Supplementary Table 1. PRISMA NMA checklist of items to include when reporting a systematic review involving a network meta-analysis

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| --- | --- | --- | --- |
| **Section/Topic** | **Item #** | **Checklist Item** | **Reported on Page #** |
| **TITLE** |  |  |  |
| Title | 1 | Identify the report as a systematic review *incorporating a network meta-analysis (or related form of meta-analysis).* | 2 |
|  |  |  |  |
| **ABSTRACT** |  |  | 1 |
| Structured summary | 2 | Provide a structured summary including, as applicable:  **Background:** main objectives  **Methods:** data sources; study eligibility criteria, participants, and interventions; study appraisal; and *synthesis methods, such as network meta-analysis.*  **Results:** number of studies and participants identified; summary estimates with corresponding confidence/credible intervals; *treatment rankings may also be discussed. Authors may choose to summarize pairwise comparisons against a chosen treatment included in their analyses for brevity.*  **Discussion/Conclusions:** limitations; conclusions and implications of findings.  **Other:** primary source of funding; systematic review registration number with registry name. | 1 |
|  |  |  |  |
| **INTRODUCTION** |  |  | 2 |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known*, including mention of why a network meta-analysis has been conducted.* | 2 |
| Objectives | 4 | Provide an explicit statement of questions being addressed, with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 2 |
|  |  |  |  |
| **METHODS** |  |  | 2 |
| Protocol and registration | 5 | Indicate whether a review protocol exists and if and where it can be accessed (e.g., Web address); and, if available, provide registration information, including registration number. |  |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. *Clearly describe eligible treatments included in the treatment network, and note whether any have been clustered or merged into the same node (with justification).* | 2-3 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 2 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | Sup Table 1 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | Sup Figure 1 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 3 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 4 |
| **Geometry of the network** | **S1** | Describe methods used to explore the geometry of the treatment network under study and potential biases related to it. This should include how the evidence base has been graphically summarized for presentation, and what characteristics were compiled and used to describe the evidence base to readers. | Figure 1 |
| Risk of bias within individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 3 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). *Also describe the use of additional summary measures assessed, such as treatment rankings and surface under the cumulative ranking curve (SUCRA) values, as well as modified approaches used to present summary findings from meta-analyses.* | 3-4 |
| Planned methods of analysis | 14 | Describe the methods of handling data and combining results of studies for each network meta-analysis. This should include, but not be limited to:   * *Handling of multi-arm trials;* * *Selection of variance structure;* * *Selection of prior distributions in Bayesian analyses; and* * *Assessment of model fit.* | 3-4 |
| **Assessment of Inconsistency** | **S2** | Describe the statistical methods used to evaluate the agreement of direct and indirect evidence in the treatment network(s) studied. Describe efforts taken to address its presence when found. | 3-4 |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | 3-4 |
| Additional analyses | 16 | Describe methods of additional analyses if done, indicating which were pre-specified. This may include, but not be limited to, the following:   * Sensitivity or subgroup analyses; * Meta-regression analyses; * *Alternative formulations of the treatment network; and* * *Use of alternative prior distributions for Bayesian analyses (if applicable).* | 3-4 |
|  |  |  |  |
| **RESULTS†** |  |  |  |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 4 |
| **Presentation of network structure** | **S3** | Provide a network graph of the included studies to enable visualization of the geometry of the treatment network. | Figure 1 |
| **Summary of network geometry** | **S4** | Provide a brief overview of characteristics of the treatment network. This may include commentary on the abundance of trials and randomized patients for the different interventions and pairwise comparisons in the network, gaps of evidence in the treatment network, and potential biases reflected by the network structure. | Figure 1,  4-5 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | 4 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment. | 4 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: 1) simple summary data for each intervention group, and 2) effect estimates and confidence intervals. *Modified approaches may be needed to deal with information from larger networks.* | 4 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence/credible intervals. *In larger networks, authors may focus on comparisons versus a particular comparator (e.g. placebo or standard care), with full findings presented in an appendix. League tables and forest plots may be considered to summarize pairwise comparisons.* If additional summary measures were explored (such as treatment rankings), these should also be presented. | 4-5 |
| **Exploration for inconsistency** | **S5** | Describe results from investigations of inconsistency. This may include such information as measures of model fit to compare consistency and inconsistency models, *P* values from statistical tests, or summary of inconsistency estimates from different parts of the treatment network. | 4-5 |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies for the evidence base being studied. | 4 |
| Results of additional analyses | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression analyses*, alternative network geometries studied, alternative choice of prior distributions for Bayesian analyses,* and so forth). |  |
|  |  |  |  |
| **DISCUSSION** |  |  |  |
| Summary of evidence | 24 | Summarize the main findings, including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy-makers). | 6-7 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias). *Comment on the validity of the assumptions, such as transitivity and consistency. Comment on any concerns regarding network geometry (e.g., avoidance of certain comparisons).* | 6-7 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 6-7 |
|  |  |  |  |
| **FUNDING** |  |  |  |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. This should also include information regarding whether funding has been received from manufacturers of treatments in the network and/or whether some of the authors are content experts with professional conflicts of interest that could affect use of treatments in the network. | 4 |

