

Recommendation 66				New
For patients undergoing carotid endarterectomy, it is recommended that the operation be performed by trained vascular surgeons, rather than by surgeons from other specialties.				
Class	Level	References	ToE	
I	B	Hussain <i>et al.</i> (2018) ¹³³ , AbuRahma <i>et al.</i> (2013) ⁴⁴⁴ , Killeen <i>et al.</i> (2007) ⁴⁴⁵		

5.1.5. Transverse or longitudinal incision? The standard approach is a longitudinal anterior sternomastoid incision, but CEA can be performed via a transverse skin crease incision which may confer better cosmesis and a lower CNI rate.⁴⁴⁶ Others, however, have reported no difference in CNI and it may be more difficult to insert a shunt with transverse incisions.⁴⁴⁷ A modified approach involves DUS marking of the bifurcation and a smaller longitudinal incision, which is extended as required. This reduces incision length and offers good cosmesis.⁴⁴⁸ Surgeons can, therefore, use whichever incision they prefer. If DUS suggests the bifurcation is not too high with a focal stenosis, a transverse crease incision will probably give the best cosmetic result. If there is any question about the bifurcation being high, or if the lesion is extensive, a longitudinal incision is preferable.

5.1.6. Antegrade or retrojugular exposure? A retrojugular approach avoids mobilising the hypoglossal nerve and may optimise access to the distal ICA, by sweeping (anteriorly) the sternocleidomastoid artery, hypoglossal nerve, and ansa cervicalis.⁴⁴⁹ A meta-analysis (four observational studies, two RCTs [740 CEAs]) found no evidence that retrojugular (vs. antegrade) exposure reduced peri-operative death (0.6% vs. 0.5%) or stroke (0.9% vs. 0.7%). However, a retrojugular approach was associated with higher rates of RLN palsy (8.1% vs. 2.2%) and no reduction in hypoglossal injury (1.3% vs. 1.3%).⁴⁵⁰

Recommendation 67				Unchanged
For patients undergoing carotid endarterectomy, decisions regarding carotid exposure (antegrade, retrojugular) should be left to the operating surgeon.				
Class	Level	References	ToE	
Ila	B	Antoniou <i>et al.</i> (2014) ⁴⁵⁰		

5.1.7. Carotid sinus nerve blockade? The hypothesis that carotid sinus nerve blockade reduces hypotension, hypertension, or dysrhythmias during/after CEA was not supported by a meta-analysis of four RCTs.⁴⁵¹ A fifth single centre RCT led to similar conclusions.⁴⁵²

Recommendation 68				Unchanged
For patients undergoing carotid endarterectomy, routine carotid sinus nerve blockade is not recommended.				
Class	Level	References	ToE	
III	A	Tang <i>et al.</i> (2007) ⁴⁵¹ , Adjuk <i>et al.</i> (2011) ⁴⁵²		

5.1.8. Protamine reversal of heparin? Evidence supports more routine use of protamine during CEA. A 2016 meta-analysis in 3 817 patients undergoing CEA who received protamine and 6 070 patients undergoing CEA who did not receive protamine, reported that protamine statistically significantly reduced re-exploration for neck haematomas (OR 0.42; 95% CI 0.22 – 0.8, $p = .008$), with no evidence that protamine increased peri-operative stroke (OR 0.71; 95% CI 0.49 – 1.03, $p = .07$).⁴⁵³ The proportion of US surgeons using protamine increased from 43% (2003) to 62% (2010)⁴⁵⁴ and 73% by 2018.¹⁵⁴ VSGNE (10 059 CEAs) also reported that protamine statistically significantly reduced re-exploration for neck haematoma (0.6% vs. 1.4%; $p = .001$), without increasing peri-operative stroke/death (1.1% vs. 1.0%) or MI (1% vs. 1.2%).⁴⁵⁴ In a 2020 SVS-VQI audit (72 787 elective CEAs for ACS), re-operation for bleeding was higher in patients not receiving protamine (1.4% vs. 0.7%; OR 2.0, 95% CI 1.8 – 2.6).¹⁵⁴ This is important as re-interventions for neck haematoma are associated with increases in peri-operative MI, stroke, and death.¹³⁷ ESVS recommendations regarding protamine reversal of heparin are the same as the 2021 SVS and German-Austrian guidelines.^{3,4}

Recommendation 69				Unchanged
For patients undergoing carotid endarterectomy, protamine reversal of heparin should be considered.				
Class	Level	References	ToE	
Ila	B	Stone <i>et al.</i> (2020) ¹⁵⁴ , Kakisis <i>et al.</i> (2016) ⁴⁵³ , Patel <i>et al.</i> (2013) ⁴⁵⁴		

5.1.9. Shunting: routine, never, selective? Carotid clamping can cause haemodynamic stroke, which is prevented by shunt insertion. Surgeons tend to be routine, selective or never shunters, based on training. There is a paucity of quality data for guiding practice. While there are numerous methods for monitoring brain perfusion during clamping (electroencephalography [EEG], stump pressure, backflow, TCD, transcranial cerebral oximetry, near infrared spectroscopy), the only reliable method is the patient's neurological status with CEA under LRA. A Cochrane review (six RCTs; 1 270 CEAs) concluded that (based on poor data) no meaningful recommendations could be made regarding shunt strategies.⁴⁵⁵ Analysis of 28 457 CEAs from a SVS-VQI audit (4 128 routine, 1 740 never, and 12 489 selective) found no differences in peri-operative TIA/stroke.¹⁶² A VQI update that included 5 683 CEA procedures performed within 14 days of symptom onset, showed no difference in peri-operative stroke rates following routine versus no shunting (OR 1.39; 95% CI 0.91 – 2.13).¹⁴⁶ Shunting was a risk factor for increased 30 day stroke/death in patients undergoing CEA in the CSTC database.⁷⁰ ESVS recommendations regarding shunting are the same as the SVS and German-Austrian guidelines.^{3,4}