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Carotid Endarterectomy in Hong Kong: Evidence, Patient Selection, Operative Strategy, and Future Directions

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Abstract

Carotid endarterectomy (CEA) remains one of the most effective surgical interventions for prevention of recurrent stroke in appropriately selected patients with extracranial carotid atherosclerotic disease. Its role is particularly important after a recent transient ischaemic attack (TIA) or nondisabling ischaemic stroke caused by ipsilateral carotid stenosis. Contemporary international guidelines generally favour CEA over transfemoral carotid artery stenting (CAS) in standard-risk symptomatic patients with ≥50% stenosis, with the greatest benefit in severe symptomatic disease and when treatment is delivered promptly. In asymptomatic disease, the balance has become more nuanced because modern medical therapy has lowered baseline stroke risk and the absolute benefit of prophylactic intervention is smaller. Hong Kong presents a distinctive clinical context. Cerebrovascular disease remains a major cause of death and hospital utilisation, while historical local studies describe a relatively high burden of intracranial atherosclerotic disease among Chinese patients. This may complicate attribution of neurological symptoms to extracranial carotid stenosis and reinforces the need for comprehensive cerebrovascular imaging and multidisciplinary decision-making. Local CEA series, although relatively small and historically concentrated in tertiary centres, have demonstrated acceptable perioperative outcomes and durable stroke-prevention benefit. This narrative review synthesises evidence from major randomised trials, contemporary guidelines, and Hong Kong-specific literature to provide a practical framework for CEA in Hong Kong. Key issues include diagnostic confirmation, selection of symptomatic and asymptomatic patients, timing after TIA or stroke, CEA versus CAS, perioperative medical therapy, anaesthetic and surgical considerations, complications, postoperative surveillance, and research priorities. The review argues that Hong Kong should preserve CEA as a core component of stroke prevention while strengthening rapid-access pathways, prospective outcome registries, multidisciplinary selection, and locally relevant comparative-effectiveness research.

Keywords: carotid endarterectomy; carotid stenosis; carotid artery stenting; stroke prevention; transient ischaemic attack; Hong Kong

1. Introduction

Stroke is an important public-health problem in Hong Kong. Government health statistics report 27,096 inpatient discharges and deaths related to cerebrovascular diseases in 2024, while 2,911 registered deaths were attributed to cerebrovascular disease, making it the fourth leading cause of death that year [1,2]. Although age-standardised cerebrovascular mortality has fallen substantially over the past two decades, the continuing burden of stroke, population ageing, and improved survival after the index event maintain a strong need for effective secondary prevention.

Atherosclerotic stenosis of the extracranial internal carotid artery is an established cause of TIA and ischaemic stroke. The rationale for CEA is to remove an emboligenic atherosclerotic plaque and enlarge the arterial lumen before another cerebral embolic event occurs. Randomised trials established the benefit of CEA for selected patients with symptomatic high-grade carotid stenosis, while later trials and guidelines refined the indications for moderate symptomatic stenosis and asymptomatic disease [3–7].

The Hong Kong context deserves specific attention. Historical pathological and clinical studies have demonstrated a substantial burden of intracranial atherosclerotic disease (IAD) among Chinese patients, with intracranial disease often more prominent than extracranial carotid disease [8,9]. In a Hong Kong series of patients with TIA, intracranial stenosis or occlusion was identified in 51% and extracranial disease in 19% [9]. This epidemiological pattern does not diminish the value of CEA when an extracranial carotid lesion is clearly responsible for symptoms; rather, it emphasises the importance of establishing the causal lesion and considering tandem or competing cerebrovascular disease.

This review therefore focuses on CEA as practiced or potentially practised within Hong Kong's healthcare environment, while applying the best available contemporary evidence. It is intended as a scholarly narrative review rather than a local clinical guideline or a report of new patient-level data.

