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Table S1. Research question and search strategy

Research question	
PICOT(T)	**Population (P): Patients with bicuspid aortic valve undergoing transcatheter aortic valve implantation (TAVI).** **Intervention (I): TAVI with Balloon-Expandable Valve (BEV).** **Comparison (C): TAVI with Self-Expandable Valve (SEV).** **Outcome (O): Overall mortality, cardiovascular mortality, procedural success, stroke, need of second valve, moderate to severe paravalvular leak, new pacemaker implantation, coronary obstruction.** **Time (T): Procedural; 30 days; Six Months; 1 year.** **Type of Study (T): Randomized controlled trials; Observational Studies.**
Search strategy	
Pubmed	
Search strategy	**("transcatheter aortic valve replacement" OR TAVR OR "transcatheter aortic valve implantation" OR TAVI OR "catheter-based aortic valve replacement" OR "transcatheter aortic valve therapy" OR "Percutaneous aortic valve replacement" OR "transcatheter heart valves") AND ("balloon-expandable" OR "new-generation balloon" OR BEV OR "balloon expandable" OR BE) AND**

	("self-expandable" OR SEV OR "self expandable" OR "self-expanding" OR "self expanding") AND ("bicuspid aortic valve" OR "bicuspid aortic valve stenosis") AND ((randomized controlled trial[pt]) OR (controlled clinical trial[pt]) OR (observational study[pt]) OR (randomized[tiab] OR randomised[tiab]) OR (placebo[tiab]) OR (randomly[tiab]) OR (trial[tiab]) OR (retrospective cohort study) OR (groups[tiab])) NOT (animals[mh] NOT humans[mh])
Restrictions	**RCT and OS**
Results	**With the search strategy and restriction, we obtained 623 results on March 2, 2025**
Embase	
Search strategy	**(“transcatheter aortic valve replacement" OR TAVR OR "transcatheter aortic valve implantation" OR TAVI OR "catheter-based aortic valve replacement" OR "transcatheter aortic valve therapy" OR "Percutaneous aortic valve replacement") AND ("balloon-expandable" OR BEV OR “balloon expandable” OR BE) AND ("self-expandable" OR SEV OR “self expandable” OR “self-expanding” OR “self expanding”)**
Restrictions	**RCT and OS**
Results	**With the search strategy and restriction, we obtained 2043 results on March 2, 2025**
Cochrane	

Search strategy	**("transcatheter aortic valve replacement" OR TAVR OR "transcatheter aortic valve implantation" OR TAVI OR "catheter-based aortic valve replacement" OR "transcatheter aortic valve therapy" OR "Percutaneous aortic valve replacement") AND ("balloon-expandable" OR BEV OR “balloon expandable” OR BE) AND ("self-expandable" OR SEV OR “self expandable” OR “self-expanding” OR “self expanding”)**
Restrictions	**RCT and OS**
Results	**With the search strategy and restriction, we obtained 184 results on March 2, 2025.**

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Table S2. Risk of bias

Risk of bias was assessed using the ROBINS-I tool, covering domains D1 to D6 and Overall risk. The domains evaluated were: D1 (Bias due to confounding), D2 (Bias in selection of participants), D3 (Bias in classification of interventions), D4 (Bias due to deviations from intended interventions), D5 (Bias due to missing data), D6 (Bias in measurement of outcomes), and Overall (Overall risk of bias for each study).

The bibliographical references mentioned in this figure correspond to: Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Hayashida et al.(8) / Kosek et al.(9) / Mylotte et al.(10) / Costopoulos et al.(11) / Buono et al.(12).

