 **Supplementary material**

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**Aspiration Thrombectomy for Treatment of ST-segment Elevation Myocardial Infarction: a Meta-analysis of 26 Randomized Trials in 11 943 Patients**

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# Table 1 of the supplementary material. Search Strategy in MEDLINE and PubMed.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| MEDLINE\* |  |  | PubMed† |  |  |
| Search line | **Search Terms** | **No. citations** | **Search line** | **Search Terms** | **No. citations** |
| 1 | Myocardial Infarction.ti,ab. | 135119 | 1 | ((((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) AND (infarction\*[tiab] OR “Myocardial Infarction”[tiab] OR (“Myocardial"[tiab] AND "Infarction”[tiab]) OR "myocardial disease"[All Fields]) AND ("Thrombectomy"[All Fields] OR "thrombus aspiration"[All Fields] OR "thromboaspiration"[All Fields] OR (aspiration[tiab] AND mechanical[tiab]) OR (aspiration[tiab] and catheter\*[tiab]) OR thrombosuction[tiab]))) AND publisher[sb] |  |
| 2 | \*Infarction/ | 4489 |  |  |
| 3 | Myocardial Infarction/ | 143138 |  |  |
| 4 | or/1-3 | 197413 |  |  |
| 5 | thrombus aspiration.ti,ab. | 354 |  |  |
| 6 | thromboaspiration.ti,ab. | 109 |  |  |
| 7 | (aspiration adj5 mechanical).ti,ab. | 197 |  |  |
| 8 | Thrombectomy.ti,ab. | 4666 |  |  |
| 9 | (aspiration and catheter\*).ti,ab. | 2060 |  |  |
| 10 | thrombosuction.ti,ab. | 31 |  |  |
| 11 | \*Thrombectomy/ | 1855 |  |  |
| 12 | or/5-11 | 7393 |  |  |
| 13 | randomized controlled trial.pt. | 388270 |  |  |
| 14 | controlled clinical trial.pt. | 89801 |  |  |
| 15 | randomized.ab. | 307888 |  |  |
| 16 | placebo.ab. | 159446 |  |  |
| 17 | drug therapy.fs. | 1742707 |  |  |
| 18 | randomly.ab. | 222104 |  |  |
| 19 | trial.ab. | 320670 |  |  |
| 20 | groups.ab. | 1401877 |  |  |
| 21 | or/13-20 | 3440707 |  |  |
| 22 | and/4,12,21 | 324 |  |  |
| 23 | exp animals/ not humans.sh. | 4008588 |  |  |
| 24 | 22 not 23 | 321 |  |  |
| 25 | remove duplicates from 24 | 310 |  |  | 12 |

\* Search performed at 5th of September 2014, using the following databases in OvidSP: Ovid MEDLINE(R) 1946 to August Week 4 2014; Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations September 04, 2014; Ovid MEDLINE(R) Daily Update September 04, 2014  
† Top-up search in PubMed (http://www.ncbi.nlm.nih.gov/pubmed) at 05 September 2014, to retrieve citations not yet indexed in OvidSP MEDLINE databases

# Table 2 of the supplementary material. Search Strategy in EMBASE and CENTRAL.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EMBASE\* |  |  | CENTRAL† |  |  |
| Search line | **Search Terms** | **No. citations** | **Search line** | **Search Terms** | **No. citations** |
| 1 | Myocardial Infarction.ti,ab. | 180962 | #1 | myocardial infarction:ti,ab,kw (Word variations have been searched) | 13877 |
| 2 | heart infarction/ or acute heart infarction/ or infarction/ or ST segment elevation myocardial infarction/ | 280572 | #2 | MeSH descriptor: [Infarction] explode all trees | 17 |
| 3 | myocardial disease/ | 4228 | #3 | MeSH descriptor: [Myocardial Infarction] explode all trees | 8187 |
| 4 | or/1-3 | 314822 | #4 | #1 or #2 or #3 | 13965 |
| 5 | thrombus aspiration.ti,ab. | 763 | #5 | thrombus aspiration:ti,ab,kw (Word variations have been searched) | 44 |
| 6 | thromboaspiration.ti,ab. | 193 | #6 | thromboaspiration:ti,ab,kw (Word variations have been searched) | 3 |
| 7 | (aspiration adj5 mechanical).ti,ab. | 296 | #7 | aspiration mechanical:ti,ab,kw (Word variations have been searched) | 142 |
| 8 | Thrombectomy.ti,ab. | 6845 | #8 | thrombectomy:ti,ab,kw (Word variations have been searched) | 184 |
| 9 | (aspiration and catheter\*).ti,ab. | 3093 | #9 | aspiration catheter\*:ti,ab,kw (Word variations have been searched) | 160 |
| 10 | thrombosuction.ti,ab. | 58 | #10 | thrombosuction:ti,ab,kw (Word variations have been searched) | 2 |
| 11 | \*Thrombectomy/ | 1838 | #11 | MeSH descriptor: [Thrombectomy] explode all trees | 114 |
| 12 | or/5-11 | 10737 | #12 | #5 or #6 or #7 or #8 or #9 or #10 or #11 | 468 |
| 13 | random$.tw. | 909876 | #13 | #4 and #12 in Trials | 123 |
| 14 | factorial$.tw. | 23811 |  |  |  |
| 15 | (crossover$ or cross-over$).tw. | 72146 |  |  |  |
| 16 | placebo$.tw. | 207113 |  |  |  |
| 17 | (doubl$ adj blind$).tw. | 149731 |  |  |  |
| 18 | (singl$ adj blind$).tw. | 14864 |  |  |  |
| 19 | assign$.tw. | 245604 |  |  |  |
| 20 | allocat$.tw. | 86535 |  |  |  |
| 21 | volunteer$.tw. | 183767 |  |  |  |
| 22 | Crossover Procedure.sh. | 40113 |  |  |  |
| 23 | Double-blind Procedure.sh. | 117717 |  |  |  |
| 24 | Randomized Controlled Trial.sh. | 351631 |  |  |  |
| 25 | Single-blind Procedure.sh. | 18765 |  |  |  |
| 26 | or/13-25 | 1460481 |  |  |  |
| 27 | animals/ not humans/ | 1195693 |  |  |  |
| 28 | and/4,12,26 | 386 |  |  |  |
| 29 | 28 not 27 | 386 |  |  |  |
| 30 | remove duplicates from 29 | 383 |  |  |  |

\*Search performed at 5th of September 2014, using the following database in OvidSP: EMBASE 1974 to 2014 September 04

