Efficacy and safety of arthroscopy in femoroacetabular impingement syndrome: A systematic review and meta-analysis

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Article

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Abstract

The aim of this study was to compare, in terms of efficacy and safety, arthroscopy with physiotherapy or joint lavage in patients with femoroacetabular impingement (FAI). A meta-analysis using PubMed, Embase, Scopus, and the Cochrane Collaboration Library database was carried out in September 2022. We included studies focusing on patients with FAI undergoing arthroscopic surgery versus physiotherapy or arthroscopic lavage. Outcomes were functional scores (iHOT-33 and HOS ADL) and adverse events. We included randomized clinical trials. Data was combined using Review Manager 5.4. (PROSPERO: CRD42022375273). A total of six RCTs were included from a pool of 839 patients (407 females). iHOT-33 and HOS ADL scales showed significant differences at 12 months in favour of the arthroscopy group (MD 10.65; 95% CI; 6.54–4.76) and (MD 8.09; 95% CI; 3.11–13.07). MCID was not achieved through arthroscopy in functional variables. The rate of osteoarthritis (OR 6.18; 95% CI; 1.06–36.00) and numbness (OR 73.73; 95% CI; 10.00–43.92) was significantly high in the arthroscopy group. Arthroscopic surgery showed statistical superiority over the control group without exceeding MCID in most studies; however, the results might have been influenced by secondary variables. Finally, arthroscopic surgery showed a high rate of conversion to osteoarthritis.

Introduction

Femoroacetabular impingement (FAI) is a painful hip disorder characterized by premature and abnormal contact between the proximal femur and acetabulum, damaging the labrum, and cartilage, with the potential risk of developing osteoarthritis. The diagnosis of FAI is both clinical and radiological with three types: cam (loss of the femoral head sphere), pincer (excessive coverage of the acetabulum), or mixed.

Treatment is usually staggered and has two main objectives: pain control and prevention of osteoarthritis. During the last few years, arthroscopy has gained importance, and its use has exponentially increased in the USA and the UK, especially in young patients. Hip arthroscopy has become popular because it is minimally invasive, causes less tissue damage, and has early rehabilitation. The aim of surgery is based on restoring the cam/pincer morphology together with osteoplasty and reestablishing, repairing, or reconstructing the labrum or cartilage. However, the protective role of arthroscopy for osteoarthritis is not established because of the short-term follow-up of comparative studies. Meanwhile, physical therapy treatment is the primary treatment for FAI and is based on increasing strength and stabilizing the hip and pelvic musculature, as well as education, activity modification, and muscle coordination.

Some of the limitations of previous RCTs and meta-analysis were the lack of study of the loss of patients in the two groups and different times from randomization to the start of treatment. In many cases, follow-up time is from randomization and not from the start of treatment. Most of these studies do not grade the level of evidence of the results and do not analyze how moderating or demographic variables affect the outcomes. Furthermore, it has not been demonstrated whether the superiority of either technique is clinically relevant.

The objectives of this study were (1) to compare arthroscopy versus a more conservative treatment (physiotherapy and joint lavage) in FAI patients in terms of efficacy and safety and, (2) to clarify whether the superiority of either technique is clinically relevant, and analyze demographic or secondary variables that may influence the results.

Materials And Methods

Eligibility Criteria. This meta-analysis was registered in PROSPERO (CRD42022375273). The current study followed PRISMA guidelines (Fig. 1). The research question was conducted following the PICOS strategy: P) patients with clinical and radiologic diagnoses of femoroacetabular impingement syndrome; I) interventions were arthroscopic surgery; C) comparisons were more conservative procedures. More conservative procedures were considered the following: physiotherapy treatment or arthroscopic lavage alone; O) outcomes were efficacy assessed by functional scores and safety evaluated by adverse events; S) we included randomized controlled trials and meta-analyses to assess the quality of previous published level I evidence studies. The diagnosis of the femoroacetabular impingement syndrome was made clinically and by image (X-rays, MRI and/or CT). Exclusion criteria were patients younger than 16 years, osteoarthritis, systemic disease, duplicated data and incomplete data.

Figure 1. Study selection flow diagram (Preferred Reporting Items for Systematic reviews and Meta-Analysis).

