articles, and the pooled results of these reports, which suggested improved short-term outcomes after endovascular repair of rDTAA. Currently, we are performing a comparative study regarding the outcomes of endovascular and open repair of rDTAA at seven large referral centers in Europe and the United States, to further investigate if endovascular repair of rDTAA results in improved outcomes. In the absence of the results of this multicenter study, or any other large comparative studies, we believe that our meta-analysis provides more insights, and perhaps better evidence than the small case series that are available at this moment.

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doi:10.1016/j.jvs.2010.05.097

Regarding "Preoperative statin therapy is associated with improved outcomes and resource utilization in patients undergoing aortic aneurysm repair"

McNally et al[1] demonstrated, in their retrospective analysis of 401 patients undergoing elective abdominal aortic aneurysm repair, that postoperative mortality rate was significantly decreased in the open repair statin cohort compared with the nonstatin open repair cohort and trended to be decreased in the endovascular repair statin group. Previous meta-analyses,[2,3] which combined

Table. Study and patient characteristics

Study	*Reference*	*Patients*		
		No.	*Age, y*	*Male, %*
Randomized trials				
Durazzo[a]	J Vasc Surg 200;39:967-76	100	67 ± 10	79
Schouten	N Engl J Med 2009;361:980-9	497	66 ± 11	75
Subtotal				
Nonrandomized studies				
Feringa 2006	Semin Cardiothorac Vasc Anesth 2006;10:25-31	511	64 ± 11	75
Feringa 2009	Arch Gerontol Geriatr 2009;48:116-20	1693	73 ± 5	76
Kennedy, asymptomatic	Stroke 2005;36:2072-6	1252	Median, 71 (statin) 73 (control)	65
Kennedy, symptomatic	Stroke 2005;36:2072-6	2031	Median, 70 (statin) 73 (control)	67
Le Manach, continued	Anesth Analg 2007;104:1326-33	178	67 ± 11	88
Le Manach, discontinued	Anesth Analg 2007;104:1326-33	491	68 ± 11	89
McGirt	J Vasc Surg 2005;42:829-37	1566	72 ± 10	63
Poldermans	Circulation 2003;107:1848-51	480	Mean, 70	82
Schanzer	J Vasc Surg 2008;47:774-81	1404	69 ± 12	64
van Gestel	Am J Cardiol 2008;102:192-6	3371	66 ± 12	73
Subtotal				
Total				

CI, Confidence interval; *MLR*, multivariate logistic regression; *NR*, not reported; *OR*, odds ratio; *PS*, propencity score.
[a]The study by Durazzo et al included 3 patients (3%) undergoing amputation and 10 patients (10%) without surgery.

unadjusted odds ratios (ORs) in nonrandomized studies, also suggested that preoperative statin therapy was associated with lower postoperative mortality after vascular surgery. Since these meta-analyses were conducted, however, results of a number of controlled studies have been reported to date. In the Dutch Echocardiographic Cardiac Risk Evaluation Applying Stress Echocardiography III (DECREASE III) trial,[4] a recent large randomized double-blind placebo-controlled trial in patients undergoing vascular surgery, perioperative statin therapy reduced not postoperative death but myocardial ischemia or the composite of death from cardiovascular causes and myocardial infarction. Combining not unadjusted but adjusted risk estimates in nonrandomized studies, we performed an updated meta-analysis of controlled studies of preoperative statin therapy for the prevention of postoperative mortality in vascular surgery.

