

Does graft thickness affect outcomes in massive rotator cuff repairs with graft augmentation?

A systematic review and meta-analysis

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Aims & Objective

- Surgical repair of massive rotator cuff tears remains challenging, particularly in terms of healing. Currently there is no universal consensus regarding the best thickness of graft for repair.
- This study aims to appraise and determine whether graft thickness influences functional outcomes and re-tear rates in massive rotator cuff repairs (RCRs) with graft augmentation, and to compare effectiveness of on-lay versus bridging/interposition techniques.

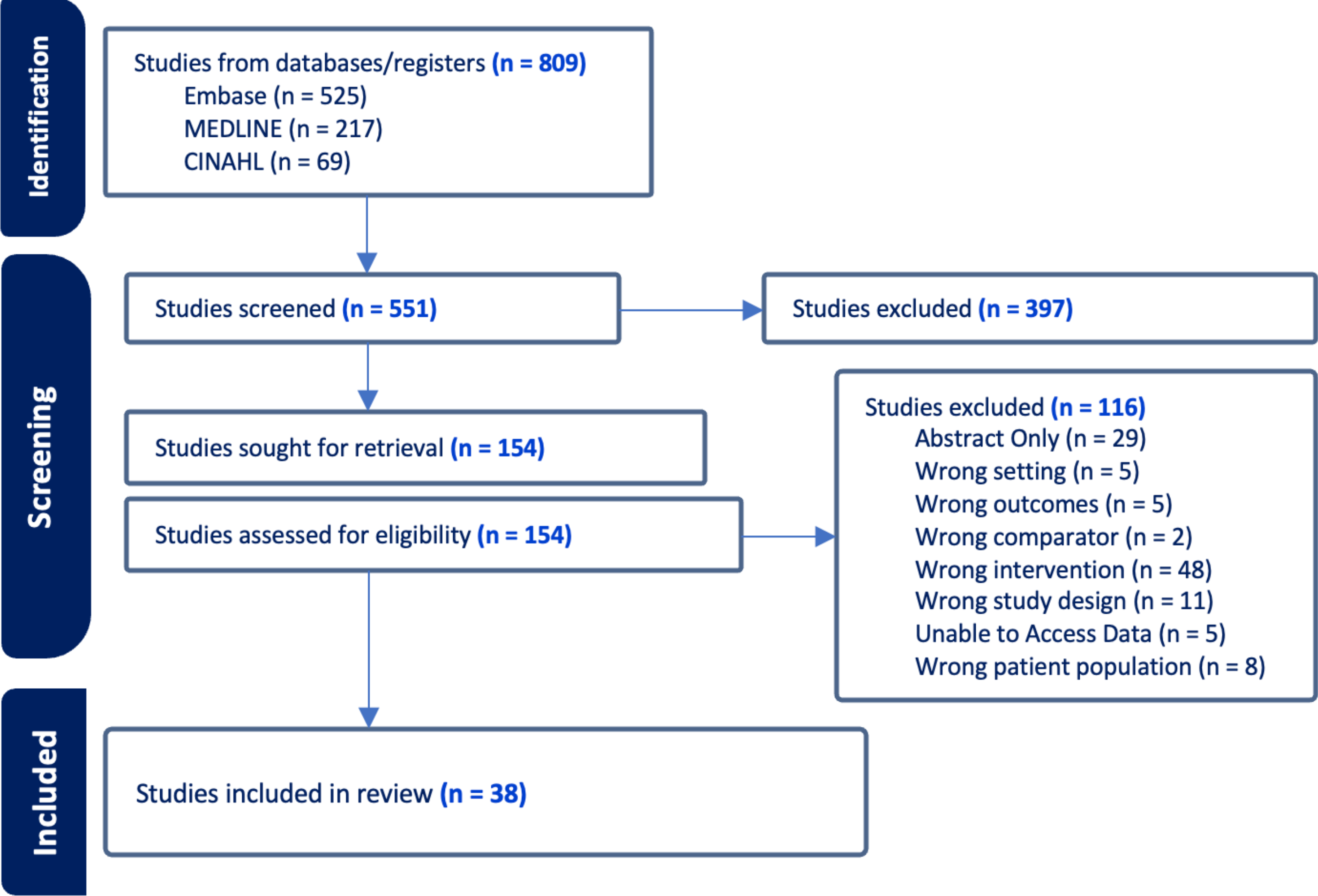
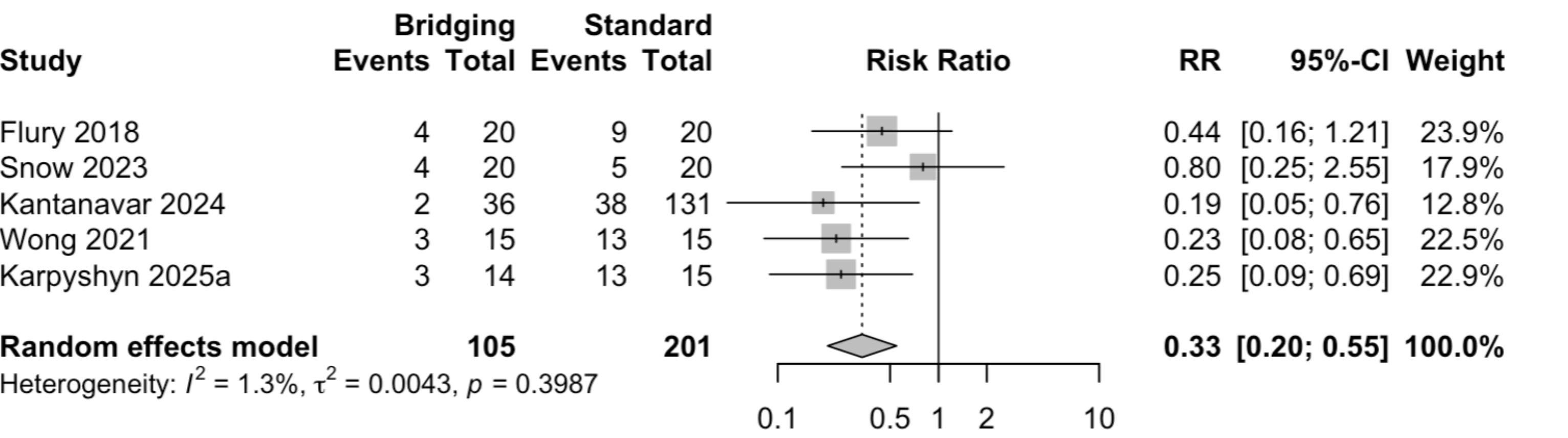
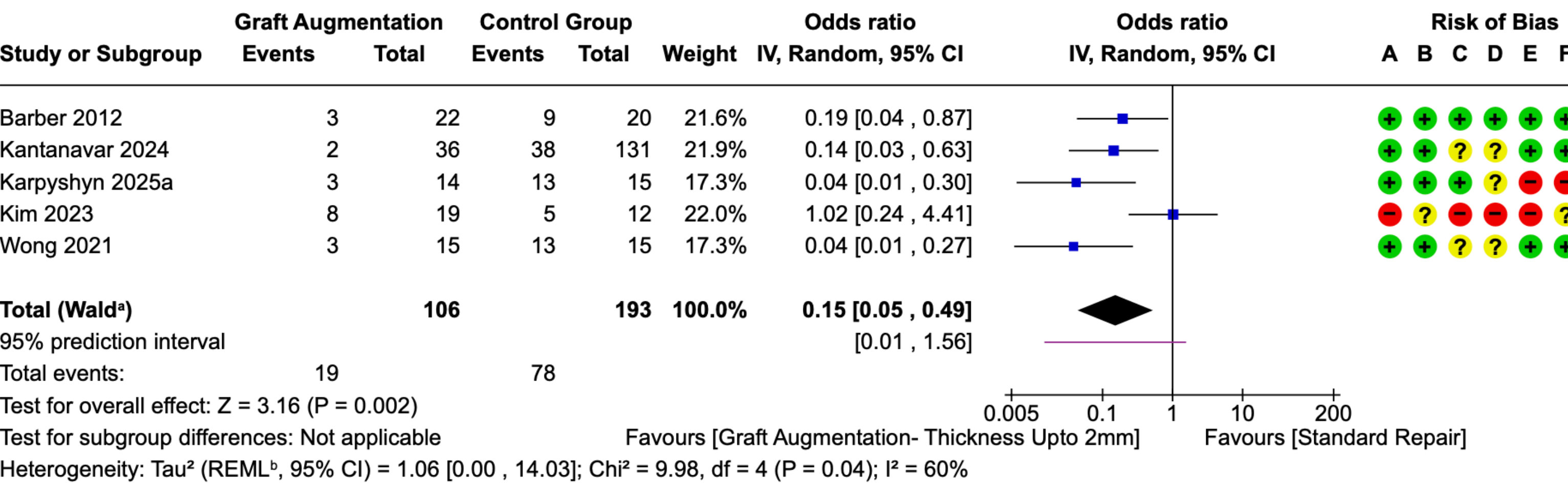
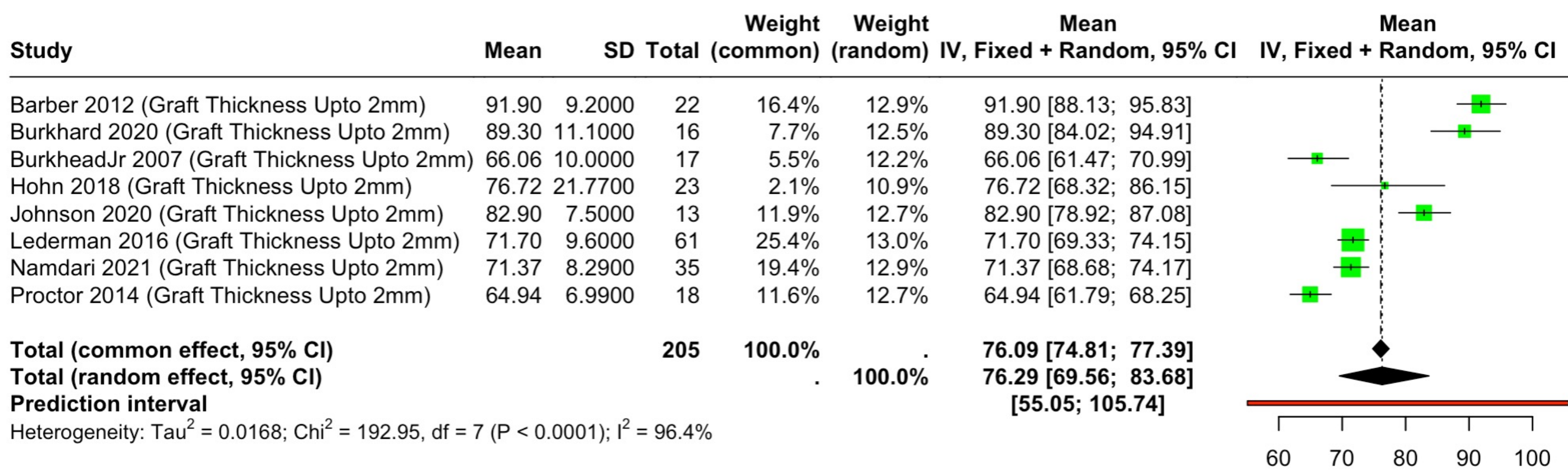
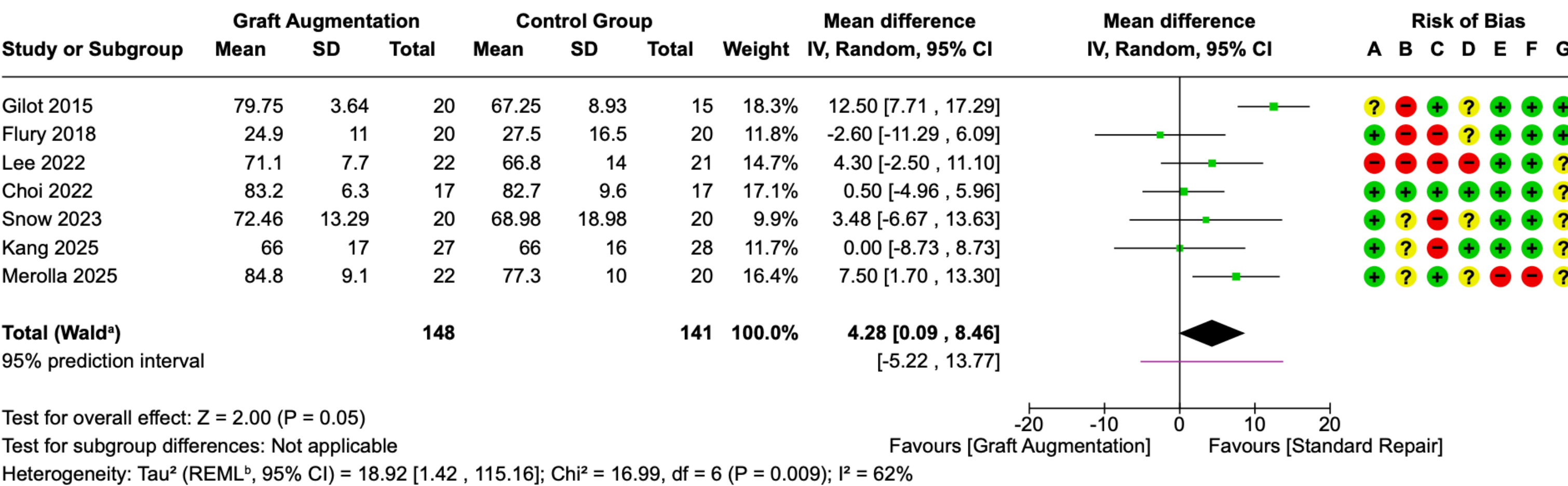
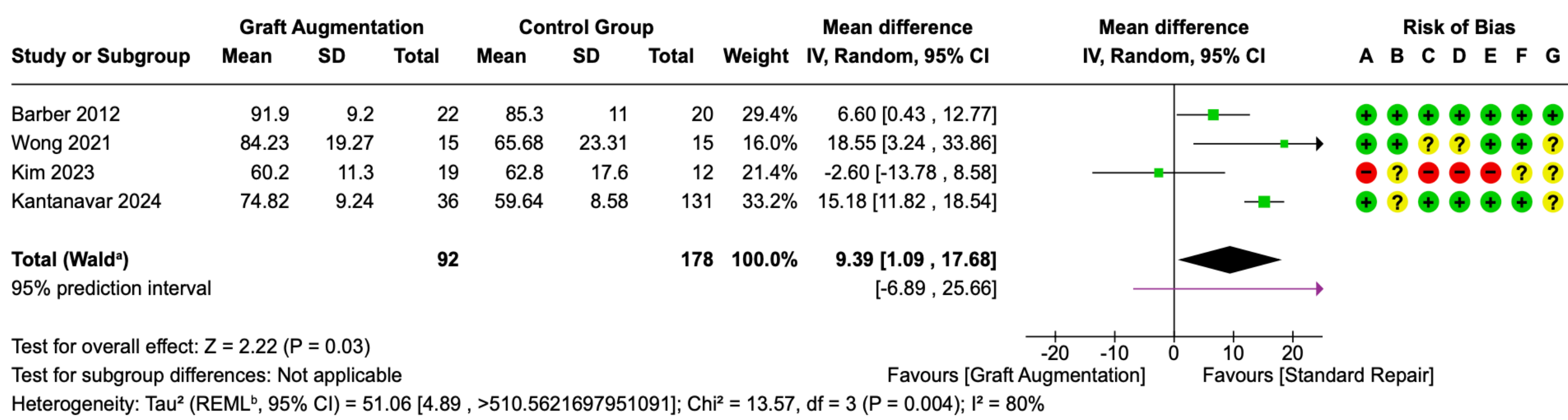