PICOS = population, intervention, comparators, outcomes, study design.

\* Text in italics indicateS wording specific to reporting of network meta-analyses that has been added to guidance from the PRISMA statement.

† Authors may wish to plan for use of appendices to present all relevant information in full detail for items in this section.

Supplementary Table 2. MEDLINE and EMBASE detailed search strategy

|  |  |
| --- | --- |
| **MEDLINE** | |
| 1 | exp rotator cuff/ |
| 2 | ((rotator cuff\* or rotator interval\* or supraspin?tus or infraspin?tus or "teres minor" or subscapularis or anterosuperior or posterosuperior) adj5 (tear or ears or tore or torn or lesion\* or rupture\* or avuls\* or injur\* or repair\* or debride\*)).mp. |
| 3 | exp tendon injuries/ |
| 4 | exp muscles/ |
| 5 | ((tendon or tendons or muscle\* or muscular) adj5 (tear or tears or tore or torn or lesion\* or rupture\* or avuls\* or injur\* or repair\* or debrid\*)).mp. |
| 6 | ((full or partial) adj4 (thick$ or tear or tears)).ti,ab. |
| 7 | 3 or 4 or 5 or 6 |
| 8 | exp shoulder/ or exp shoulder joint/ |
| 9 | (shoulder or glenohumeral).mp. |
| 10 | (rotator cuff\* or rotator interval\* or supraspin?tus or infraspin?tus or infraspin?teres minor or subscapularis or anterosuperior or posterosuperior).mp. |
| 11 | 8 or 9 or 10 |
| 12 | 7 and 11 |
| 13 | 1 or 2 or 12 |
| 14 | "randomized controlled trial".pt. |
| 15 | (random$ or placebo$ or single blind$ or double blind$ or triple blind$).ti,ab. |
| 16 | (retraction of publication or retracted publication).pt. |
| 17 | 14 or 15 or 16 |
| 18 | (animals not humans).sh. |
| 19 | ((comment or editorial or meta-analysis or practice-guideline or review or letter or journal correspondence) not "randomized controlled trial").pt. |
| 20 | (random sampl$ or random digit$ or random effect$ or random survey or random regression).ti,ab. not "randomized controlled trial".pt. |
| 21 | 17 not (18 or 19 or 20) |
| 22 | 13 and 21 |
| 23 | limit 22 to ("middle age (45 to 64 years)" or "all aged (65 and over)") |
| 24 | limit 23 to yr="2009 -Current" |