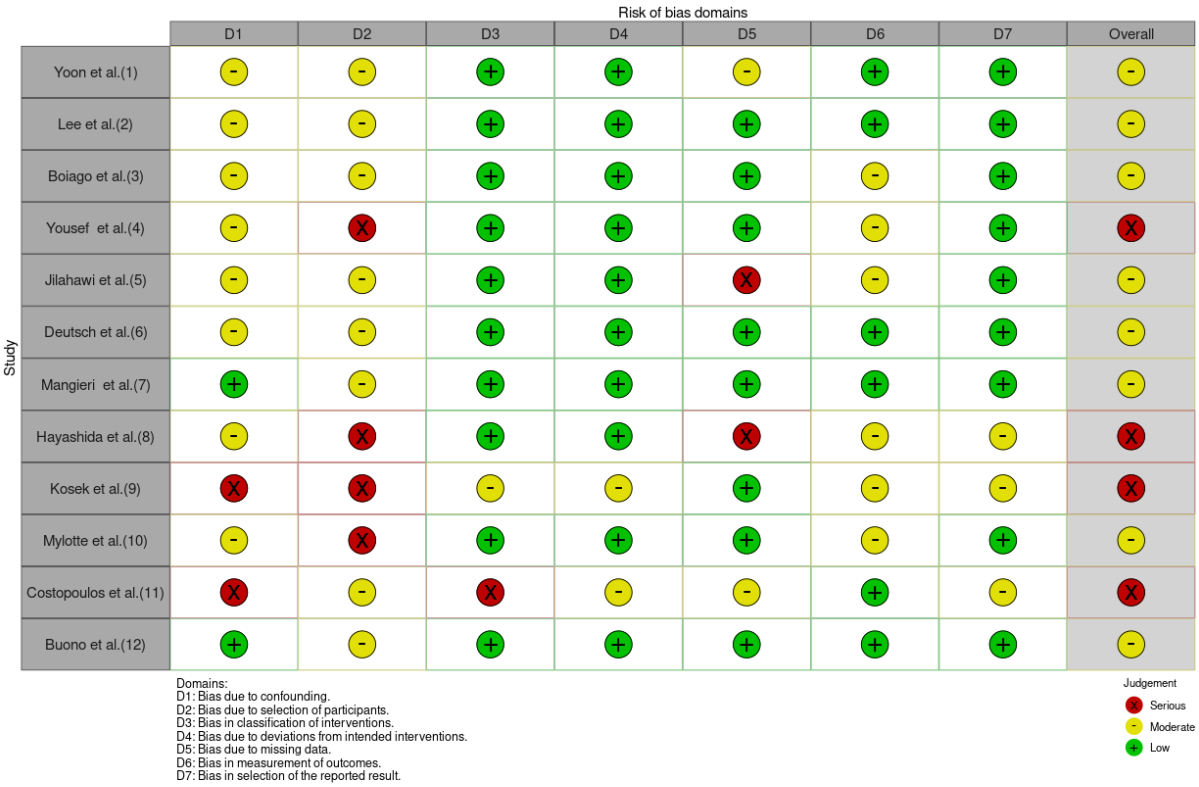

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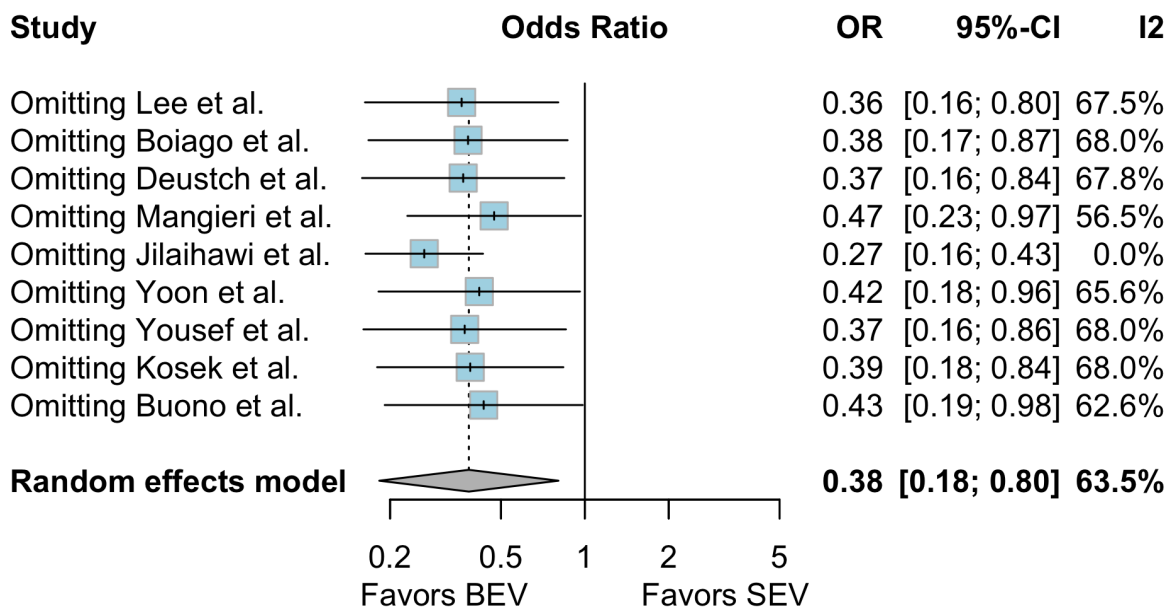
Figure S1. Leave-one-out sensitivity analysis of moderate/severe paravalvular leak: BEV vs. SEV.