2. Review approach

A narrative literature review was undertaken using major guideline documents, randomised trials, systematic reviews, PubMed-indexed literature, Hong Kong Medical Journal publications, Hong Kong government health statistics, and Hong Kong academic institutional sources. Priority was given to evidence concerning CEA, symptomatic and asymptomatic carotid stenosis, CEA versus CAS, timing of revascularisation, perioperative complications, and outcomes in Chinese or Hong Kong populations. Contemporary recommendations were cross-checked against the 2021 Society for Vascular Surgery (SVS) guideline and the 2023 European Society for Vascular Surgery (ESVS) guideline [5,6].

Because modern Hong Kong-specific CEA outcome series are limited in the accessible literature, older local series are presented as historical and context-setting evidence rather than as estimates of current institutional performance. Current Hong Kong cerebrovascular statistics are used to establish the public-health context, not to infer the incidence of carotid stenosis or the present volume of CEA.

3. Epidemiological and clinical context in Hong Kong

The contemporary Hong Kong burden of cerebrovascular disease is substantial. In 2024, cerebrovascular disease accounted for approximately 5.6% of registered deaths, and its age-standardised death rate was substantially lower than in previous decades [1,2]. The Department of Health also reports that 0.8% of persons

aged ≥15 years in the 2020–2022 Population Health Survey reported doctor-diagnosed stroke, with prevalence increasing sharply in older age groups [3].

For carotid surgery, however, national stroke statistics cannot be translated directly into a surgical workload. Only a subset of ischaemic strokes are attributable to extracranial carotid atherosclerosis, and an even smaller subset meets evidence-based criteria for revascularisation. The distinction between extracranial carotid disease and intracranial atherosclerosis is particularly important in Chinese populations.

Autopsy work in Hong Kong Chinese patients found more severe intracranial than extracranial cerebral atherosclerosis compared with Caucasian and Japanese populations, while hypertension and diabetes were associated particularly with intracranial disease and smoking with extracranial narrowing [8]. These findings support a broad neurovascular assessment rather than an isolated focus on the carotid bifurcation.

4. Evidence base for carotid endarterectomy

4.1 Symptomatic carotid stenosis

The pivotal evidence for CEA comes from the North American Symptomatic Carotid Endarterectomy Trial (NASCET) and the European Carotid Surgery Trial (ECST). These trials demonstrated a major reduction in subsequent ipsilateral stroke among patients with severe symptomatic carotid stenosis and established the principle that benefit is strongly dependent on stenosis severity, timing, age, sex, and operative risk [4,7]. Subsequent pooled analyses confirmed that patients with recent ipsilateral symptoms and 70–99% stenosis derive the clearest benefit, while selected patients with 50–69% stenosis may also benefit [7].

Current SVS guidance recommends CEA as first-line treatment for low-risk surgical patients with symptomatic 50–99% stenosis and supports intervention after recent stable stroke once the patient is neurologically stable, ideally after 48 hours and within 14 days [5]. The ESVS guideline similarly recommends CEA for symptomatic 70–99% stenosis and considers it for 50–69% stenosis when perioperative risk is acceptably low [6].

4.2 Asymptomatic carotid stenosis

The decision to operate on asymptomatic carotid stenosis is substantially more selective. Modern intensive medical therapy—antiplatelet therapy, lipid lowering, blood-pressure control, smoking cessation, diabetes management, diet, exercise, and treatment of other vascular risk factors—has reduced the baseline risk of ipsilateral stroke. Consequently, the absolute benefit of prophylactic CEA is smaller than in the era of the original asymptomatic trials [6,10].

SVS guidance supports CEA in selected low-risk patients with ≥70% asymptomatic stenosis when life expectancy is sufficient and the centre's 30-day stroke/death risk is ≤3% [5]. ESVS guidance is more selective, favouring intervention in patients with 60–99% stenosis who have clinical or imaging features associated with higher late stroke risk, provided life expectancy exceeds five years and audited perioperative stroke/death risk is ≤3% [6].