†Search performed at 5th of September 2014, using the Cochrane Library of the publisher Wiley at http://onlinelibrary.wiley.com/cochranelibrary/search.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3A of the supplementary material.** Randomized Clinical Trials included in the Meta-analyses of Outcomes comparing Aspiration Thrombectomy vs Control | | | | | | | | | | | | | | |
| **N° of trial** | **Trial acronym** | **Device(s)** | **No. of patients** | **Age, mean** | **Males, %** | **Diabetes, %** | **MVD, %** | **Ischemic time, h\*** | **LAD MI, %** | **Pre TIMI 0 or 1, %** | **GP IIb/IIIa use, %** | **Baseline thrombus for inclusion** | | **Longest FUP, months** | |
| **1** | **NONSTOP1** | Rescue‡ | 258 | 65.0 | 79.8 | NA | NA | NA | 39.9 | NA | NA | | - | IH | |
| **2** | **Dudek et al2** | Rescue‡ | 72 | 57.8 | 75.0 | 13.9 | NA | 4.1 | 47.2 | 73.6 | NA | | + | NA | |
| **3** | **REMEDIA3** | Diver | 99 | 60.5 | 83.8 | 20.2 | 38.4 | 4.8 | 45.5 | 87.9 | 65.7 | | - | 1 | |
| **4** | **Noel et al4** | Export | 50 | 61.2 | NA | NA | NA | 4.7 | 44.0 | NA | NA | | - | IH | |
| **5** | **De Luca et al5** | Diver | 76 | 65.7 | 63.2 | 21.1 | 21.1 | 7.4 | 98.7 | 100.0 | 100.0 | | + | 6 | |
| **6** | **Kaltoft et al6** | Rescue‡ | 215 | 64.0 | 78.1 | 7.0 | 49.8 | 3.8 | 44.7 | 66.5 | 94.9 | | - | 1 | |
| **7** | **DEAR-MI7** | Pronto | 148 | 58.1 | 79.7 | 18.2 | 51.4 | 3.4 | 47.3 | 77.0 | 100.0 | | - | IH | |
| **8** | **Chao et al8** | Export | 74 | 61.0 | 85.1 | 27.0 | NA | 5.8 | 58.1 | 98.6 | 25.7 | | + | 6 | |
| **9** | **TAPAS9,10** | Export | 1071 | 63.0 | 70.5 | 11.6 | 67.5 | 3.1 | 43.0 | 57.1 | 91.6 | | - | 12 | |
| **10** | **EXPORT11** | Export | 249 | 60.2 | 81.1 | 14.9 | NA | 5.5 | 49.8 | 99.6 | 67.9 | | - | 1 | |
| **11** | **VAMPIR12** | TVAC‡ | 355 | 63.3 | 79.2 | 26.5 | NA | 6.7 | 51.3 | 75.1 | 0.0 | | - | 8 | |
| **12** | **EXPIRA13-15** | Export | 175 | 65.7 | 60.0 | 21.1 | 21.1 | 6.2 | 43.4 | 100.0 | 100.0 | | + | 24 | |
| **13** | **Moura et al16** | Export | 152 | NA | NA | NA | NA | NA | NA | NA | 70.4 | | - | NA | |
| **14** | **Liistro et al17** | Export | 111 | 64.5 | 77.5 | 16.2 | 42.3 | 3.4 | 42.3 | 73.0 | 100.0 | | - | 6 | |
| **15** | **PIHRATE18** | Diver | 196 | 59.8 | 80.6 | 11.2 | NA | NA | 39.3 | 97.4 | 9.2 | | - | 6 | |
| **16** | **Yin et al19** | Diver | 160 | 63.0 | 80.0 | 33.1 | NA | 5.7 | 20.0 | NA | 100.0 | | - | 12 | |
| **17** | **Lelek et al20,21** | NA | 71 | 57.0 | 71.8 | 21.1 | 36.6 | 4.0 | 100.0 | 88.7 | 91.5 | | + | 6 | |
| **18** | **Ciszewski et al22** | Diver/ Rescue‡ | 137 | 64.1 | 71.5 | 13.9 | NA | 5.6 | 35.8 | 90.5 | 81.8 | | + | IH | |
| **19** | **INFUSE-AMI**§**23-25** | Export | 452 | 60.2 | 73.9 | 11.3 | NA | 2.5 | 100.0 | 71.7 | 50.4 | | - | 12 | |
| **20** | **Bulum et al26** | Export | 60 | 56.4 | 78.3 | 10.0 | NA | 4.4 | 41.7 | NA | 90.0 | | - | 6 | |
| **21** | **TROFI27** | Eliminate | 141 | 61.0 | 72.3 | 10.6 | 0.0 | NA | 58.9 | 47.5 | 55.3 | | - | IH | |
| **22** | **TASTE**§**28,29** | Eliminate, Export, Pronto | 7244 | 66.2 | 74.9 | 12.4 | 43.3 | 3.0 | 44.5 | 77.7 | 16.4 | | - | 12 | |
| **23** | **Sim et al30** | Thrombuster II | 86 | 61.5 | 68.6 | 30.2 | NA | 2.1 | 55.8 | 76.7 | 38.4 | | + | 12 | |
| **24** | **Woo et al31,32** | Export | 63 | 54.0 | 92.1 | 19.0 | 28.6 | 4.5 | 63.5 | 81.0 | 0.0 | | - | NA | |
| **25** | **Shehata et al33-35** | Export | 100 | 59.9 | 64.0 | 100.0 | NA | NA | 54.0 | NA | 100.0 | | - | 8 | |
| **26** | **PATA-STEMI36-38** | Eliminate | 128 | 59.3 | 67.2 | 10.9 | NA | 3.0 | 41.4 | 80.5 | 26.6 | | - | 12 | |
|  |  |  |  |  |  |  |  |  |  |  |  | |  |  | |
| \*Definitions for ischemic time for each trial are provided in the Table 4 of the supplementary material. | | | | | | | | | | | | | | | | |
| Nineteen trials did not required thrombus visualization prior to randomization. | | | | | | | | | | | | | | | | |
| ‡Vacuum aspiration devices. | | | | | | | | | | | | | | | | |
| §Trials that used bivalirudin: INFUSE-AMI (%) 100/100 and TASTE (%) 79/78. | | | | | | | | | | | | | | | | |
| +, yes; -, no; FUP, follow-up; GP, glycoprotein; IH, in-hospital, LAD MI, LAD-dependent myocardial infarction; MVD, multi-vessel disease; NA, not available; Pre TIMI, TIMI flow prior to intervention. | | | | | | | | | | | | | | | | |
| REMEDIA, Randomized Evaluation of the Effect of Mechanical Reduction of Distal Embolization by Thrombus-Aspiration in Primary and Rescue Angioplasty Trial; DEAR-MI, Dethrombosis to Enhance Acute Reperfusion in Myocardial Infarction Study; TAPAS, Thrombus Aspiration during Percutaneous Coronary Intervention in Acute Myocardial Infarction Study; VAMPIRE, VAcuuM asPIration thrombus Removal Trial; EXPIRA, Impact of Thrombectomy with EXPort Catheter in Infarct-Related Artery during Primary Percutaneous Coronary Intervention Trial; PIHRATE, Polish-Italian-Hungarian Randomized ThrombEctomy Trial; INFUSE-AMI, Intracoronary Abciximab and Aspiration Thrombectomy in Patients With Large Anterior Myocardial Infarction Trial; TROFI, ThRombus Aspiration on Flow Area in STEMI Patients Study; TASTE, Thrombus Aspiration in ST-Elevation myocardial infarction in Scandinavia; PATA-STEMI, The Randomized Physiologic Assessment of Thrombus Aspiration in Patients with ST-segment Elevation Myocardial Infarction Trial.  Details on extraction of outcomes, Data on all-cause death was not available in eight trials;2,11,13,16,17,29,35,37 in five of these cardiac death was used as a proxy measure.11,13,17,29,35 Reinfarction included Q-wave and non-Q-wave MI, as defined in each trial. TVR was defined as repeat percutaneous intervention or bypass surgery of the target vessel or its branches. In case TVR was not reported, target lesion revascularization was used as a proxy measure.3,12,17,18,26,35 | | | | | | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3b of the supplementary material.** Definitions in Clinical Trials included in this Meta-analysis. | | | | | | | | |
| **N° of trial** | **Trial acronym** | **Maximal ischemic time allowed for inclusion (h)** | | | **Primary endpoints** | **Calculation of ischemic time** | |
| **1** | **NONSTOP1** | | 24 | TIMI flow | | | NA | |
| **2** | **Dudek et al2** | | NA | TIMI flow and MBG | | | Symptoms to angiography (min), mean | |
| **3** | **REMEDIA3** | | 12 | MBG ≥ 2; STR ≥ 70% (post-PPCI) | | | Symptoms to angiography (min), mean | |
| **4** | **Noel et al4** | | 12 | STR ≥70% after 60' | | | Symptoms to admission (min), mean | |
| **5** | **De Luca et al5** | | 12 | Left ventricular remodeling at 6 months | | | Symptoms to balloon (hours), mean | |
| **6** | **Kaltoft et al6** | | 12 | Myocardial salvage at 30 days (99mTc-sestamibi SPECT) | | | Symptoms to balloon (min), median | |
| **7** | **DEAR-MI7** | | 12 | MBG: 3; STR > 70% (post-PPCI) | | | Ischemic time (min), mean | |
| **8** | **Chao et al8** | | 12 | Δ TIMI flow; Δ MBG | | | Onset to lab (min) + lab to modification (min), mean | |
| **9** | **TAPAS9,10** | | 12 | MBG ≤ 1 | | | Ischemic time (min), median | |
| **10** | **EXPORT11** | | 12 | MBG: 3 and/or STR > 50% at 60' | | | Symptoms to randomisation (min) + procedure (min), mean | |
| **11** | **VAMPIRE12** | | 24 | Incidence of slow flow or no-reflow during PPCI | | | Symptoms to hospital (hours) + door to TIMI ≥ 2 (min), mean | |
| **12** | **EXPIRA13-15** | | 9 | MBG ≥ 2; STR > 70% at 90' | | | Symptoms to balloon (hours), mean | |
| **13** | **Moura et al16** | | 6 | MBG ≥ 2; STR > 70% | | | NA | |
| **14** | **Liistro et al17** | | 12 | STR ≥ 70% at 90' | | | Symptoms to balloon (min), mean | |
| **15** | **PIHRATE18** | | 6 | STR > 70% at 60' | | | NA | |
| **16** | **Yin et al19** | | NA | No reflow and TIMI frame count post-procedure | | | Symptoms to PCI (hours), mean | |
| **17** | **Lelek et al20,21** | | 12 | LV function and myocardial perfusion with MCE | | | Symptoms to angiography (min), mean | |
| **18** | **Ciszewski et al22** | | 12 | Myocardial salvage index at 6 days (99mTc-sestamibi SPECT) | | | Symptoms to balloon (min), mean | |
| **19** | **INFUSE-AMI**§**23-25** | | 5 | Infarct size at 30 days (cMRI) | | | Symptoms to first device (min), median | |
| **20** | **Bulum et al26** | | 12 | Late lumen loss at 6 months | | | Ischemic time (min), mean | |
| **21** | **TROFI27** | | 12 | Minimum flow area post-procedure assessed by OFDI | | | NA | |
| **22** | **TASTE**§**28,29** | | 24 | All-cause mortality at 30 days | | | Symptoms to PCI (min), median | |
| **23** | **Sim et al30** | | 12 | Infarct size at 2 months with CT | | | Symptoms to door (min) + door to balloon (min), median | |
| **24** | **Woo et al31,32** | | 12 | Index of microcirculatory resistance | | | Symptoms to balloon (min), mean | |
| **25** | **Shehata et al33-35** | | 12 | 8-month in-stent restenosis | | | NA | |
| **26** | **PATA-STEMI36-38** | | 12 | Mean value of the index of myocardial resistance | | | Ischemic time (min), median | |
| Δ, improvement or change; HF, heart failure; CABG, coronary artery bypass graft; cMRI, cardiac magnetic resonance imaging; CT, computed tomography; CVA, cerebrovascular accidents; MACE, major adverse cardiac or cardiovascular events; MBG, myocardial blush grade; MI, myocardial infarction; NA, not available; OFDI, optical frequency domain imaging; PPCI, primary percutaneous coronary intervention; SPECT, single photon emission computed tomography; STR, ST-segment elevation resolution; TIMI flow, coronary flow grade according to TIMI study group; TVR, target vessel revascularization; TLR, target lesion revascularization; | | | | | | | | |
| DEAR-MI, Dethrombosis to Enhance Acute Reperfusion in Myocardial Infarction Study; REMEDIA, Randomized Evaluation of the Effect of Mechanical Reduction of Distal Embolization by Thrombus-Aspiration in Primary and Rescue Angioplasty Trial; TAPAS, Thrombus Aspiration during Percutaneous Coronary Intervention in Acute Myocardial Infarction Study; VAMPIRE, VAcuuM asPIration thrombus Removal Trial; EXPIRA, Impact of Thrombectomy with EXPort Catheter in Infarct-Related Artery during Primary Percutaneous Coronary Intervention Trial; PIHRATE, Polish-Italian-Hungarian Randomized ThrombEctomy Trial; INFUSE-AMI, Intracoronary Abciximab and Aspiration Thrombectomy in Patients With Large Anterior Myocardial Infarction Trial; TROFI, ThRombus Aspiration on Flow Area in STEMI Patients Study; TASTE, Thrombus Aspiration in ST-Elevation myocardial infarction in Scandinavia; PATA-STEMI, The Randomized Physiologic Assessment of Thrombus Aspiration in Patients with ST-segment Elevation Myocardial Infarction Trial. | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 4 of the supplementary material.** Methodological Characteristics of Trials. | | | | | | | | | |
| **N° of trial** | **Trial acronym** | **Year of publication** | **Single- or Multi- center** | **Adequate Concealment of Allocation** | **Blind Adjudication of Clinical Events** | **Independent Adjudication of Angiographic Endpoints** | **Independent Assessment of Electrocardiographic Endpoints** | **Intention-to-treat Analysis** | **Source of funding** |
| **1** | **NONSTOP1** | 2004 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **NA** | **ITT** | **Unclear** |
| **2** | **Dudek et al2** | 2004 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **Core-lab, unclear independency** | **ITT** | **Unclear** |
| **3** | **REMEDIA3** | 2005 | **Single-center** | **Unclear** | **Unclear** | **Core-lab, unclear independency** | **Core-lab, unclear independency** | **Not ITT** | **Unclear** |
| **4** | **Noel et al4** | 2005 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **Unclear** | **ITT** | **Unclear** |
| **5** | **De Luca et al5** | 2006 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **Unclear** | **Not ITT** | **Not commercial** |
| **6** | **Kaltoft et al6** | 2006 | **Single-center** | **Adequate** | **Unclear** | **Core-lab, unclear independency** | **Independent core-lab** | **ITT** | **Commercial** |
| **7** | **DEAR-MI7** | 2006 | **Single-center** | **Unclear** | **Unclear** | **Core-lab, not independent** | **Core-lab, unclear independency** | **ITT** | **Not commercial** |
| **8** | **Chao et al8** | 2007 | **Single-center** | **Unclear** | **Unclear** | **Core-lab, unclear independency** | **Core-lab, unclear independency** | **ITT** | **Not commercial** |
| **9** | **TAPAS9,10** | 2008 | **Single-center** | **Adequate** | **Unclear** | **Independent core-lab** | **Unclear** | **ITT** | **Commercial** |
| **10** | **EXPORT11** | 2008 | **Multi-center** | **Adequate** | **CEC, blinding unclear** | **Independent core-lab** | **Independent core-lab** | **ITT** | **Commercial** |
| **11** | **VAMPIRE12** | 2008 | **Multi-center** | **Unclear** | **CEC, blinding unclear** | **Independent core-lab** | **Independent core-lab** | **Not ITT** | **Commercial** |
| **12** | **EXPIRA13-15** | 2009 | **Single-center** | **Unclear** | **Unclear** | **Core-lab unclear independency** | **Unclear** | **ITT** | **Unclear** |
| **13** | **Moura et al16** | 2009 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **Unclear** | **Not ITT** | **Unclear** |
| **14** | **Liistro et al17** | 2009 | **Single-center** | **Unclear** | **Unclear** | **Core-lab unclear independency** | **Core-lab, unclear independency** | **ITT** | **Not commercial** |
| **15** | **PIHRATE18** | 2010 | **Multi-center** | **Adequate** | **Unclear** | **Independent core-lab** | **Unclear** | **Not ITT** | **Not commercial** |
| **16** | **Yin et al19** | 2011 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **NA** | **Not ITT** | **Unclear** |
| **17** | **Lelek et al20,21** | 2011 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **Unclear** | **ITT** | **Unclear** |
| **18** | **Ciszewski et al22** | 2011 | **Single-center** | **Unclear** | **Unclear** | **Core-lab, unclear independency** | **Unclear** | **Not ITT** | **Not commercial** |
| **19** | **INFUSE-AMI23-25** | 2012 | **Multi-center** | **Adequate** | **CEC blinded to treatment** | **Independent core-lab** | **Independent core-lab** | **Not ITT** | **Commercial** |
| **20** | **Bulum et al26** | 2012 | **Single-center** | **Unclear** | **Unclear** | **Core-lab, unclear independency** | **NA** | **ITT** | **Not commercial** |
| **21** | **TROFI27** | 2013 | **Multi-center** | **Adequate** | **CEC blinded to treatment** | **Independent core-lab** | **Unclear** | **Not ITT** | **Commercial** |
| **22** | **TASTE**§**28,29** | 2013 | **Multi-center** | **Adequate** | **No CEC** | **No core-lab** | **NA** | **ITT** | **Commercial** |
| **23** | **Sim et al30** | 2013 | **Single-center** | **Unclear** | **Unclear** | **Unclear** | **Unclear** | **ITT** | **Not commercial** |
| **24** | **Woo et al31,32** | 2014 | **Single-center** | **Unclear** | **No CEC** | **No core-lab** | **NA** | **ITT** | **Unclear** |
| **25** | **Shehata et al33-35** | 2014 | **Single-center** | **Unclear** | **No CEC** | **Unclear** | **Unclear** | **ITT** | **Unclear** |
| **26** | **PATA-STEMI36-38** | 2014 | **Single-center** | **Unclear** | **Unclear** | **No core-lab** | **NA** | **ITT** | **Unclear** |
|  |  |  |  |  |  |  |  |  |  |
| CEC, clinical events committee; ITT, intention-to-treat; NA, not applicable;  REMEDIA, Randomized Evaluation of the Effect of Mechanical Reduction of Distal Embolization by Thrombus-Aspiration in Primary and Rescue Angioplasty Trial; DEAR-MI, Dethrombosis to Enhance Acute Reperfusion in Myocardial Infarction Study; TAPAS, Thrombus Aspiration during Percutaneous Coronary Intervention in Acute Myocardial Infarction Study; VAMPIRE, VAcuuM asPIration thrombus Removal Trial; EXPIRA, Impact of Thrombectomy with EXPort Catheter in Infarct-Related Artery during Primary Percutaneous Coronary Intervention Trial; PIHRATE, Polish-Italian-Hungarian Randomized ThrombEctomy Trial; INFUSE-AMI, Intracoronary Abciximab and Aspiration Thrombectomy in Patients With Large Anterior Myocardial Infarction Trial; TROFI, ThRombus Aspiration on Flow Area in STEMI Patients Study; TASTE, Thrombus Aspiration in ST-Elevation myocardial infarction in Scandinavia; PATA-STEMI, The Randomized Physiologic Assessment of Thrombus Aspiration in Patients with ST-segment Elevation Myocardial Infarction Trial.  Details on extraction of methodological characteristics, Concealment of allocation was adequate in seven trials6,9,11,18,23,27,28 and not reported in 19 trials. Blind adjudication of clinical events by an independent clinical events committee was described in two trials,23,27 independent assessment of angiographic outcomes in six trials,9,11,12,18,23,27 and independent assessment of electrocardiographic endpoints in four trials.6,11,12,23 Seventeen trials had analyzed data according to the intention-to-treat principle. The maximum length of follow-up ranged from in-hospital to two years with a follow-up duration of more than one month in 17 trials. Eight trials reported funding received to be independent from industry.5,7,8,17,18,22,26,29 | | | | | | | | | |