Information Sources. A systematic search of the literature using PubMed, EMBASE, Scopus, and the Cochrane Collaboration Library database was carried out. No date limit was specified. Studies of interest that appeared in the references of the included studies in the first search were also evaluated.

Search Methods for Identification of Studies. We used the following search terms to search all trials registers and databases: “femoroacetabular impingement AND arthroscopy”. Two reviewers independently agreed on selection of eligible studies and achieved consensus on which studies to include. Regarding data extraction, two authors also independently reviewed the studies. If consensus was not reached, a third review author was asked to complete the data extraction form. We analyzed the records of the RCTs as well as their complementary material. We consulted expert opinion to assess which variables would be of most interest.

Data Extraction and Data Items. The baseline characteristics of each study were obtained: number of participants, type of study, journal, age, %female, %right hip, morphology (pincer, cam, or mixed), and follow-up. Lost follow-up rate and time from randomization were also analyzed. Funding and conflicts of interest were also evaluated. Primary efficacy outcomes were iHOT-33, HOS ADL (activity daily life) and HOS S (sports). These measures were taken at six months, and at twelve months. Minimally clinical important difference (MCID) was included in the outcomes based on previous studies analyzing these scales. The MCID for iHOT-33, HOS ADL, and HOS S were six, 14, and 11 points, respectively. Then it was assessed whether MCID was achieved through the confidence intervals of the mean difference between experimental and control groups (yes/no).
Regarding safety outcomes, we measured infection, numbness, additional surgery, osteoarthritis, and nerve injury. Regarding studies evaluating complications, these were assessed up to the end of follow-up. Although some of the complications almost exclusively occur with arthroscopy surgery, since they are related to surgery and will practically not occur with physical therapy (e.g., infection), they were also compared to see if such a complication is more frequent. This is because some complications could have potentially negative consequences.

For the assessment of the quality of previously published meta-analyses, we extracted the variables required by the AMSTAR-2 scale. AMSTAR-2 is a tool that allows for a detailed assessment of meta-analyses and systematic reviews of RCTs and nonrandomized studies. AMSTAR-2 is a questionnaire with 16 domains with simple answers: yes (positive result), no (insufficient information) or partial yes (partial information to standard)\(^13\).

**Assessment of Risk of Bias in Included Studies.** The quality of the RCT was evaluated in accordance with Review Manager by two reviewers. The evaluation methods consisted of the following steps: A) random sequence generation, B) allocation concealment, C) blinding patients and personnel, D) blinding of data extraction, E) incomplete outcome data, and F) selective outcome reporting. The justification for the rating for each item is provided in the Supplementary File 1 (Fig. 2). In addition, we provide the risk of bias for each item within each forest plot to facilitate critical reading of the article.

**Assessment of Results.** The meta-analysis was performed using the Review Manager 5.4 software package provided by the Cochrane Collaboration. For dichotomous variables, odds ratios with a confidence interval (CI) of 95% were calculated. The mean difference (MD) and the 95% CI were calculated for the continuous variables. Heterogeneity was checked with both the chi2 and the I2 test. I2 varies from 0 to 100%, considering the values of 25, 50 and 75% as low, moderate, and high heterogeneity, respectively. A fixed effects model was adopted if there was no statistical evidence of heterogeneity, and a random effects model was adopted if significant heterogeneity was observed. WebPlotDigitizer version 13.1.4 was used to obtain accurate information from the figures in the articles.

**Risk of Bias Across the Studies.** We assessed the possibility of publication bias by evaluating a funnel plot (Review Manager 5.4) of the trial mean differences for asymmetry, which can result from the non-publication of small trials with negative results. We acknowledge that other factors, such as differences in trial quality or true study heterogeneity, could produce asymmetry in funnel plots.

**Additional Analyses.** A sensitivity analysis was also carried out using Review Manager 5.4 eliminating the top-weight study from the comparisons in all outcomes.

A regression analysis was also performed to examine the impact of moderating variables in the effect size study. Different moderator or demographic variables were included. The qualitative variables were given a numerical value to carry out the analysis. The dependent variables were efficacy outcomes (iHOT-33 and HOS ADL), while the independent variables were morphology, risk of bias, loss to follow-up, time since randomization, and direct funding from arthroscopic foundations or societies. Regression analysis was conducted using SPSS package v. 24.0 (IBM, USA), and p < 0.05 was considered statistically significant. Thus, to complement this analysis, a subgroup analysis of the aforementioned variables was carried out using Review Manager 5.4 software package.