For Hong Kong, this distinction is important. A policy of treating every severe asymptomatic carotid stenosis surgically would expose many patients to procedural risk without assured net benefit. CEA should instead be considered within a multidisciplinary framework incorporating age, life expectancy, plaque characteristics, progression, cerebral imaging, contralateral disease, co-morbidity, surgical risk, patient preference, and the quality of contemporary medical therapy.

4.3 CEA versus carotid artery stenting

CEA and CAS are complementary rather than interchangeable procedures. CREST showed similar composite long-term efficacy, but different perioperative risk profiles: CAS was associated with more periprocedural stroke, whereas CEA was associated with more myocardial infarction [11,12]. Age modifies the comparison, with outcomes generally favouring CEA more strongly in older patients [11].

The ACST-2 randomised trial in patients with severe asymptomatic stenosis found similarly low rates of disabling stroke or death with competent CEA and CAS, while non-disabling procedural stroke was more frequent with CAS; long-term fatal or disabling stroke outcomes were broadly comparable [13]. These data support a tailored choice based on anatomy, age, co-morbidity, prior surgery or radiation, operator expertise, and local outcomes.

In recently symptomatic patients, especially during the first days after the index event, CEA is generally preferred over transfemoral CAS because embolic risk with stenting is higher in this setting [6,14]. CAS may nevertheless be appropriate in selected patients at high surgical risk or with anatomical factors that make CEA difficult, provided an experienced multidisciplinary service is available.

5. Patient selection for CEA in Hong Kong

The central clinical question is not simply whether a carotid stenosis is present, but whether it is the likely cause of the patient's neurological event and whether the expected reduction in future stroke outweighs procedural risk. A practical Hong Kong pathway should therefore begin with rapid stroke assessment, brain imaging, extracranial carotid imaging, and assessment for intracranial or cardioembolic causes.

Clinical situation	Typical evidence-based approach	Hong Kong-specific consideration
Recent ipsilateral TIA/minor stroke + 70–99% stenosis	CEA strongly recommended if surgical risk acceptable.	Prioritise rapid referral and confirm competing intracranial/cardioembolic disease.
Recent ipsilateral TIA/minor stroke + 50–69% stenosis	CEA should be considered in selected patients.	Individualise by age, sex, symptom type, timing, anatomy and operative risk.
<50% symptomatic stenosis	CEA generally not recommended solely for carotid disease.	Search for alternative stroke mechanisms, including intracranial disease.
Asymptomatic ≥70% stenosis	CEA may be considered in selected low-risk patients with adequate life expectancy and ≤3% 30-day stroke/death risk.	Shared decision-making and audited local outcomes are essential.
Near-occlusion / complete occlusion	Management differs from conventional stenosis and requires specialist review.	CTA/MRA and multidisciplinary assessment are important.
High surgical/anatomical risk	Consider CAS or other alternatives in selected cases.	Prior neck surgery/radiation, high lesions, restenosis and severe cardiac disease may alter choice.

6. Diagnostic work-up

6.1 Duplex ultrasound

Duplex ultrasound is an appropriate first-line investigation because it is non-invasive, widely available, inexpensive, and capable of identifying haemodynamically significant bifurcation disease. It should be

performed by an accredited laboratory using validated velocity criteria and interpreted in conjunction with plaque morphology and the clinical presentation.

6.2 CTA and MRA

CTA is particularly useful for confirming the degree and distribution of stenosis, defining the distal internal carotid artery, identifying tandem lesions, assessing the aortic arch, and planning intervention. MRA can provide a non-ionising alternative in appropriate patients. Discordant non-invasive tests, unusual anatomy, or uncertainty about the indication may justify additional imaging.

6.3 Brain and intracranial imaging

Brain CT or MRI should establish the index event and its size and distribution. In Hong Kong Chinese patients, assessment of the intracranial circulation deserves particular attention because intracranial stenosis may coexist with extracranial carotid disease [8,9,15]. A carotid lesion should not automatically be labelled causal merely because it is severe.