|  |  |
| --- | --- |
| **EMBASE** | |
| 1 | exp rotator cuff rupture/ |
| 2 | ((rotator cuff\* or rotator interval\* or supraspin?tus or infraspin?tus or "teres minor" or subscapularis or anterosuperior or posterosuperior) adj5 (tear or tears or tore or torn or lesion\* or rupture\* or avuls\* or injur\* or repair\* or debride\*)).mp. |
| 3 | exp tendon injury/ or exp tendon rupture/ or exp ligament rupture/ |
| 4 | ((tendon or tendons or muscle\* or muscular) adj5 (tear or tears or tore or torn or lesion\* or rupture\* or avuls\* or injur\* or repair\* or debride\*)).mp. |
| 5 | ((full or partial) adj4 (thick$ or tear or tears)).ti,ab. |
| 6 | 3 or 4 or 5 |
| 7 | exp Shoulder/ or exp Rotator Cuff/ or "teres minor muscle"/ |
| 8 | (shoulder or glenohumeral).mp. |
| 9 | (rotator cuff\* or rotator interval\* or supraspin?tus or infraspin?tus or "teres minor" or subscapularis or anterosuperior or posterosuperior).mp. |
| 10 | 7 or 8 or 9 |
| 11 | 6 and 10 |
| 12 | 1 or 2 or 11 |
| 13 | (random$ or placebo$ or single blind$ or double blind$ or triple blind$).ti,ab. |
| 14 | RETRACTED ARTICLE/ |
| 15 | 13 or 14 |
| 16 | (animal$ not human$).sh,hw. |
| 17 | (book or conference paper or editorial or letter or review).pt. not exp randomized controlled trial/ |
| 18 | (random sampl$ or random digit$ or random effect$ or random survey or random regression).ti,ab. not exp randomized controlled trial/ |
| 19 | 15 not (16 or 17 or 18) |
| 20 | 12 and 19 |
| 21 | limit 20 to (adult <18 to 64 years> or aged <65+ years>) |
| 22 | limit 21 to yr="2009 -Current" |

Supplementary Table 3. Main characteristics of eligible randomized controlled trials