Leave-one-out sensitivity analysis of moderate/severe paravalvular leak (PVL) in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The results demonstrate that the direction of the effect remains consistent across all exclusions, supporting the stability of the meta-analysis findings.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Kosek et al.(9) / Buono et al.(12).

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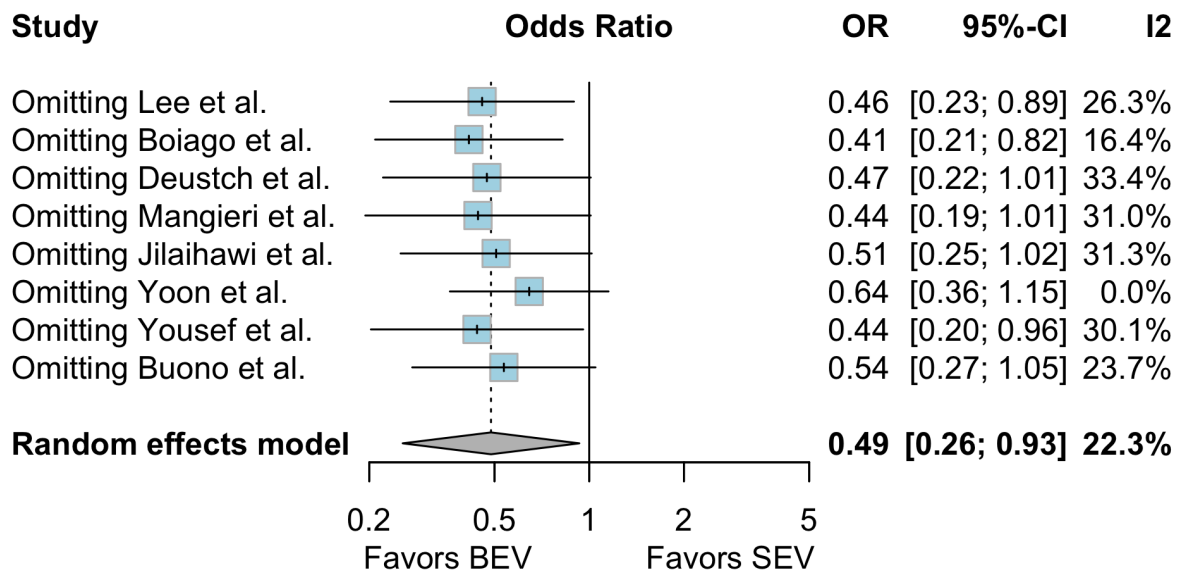
Figure S2: Leave-one-out sensitivity analysis of need of second valve: BEV vs. SEV.



The leave-one-out sensitivity analysis for the need for a second valve implantation showed a consistent direction of effect favoring BEV across all iterations, with the pooled OR remaining below 1 in every scenario. However, statistical significance was not uniformly maintained: when omitting Deutsch et al., Mangieri et al., Jilaihawi et al., Yoon et al., or Buono et al., confidence intervals marginally crossed unity. These findings indicate that, while the overall pooled result is statistically significant, the result should be interpreted with caution, as it may be influenced by the specific composition of included studies

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Buono et al.(12).