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| **Table 5 of the supplementary material.** Stratified Meta-analysis of Clinical Outcomes depending on Trial Characteristics. | | | | | | | | | | | | | | | | | | | | | | | | |
|  | Death | | | |  | Reinfarction | | | |  | TVR | | | |  | Def. Stent Thrombosis | | | |  | Stroke | | | |
| **Trials characteristics** | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **This study (overall)** | 20 | 0.88 (0.74-1.04) | 0 |  |  | 15 | 0.85 (0.67-1.08) | 0 |  |  | 14 | 0.86 (0.73-1.00) | 0 |  |  | 5 | 0.76 (0.49-1.16) | 0 |  |  | 5 | 1.03 (0.57-1.86) | 0 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Adequate concealment of allocation** |  |  |  | .50 |  |  |  |  | .34 |  |  |  |  | .14 |  |  |  |  | .37 |  |  |  |  | .49 |
| Yes | 6 | 0.88 (0.74-1.04) | 0 |  |  | 6 | 0.85 (0.64-1.13) | 2 |  |  | 5 | 0.89 (0.75-1.06) | 0 |  |  | 3 | 0.77 (0.50-1.21) | 0 |  |  | 4 | 1.03 (0.56-1.89) | 0 |  |
| No or Unclear | 14 | 0.88 (0.47-1.63) | 0 |  |  | 9 | 0.73 (0.39-1.39) | 0 |  |  | 9 | 0.71 (0.50-1.03) | 0 |  |  | 2 | 0.61 (0.15-2.47) | 0 |  |  | 1 | 0.98 (0.06-15.23) |  |  |
| **Blind adjudication of events** |  |  |  | .29 |  |  |  |  | .20 |  |  |  |  | .33 |  |  |  |  | .20 |  |  |  |  | .15 |
| Yes | 1 | 0.71 (0.34-1.52) |  |  |  | 1 | 0.32 (0.03-3.10) |  |  |  | 2 | 1.14 (0.31-4.11) | 16 |  |  | 1 | 2.96 (0.12-71.41) |  |  |  | 2 | 0.33 (0.03-3.12) | 0 |  |
| No or Unclear | 19 | 0.89 (0.75-1.05) | 0 |  |  | 14 | 0.86 (0.68-1.09) | 0 |  |  | 12 | 0.85 (0.73-1.00) | 0 |  |  | 4 | 0.74 (0.48-1.14) | 0 |  |  | 3 | 1.12 (0.61-2.07) | 0 |  |
| **Intention-to-treat principle** |  |  |  | .34 |  |  |  |  | .20 |  |  |  |  | .17 |  |  |  |  | .20 |  |  |  |  | .20 |
| Yes | 13 | 0.89 (0.75-1.06) | 0 |  |  | 9 | 0.88 (0.69-1.12) | 0 |  |  | 9 | 0.88 (0.75-1.04) | 0 |  |  | 4 | 0.74 (0.48-1.14) | 0 |  |  | 2 | 1.13 (0.60-2.12) | 0 |  |
| No | 7 | 0.79 (0.47-1.34) | 0 |  |  | 6 | 0.60 (0.26-1.39) | 0 |  |  | 5 | 0.70 (0.45-1.09) | 0 |  |  | 1 | 2.96 (0.12-71.41) |  |  |  | 3 | 0.51 (0.09-2.91) | 0 |  |
| **Sample size ≥300 patients** |  |  |  | .46 |  |  |  |  | .45 |  |  |  |  | .45 |  |  |  |  | .48 |  |  |  |  | .43 |
| Yes | 4 | 0.85 (0.67-1.08) | 13 |  |  | 4 | 0.77 (0.50-1.19) | 21 |  |  | 4 | 0.86 (0.73-1.01) | 0 |  |  | 2 | 0.75 (0.48-1.19) | 0 |  |  | 2 | 1.01 (0.54-1.89) | 0 |  |
| No | 16 | 0.83 (0.48-1.41) | 0 |  |  | 11 | 0.74 (0.41-1.34) | 0 |  |  | 10 | 0.83 (0.51-1.37) | 0 |  |  | 3 | 0.79 (0.22-2.84) | 0 |  |  | 3 | 1.20 (0.22-6.66) | 0 |  |
| **Single-center versus multi-center study** |  |  |  | .07 |  |  |  |  | .07 |  |  |  |  | .49 |  |  |  |  | .15 |  |  |  |  | .25 |
| Multi-center | 5 | 0.93 (0.78-1.12) | 0 |  |  | 5 | 0.94 (0.72-1.23) | 0 |  |  | 5 | 0.86 (0.71-1.04) | 0 |  |  | 2 | 0.87 (0.53-1.44) | 0 |  |  | 3 | 0.97 (0.52-1.79) | 0 |  |
| Single center | 15 | 0.68 (0.46-0.99) | 0 |  |  | 10 | 0.63 (0.39-1.00) | 0 |  |  | 9 | 0.85 (0.65-1.12) | 0 |  |  | 3 | 0.53 (0.24-1.19) | 0 |  |  | 2 | 2.04 (0.27-15.54) | 0 |  |
| **Industry-dependent funding** |  |  |  | .29 |  |  |  |  | .49 |  |  |  |  | .36 |  |  |  |  | .37 |  |  |  |  | NA |
| No | 6 | 1.13 (0.45-2.82) | 0 |  |  | 3 | 0.86 (0.26-2.81) | 0 |  |  | 5 | 0.76 (0.39-1.49) | 0 |  |  | 1 | 0.51 (0.05-5.45) | 0 |  |  | 0 | NA |  |  |
| Yes or Unclear | 14 | 0.87 (0.74-1.03) | 0 |  |  | 12 | 0.85 (0.67-1.08) | 0 |  |  | 9 | 0.86 (0.73-1.01) | 0 |  |  | 4 | 0.77 (0.50-1.18) | 0 |  |  | 5 | 1.03 (0.57-1.86) | 0 |  |
| **Year of Publication** |  |  |  | .05 |  |  |  |  | .14 |  |  |  |  | .29 |  |  |  |  | .15 |  |  |  |  | .25 |
| 2010-2014 | 9 | 0.94 (0.78-1.12) | 0 |  |  | 7 | 0.90 (0.70-1.17) | 0 |  |  | 7 | 0.89 (0.73-1.08) | 0 |  |  | 3 | 0.85 (0.53-1.38) | 0 |  |  | 3 | 0.97 (0.52-1.79) | 0 |  |
| 2004-2009 | 11 | 0.65 (0.44-0.97) | 0 |  |  | 8 | 0.65 (0.38-1.12) | 0 |  |  | 7 | 0.81 (0.63-1.05) | 0 |  |  | 2 | 0.50 (0.20-1.23) | 0 |  |  | 2 | 2.04 (0.27-15.54) | 0 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Depicted are the numbers of trials contributing to each analysis *Nr*, random-effects meta-analyses risk ratios RR with in brackets 95% confidence intervals, I-squares, and interaction *p*-values. NA, not enough data to perform calculations. | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum follow-up data used, which for stroke was always ≤1 month.  95%CI, 95 % of confidence interval; MI, myocardial infarction; RR, risk ratio; TVR, target vessel revascularization. | | | | | | | | | | | | | | | | | | | | | | | | |
| \* *P* value for interaction. | | | | | | | | | | | | | | | | | | | | | | | | |