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author** | **Country** | **n** | **Age** | **Tear Location** | **Treatment Methods** c | | |
| **Treatment 1** | **Treatment 2** | **Treatment 3** |
| **Allocated Number/Follow-up Loss**a**/Not Receiving Allocated Treatment**b | | |
| Randelli et al. (2011) | Italy | 53 | ≥50 | Supraspinatus /multple | Arthroscopic surgery +PRP+ + PT | Arthroscopic surgery + PT | - |
| 26/4/0 | 27/4/0 |  |
| Dezaly et al. (2011) | France | 127 | ≥60 | Supraspinatus ± infraspinatus | Arthroscopic repair + PT | Acromioplasty+PT | - |
| 68/0/0 | 59/0/0 |  |
| Gumina et al. (2012) | Italy | 76 | 61(46-71) | Supraspinatus | Arthroscopic surgery +PRP+ PT | Arthroscopic surgery + PT | - |
| 40/1/0 | 40/3/0 |  |
| Rodeo et al. (2012) | U.S. | 79 | ≥50 | NRd | Arthroscopic surgery +PRP+ PT | Arthroscopic surgery +PT | - |
| 40/5/0 | 39/7/0 |  |
| Zwaal et al. (2013) | Netherland | 100 | ≥50 | Supraspinatus /Infraspinatus | Arthroscopic surgery + PT | Mini-open+ PT | Arthroscopic surgery +acromioplasty+PTc |
| 50/3/3 | 50/1/1 | 60/0/5 |
| Ruiz-Moneo et al. (2013) | Spain | 69 | 56(29-73) | Supraspinatus /Infraspinatus/ multiple | Arthroscopic surgery +PRP+ PT | Arthroscopic surgery +PT |  |
| 32/-/- | 31/-/- |  |
| Kukkonen et al. (2014) | Finland | 180 | ≥55 | Supraspinatus | PT | Acromioplasty+ PT | - |
| 60/2/4 | 60/2/1 |  |
| Moosmayer et al. (2014) | Norway | 103 | ≥18 | Supraspinatus /Infraspinatus /Subscapularis | Open(mini-open) + PT | PTc | - |
| 52/0/1 | 51/0/12 |  |
| Malavolta et al.(2014) | Brazil | 54 | T1: 55.30±8.30 | Supraspinatus | Arthroscopic surgery+PRP+ PT | Arthroscopic surgery+PT |  |
| T2: 54.07±6.59 | 39/1/11 | 36/0/9 |  |
| Ilhanli et al., (2015) | Turkey | 62 | G1: 59.16±10.76 | Supraspinatus | Arthroscopic surgery +PRP+ PT | Arthroscopic surgery +PT |  |
| G2: 59.68±9.88 | 35/5/0 | 35/3/0 |  |
| Jo et al., (2015) | Korea | 74 | 45~85 | Supraspinatus, infraspinatus, subscapularis | Arthroscopic surgery +PRP+ PT | Arthroscopic surgery+ PT |  |
| 37/0/1 | 37/0/0 |  |
| Pandey et al., (2016) | India | 110 | 50-70 | supraspinatus or infraspinatus cuff tear | Arthroscopic surgery +PRP+ PT | Arthroscopic surgery +PT |  |
| 56/4/0 | 54/4/0 |  |
| Zhang et al., (2016) | China | 62 | 57.2±7.4; | NR | Arthroscopic surgery + PT | Arthroscopic surgery +PRP+ PT |  |
| 30/0/0 | 32/2/0 |  |
| Liu et al., (2017) | China | 100 | 53.0(40-59) | supraspinatus and/or infraspinatus | Arthroscopic surgery + PT | mini-open+PT |  |
| 50/0/0 | 50/1/0 |  |
| Carr et al., (2017) | UK | 273 | 62.9 | NR | Arthroscopic surgery+ PT | Open + PT |  |
| 136/13/0 | 137/14/0 |  |
| Note. Reported mean (range) age of participants in each article. If mean age was not reported, we checked inclusion criteria.  a Follow-up loss at 12 months regarding primary outcomes  b Dropped out from intervention because of conversion to another treatment option  c PT, Physiotherapy  d NR, Not reported | | | | | | | |

Supplementary Figure 1. Flow Chart of Systematic Review

**International**

- Medline (n=2,439)

- AMED (n=233)

- Cochrane (n=490)

- Embase (n=1,981)

- CINAHL (n=47)

- Pubmed (n=829)

**Screening**

**Included**

**Eligibility**

**Identification**

**Local**

- KMBASE (n=513)

- KoreaMed (n=285)

- KISS (n=159)

- RISS (n=654)

Records after duplicates removed   
(n=4,864)

Records screened   
(n=4,580)

**Publications excluded after screening title and abstract (n =4,822)**

∙ Not a rotator cuff tear (n=2,589)

∙ Did not perform treatment for rotator cuff tear (n=482)

∙ No reported outcome= (n=64)

∙ Not a RCT study (n= 1,080)

∙ Pre-clinical/non-human study (n=110)

∙ Gray literature (n=497)

Full-text articles assessed

for eligibility  
(n=42)

**Excluded after reading the full text**

**(n=27)**

∙ Not a rotator cuff tear (n=3)

∙ Did not perform treatment for rotator cuff tear (n=１)

∙ No reported outcome= (n=21)

∙ Not a RCT (n= 2)