Our comprehensive search identified 10 controlled studies of preoperative statin therapy enrolling patients undergoing vascular surgery (Table). We excluded nonrandomized studies reporting only unadjusted risk estimates. Kennedy et al[5] provided an adjusted OR separately in symptomatic and asymptomatic patients undergoing carotid endarterectomy. Le Manach et al[6] reported an adjusted OR separately in patients who continued and discontinued preoperative statin therapy after infrarenal aortic surgery. Therefore, from the eight nonrandomized studies, 10 ORs adjusted for potential confounding using appropriate statistical methods could be abstracted. In total, our meta-analysis included data on 13,574 patients undergoing vascular surgery and receiving statin therapy (4651 patients) or control (placebo or no statin; 8923 patients). Pooled analysis of all the 10 studies demonstrated that statin therapy was statistically significantly associated with lower mortality in fixed effects models (OR, 0.44; 95% confidence interval [CI], 0.33-0.57; $P < .00001$). There was minimal study heterogeneity ($P = .11$) and, accordingly, little difference in the pooled result from random-effects modeling (OR, 0.43; 95% CI, 0.30-0.62; $P < .00001$). Exclusion of any single study from the analysis did not substantively alter overall result of our analysis. When data from randomized trials (597 patients) and nonrandomized studies (12,977 patients) were separately pooled using a fixed effects model, statin therapy reduced mortality statistically nonsignificantly (OR, 0.47; 95% CI, 0.18-1.21; $P = .12$) and was statistically significantly associated with lower mortality (OR, 0.44; 95% CI, 0.33-0.58; $P < .00001$), respectively. There was no evidence of significant publication bias ($P = .63$) by an adjusted rank-correlation test.

The results of our analysis suggest that preoperative statin therapy may reduce postoperative mortality in patients undergoing vascular surgery, which was robust in sensitivity analyses. The data from only the two randomized trials, however, are less robust, primarily due to the small number (597) of enrolled patients. More randomized trials are needed to confirm the results of the present meta-analysis.

Table. Continued.

Surgery, %						
Carotid	*Aortic*	*Infrainguinal*	*Statin*	*Adjustment method*	*Follow-up*	*OR (95% CI)*
11	56	20	Atorvastatin	Unneeded	30 days	0.33 (0.01-8.21)
14	47	39	Fluvastatin	Unneeded	30 days	0.48 (0.18-1.30)
						0.47 (0.18-1.21)
10	46	43	NR	MLR	In hospital	0.07 (0.01-0.53)
21	42	37	NR	PS adjusted MLR	In hospital	0.35 (0.18-0.68)
100	0	0	NR	PS adjusted MLR	In hospital	0.69 (0.14-3.39)
100	0	0	NR	PS adjusted MLR	In hospital	0.23 (0.06-0.91)
0	100	0	Atorvastatin Fluvastatine Pravastatin Simvastatin	PS adjusted MLR	30 days and/or in hospital	0.50 (0.07-3.51)
0	100	0	Atorvastatin Fluvastatine Pravastatin Simvastatin	PS adjusted MLR	30 days and/or in hospital	1.40 (0.50-3.90)
100	0	0	Atorvastatin Fluvastatin Lovastatin Pravastatin Simvastatin	MLR	30 days	0.22 (0.05-0.96)
4	85	11	NR	Unconditional logistic regression	30 days	0.22 (0.10-0.47)
0	0	100	NR	PS weighting	30 days	0.81 (0.41-1.61)
24	35	41	Atorvastatin Fluvastatine Pravastatin Rosuvastatin Simvastatin	MLR	30 days	0.45 (0.27-0.75)
						0.44 (0.33-0.58)
						0.44 (0.33-0.57)

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doi:10.1016/j.jvs.2010.05.111

Reply

We read the comments from Takagi et al with great interest. Their letter outlines an interesting and thought-provoking meta-analysis demonstrating the protective benefits of preoperative statin therapy in patients with noncoronary vascular disease. In addition to the studies cited in our manuscript, this letter cites several other important sources which add credence to our hypothesis regarding the influence of statin-class drugs on operative outcomes and resource utilization after aneurysm surgery. Takagi et al should be commended for this analysis, and we would urge the authors to consider a robust publication of the methodology and data.

There exists a considerable body of literature demonstrating a protective benefit attributable to statin therapy in patients with both central and peripheral vascular disease. The data are so compelling, that one might argue that there are ethical considerations to randomized trials as suggested by Takagi and colleagues. Statistical analyses such as this, and comparative effectiveness research should be used to develop evidence-based guidelines regarding the appropriate risk optimization of patients with vascular disease.

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doi:10.1016/j.jvs.2010.05.110