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| **Table 6 of the supplementary material.** Sensitivity Meta-analysis on Clinical Outcomes. | | | | | | | | | | | | | | | | | | | |
|  | Death | | |  | Reinfarction | | |  | TVR | | |  | Def. Stent Thrombosis | | |  | Stroke | | |
| **Trials used** | Trials (n) | RR (95%CI) | *P*-value |  | Trials (n) | RR (95%CI) | *P*-value |  | Trials (n) | RR (95%CI) | *P*-value |  | Trials (n) | RR (95%CI) | *P*-value |  | Trials (n) | RR (95%CI) | *P*-value |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **This study (all trials)** | 20 | 0.88 (0.74-1.04) | .124 |  | 15 | 0.85 (0.67-1.08) | .176 |  | 14 | 0.86 (0.73-1.00) | .052 |  | 5 | 0.76 (0.49-1.16) | .202 |  | 5 | 1.03 (0.57-1.86) | .922 |
| **Excluding trials that used vacuum aspiration devices** | 16 | 0.88 (0.74-1.04) | .128 |  | 13 | 0.86 (0.68-1.09) | .208 |  | 13 | 0.88 (0.75-1.04) | .138 |  | 5 | 0.76 (0.49-1.16) | 0.202 |  | 4 | 0.97 (0.53-1.77) | .915 |
| **Excluding TASTE trial** | 19 | 0.71 (0.52-0.99) | .040 |  | 14 | 0.61 (0.40-0.95) | .028 |  | 13 | 0.81 (0.64-1.02) | .072 |  | 4 | 0.59 (0.27-1.28) | .182 |  | 4 | 0.90 (0.20-4.06) | .888 |
| **Excluding TASTE and TAPAS trials** | 18 | 0.81 (0.53-1.24) | .336 |  | 13 | 0.68 (0.39-1.20) | .188 |  | 12 | 0.74 (0.53-1.04) | .083 |  | 3 | 0.79 (0.22-2.84) | .713 |  | 4 | 0.90 (0.20-4.06) | .888 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Depicted are numbers of trials contributing to the outcome, random-effects meta-analyses risk ratios RR with in brackets 95% confidence intervals and *P*-values. | | | | | | | | | | | | | | | | | | | |
| I-square was zero in each of the twenty five meta-analyses. | | | | | | | | | | | | | | | | | | | |
| \* Not calculated, because all trials reported strokes only at 30 days of follow-up. | | | | | | | | | | | | | | | | | | | |