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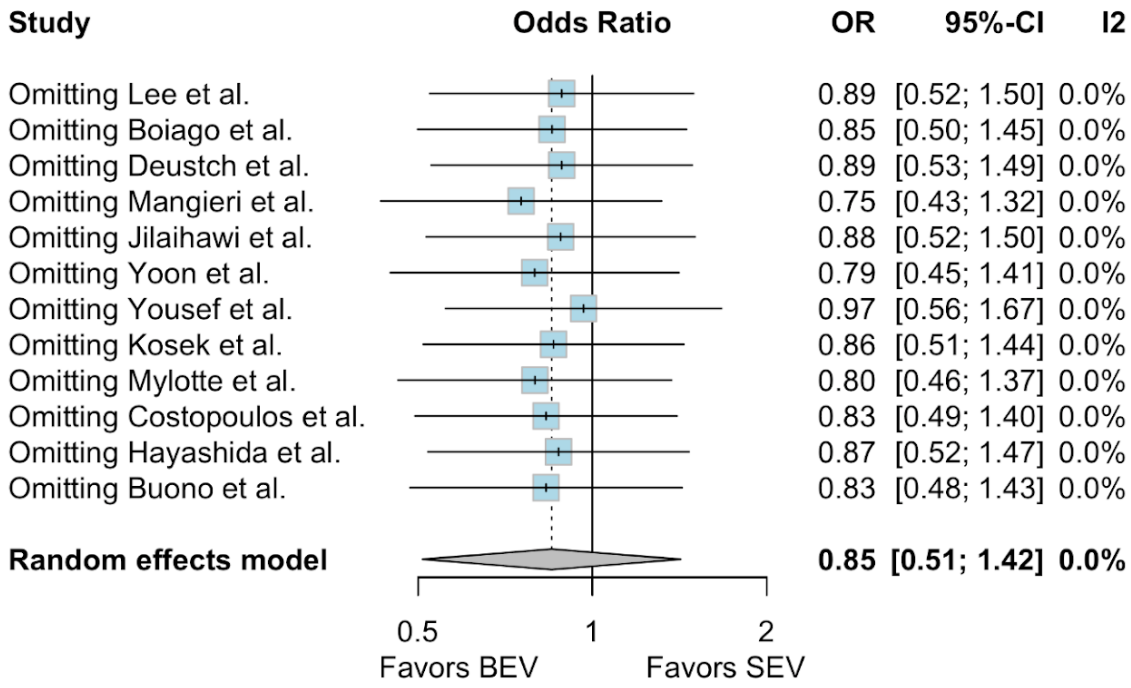
Figure S3. Leave-one-out sensitivity analysis of 30-day all-cause death: BEV vs. SEV.



Leave-one-out sensitivity analysis of 30-day all-cause death in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Hayashida et al.(8) / Kosek et al.(9) / Mylotte et al.(10) / Costopoulos et al.(11) / Buono et al.(12).

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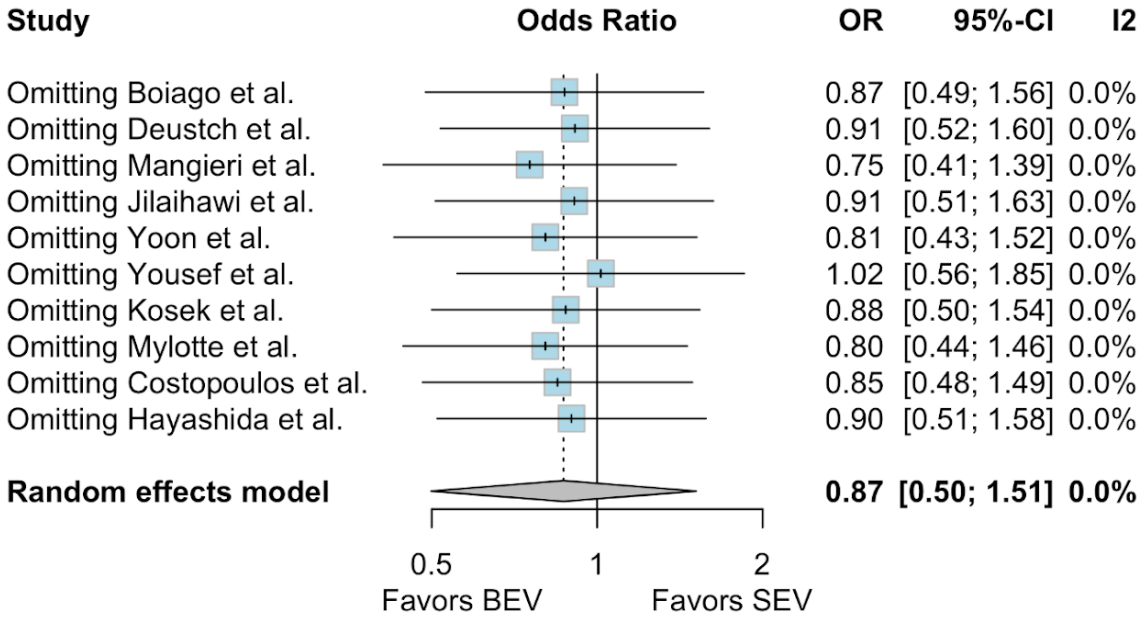
Figure S4. Leave-one-out sensitivity analysis of 30-day cardiovascular death: BEV vs. SEV.



Leave-one-out sensitivity analysis of 30-day cardiovascular death in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Hayashida et al.(8) / Kosek et al.(9) / Mylotte et al.(10) / Costopoulos et al.(11).