Figure - PRISMA flowchart for comprehensive data search

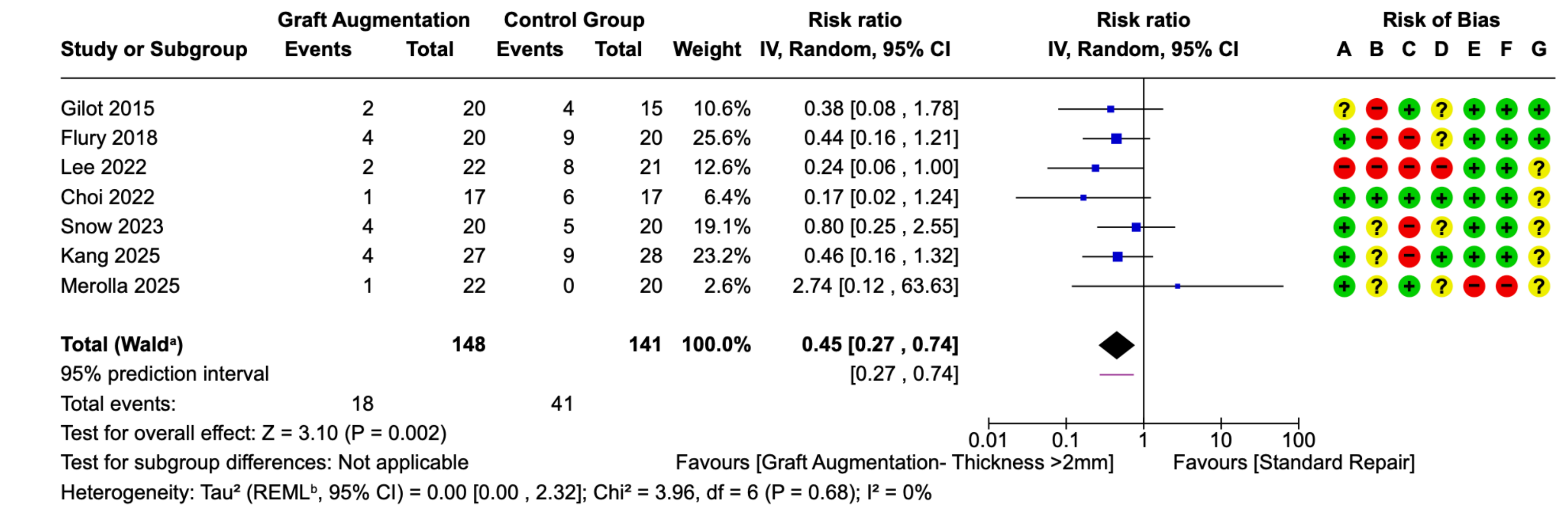
Methods

- A systematic review was performed in accordance with the PRISMA guidelines where databases were comprehensively searched between **April 2006** and **April 2025**. (*Figure-1*).
- Clinical studies reporting shoulder-specific functional outcomes scores and re-tear rates evaluating RCRs with graft augmentation (on-lay or bridging) using allografts, xenografts and synthetic grafts, as well as comparative studies with standard repair with minimum 12-months follow-up were included.
- Studies were stratified by graft thickness (≤ 2 mm vs >2 mm) and technique (on-lay vs bridging).
- Meta-analysis was conducted using a random-effects models if ≥ 2 comparative studies reported the same outcome measure using Rev-Man Web. Outcomes used for analysis included PROMs- Constant Murley Score(CMS) and radiographic re-tear rates with at least a mean FU period of 12 months.
- A proportional meta-analysis was conducted for single arm studies using R-Studio. Risk of bias assessment was undertaken for randomised and comparative studies (ROBINS- I, Cochrane).



Results

- 38 studies reporting on 1761 total cases (23 studies having graft thickness up to 2mm, 15 studies using >2 mm thickness) were included.
- On-lay augmentation using grafts ≤ 2 mm had better CMS compared to standard repair (MD +9.39 points; 95% CI: 1.09–17.68; p = 0.03; I² = 80%) while grafts >2 mm showed only borderline improvement (MD +4.28 points; 95% CI: 0.09–8.46; p = 0.05; I² = 62%).
- In single-arm analyses, bridging with grafts ≤ 2 mm achieved the highest mean Constant score (76.29 points; 95% CI: 69.56–83.68), followed by on-lay ≤ 2 mm grafts (74.64 points; 95% CI: 70.85–78.63).
- On-lay grafts ≤ 2 mm provided the greatest protective effect, yielding an 85% reduction in re-tear risk (OR 0.15; 95% CI: 0.05–0.49; p = 0.04) and the lowest absolute failure rate (8%).
- Bridging with ≤ 2 mm grafts achieved a 67% risk reduction (RR 0.33; 95% CI: 0.20–0.55; I² = 1.3%), whereas grafts >2 mm reduced risk by 55% (RR 0.45; 95% CI: 0.27–0.74; I² = 0%).
- Pooled proportional analysis demonstrated an overall re-tear rate of 12% (95% CI: 9–15%; I² = 77.9%)



Conclusion

- Bridging with thin grafts (≤ 2 mm) resulted in superior functional outcomes, while on-lay augmentation with thin grafts provided enhanced structural integrity, with a re-tear rate of 8% and an 85% relative risk reduction.
- Both augmentation strategies significantly decrease re-tear incidences compared with standard repair alone, with thin grafts demonstrating consistently greater efficacy across all functional and structural outcome parameters than thick grafts.