7. Timing of CEA after TIA or stroke

The benefit of CEA declines as the interval from the last neurological event increases because the risk of recurrent stroke is highest early after TIA or minor stroke. Contemporary guidelines therefore recommend expedited CEA in appropriately selected symptomatic patients [5,6]. The ESVS guideline recommends treatment within 14 days for eligible symptomatic stenosis, while the SVS similarly supports intervention once the patient is neurologically stable after 48 hours and before 14 days [5,6].

Very urgent surgery within 48 hours requires caution. A systematic review and meta-analysis found that CEA is generally safer than transfemoral CAS in the very early period, but urgent intervention after an established stroke can carry higher perioperative risk than surgery after TIA, particularly when there is a large infarct, haemorrhagic transformation, major neurological deficit, uncontrolled hypertension, or unstable medical status [14,16].

For Hong Kong, an ideal pathway would establish a rapid-access carotid service linking emergency departments, stroke physicians, neuroradiology, vascular surgery, anaesthesia and rehabilitation. The practical target should be prompt identification of eligible patients and avoidance of unnecessary administrative delay, while maintaining safety in patients with large infarction or other contraindications.

Time from index event	Clinical priority	Comments
0–48 h	Neurological stabilisation and urgent multidisciplinary assessment	Exclude large infarct, haemorrhagic transformation, unstable hypertension and other contraindications; emergency CEA is not routine.
48 h–7 days	Preferred window for many stable, high-risk symptomatic patients	Particularly important for severe symptomatic stenosis when anatomy and neurological status are suitable.
8–14 days	Still strongly beneficial in appropriate patients	Do not delay solely because the ideal early window was missed.
>14 days	CEA may remain indicated	Absolute benefit may be lower; reassess symptoms, stenosis severity, life expectancy and current medical therapy.

8. Operative and anaesthetic considerations

CEA involves exposure of the common carotid artery and internal and external carotid arteries, control of cerebral perfusion, arteriotomy, removal of the atherosclerotic plaque, restoration of a smooth arterial lumen, and closure with or without a patch. Technical priorities include avoiding residual plaque, intimal flap formation, embolisation, excessive clamp time, and local nerve injury.

General and regional/local anaesthetic approaches are both used. The choice should reflect institutional expertise, patient preference, airway considerations, haemodynamic stability, and the need for neurological monitoring. Hong Kong tertiary vascular services have experience with CEA and a range of anaesthetic approaches [17].

Routine shunting is not universally required. Shunt policy may be selective or routine depending on surgeon preference, cerebral monitoring strategy, contralateral carotid status, collateral circulation, and institutional protocol. Patch angioplasty is widely used to reduce restenosis, although the exact technique should follow surgeon experience and evidence-based practice.

9. Perioperative medical management

CEA is not a substitute for aggressive vascular risk-factor modification. Antiplatelet therapy, high-intensity lipid lowering, blood-pressure management, smoking cessation, diabetes control, dietary modification, exercise and management of other cardiovascular risk factors should continue before and after surgery. The exact antiplatelet regimen should be coordinated with the stroke and surgical teams and should not unnecessarily delay urgent CEA [6].

Patients receiving anticoagulants require individualised perioperative planning based on the indication for anticoagulation, renal function, bleeding risk and timing of surgery. The ESVS guideline provides specific recommendations for interruption and resumption of anticoagulants around CEA [6].

10. Complications and postoperative care

The principal complications of CEA include perioperative stroke, death, myocardial infarction, neck haematoma, cranial nerve injury, wound infection, restenosis, hypertension, hypotension, and cerebral hyperperfusion syndrome. The ESVS guideline specifically emphasises prevention and management of post-CEA hypertension, hyperperfusion syndrome, wound haematoma and cranial nerve injury [6].

Postoperative neurological observation and blood-pressure control are therefore central to safe care. A neck haematoma causing airway compromise is a surgical emergency. New neurological symptoms require immediate assessment for thrombosis, embolisation, hypoperfusion, hyperperfusion-related injury, intracranial haemorrhage or other stroke mechanisms.