95%CI, 95 % of confidence interval; RR, risk ratio; TVR, target vessel revascularization.

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| **Table 7 of the supplementary material.** Stratified Meta-analysis of Procedural Outcomes depending on Trial Characteristics. | | | | | | | | | | | | | | | | | | | | | | | | |
|  | Post-procedural TIMI flow < 3 | | | |  | Post-procedural MBG < 3 | | | |  | Incomplete STR | | | |  | No direct stenting | | | |  | Distal embolization | | | |
| **Trials characteristics** | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |  | Trials (n) | RR (95%CI) | I2 | *P\** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **This study (overall)** | 21 | 0.70 (0.60-0.81) | 0 |  |  | 10 | 0.76 (0.65-0.89) | 73 |  |  | 17 | 0.72 (0.62-0.84) | 74 |  |  | 10 | 0.42 (0.30-0.57) | 92 |  |  | 11 | 0.61 (0.46-0.81) | 12 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Adequate concealment of allocation** |  |  |  | .07 |  |  |  |  | .10 |  |  |  |  | .002 |  |  |  |  | .001 |  |  |  |  | .12 |
| Yes | 6 | 0.78 (0.63-0.95) | 0 |  |  | 4 | 0.84 (0.72-0.99) | 60 |  |  | 5 | 0.92 (0.78-1.08) | 61 |  |  | 1 | 0.80 (0.78-0.83) |  |  |  | 5 | 0.76 (0.48-1.21) | 3 |  |
| No or Unclear | 15 | 0.62 (0.51-0.77) | 0 |  |  | 6 | 0.68 (0.51-0.91) | 76 |  |  | 12 | 0.61 (0.48-0.77) | 78 |  |  | 9 | 0.35 (0.21-0.59) | 93 |  |  | 6 | 0.54 (0.38-0.77) | 14 |  |
| **Independent Assessment of Outcomes**‡ |  |  |  | .19 |  |  |  |  | .24 |  |  |  |  | <.001 |  |  |  |  | NA |  |  |  |  | .38 |
| Yes | 6 | 0.74 (0.61-0.90) | 0 |  |  | 5 | 0.80 (0.69-0.93) | 68 |  |  | 3 | 0.99 (0.88-1.12) | 25 |  |  | 0 | NA |  |  |  | 5 | 0.57 (0.42-0.79) | 0 |  |
| No or Unclear | 15 | 0.65 (0.52-0.81) | 0 |  |  | 5 | 0.68 (0.44-1.05) | 81 |  |  | 14 | 0.65 (0.55-0.77) | 66 |  |  | 10 | 0.42 (0.30-0.57) | 92 |  |  | 6 | 0.64 (0.36-1.13) | 46 |  |
| **Intention-to-treat principle** |  |  |  | .47 |  |  |  |  | .49 |  |  |  |  | .22 |  |  |  |  | .080 |  |  |  |  | .38 |
| Yes | 14 | 0.69 (0.58-0.83) | 2 |  |  | 6 | 0.75 (0.60-0.95) | 77 |  |  | 9 | 0.68 (0.58-0.81) | 55 |  |  | 7 | 0.49 (0.35-0.68) | 92 |  |  | 6 | 0.64 (0.38-1.07) | 46 |  |
| No | 7 | 0.70 (0.55-0.90) | 0 |  |  | 4 | 0.76 (0.59-0.97) | 73 |  |  | 8 | 0.77 (0.60-0.98) | 80 |  |  | 3 | 0.27 (0.13-0.57) | 79 |  |  | 5 | 0.58 (0.41-0.81) | 0 |  |
| **Sample size ≥300 patients** |  |  |  | .20 |  |  |  |  | .49 |  |  |  |  | .01 |  |  |  |  | .001 |  |  |  |  | .21 |
| Yes | 3 | 0.75 (0.60-0.95) | 0 |  |  | 2 | 0.75 (0.63-0.88) | 68 |  |  | 3 | 0.92 (0.76-1.13) | 80 |  |  | 1 | 0.80 (0.78-0.83) |  |  |  | 2 | 0.53 (0.36-0.78) | 0 |  |
| No | 18 | 0.66 (0.55-0.80) | 0 |  |  | 8 | 0.75 (0.58-0.96) | 77 |  |  | 14 | 0.65 (0.54-0.79) | 71 |  |  | 9 | 0.35 (0.21-0.59) | 93 |  |  | 9 | 0.67 (0.45-0.99) | 26 |  |
| **Single-center versus multi-center study** |  |  |  | .50 |  |  |  |  | .28 |  |  |  |  | <.001 |  |  |  |  | .001 |  |  |  |  | .38 |
| Multi-center | 5 | 0.70 (0.53-0.91) | 0 |  |  | 4 | 0.79 (0.63-1.00) | 76 |  |  | 4 | 0.96 (0.85-1.09) | 20 |  |  | 1 | 0.80 (0.78-0.83) |  |  |  | 5 | 0.57 (0.42-0.79) | 0 |  |
| Single center | 16 | 0.70 (0.59-0.83) | 0 |  |  | 6 | 0.72 (0.55-0.93) | 76 |  |  | 13 | 0.64 (0.53-0.77) | 72 |  |  | 9 | 0.35 (0.21-0.59) | 93 |  |  | 6 | 0.64 (0.36-1.13) | 46 |  |
| **Industry-dependent funding** |  |  |  | .34 |  |  |  |  | .18 |  |  |  |  | .43 |  |  |  |  | .50 |  |  |  |  | .13 |
| No | 6 | 0.65 (0.45-0.94) | 0 |  |  | 4 | 0.61 (0.32-1.14) | 84 |  |  | 6 | 0.71 (0.54-0.92) | 59 |  |  | 5 | 0.39 (0.19-0.77) | 94 |  |  | 3 | 0.41 (0.19-0.86) | 28 |  |
| Yes or Unclear | 15 | 0.71 (0.60-0.83) | 0 |  |  | 6 | 0.82 (0.72-0.92) | 56 |  |  | 11 | 0.73 (0.60-0.87) | 80 |  |  | 5 | 0.39 (0.20-0.76) | 93 |  |  | 8 | 0.65 (0.49-0.85) | 0 |  |
| **Year of Publication** |  |  |  | .27 |  |  |  |  | .12 |  |  |  |  | <.001 |  |  |  |  | .46 |  |  |  |  | .063 |
| 2010-2014 | 9 | 0.65 (0.49-0.86) | 0 |  |  | 5 | 0.86 (0.65-1.13) | 61 |  |  | 6 | 0.97 (0.86-1.11) | 0 |  |  | 3 | 0.37 (0.15-0.94) | 92 |  |  | 5 | 0.86 (0.52-1.43) | 0 |  |
| 2004-2009 | 12 | 0.72 (0.61-0.85) | 0 |  |  | 5 | 0.70 (0.57-0.85) | 81 |  |  | 11 | 0.62 (0.50-0.75) | 80 |  |  | 7 | 0.39 (0.22-0.70) | 94 |  |  | 6 | 0.53 (0.36-0.77) | 27 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Depicted are the number of trials contributing to each analysis Nr, random-effects meta-analyses risk ratios RR with in brackets 95% confidence intervals, I-squares, and interaction *P*-values P.  95%CI, 95 % of confidence interval; MBG: myocardial blush grade; NA: not enough data; RR, risk ratio; STR, ST-segment elevation resolution. | | | | | | | | | | | | | | | | | | | | | | | | |
| \* *P* value for interaction | | | | | | | | | | | | | | | | | | | | | | | | |
|  See methodology for description of trials excluded from incomplete STR and no direct stenting analyses. | | | | | | | | | | | | | | | | | | | | | | | | |