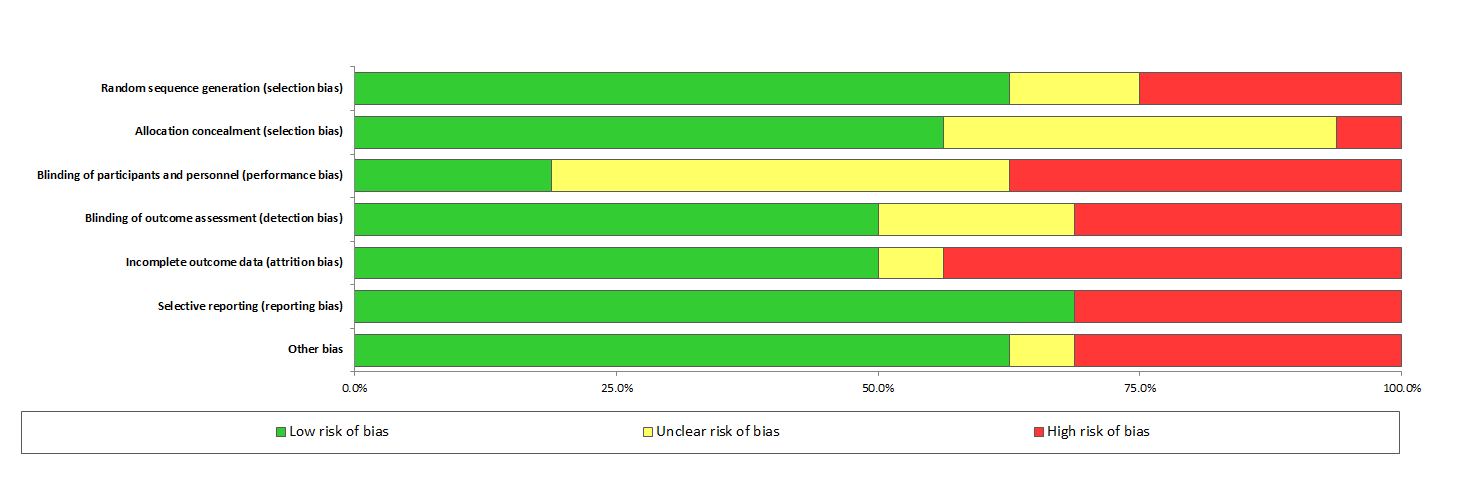
Studies included in qualitative synthesis   
(n=15)

Studies included in quantitative synthesis (meta-analysis)  
(n=15)