Complication	Clinical significance	Prevention/response
Perioperative stroke/TIA	Most feared neurological complication.	Careful patient selection, meticulous plaque removal, cerebral protection, prompt recognition and re-exploration when indicated.
Death	Usually related to major stroke, cardiac events or other severe complications.	Audit 30-day stroke/death outcomes; optimise co-morbidity and multidisciplinary selection.
Myocardial infarction	Important competing perioperative risk.	Preoperative cardiac assessment when indicated; haemodynamic

		optimisation.
Neck haematoma	May rapidly threaten the airway.	Meticulous haemostasis; urgent evacuation for airway compromise.
Cranial nerve injury	Usually transient but can cause dysphonia, dysphagia or tongue weakness.	Careful dissection and documentation of pre-existing deficits.
Cerebral hyperperfusion syndrome	Can cause severe headache, seizures or intracranial haemorrhage.	Strict postoperative BP surveillance and prompt treatment of hypertension.
Restenosis	May threaten long-term patency and stroke prevention.	Risk-factor control and duplex surveillance when clinically appropriate.

11. Hong Kong-specific evidence on CEA

Hong Kong's published CEA literature is relatively small but historically informative. Lau and Cheng reported a tertiary-centre audit of 36 CEAs in 35 patients performed at Queen Mary Hospital between October 1994 and September 1997; there were no neurological complications or deaths in that series, and the authors concluded that outcomes met contemporary standards for CEA [18].

Ting and colleagues subsequently reported early and late outcomes in 59 Hong Kong Chinese patients undergoing 62 CEAs. The mean age was 70 years; 34% of procedures were for asymptomatic disease. Two perioperative neurological events occurred—one TIA and one minor stroke—with no operative mortality, major bleeding or cranial nerve injury. During a mean follow-up of approximately 24 months, seven patients died and five experienced subsequent neurological events, including two fatal strokes. Three-year survival was 86%, freedom from stroke was 87%, and stroke-free survival was 83%; one 80% recurrent stenosis was detected on duplex surveillance [19].

These studies provide useful local evidence that CEA can be performed safely in Hong Kong Chinese patients, even in the presence of substantial intracranial atherosclerotic disease. However, they predate contemporary intensive lipid-lowering therapy, modern stroke pathways, high-resolution CTA/MRA, contemporary anaesthesia, and current CEA-versus-CAS decision frameworks. Their results should therefore not be treated as estimates of current Hong Kong performance.

12. CEA in the setting of intracranial atherosclerosis

A key Hong Kong-specific issue is the coexistence of extracranial carotid and intracranial disease. In a cohort of Chinese patients with TIA, intracranial stenosis or occlusion was substantially more frequent than extracranial disease [9]. A contemporary review of carotid disease in Chinese populations similarly notes the higher prevalence of intracranial stenosis and the frequent coexistence of intracranial and extracranial atherosclerosis [15].

This creates three practical problems. First, the carotid lesion may be incidental rather than causal. Second, removal of the extracranial lesion may not eliminate the patient's overall cerebrovascular risk. Third, patients may have impaired collateral circulation, making cerebral haemodynamic management more important. Consequently, Hong Kong CEA programmes should maintain close collaboration with stroke neurology and neuroradiology rather than operating within a purely anatomical vascular-surgery model.

13. CEA versus CAS: a Hong Kong decision framework

For most standard-risk patients with recent symptomatic carotid stenosis, particularly those aged ≥70 years, CEA remains the default revascularisation strategy. CAS becomes more attractive when CEA carries unusual anatomical or surgical risks, such as prior neck irradiation, extensive previous neck surgery, restenosis after CEA, a high cervical lesion, severe tracheostomy-related anatomy, or selected severe medical co-morbidity [6,11].