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| --- | --- | --- | --- | --- | --- |
| **Table 8 of the supplementary material.** Randomized Clinical Trials that Required Evidence of Thrombus for Inclusion. | | | | | |
| **N° of trial** | **Trial acronym** | **Device(s)** | **No. of patients** | **Pre TIMI 0 or 1, %** | **Angiographic criteria used for inclusion related to thrombus burden** |
| **2** | **Dudek et al2** | Rescue‡ | 72 | 73.6 | TIMI flow 0-1 or TIMI flow 2-3 with a large thrombus in the IRA |
| **5** | **De Luca et al5** | Diver | 76 | 100.0 | Presence of a filling defect, surrounded by contrast material, seen in multiple projections and in the absence of calcium, or the persistence of contrast material within the coronary lumen |
| **8** | **Chao et al8** | Export | 74 | 98.6 | Patients with TIMI 3 flow without visible thrombus were excluded |
| **12** | **EXPIRA13-15** | Export | 175 | 100.0 | TIMI thrombus grade ≥ 3, and TIMI flow 0-1 |
| **17** | **Lelek et al20-21** | NA | 71 | 88.7 | TIMI thrombus grade ≥ 3, and TIMI flow < 3 |
| **18** | **Ciszewski et al22** | Diver/ Rescue‡ | 137 | 90.5 | Total occlusion or specific angiographic appearance of thrombus, and TIMI flow < 3 |
| **23** | **Sim et al30** | Thrombuster II | 86 | 76.7 | Visible thrombus |
| ‡Vacuum aspiration devices. | | | | | |
| Pre TIMI: TIMI flow prior to intervention. | | | | | |
| EXPIRA: Impact of Thrombectomy with EXPort Catheter in Infarct-Related Artery during Primary Percutaneous Coronary Intervention Trial. | | | | | |

# Figure 1 of the supplementary material. Identification of Eligible Trials.

**Eligibility**

**Included**

**Screening**

828 records identified through   
database search

3 additional records identified through other sources

Records after duplicates (290) removed

541 records screened

454 records excluded:  
  
Not randomized or not PPCI = 326

Not relevant to target population = 34

Not relevant to experimental intervention = 38

Combined experimental intervention = 24

Active control intervention = 27

Only protocol available = 5

87 full-text articles (45) and abstracts (42) assessed for eligibility

38 records on 26 RCTs included in the meta-analysis

49 full-text articles (20) and abstracts (29) excluded:

AT after 24h of onset of symptoms = 6

Combined experimental intervention = 3

No relevant outcomes provided =38

Eligibility unclear = 1\*

Only protocol available = 1

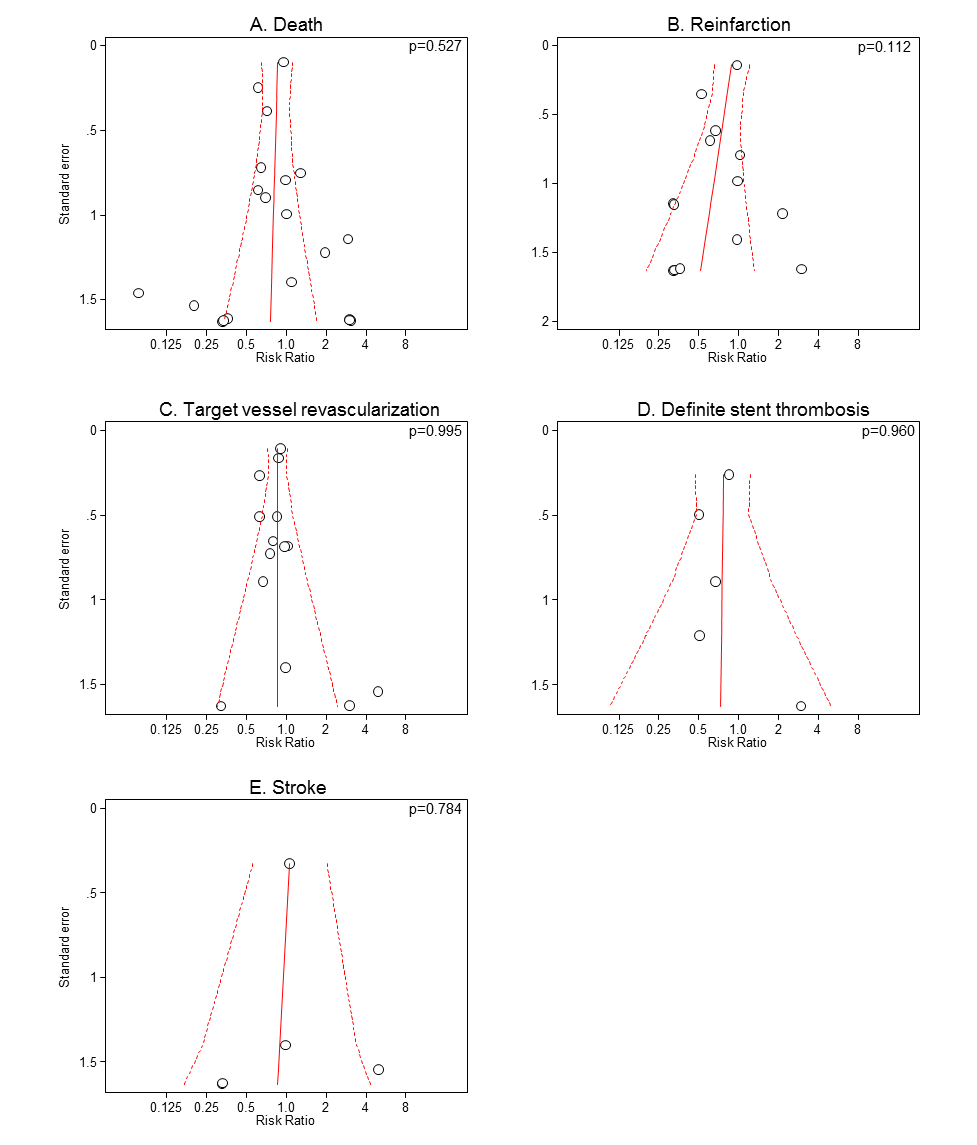
AT, aspiration thrombectomy; PPCI, primary percutaneous coronary intervention; RCT, randomised controlled trial; STEMI, ST-elevation myocardial infarction. \*The trialists were contacted without success to obtain details on eligibility.

**Figure 2 of the supplementary material.** Forest plots for clinical outcomes. All weights are from random effects analysis.



AT, aspiration thrombectomy; CI, confidence interval; MI, myocardial infarction; RR, risk ratio; TVR: target vessel revascularization.

