Outcomes Scores. Patients were stratified according to BMI, degree of osteoarthritis, history of injury, and duration of knee symptoms.

Results: Pre-operative to post-operative EuroQol index scores [0.642 ± 0.253 to 0.735 ± 0.277 , median \pm SD] and Knee injury and Osteoarthritis Outcome Scores [44.63 ± 18.78 to 62.28 ± 24.94 , median \pm SD] improved across all patients ($p < 0.0001$). This was irrespective of degree of BMI, history of injury, or duration of symptoms. There was no such improvement in patients with moderate to severe osteoarthritis. Those patients with a BMI $> 35 \text{ kg/m}^2$ had lower post-operative scores than the pre-operative scores of those of BMI $< 30 \text{ kg/m}^2$.

Conclusions: Arthroscopic meniscectomy is beneficial regardless of patient BMI, duration of symptoms, history of injury, or in the presence of early osteoarthritis.

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1. Introduction

Arthroscopic knee surgery with or without meniscectomy is one of the most common elective orthopaedic operations carried out today. Current guidance from the National Institute for Health and Clinical Excellence (NICE) on treatment of patients with osteoarthritis suggests limiting meniscectomy to those patients who either have no pre-operative osteoarthritis or in those with osteoarthritis that is in the early stage only, unless there is evidence of mechanical locking or intra-articular loose bodies [1]. Guidance from the Osteoarthritis Research Society International (OARSI) suggests that benefit from meniscectomy in an arthritic knee has limited evidence at best [2], and the most recent American Academy of Orthopaedic Surgeons (AAOS) guidance cannot recommend for or against meniscectomy in patients with a primary diagnosis of osteoarthritis [3]. In the recent Scottish Government Knee Arthroscopy Audit and Patient Reported

Outcome Measures Project 2012 [4,5] 5% of knee arthroscopies were performed on patients with moderate to severe osteoarthritis.

As part of this national audit into arthroscopic knee practices within the Scottish National Health Service (NHS) we present 6-month post-operative patient reported outcomes of those patients who underwent elective knee arthroscopic meniscectomy. Our null hypothesis was that there would be no difference in patient reported outcomes when taking into account the effect of BMI or osteoarthritis after a knee arthroscopy.

2. Methods

All patients who underwent arthroscopic meniscectomy within the NHS in Scotland between the 6th of February and 29th of April 2012 were audited as part of the Scottish Government Musculoskeletal Knee Arthroscopy Audit [4,5] and were eligible for inclusion within this study. All patients were sent both pre-operative and 6-month post-operative questionnaire based assessments. Patients were fully informed and consent to analyse their data was assumed to be given at the time of completing each questionnaire. Study ethical approval was obtained through the National Services Scotland (PAC Ref 67/11).

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Each pre-operative and 6-month post-operative assessment was a combination of both the EuroQol 5Q5D5L [6,7] descriptive questionnaire, to assess the general health status of the patient (questions on Mobility, Self-care, Usual Activities, Pain/Discomfort, Anxiety/Depression), and the Knee injury and Osteoarthritis Outcome Score (KOOS) [8], to assess knee specific patient reported outcome measures (questions on Symptoms, Pain, Activities of Daily Living, Sport, Quality of Life). Both the EuroQol and KOOS questionnaires have been fully validated for use in both primary injury and osteoarthritis of the knee [6–8].

In addition to the EuroQol and KOOS outcome scores the following data on each patient was obtained: age (years), BMI (kg/m^2), osteoarthritis severity (grade assigned by operating surgeon using pre-operative radiographs or MRI and confirmed intra-operative by direct observation. Graded as none, early, moderate, advanced), gender, knee pain duration (months), and history of preceding knee injury.

Data collection and analysis were undertaken by local audit co-ordinators and independent statisticians. Data was collated and analysed using Excel (Microsoft, USA) and SPSS (IBM Corporation, USA). Averages are presented as means or medians \pm standard deviation. Normality was assessed using the Shapiro–Wilk Test. Parametric variables were analysed with 2-sample t-tests and non-parametric variables with a 2-tailed Mann–Whitney test for independent samples and a Wilcoxon Signed-Rank test for paired samples. A 2-tailed alpha value of <0.05 was deemed as statistical significance.

3. Results

One thousand five hundred and forty seven patients underwent planned elective knee arthroscopy within the NHS in Scotland between the 6th of February 2012 and 29th of April 2012. A total of 387 patients returned both pre-operative and post-operative questionnaires. Once linked to audit data a total of 367 patients had useable data, of which 270 patients underwent arthroscopic meniscectomy and were analysed accordingly. Table 1 provides a brief descriptive summary of the data.

Median post-operative EuroQol index scores significantly improved compared to pre-operative scores across all patients [Table 2].

Subgroup analysis demonstrated significant improvement in EuroQol index scores post-operatively for BMI $25 \text{ kg}/\text{m}^2$ and over. No significant difference was demonstrated for BMI $18.5 \text{ kg}/\text{m}^2$ to $25 \text{ kg}/\text{m}^2$. Post-operative EuroQol index scores for BMI $35 \text{ kg}/\text{m}^2$ and over were less than pre-operative scores of all other BMI subgroups [Table 2] [Fig. 1].

Subgroup analysis of patients with or without osteoarthritis demonstrated a significantly improved EuroQol index score in patients with no osteoarthritis and early osteoarthritis. No significant difference was demonstrated in patients with moderate to advanced osteoarthritis [Table 2] [Fig. 3].