Supplementary Figure 1. Flow chart of systematic review

Supplementary Table 4. Lists of Studies included in qualitative synthesis

|  |  |
| --- | --- |
| No | References |
| 1 | Randelli P., Arrigoni P., Ragone V., Aliprandi A. & Cabitza P. Platelet rich plasma in arthroscopic rotator cuff repair: a prospective RCT study, 2-year follow-up. J Shoulder Elbow Surg, 2011, 20(4), 518-28. |
| 2 | Dezaly C., Sirveaux F., Philippe R., et al. Arthroscopic treatment of rotator cuff tear in the over-60s: repair is preferable to isolated acromioplasty-tenotomy in the short term. Orthop Traumatol Surg Res, 2011, 97(6 Suppl), S125-30. |
| 3 | Gumina S., Campagna V., Ferrazza G., et al. Use of platelet-leukocyte membrane in arthroscopic repair of large rotator cuff tears: a prospective randomized study. J Bone Joint Surg Am, 2012, 94(15), 1345-52. |
| 4 | Rodeo S.A., Delos D., Williams R.J., et al. The effect of platelet-rich fibrin matrix on rotator cuff tendon healing: a prospective, randomized clinical study. Am J Sports Med, 2012, 40(6), 1234-41. |
| 5 | van der Zwaal P., Thomassen B.J., Nieuwenhuijse M.J., et al. Clinical outcome in all-arthroscopic versus mini-open rotator cuff repair in small to medium-sized tears: a randomized controlled trial in 100 patients with 1-year follow-up. Arthroscopy, 2013, 29(2), 266-73. |
| 6 | Ruiz-Moneo P., Molano-Munoz J., Prieto E. & Algorta J. Plasma rich in growth factors in arthroscopic rotator cuff repair: a randomized, double-blind, controlled clinical trial. Arthroscopy, 2013, 29(1), 2-9. |
| 7 | J. Kukkonen A.J., J. Lehtinen, K. T. Mattila, E. K. J. Tuominen, T. Kauko, V. Äärimaa. Treatment of non-traumatic rotator cuff tears: A RANDOMISED CONTROLLED TRIAL WITH ONE-YEAR CLINICAL RESULTS. J Bone Joint Surg Br, 2014, 96-B. |
| 8 | Moosmayer S., Lund G., Seljom U.S., et al. Tendon repair compared with physiotherapy in the treatment of rotator cuff tears: a randomized controlled study in 103 cases with a five-year follow-up. Journal of Bone & Joint Surgery - American Volume, 2014, 96(18), 1504-14. |
| 9 | Malavolta E.A., Gracitelli M.E., Ferreira Neto A.A., et al. Platelet-rich plasma in rotator cuff repair: a prospective randomized study. American Journal of Sports Medicine, 2014, 42(10), 2446-54. |
| 10 | Ilhanli I., Guder N. & Gul M. Platelet-rich plasma treatment with physical therapy in chronic partial supraspinatus tears. Iranian Red Crescent Medical Journal, 2015, 17 (9) (no pagination)(e23732). |
| 11 | Jo C.H., Shin J.S., Shin W.H., et al. Platelet-rich plasma for arthroscopic repair of medium to large rotator cuff tears: a randomized controlled trial. The American journal of sports medicine, 2015, 43(9), 2102-10. |
| 12 | Pandey V., Bandi A., Madi S., et al. Does application of moderately concentrated platelet-rich plasma improve clinical and structural outcome after arthroscopic repair of medium-sized to large rotator cuff tear? A randomized controlled trial. Journal of Shoulder & Elbow Surgery, 2016, 25(8), 1312-22. |
| 13 | Zhang Z., Wang Y. & Sun J. The effect of platelet-rich plasma on arthroscopic double-row rotator cuff repair: a clinical study with 12-month follow-up. Acta Orthopaedica et Traumatologica Turcica, 2016, 50(2), 191-7. |
| 14 | Liu J., Fan L., Zhu Y., et al. Comparison of clinical outcomes in all-arthroscopic versus mini-open repair of rotator cuff tears: A randomized clinical trial. Medicine, 2017, 96(11), e6322. |
| 15 | Carr A., Cooper C., Campbell M.K., et al. Effectiveness of open and arthroscopic rotator cuff repair (UKUFF): a randomised controlled trial. Bone & Joint Journal, 2017, 99-B(1), 107-15. |

Supplementary Figure 2. Risk of bias

Supplementary Table 5. Comparison of outcomes between rotator cuff tear treatment (Ranking probability and SUCRA)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatment** a | **Functional improvement** | | **Pain** | |
| **Ranking probability** | **SUCRA** b | **Ranking probability** | **SUCRA** b |
| 1 | 0.0 | 0.5 | 0.0 | 0.6 |
| 2 | 0.1 | 0.7 | 0.2 | 0.8 |
| 3 | 0.1 | 0.5 | 0.2 | 0.6 |
| 4 | 0.0 | 0.2 | 0.0 | 0.0 |
| 5 | 0.0 | 0.2 | 0.0 | 0.3 |
| 6 | 0.8 | 0.9 | 0.5 | 0.8 |
| a 1: Arthroscopic surgery + Physiotherapy  2: Arthroscopic surgery + PRP + Physiotherapy  3: Mini-open surgery + Physiotherapy  4: Physiotherapy  5: Acromioplasty + Physiotherapy  6: Open surgery + Physiotherapy  b SUCRA, cumulative ranking curve | | | | |

Supplementary figure 2. Contribution plot for A. Shoulder functional improvement and B. Pain

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| --- |
|  |
| A. Contribution plot for shoulder functional improvement a |
|  |
| B. Contribution plot for pain a |

a 01: Arthroscopic surgery + Physiotherapy

02: Arthroscopic surgery + PRP + Physiotherapy

03: Mini-open surgery + Physiotherapy

04: Physiotherapy

05: Acromioplasty + Physiotherapy

06: Open surgery + Physiotherapy