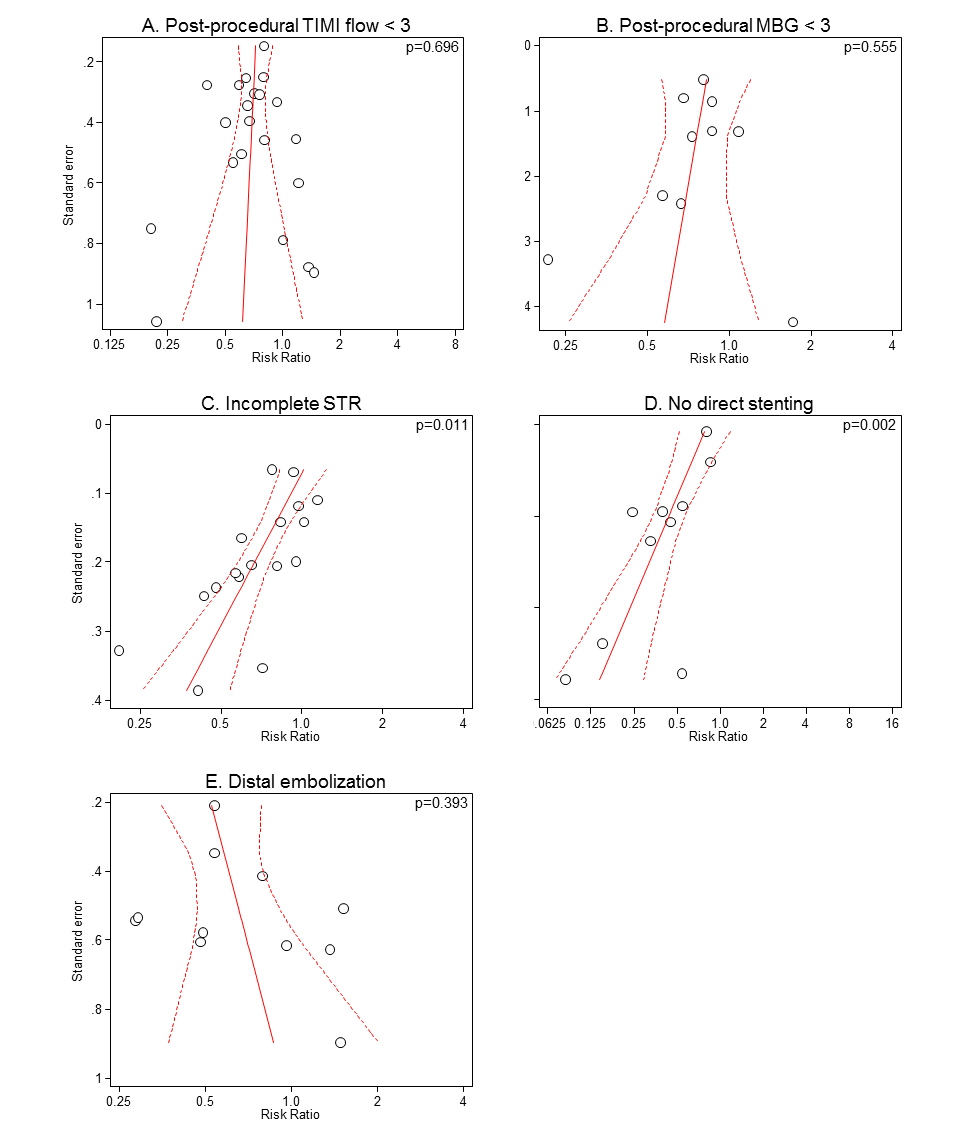
**Figure 3 of the supplementary material.** Funnel Plots for Clinical Outcomes. Risk ratios on x axis and standard errors of the log (risk ratio) on y axis.

P values for asymmetry from Egger’s test. MI: reinfarction; TVR: target vessel revascularization. ****

**Figure 4 of the supplementary material.** Forest Plots for Procedural Outcomes. All weights are from random effects analysis. 

AT, aspiration thrombectomy; CI, confidence interval; MBG, myocardial blush grade; MI, myocardial infarction STR, ST-segment elevation resolution;; RR, risk ratio; TVR, target vessel revascularization.

# Figure 5 of the supplementary material. Funnel Plots for Procedural Outcomes. Risk ratios on x axis and standard errors of the log (risk ratio) on y axis.



# *P* values for asymmetry from Egger’s test. MBG: myocardial blush grade; STR: ST-segment elevation resolution.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Figure 6 of the supplementary material.** Meta-analyses of Clinical Outcomes Stratified for Selective vs Unrestricted Thrombectomy. | | | | | | | | |
|  | **Nr of Trials/Patients Contributing Outcome\*** | |  | | --- | | **Events/Nr of patients** | | |  |  |  |  | Interaction *P*-value |
|  | AT | Control |  | Pooled RR (95%CI) | I2 | *P*-value |
|  |  |  |  |  |  |  |  |  |
| Death |  |  |  |  |  |  |  | 0.29 |
| Selective | 6/619 | 5/307 | 12/312 |  | 0.65 (0.23-1.88) | 0.0 | .43 |  |
| Unrestricted | 14/10688 | 247/5338 | 280/5350 |  | 0.89 (0.75-1.05) | 0.0 | .15 |  |
| Reinfarction |  |  |  |  |  |  |  | 0.42 |
| Selective | 3/322 | 1/160 | 2/162 |  | 0.71 (0.11-4.45) | 0.0 | .72 |  |
| Unrestricted | 12/10380 | 125/5185 | 149/5195 |  | 0.85 (0.67-1.08) | 0.0 | .19 |  |
| TVR |  |  |  |  |  |  |  | 0.41 |
| Selective | 2/249 | 7/125 | 9/124 |  | 0.77 (0.30-2.00) | 0.0 | .60 |  |
| Unrestricted | 12/10105 | 266/5060 | 307/5045 |  | 0.86 (0.73-1.01) | 0.0 | .06 |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | AT better Control better | | |  |  |  |
| \*Excludes trials with zero events in both arms. | | | | | | | | |
| Longest follow-up information used. No strokes and No Definite stent thrombosis were reported for the Selective trials. | | | | | | | | |
| 95%CI, 95% of confidence interval; AT, aspiration thrombectomy; TVR, target-vessel revascularization; MI, myocardial infarction; RR, random effects meta-analysis risk ratio. | | | | | | | | |