To assess the quality of the evidence and grade the strength of the recommendations, the Grade of Recommendation, Assessment, Development, and Evaluation (GRADE) system was used using GRADEpro. This system assesses study design, risk of bias, inconsistency, indirectness, imprecision, and summary of findings\(^14\).

**Results**

**Study Characteristics.** A total of six randomized clinical trials published between 2018 and 2021 were included (Table 1)\(^15\)-\(^20\). A pool of 839 patients was included: 418 in the arthroscopy group and 421 in the control group. The mean age ranged from 29.7 to 39.6 years in the arthroscopy group and from 30.6 to 49.1 in the control group. The mean % of females was 48.5%, while in the control group, it was 48%. Follow-up varied between eight months and two years, with the mean follow-up being 13·3 months. Regarding the number of lost patients in each study, the physiotherapy group presented a higher rate of losses than the arthroscopy group (48/421, 11.4% in the physiotherapy group vs. 33/418, 7.9% in the arthroscopy group). Three studies evaluated the mean time from randomization to the start of treatment: 38.0 days in the physiotherapy group, varying between 33 and 44 days, and 98.5 days in the arthroscopy group, varying between 86 and 122 days. Funding of each article was analyzed. Two studies received direct funding through foundations or arthroscopy associations and conflicts of interest were present in five of the six included studies. In two studies, there was a conflict of interest with arthroscopy associations and societies.
### Table 1
Characteristics of the included studies.

<table>
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<tr>
<th>Journal type</th>
<th>n</th>
<th>Age</th>
<th>% Female</th>
<th>% Right</th>
<th>% Pincer</th>
<th>% Cam</th>
<th>% Mixed</th>
<th>Follow-up</th>
<th>Fi</th>
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</thead>
<tbody>
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<td></td>
<td>AS</td>
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<td>AS</td>
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<td>Orthopedic</td>
<td>49</td>
<td>50</td>
<td>32.9±11.8</td>
<td>32.9±9.1</td>
<td>37.0</td>
<td>48.0</td>
<td>45.0</td>
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<td>Sports</td>
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<td>40</td>
<td>29.7±7.4</td>
<td>30.6±7.4</td>
<td>47.5</td>
<td>35.0</td>
<td>72.5</td>
<td>47.5</td>
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<tr>
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<td>Sports</td>
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<td>44</td>
<td>49.6</td>
<td>49.1</td>
<td>50.0</td>
<td>55.0</td>
<td>43.0</td>
<td>59.0</td>
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<td>36.0±9.9</td>
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<td>66.0</td>
<td>60.0</td>
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<td>177</td>
<td>35.4±9.7</td>
<td>35.2±9.4</td>
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</tbody>
</table>

AS: Arthroscopic surgery; CT: Control group; * Funding directly from arthroscopic foundation/association; ** Conflict of interest from arthroscopic associations/societies; NA: Not applicable.

### Outcomes
The iHOT-33 scale showed significant differences at six and 12 months in favor of the arthroscopy group (MD 3.98, 95% CI, 0.19–7.77, and MD 10.65, 95% CI, 6.54–14.76, respectively). The HOS ADL assessed at six and 12 months also showed superiority in the arthroscopy group (MD 5.19, 95% CI, 0.77–9.61, and MD 8.09, 95% CI, 3.11–13.07, respectively) (Fig. 3). For the variable HOS ADL, arthroscopy did not exceed the MCID in any case, both at six and 12 months. For HOS S at six and 12 months, arthroscopy did not exceed the MCID in any case (Table 2). Complications forest plots are shown in Fig. 4 and Fig. 5. There were no significant differences regarding infection rate (OR 4.14, 95% CI, 0.87–19.59), or nerve injury (OR 2.32, 95% CI, 0.34–15.83). Significant differences were found in additional surgery (OR 11.11, 95% CI 1.42 to 86.89), osteoarthritis (OR 6.18, 95% CI, 1.06–36.00) and numbness (OR 73.73, 95% CI, 10.00–543.92).