The choice should be based on audited local outcomes rather than theoretical procedural convenience. CREST demonstrated that stroke and MI are distributed differently between the procedures, while ACST-2 showed that both can be performed with low rates of disabling stroke or death in selected asymptomatic patients [11–13]. In Hong Kong, the relatively high prevalence of intracranial disease further supports individualised neurovascular assessment.

Feature	CEA	Transfemoral CAS
Symptomatic ≥50% stenosis	Generally preferred in standard-risk patients.	Alternative in selected patients; less attractive very early after symptoms.
Age ≥70 years	Generally favoured.	Higher embolic stroke risk than CEA in many studies.
Prior neck radiation/surgery	May be technically difficult.	May be useful when anatomy is favourable.
Restenosis after previous CEA	Redo surgery may be more complex.	May be considered in selected cases.
Periprocedural stroke	Lower than CAS in major trials.	Higher than CEA in major trials.
Periprocedural MI	Higher than CAS in CREST.	Lower than CEA in CREST.
Need for general anaesthesia	Variable; depends on centre and technique.	Usually avoided.
Durability	Established long-term durability.	Good long-term results but surveillance remains important.

14. Quality assurance and service design for Hong Kong

Because the absolute benefit of CEA depends strongly on perioperative risk, Hong Kong centres should prospectively audit at least 30-day stroke, death and myocardial infarction outcomes. The benchmark of ≤6% 30-day stroke/death for symptomatic patients and ≤3% for asymptomatic patients is embedded in contemporary guideline recommendations [5,6]. Centres should report these outcomes transparently and separately by symptomatic status.

A high-quality regional service should also measure time from symptom onset to carotid imaging, time from imaging to vascular review, time from referral to CEA, proportion of eligible patients treated within 14 days, postoperative neurological complications, cranial nerve injury, haematoma, restenosis and long-term ipsilateral stroke. These metrics are more informative than procedural volume alone.

Suggested Hong Kong CEA quality indicator	Suggested metric
Access	Median time from TIA/stroke presentation to carotid duplex/CTA.
Timeliness	Median time from qualifying event to CEA; proportion completed within 14 days.
Safety	30-day stroke/death for symptomatic CEA; 30-day stroke/death for asymptomatic CEA.
Cardiac outcomes	30-day myocardial infarction rate.
Technical outcomes	Early reintervention, thrombosis or significant residual stenosis.
Neurological complications	Cranial nerve injury and perioperative neurological

	events.
Long-term outcomes	Ipsilateral stroke, restenosis and survival at 1, 3 and 5 years.
Equity	Referral and treatment intervals by age, sex, district and socioeconomic context where data governance permits.

15. Research priorities in Hong Kong

The most important evidence gap is the absence of a contemporary, territory-wide CEA registry linked to stroke outcomes. A Hong Kong Carotid Revascularisation Registry could capture demographics, symptom status, stenosis severity, imaging findings, intracranial disease, procedural details, medical therapy, complications, time to intervention and long-term outcomes. Such a registry would allow local benchmarking and comparison with international standards.

Prospective research should also address the interaction between extracranial carotid stenosis and intracranial atherosclerosis, especially whether selected patients have residual stroke risk despite technically successful CEA. Other priorities include plaque imaging, cerebral perfusion assessment, rapid-access pathways, CEA versus CAS in older Chinese patients, and the contemporary natural history of asymptomatic carotid stenosis under intensive medical therapy.

Hong Kong is particularly well placed for multidisciplinary studies because vascular surgery, stroke neurology, neuroradiology, interventional neuroradiology, cardiology and anaesthesia services are concentrated within sophisticated tertiary hospitals. Collaborative studies across the Hospital Authority and university-affiliated centres could provide evidence that is more directly applicable to Chinese populations than extrapolation from predominantly Western trials.