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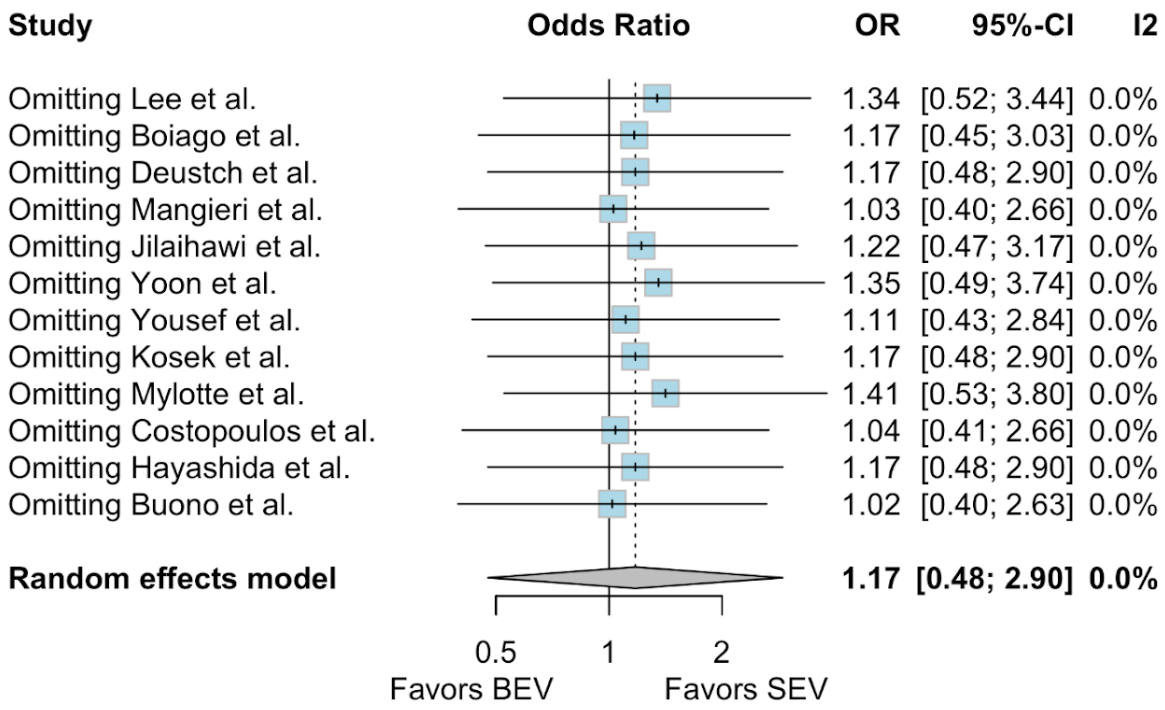
Figure S5. Leave-one-out sensitivity analysis of procedural death: BEV vs. SEV.

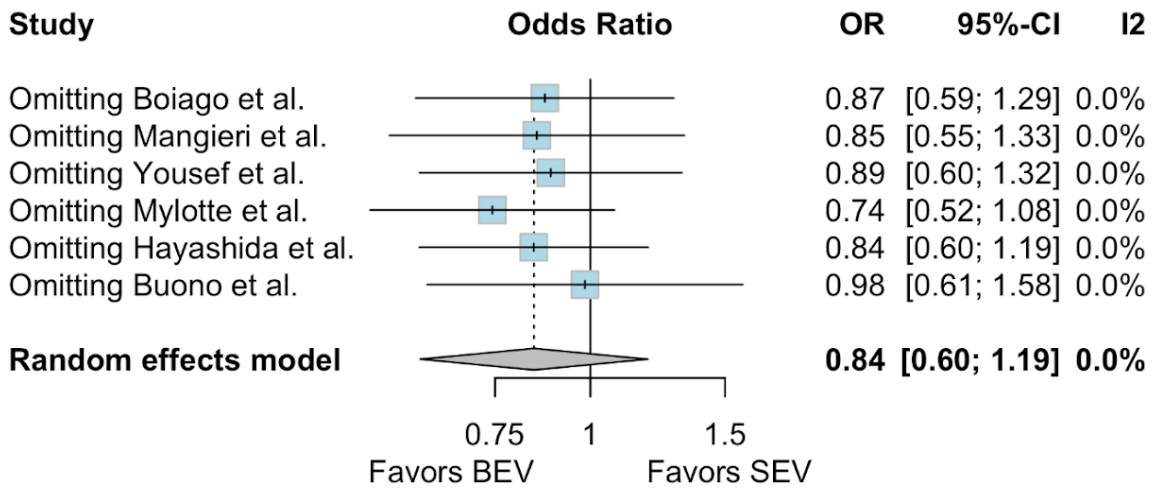


Leave-one-out sensitivity analysis of procedural death in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Hayashida et al.(8) / Kosek et al.(9) / Mylotte et al.(10) / Costopoulos et al.(11) / Buono et al.(12).

https://doi.org/10.24875/RECICE.M26000598

Figure S6. Leave-one-out sensitivity analysis of 1-year all-cause death: BEV vs. SEV.