### Table 2
Assessment of MCID between the confidence intervals between two groups.

<table>
<thead>
<tr>
<th></th>
<th>MCID iHOT 6m</th>
<th>MCID iHOT 12m</th>
<th>MCID HOS ADL 6m</th>
<th>MCID HOS ADL 12m</th>
<th>MCID HOS S 6m</th>
<th>MCID HOS S 12m</th>
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<td>No</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

NA: Not applicable; No: MCID not achieved.

### Risk of Bias Within Studies
Strong evidence of heterogeneity (I2 ), greater than 70, was not observed in any of the outcomes. However, the publication bias of the main variables considered by the RCTs (iHOT-33 and HOS ADL) was examined. A sensitivity analysis was carried out by eliminating the top-weight study from the comparisons in all the outcomes. Only one of the variables changed the direction of the results by eliminating the heaviest study. This outcome was HOS ADL at six months (Fig. 6). Regarding publication bias, the values were in an acceptable range (Fig. 7).

### Additional Analyses and Risk of Bias Across the Studies
The following moderating variables were analyzed to assess what percentage of the efficacy variable could be explained by morphology, risk of bias, loss to follow-up, time since randomization, and funding. There was a significant association between iHOT-33 at six months and pincer-type morphology with an explained variance of 86.4%, p = 0.46 (adjusted R-squared). There was also an association between iHOT-33 at six months and pincer-type morphology with an explained variance of 99.9%, p = 0.01 (adjusted R-squared). Regarding the subgroup analysis, there were significant differences for the independent variable direct funding from arthroscopic foundations or societies in the iHOT-33 at six and 12 months and the HOS ADL at six and 12 months. The subgroup analyses are provided in Supplementary Figure 1.
The GRADE (Grading of Recommendations, Assessment, Development and Evaluation) summary of the results of these three comparisons is shown in Table 3.

Table 3
GRADE assessment of the quality of the evidence and the strength of the recommendations.

<table>
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<th>Certainty assessment</th>
<th>Nº of patients</th>
<th>Effect</th>
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<tr>
<td>Nº of studies</td>
<td>Study design</td>
<td>Risk of bias</td>
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<td>4</td>
<td>randomised trials</td>
<td>serious&lt;sup&gt;a&lt;/sup&gt; not serious</td>
</tr>
<tr>
<td>5</td>
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<td>serious&lt;sup&gt;a&lt;/sup&gt; not serious</td>
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<td>randomised trials</td>
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<td>serious&lt;sup&gt;a&lt;/sup&gt; not serious</td>
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<tr>
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<td>randomised trials</td>
<td>serious&lt;sup&gt;a&lt;/sup&gt; not serious</td>
</tr>
<tr>
<td>2</td>
<td>randomised trials</td>
<td>not serious</td>
</tr>
</tbody>
</table>

CI: confidence interval; MD: mean difference; OR: odds ratio; a: There were several risk of bias items with high risk of bias among the studies included in this outcome; b: The examined patients are similar but not identical; c: Comparing the lower and upper limit of the confidence interval, there were demonstrated clinical differences; NA: Not applicable.

The results of the AMSTAR-2 assessment are shown in Supplementary Table 1<sup>21–27</sup>. Further alteration of the standards was observed with respect to duplicate data extraction, lack of discussion or interpretation of the results according to the risk of bias of the articles, and lack of discussion of the influence of individual article funding or conflict of interest on the overall results.
Discussion

In this meta-analysis, we compared the use of arthroscopic surgery with a control group in the treatment of femoroacetabular impingement syndrome. We also included articular lavage because of the necessity of comparing RCTs with placebo\textsuperscript{27}. We observed from our study that arthroscopic surgery presented statistical superiority over the control group in the variables iHOT-33 and HOS ADL; however, this superiority did not reach the minimum clinically relevant improvement. Although the rate of complications was higher in the arthroscopy group and presented a higher risk of conversion to osteoarthritis with respect to the control group. The risk of bias between RCTs was high in terms of performance bias and attrition bias.