EuroQol index scores also significantly improved regardless of history of injury [Table 2] [Fig. 5] or duration of symptoms [Table 2] [Fig. 7].

Median post-operative Knee injury and Osteoarthritis Outcome Score (KOOS) significantly improved compared to pre-operative scores across all patients [Table 3].

Table 1

Table summarising cohort of patients who underwent arthroscopic meniscal surgery. Summaries presented as mean \pm standard deviation (SD) and percentages (%).

Summary characteristics	
Age, mean \pm SD (years)	51 \pm 14
Female (% of patients)	39
Body mass index (% of patients)	
Body mass index 18.5–24.9 kg/m^2	20
Body mass index 25–29.9 kg/m^2	44
Body mass index 30–34.9 kg/m^2	25
Body mass index $\geq 35 \text{ kg}/\text{m}^2$	11
Osteoarthritis positive (% of patients)	24
Early	19
Moderate	3
Advanced	2
History of injury (% of patients)	26
Pain duration (% of patients)	
Less than 1 month	11
1 to 6 months	40
6 to 12 months	13
Greater than 12 months	36

Table 2

Table summarising pre-operative and post-operative EuroQol index 5Q5D5L patient reported outcome scores. Averages expressed as medians \pm standard deviation. 95% confidence interval provided in brackets for parametric variables. BMI: body mass index (kg/m^2). Hx: history.

	Pre-op EuroQol	Post-op EuroQol	Difference	p-Value
All patients	0.642 \pm 0.253	0.735 \pm 0.277	0.114	$<0.0001^a$
BMI				
18.5–24.9	0.691 \pm 0.221	0.735 \pm 0.280	0.044	n.s. ^a
25–29.9	0.681 \pm 0.202	0.735 \pm 0.219	0.054	$<0.0001^a$
30–34.9	0.620 \pm 0.242	0.706 \pm 0.279	0.086	$<0.05^a$
≥ 35	0.249 \pm 0.336 (0.098,0.393)	0.422 \pm 0.390 (0.233,0.567)	0.173	$<0.01^b$
Osteoarthritis				
None	0.671 \pm 0.238	0.735 \pm 0.245	0.064	$<0.0001^a$
Early	0.498 \pm 0.270	0.691 \pm 0.345	0.193	$<0.05^a$
Moderate/advanced	0.498 \pm 0.252	0.617 \pm 0.363	0.119	n.s. ^a
Hx of preceding injury				
Yes	0.635 \pm 0.299	0.735 \pm 0.274	0.1	$<0.0001^a$
No	0.647 \pm 0.235	0.735 \pm 0.279	0.088	$<0.0001^a$
Duration of symptoms				
<1 month	0.592 \pm 0.330	0.735 \pm 0.329	0.143	$<0.05^a$
1 to 6 months	0.654 \pm 0.236	0.735 \pm 0.233	0.081	$<0.0001^a$
>6 months	0.624 \pm 0.246	0.722 \pm 0.296	0.098	$<0.001^a$

^a Wilcoxon Signed Rank Test for paired samples.

^b Student's t-test for paired samples.

Subgroup analysis demonstrated a significant improvement in the KOOS regardless of BMI [Table 3] [Fig. 2], history of injury [Table 3] [Fig. 6], or duration of symptoms [Table 3] [Fig. 8]. Post-operative KOOS for patients of BMI $35 \text{ kg}/\text{m}^2$ and over was less than the pre-operative scores of BMI $18.5 \text{ kg}/\text{m}^2$ to $30 \text{ kg}/\text{m}^2$.

Subgroup analysis of patients with or without osteoarthritis demonstrated a significantly improved KOOS in patients with no osteoarthritis and early osteoarthritis. No significant difference was demonstrated in patients with moderate to advanced osteoarthritis [Table 3] [Fig. 4].

4. Discussion

This study has demonstrated that benefit gained from arthroscopic meniscectomy is not just localised to the non-obese non-arthritic individual but also encompasses those of greater body habitus and those with early osteoarthritis, regardless of history of injury or duration of symptoms. We are unable to demonstrate any significant benefit in arthroscopic meniscectomy for patients with moderate to advanced osteoarthritis. The null hypothesis can therefore be rejected in relation to BMI but accepted with regard to increased severity of knee osteoarthritis.

The optimal treatment of those who present with a degenerative meniscal tear remains unknown. Current NICE and AAOS guidelines advise against performing knee arthroscopy on patients with pre-existing moderate to severe knee arthritis unless patients present with clinical signs of instability, locking or a suspicion of an intra-articular

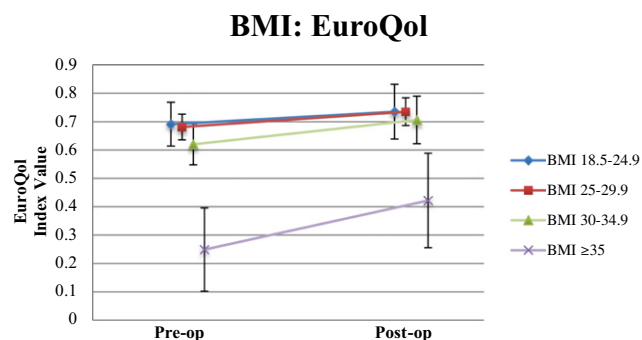


Fig. 1. Graph depicting the difference that “BMI” has on the median pre-operative and post-operative EuroQol index values. BMI groups: 18.5–24.9; 25–29.9; 30–34.9; and ≥ 35 . BMI: body mass index (kg/m^2). 95% confidence intervals represented by corresponding error bars.

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