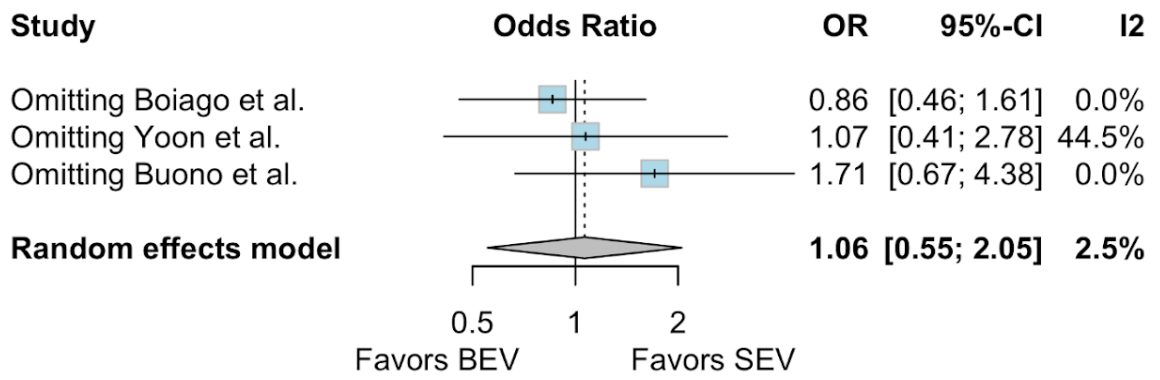


Leave-one-out sensitivity analysis of 1-year all-cause death in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Boiago et al.(3) / Yousef et al.(4) / Mangieri et al.(7) / Hayashida et al.(8) / Mylotte et al.(10) / Buono et al.(12).

https://doi.org/10.24875/RECICE.M26000598

Figure S7. Leave-one-out sensitivity analysis of 1-year cardiovascular death: BEV vs. SEV.

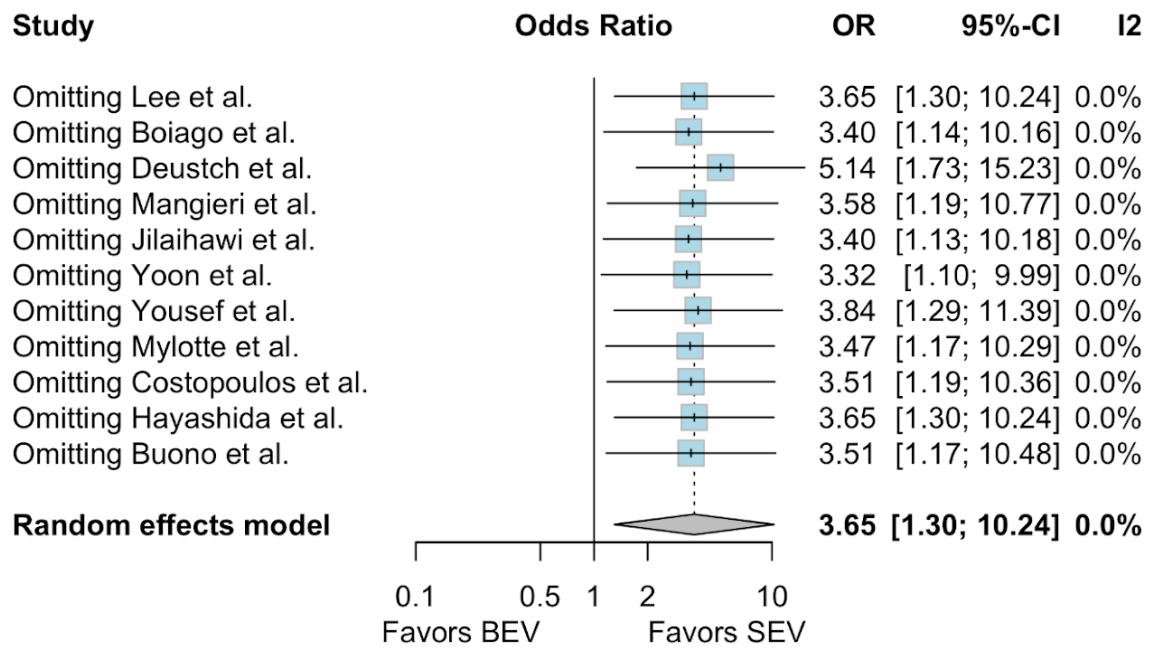


Leave-one-out sensitivity analysis of 1-year cardiovascular death in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Boiago et al.(3) / Buono et al.(12).