Regarding the MCID, arthroscopy was not superior to physical therapy in any case. In addition, the quality of the evidence and the strength of the recommendations were low or very low for the efficacy variables assessed by the GRADE system. The meta-analysis by Zhu et al.\textsuperscript{21}, the one with the highest number of studies, also included six RCTs concluding in favor of the statistical superiority of arthroscopy; however, one of the included studies is a duplicate of the UK FASHHiON trial. Furthermore, it did not include the analysis of clinical superiority in the main variables of these RCTs, did not grade the evidence according to GRADE, and did not discuss the impact of different moderating or demographic variables on the main results of the meta-analysis\textsuperscript{21}. This meta-analysis concluded that “arthroscopic treatment is more recommended for patients who need improvement in a shorter period of time” but did not consider the time lag from randomization between groups, which was almost three months. Consistent with and in favor of arthroscopy are the meta-analyses of Gatz et al.\textsuperscript{22}, Dwyer et al.\textsuperscript{23}, Mok et al.\textsuperscript{25}, Casartelli et al.\textsuperscript{26}, and Ferreira et al.\textsuperscript{27}, although these included three RCTs. Mok et al.\textsuperscript{25}, found the superiority of arthroscopy but highlighted the importance of demographic variables or factors that could affect outcomes\textsuperscript{25}. In our meta-analysis, we were only able to perform regression analysis of the main demographic variables contributed by the studies without finding differences except for time from randomization and pincer morphology with respect to iHOT-33 at six months. Regarding subgroup comparisons, funding played an important role in some functional outcomes although these analyses are of limited value because of the low number of studies included. Furthermore, Bastos et al.\textsuperscript{28}, including the same three RCTs, concluded that surgery is not more effective, criticizing the lack of cost-type outcomes and adverse events in the longer term, such as osteoarthritis\textsuperscript{28}.

Regarding complications, recent meta-analyses did not analyze these results and focused on functional scales. Longer-term studies are important to assess conversion to osteoarthritis, as this is one of the most relevant concerns in FAI. In patients undergoing arthroscopy and osteochondroplasty, one out of six patients over 40 years old opted for total hip arthroplasty at two years\textsuperscript{28}. Meanwhile, in younger patients, the prognosis was better\textsuperscript{29}. Some risk factors for conversion to arthroplasty were age, level of chondral damage, femoral osteoplasty, smoking, and inflammatory joint diseases, among others\textsuperscript{30,31}. The conversion rate to osteoarthritis remains relevant since the early development of osteoarthritis, less than five years, has been shown to decrease the cost-effectiveness of arthroscopy\textsuperscript{22}. In our study, we found 6% of patients developed osteoarthritis in the arthroscopy group.

The difference in time from randomization to the start of the study was notable, varying by approximately two months between the two groups, with the physiotherapy group being the earliest to start. In the Griffin et al.\textsuperscript{15} study, there was a difference of 85 days, almost three months\textsuperscript{19}. This fact may have potentially important implications to consider since the assessment of the scales was made from the time of randomization and not from the beginning of treatment. Therefore, this mismatch should be considered when assessing the results. Because of this, in the evaluation of time at 12 months, in the arthroscopy group, the effect of the intervention is two months earlier compared to physiotherapy. In fact, regression analysis of randomization time could only be performed on two variables, including iHOT-33 at six months, with the time from randomization explaining 99.9% of this variable.

Two studies received direct funding through foundations or arthroscopy associations. When subgroups were done, studies funded directly by foundations or arthroscopy societies showed better results although the subgroup analysis was underpowered.

The need for high-quality reviews is evident and necessary when the AMSTAR-2 scale was reviewed objectively and independently by two authors. Almost all studies were of low or critically low quality. There are several limitations in this study. Our meta-analysis included a low number of articles, and the sensitivity analysis is affected by the study with the highest weight in the case of HOS ADL at six months. In addition, a regression analysis was performed. Although Cochrane recommends including at least ten studies to perform this type of analysis, caution should be exercised in the interpretation of these results. In addition, because of the limited number of articles, the statistical program was not able to assess the subgroup analyses of these variables in many cases.

Conclusion

We have conducted analyses that justify a new review on this topic and enhance the evidence of the findings. Therefore, we can conclude that in terms of efficacy, arthroscopic surgery showed statistical superiority over the control group; however, the clinical difference is controversial, and arthroscopy did not show MCID in all cases. These results were observed both at six and twelve months. In addition, the efficacy of arthroscopy was related in many cases to secondary variables such as time from randomization and funding received although these analyses must be taken with caution given the low number of articles. In terms of safety, arthroscopic surgery showed a higher rate of conversion to osteoarthritis than the control group. Future research should focus on analyzing how these moderator, or demographic variables affect the results.