16. Practical clinical pathway

- 1. Confirm the neurological event: distinguish TIA, minor ischaemic stroke, major stroke, haemorrhage and non-vascular mimics.
- 2. Establish carotid anatomy: duplex as first-line where appropriate, with CTA/MRA for confirmation and operative planning.
- 3. Determine causality: confirm that symptoms are ipsilateral and compatible with carotid-territory embolism or hypoperfusion.
- 4. Assess the intracranial circulation and competing causes, especially atrial fibrillation and other cardioembolic mechanisms.
- 5. Grade stenosis using a validated method, preferably NASCET-based criteria when reporting percentages.
- 6. Discuss symptomatic 50–99% disease urgently with vascular surgery and stroke medicine; aim for CEA within 14 days when appropriate.
- 7. For asymptomatic disease, apply a higher threshold: excellent medical therapy, adequate life expectancy, high-risk plaque/clinical features where relevant, and audited perioperative risk ≤3%.
- 8. Select CEA versus CAS according to age, anatomy, co-morbidity, prior treatment, local expertise and patient preference.
- 9. Continue intensive secondary prevention before and after revascularisation.
- 10. Audit outcomes and maintain longitudinal surveillance according to local protocol.

17. Discussion

CEA remains a cornerstone of secondary stroke prevention despite major advances in medical therapy and endovascular intervention. The evidence is strongest in patients with recent ipsilateral neurological symptoms and severe extracranial carotid stenosis. The therapeutic window is now understood to be substantially earlier than was customary in the past, making the organisation of care almost as important as the technical performance of surgery.

The Hong Kong setting adds two important considerations. First, stroke remains a significant cause of mortality and healthcare utilisation despite declining age-standardised mortality [1–3]. Second, Chinese patients have a relatively high burden of intracranial atherosclerosis, which can coexist with extracranial carotid disease [8,9,15]. Thus, the best Hong Kong CEA service is not one that simply identifies stenosis and operates quickly; it is one that identifies the correct culprit lesion quickly.

The local evidence base is encouraging but dated. The historical Queen Mary Hospital series demonstrated low perioperative morbidity and satisfactory long-term outcomes [18,19], but current practice has changed. Modern lipid-lowering therapy, better stroke-unit care, rapid imaging, improved anaesthesia, patching strategies, perioperative blood-pressure management and evolving CAS technology all influence contemporary outcomes. Hong Kong should therefore avoid assuming that historical local results either underestimate or overestimate current performance.

The principal future opportunity is to integrate high-quality surgery with high-quality systems of care. A patient with symptomatic severe carotid stenosis benefits from timely imaging, expert interpretation, immediate medical therapy, rapid multidisciplinary decision-making, safe surgery, and lifelong vascular-risk management. In this model, CEA is not an isolated operation but one component of a coordinated stroke-prevention pathway.

18. Limitations

This manuscript is a narrative review rather than a systematic review or meta-analysis. It does not provide a formal PRISMA search, quantitative risk-of-bias assessment, or pooled effect estimates. Hong Kong-specific CEA evidence is limited and includes older single-centre series; therefore, local conclusions should be interpreted cautiously. Current international guideline recommendations may not perfectly reflect local service capacity or case mix. Finally, the manuscript does not substitute for institutional protocols, multidisciplinary assessment, or individualised patient consent.

19. Conclusions

CEA remains an evidence-based and clinically important intervention for appropriately selected patients with extracranial carotid stenosis in Hong Kong. Its greatest established benefit is in recently symptomatic patients with 70–99% stenosis and in selected patients with 50–69% stenosis, provided perioperative risk is acceptably low and surgery is performed promptly. Asymptomatic disease requires more selective decision-making because contemporary medical therapy has reduced baseline stroke risk.

Hong Kong's distinctive burden of intracranial atherosclerosis reinforces the need for complete neurovascular assessment and multidisciplinary care. Historical Hong Kong series demonstrate that CEA can be performed with good outcomes, but contemporary territory-wide data are needed. Establishing a prospective carotid registry, measuring time-to-treatment and audited outcomes, and integrating vascular surgery with stroke

neurology and neuroradiology would strengthen the evidence base and help ensure that CEA remains a safe, timely and appropriately targeted component of stroke prevention in Hong Kong.

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