References

1. Kunii H, Kijima M, Araki T, Tamaki K, Katoh A, Kubo T, et al. Lack of benefit of intracoronary thrombus aspiration before coronary stenting in patients with acute myocardial infarction: A multicenter randomized trial [abstract]. J Am Coll Cardiol. 2004;43:245A.
2. Dudek D, Mielecki W, Legutko J, Chyrchel M, Sorysz D, Bartus S, et al. Percutaneous thrombectomy with the RESCUE system in acute myocardial infarction. Kardiol Pol. 2004;61:523-33.
3. Burzotta F, Trani C, Romagnoli E, Mazzari MA, Rebuzzi AG, De Vita M, et al. Manual thrombus-aspiration improves myocardial reperfusion: The randomized evaluation of the effect of mechanical reduction of distal embolization by thrombus-aspiration in primary and rescue angioplasty (REMEDIA) trial. J Am Coll Cardiol. 2005;46:371-6.
4. Noel B, Morice M, Lefevre T, Garot P, Tavolaro O, Louvard Y, et al. Thrombus aspiration in acute ST-elevation myocardial infarction: A randomized controlled trial [abstract]. Circulation. 2005;112(Suppl. II):519.
5. De Luca L, Sardella G, Davidson CJ, De Persio G, Beraldi M, Tommasone T, et al. Impact of intracoronary aspiration thrombectomy during primary angioplasty on left ventricular remodeling in patients with anterior ST elevation myocardial infarction. Heart. 2006;92:951-7.
6. Kaltoft A, Bottcher M, Nielsen SS, Hansen HH, Terkelsen C, Maeng M, et al. Routine thrombectomy in percutaneous coronary intervention for acute ST-segment-elevation myocardial infarction: A randomized, controlled trial. Circulation. 2006;114:40-7.
7. Silva-Orrego P, Colombo P, Bigi R, Gregori D, Delgado A, Salvade P, et al. Thrombus aspiration before primary angioplasty improves myocardial reperfusion in acute myocardial infarction: The DEAR-MI (dethrombosis to enhance acute reperfusion in myocardial infarction) study. J Am Coll Cardiol. 2006;48:1552-9.
8. Chao CL, Hung CS, Lin YH, Lin MS, Lin LC, Ho YL, et al. Time-dependent benefit of initial thrombosuction on myocardial reperfusion in primary percutaneous coronary intervention. Int J Clin Pract. 2008;62:555-61.
9. Svilaas T, Vlaar PJ, van der Horst IC, Diercks GF, de Smet BJ, van den Heuvel AF, et al. Thrombus aspiration during primary percutaneous coronary intervention. N Engl J Med. 2008;358:557-67.
10. Vlaar PJ, Svilaas T, van der Horst IC, Diercks GF, Fokkema ML, de Smet BJ, et al. Cardiac death and reinfarction after 1 year in the thrombus aspiration during percutaneous coronary intervention in acute myocardial infarction study (tapas): A 1-year follow-up study. Lancet. 2008;371:1915-20.
11. Chevalier B, Gilard M, Lang I, Commeau P, Roosen J, Hanssen M, et al. Systematic primary aspiration in acute myocardial percutaneous intervention: A multicentre randomised controlled trial of the Export aspiration catheter. EuroIntervention. 2008;4:222-8.
12. Ikari Y, Sakurada M, Kozuma K, Kawano S, Katsuki T, Kimura K, et al. Upfront thrombus aspiration in primary coronary intervention for patients with ST-segment elevation acute myocardial infarction: Report of the VAMPIRE (vacuum aspiration thrombus removal) trial. JACC Cardiovasc Interv. 2008;1:424-31.
13. Sardella G, Mancone M, Bucciarelli-Ducci C, Agati L, Scardala R, Carbone I, et al. Thrombus aspiration during primary percutaneous coronary intervention improves myocardial reperfusion and reduces infarct size: The EXPIRA (thrombectomy with export catheter in infarct-related artery during primary percutaneous coronary intervention) prospective, randomized trial. J Am Coll Cardiol. 2009;53:309-15.
14. Sardella G, Mancone M, Canali E, Di Roma A, Benedetti G, Stio R, et al. Impact of thrombectomy with export catheter in infarct-related artery during primary percutaneous coronary intervention (EXPIRA trial) on cardiac death. Am J Cardiol. 2010;106:624-9.
15. Sardella G, Mancone M, Di Roma A, Agati L, Fedele F. Impact of thrombectomy with export catheter in infarct related artery during primary PCI on procedural outcome in patients with AMI (EXPIRA trial). 24 months clinical outcome. Circulation. 2010;120:2157-8.
16. Moura R, Barreto F, Costa M, Barreto C, Brasileiro L, Tavares F. Improvement of reperfusion rates with thrombectomy catheter in acute myocardial infarction [abstract]. J Am Coll Cardiol. 2009;53:A329.
17. Liistro F, Grotti S, Angioli P, Falsini G, Ducci K, Baldassarre S, et al. Impact of thrombus aspiration on myocardial tissue reperfusion and left ventricular functional recovery and remodeling after primary angioplasty. Circ Cardiovasc Interv. 2009;2:376-83.
18. Dudek D, Mielecki W, Burzotta F, Gasior M, Witkowski A, Horvath IG, et al. Thrombus aspiration followed by direct stenting: A novel strategy of primary percutaneous coronary intervention in ST-segment elevation myocardial infarction. Results of the Polish-Italian-Hungarian randomized thrombectomy trial (pihrate trial). Am Heart J. 2010;160:966-72.
19. Yin D, Zhu H, Zhou X, Huang R, Wang J, Zheng Z. Thrombus aspiration before angiography during percutaneous coronary intervention in acute myocardial infarction. Journal of Dalian Medical University. 2011;33:235-9.
20. Lelek M, Wita K, Drzewiecki J, Trusz-Gluza M. Impact of thrombus aspiration on myocardial perfusion and left ventricle function in patients with anterior myocardial infarction treated with primary angioplasty [abstract]. Eur Heart J. 2011;32(Suppl I):1045.
21. Lelek M, Wita K, Drzewiecki J, Trusz-Gluza M. Impact of thrombus aspiration on myocardial perfusion and left ventricle function in patients with anterior STEMI treated with primary angioplasty [abstract]. EuroIntervention. 2011;7:M176
22. Ciszewski M, Pregowski J, Teresinska A, Karcz M, Kalinczuk L, Pracon R, et al. Aspiration coronary thrombectomy for acute myocardial infarction increases myocardial salvage: Single center randomized study. Catheter Cardiovasc Interv. 2011;78:523-31.
23. Stone GW, Maehara A, Witzenbichler B, Godlewski J, Parise H, Dambrink JH, et al. Intracoronary abciximab and aspiration thrombectomy in patients with large anterior myocardial infarction: The INFUSE-AMI randomized trial. JAMA. 2012;307:1817-26.
24. El-Omar M, Brener S, Maehara A, Scott T, Mehran R, Aengevaeren W, et al. Low overall rates of angiographically visible distal embolization in INFUSE-AMI: Possible explanation for lack of efficacy of manual aspiration thrombectomy [abstract]. J Am Coll Cardiol. 2012;60(Suppl B):147.
25. Stone GW, Witzenbichler B, Godlewski J, Dambrink JH, Ochala A, Chowdhary S, et al. Intralesional abciximab and thrombus aspiration in patients with large anterior myocardial infarction: One-year results from the INFUSE-AMI trial. Circ Cardiovasc Interv. 2013;6:527-34.
26. Bulum J, Ernst A, Strozzi M. The impact of successful manual thrombus aspiration on in-stent restenosis after primary PCI: Angiographic and clinical follow-up. Coron Artery Dis. 2012;23:487-91.
27. Onuma Y, Thuesen L, van Geuns RJ, van der Ent M, Desch S, Fajadet J, et al. Randomized study to assess the effect of thrombus aspiration on flow area in patients with ST-elevation myocardial infarction: An optical frequency domain imaging study - TROFI trial. Eur Heart J. 2013;34:1050-60.
28. Frobert O, Lagerqvist B, Olivecrona GK, Omerovic E, Gudnason T, Maeng M, et al. Thrombus aspiration during st-segment elevation myocardial infarction. N Engl J Med. 2013;369:1587-97.
29. Lagerqvist B, Frobert O, Olivecrona GK, Gudnason T, Maeng M, Alstrom P, et al. Outcomes 1 year after thrombus aspiration for myocardial infarction. N Engl J Med. 2014;371:1111-20.
30. Sim DS, Ahn Y, Kim YH, Lee D, Seon HJ, Park KH, et al. Effect of manual thrombus aspiration during primary percutaneous coronary intervention on infarct size: Evaluation with cardiac computed tomography. Int J Cardiol. 2013;168:4328-30.
31. Woo SI, Kim SH, Kim DH, Kwan J, Shin SH, Park KS, et al. Thrombus aspiration during primary percutaneous coronary intervention can preserve the index of microcirculatory resistance in patients with anterior ST-segment elevation myocardial infarction [abstract]. Eur Heart J. 2013;34:514.
32. Woo SI, Park SD, Kim DH, Kwan J, Shin SH, Park KS, et al. Thrombus aspiration during primary percutaneous coronary intervention for preserving the index of microcirculatory resistance: A randomised study. EuroIntervention. 2014;9:1057-62.
33. Shehata M. Impact of successful manual thrombus aspiration during primary PCI in diabetic patients: Angiographic and clinical follow-up [abstract]. Presented at EuroPCR 2014. Available at pcronline.com. Euro14A-POS183.
34. Shehata M. Impact of successful manual thrombus aspiration during primary PCI in diabetic patients: Angiographic and clinical follow-up [abstract]. Catheter Cardiovasc Interv. 2014;83:S3.
35. Shehata M. Angiographic and clinical impact of successful manual thrombus aspiration in diabetic patients undergoing primary PCI. Int J Vasc Med. 2014;263926 doi: 10.1155/2014/263926.
36. Orlic D, Ostojic M, Beleslin B, Sobic-Saranovic D, Tesic M, Vukcevic V, et al. The randomized physiologic assessment of thrombus aspiration in patients with ST-segment elevation acute myocardial infarction trial (PATA STEMI) [abstract]. Eur Heart J. 2013;34:79.
37. Orlic D, Ostojic M, Beleslin B, Tesic M, Sobic-Saranovic D, Vukcevic V, et al. The randomised myocardial perfusion assessment after thrombus aspiration in patients with STEMI trial [abstract]. EuroIntervention. 2013;9:181.
38. Orlic D, Ostojic M, Beleslin B, Borovic M, Tesic M, Milasinovic D, et al. The randomized physiologic assessment of thrombus aspiration in patients with ST-segment elevation acute myocardial infarction trial (PATA STEMI) [abstract]. Eur Heart J. 2014;35:(Abstract Supplement, 45).