Declarations

Author contributions

Data availability

All data generated or analysed during this study are included in this published article (and its supplementary information files).

Funding

No funding was received.

Competing interests

The authors declare no competing interests.

References


Figure 1

Study selection flow diagram (Preferred Reporting Items for Systematic reviews and Meta-Analysis).

Figure 2

Risk of bias (green = low risk; red = high risk; yellow = unknown).
Figure 3

Forest plot showing functional and disability outcomes. AT group showed a statistically significant difference in iHOT-33 at six (3a) and 12 (3b) months. Regarding the HOS ADL, there were significant differences in favor of AT group at six (3c) and 12 (3d) months. No significant heterogeneity was observed in these comparisons.
**Figure 4**

Forest plot showing complications. There were no differences regarding infection rate (1.5%) (4a) or additional surgery (6.7%) (4b). The numbness rate was higher in the AT group (26.7%; p<0.0001).
### a) Nerve Injury

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<th>Control Events</th>
<th>Total</th>
<th>Weight</th>
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<th>Odds Ratio M-H, Fixed, 95% CI</th>
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<th>Control Events</th>
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<th>Weight</th>
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<td>222</td>
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<tr>
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<tr>
<td>Heterogeneity: Not applicable</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Test for overall effect: Z = 1.03 (P = 0.30)</td>
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</tr>
</tbody>
</table>

Total (95% CI) | 217 | 214 | 100.0% | 2.32 [0.34, 15.83] | 0.01 | 0.1 | 1 | 10 | 100 |

Total events | 3 | 1 | 4 |
Heterogeneity: Chi² = 0.60, df = 1 (P = 0.44); I² = 0%
Test for overall effect: Z = 0.86 (P = 0.39)
Test for subgroup differences: Chi² = 0.59, df = 1 (P = 0.44), I² = 0%

### b) Osteoarthritis

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Surgery Events</th>
<th>Control Events</th>
<th>Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
<th>Risk of Bias</th>
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<tr>
<td>1.4.1 PT</td>
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<tr>
<td>Mansell et al. 2018</td>
<td>7</td>
<td>40</td>
<td>47</td>
<td>39</td>
<td>62.8% [0.94, 68.96]</td>
<td>8.06 [0.94, 68.96]</td>
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<tr>
<td>Subtotal (95% CI)</td>
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<td>Test for overall effect: Z = 1.91 (P = 0.06)</td>
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### 1.4.2 Lavage

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<th>Control Events</th>
<th>Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
<th>Risk of Bias</th>
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<tbody>
<tr>
<td>Almasri et al. 2021</td>
<td>1</td>
<td>105</td>
<td>106</td>
<td>104</td>
<td>37.2% [0.12, 74.49]</td>
<td>3.00 [0.12, 74.49]</td>
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<tr>
<td>Subtotal (95% CI)</td>
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<td>Heterogeneity: Not applicable</td>
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<td></td>
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</tr>
<tr>
<td>Test for overall effect: Z = 0.67 (P = 0.50)</td>
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</tr>
</tbody>
</table>

Total (95% CI) | 145 | 143 | 100.0% | 6.18 [1.06, 36.00] | 0.01 | 0.1 | 1 | 10 | 100 |

Total events | 8 | 1 | 9 |
Heterogeneity: Chi² = 0.25, df = 1 (P = 0.61); I² = 0%
Test for overall effect: Z = 2.02 (P = 0.04)
Test for subgroup differences: Chi² = 0.25, df = 1 (P = 0.62), I² = 0%

### Figure 5

Forest plot showing nerve injury rate (5a) and osteoarthritis rate (5b). A significant difference was observed with respect to osteoarthritis rate (5.5% in AT group versus 0.7% in control group; p = 0.04).

### Figure 6

Sensitivity analysis showing statistically significant differences regarding the iHOT-33 at six months outcome.
Figure 7

Funnel plot evaluating the publication bias regarding the main functional outcomes: iHOT-33 at six months (7a) iHOT-33 at 12 months (7b) HOS ADL at six months (7c), and HOS ADL at 12 (7d) months.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryTable1SR.docx
- Supplementaryfigure1SR.jpg
- Supplementaryfile1.pdf
- PRISMA2020checklistSR.docx