https://doi.org/10.24875/RECICE.M26000598

Figure S8. Leave-one-out sensitivity analysis of annulus rupture: BEV vs. SEV.



Leave-one-out sensitivity analysis of annulus rupture in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Hayashida et al.(8) / Mylotte et al.(10) / Costopoulos et al.(11) / Buono et al.(12).

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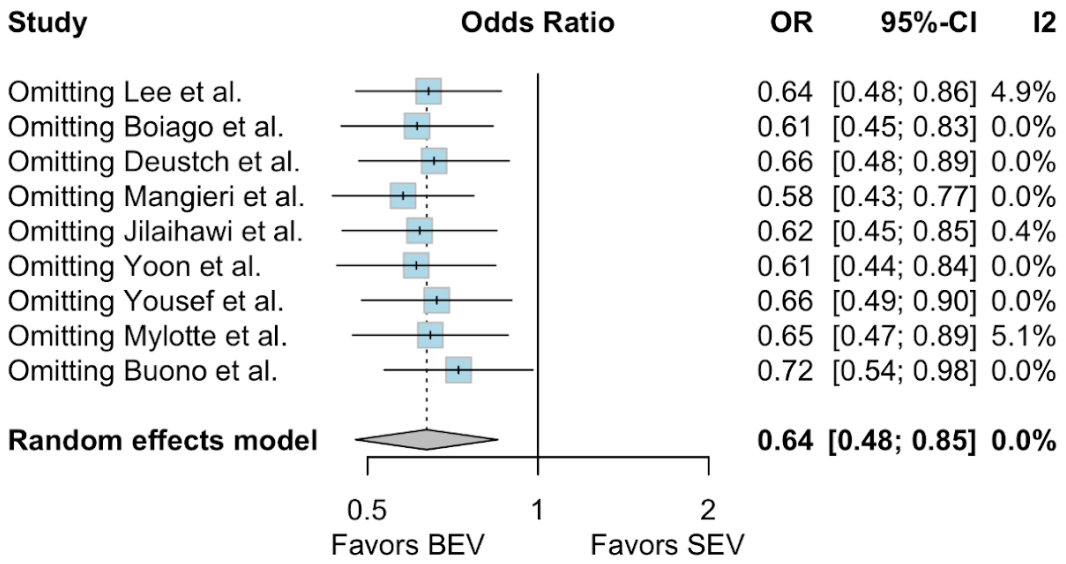
Figure S9. Leave-one-out sensitivity analysis of new pacemaker implantation: BEV vs. SEV.



Leave-one-out sensitivity analysis of new pacemaker implantation in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Mylotte et al.(10) / Buono et al.(12).

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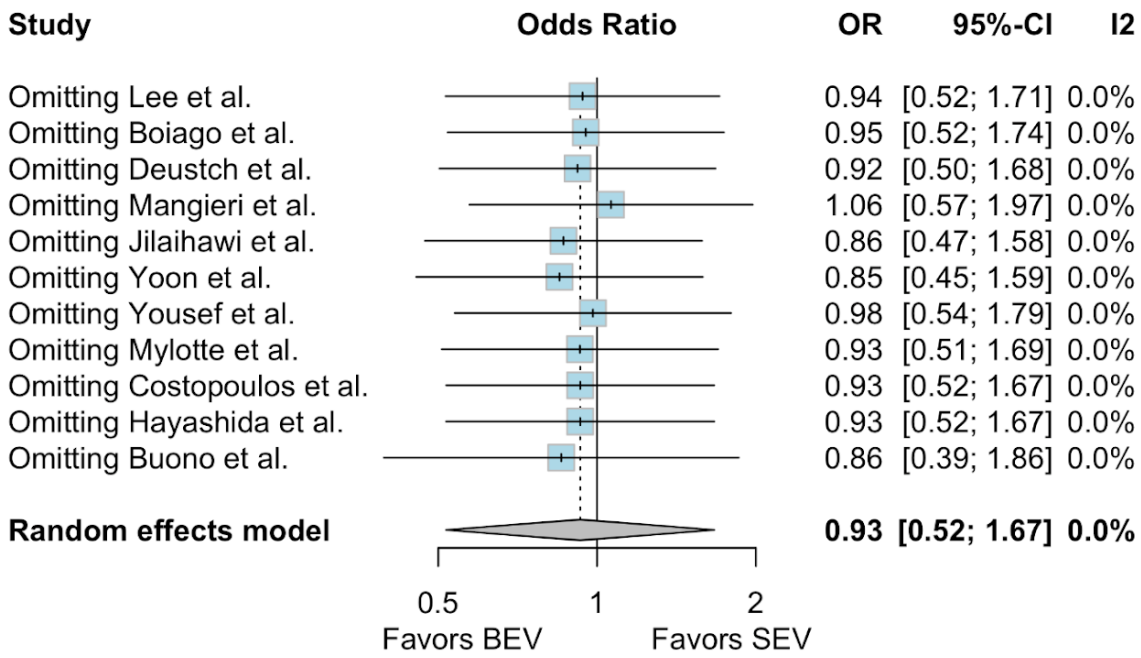
Figure S10. Leave-one-out sensitivity analysis of stroke: BEV vs. SEV.

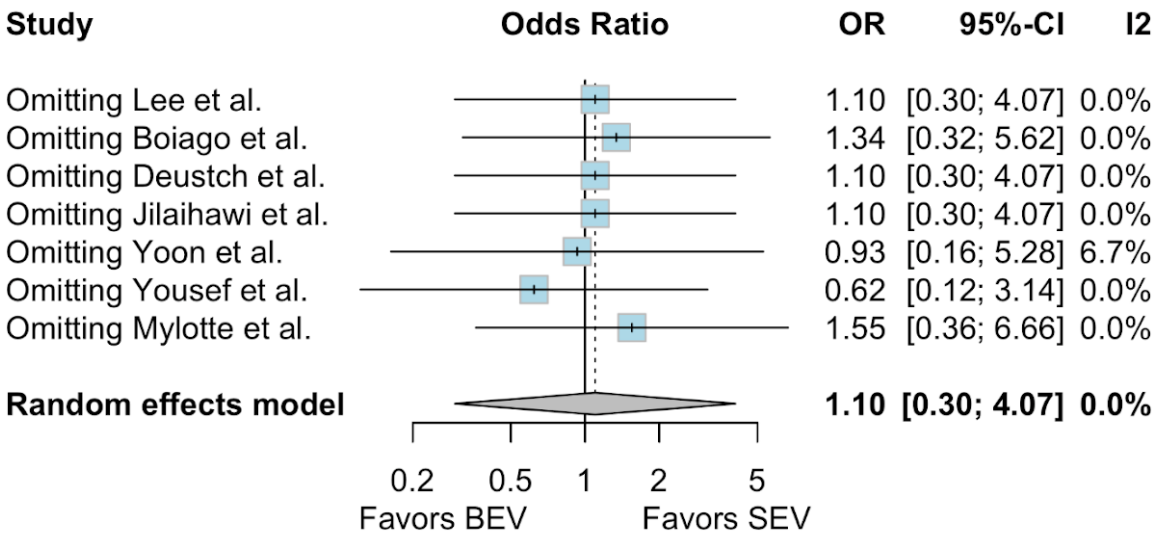


Leave-one-out sensitivity analysis of stroke in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Yoon et al.(1) / Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mangieri et al.(7) / Hayashida et al.(8) / Mylotte et al.(10) / Costopoulos et al.(11) / Buono et al.(12).

https://doi.org/10.24875/RECICE.M26000598

Figure S11. Leave-one-out sensitivity analysis of coronary obstruction: BEV vs. SEV.



Leave-one-out sensitivity analysis of coronary obstruction in the meta-analysis comparing BEV vs. SEV. Each row represents the recalculated odds risk (OR) and 95% confidence interval (CI) after omitting one study at a time to assess the robustness of the overall findings. The forest plot demonstrates the robustness of the random-effects model, showing no significant changes in the pooled Odds Ratio (OR) when omitting individual studies, alongside consistently low heterogeneity.

The bibliographical references mentioned in this figure correspond to**:** Lee et al.(2) / Boiago et al.(3) / Yousef et al.(4) / Jilaihawi et al.(5) / Deutsch et al.(6) / Mylotte et al.(10) / Buono et al.(12).

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