Neuron

Newsletter from Neuro One Hospital

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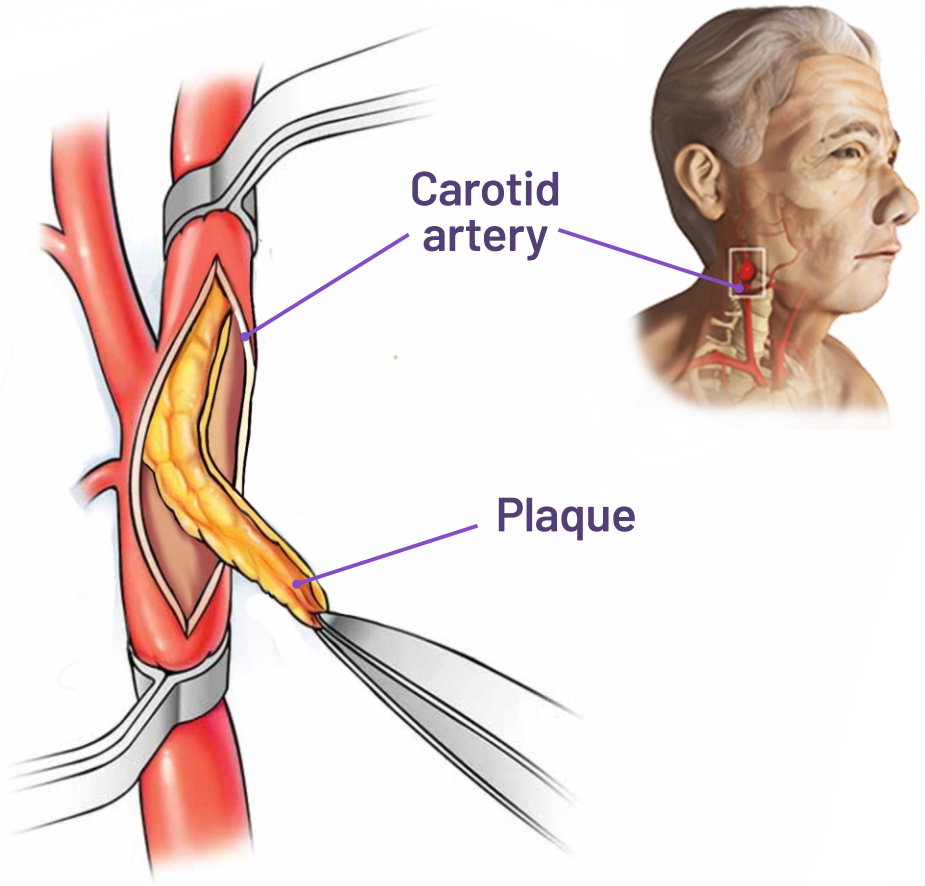


Carotid Endarterectomy

Neurosurgical Precision in Stroke Prevention

A 78-Case Experience from Neuroone Hospital

Neuron - A Newsletter from

Neuro One Hospital

Leaders in neuro care

Carotid artery stenosis is a major but modifiable contributor to ischemic stroke — a condition where time lost is brain lost. Early identification of red flags and timely surgical intervention can prevent permanent disability. At Neuroone Hospital, 78 carotid endarterectomy (CEA) procedures have been performed with a focus on microsurgical precision, cerebral protection, and functional outcomes.

This newsletter outlines our journey, including patient selection, surgical refinements, intraoperative monitoring and lessons learned from complications — all to enhance stroke prevention strategies in neurological care.

Each carotid endarterectomy is a race against a stroke that might have happened. Precision, patience and preparation are the cornerstones of our approach. With every patient saved from a disabling stroke, we reaffirm the power of neurosurgical intervention in vascular disease.

Regards,

Dr **S.Vijay Kumar** MCh.,
Keyhole Brain and Spine Surgeon

Indications : Selecting the Right Cases

Patient selection is key to the success of CEA. Our indications follow global guidelines and are tailored by neurosurgical insights:

- ✅ Symptomatic patients with > **50% stenosis** as confirmed by Doppler, CTA, or DSA.
- ✅ Select cases of **50–70% stenosis** with recurrent TIA or minor stroke within the past 6 months.
- ✅ Asymptomatic patients with **> 60% stenosis** and high-risk plaque features on imaging (e.g., intraplaque hemorrhage on MRI, ulcerated plaques).

Our Experience So Far

- Total Cases Performed: **78** (as of Sept 2025)
- Age Range: **30–78** years
- Symptomatic Patients: **47**
- Asymptomatic with High-Risk Features: **6**
- Right-sided CEA: **39** | Left-sided: **39**

Contraindications Considered

We avoided surgery in patients with:

- ❌ Near-total occlusion with poor intracranial collateral circulation
- ❌ Severe cardiac dysfunction prohibiting general anesthesia
- ❌ Recent large stroke with mass effect
- ❌ Contralateral laryngeal nerve palsy
- ❌ Prior neck radiation or complex re-do neck surgery (selected for stenting)

Recognizing the Red Flags in Symptomatic Carotid Disease

CEA is most beneficial when high-risk patients are identified early.

Clinical Red Flags

- Crescendo TIAs – 2 or more TIAs in 7 days
- Stroke-in-evolution – fluctuating or worsening deficits
- Recent TIA or minor stroke (<14 days)
- Amaurosis fugax – transient monocular blindness
- Neurological symptoms despite dual antiplatelets

These patients are at **high imminent stroke risk** and should undergo CEA within 48–72 hours wherever feasible.

Radiological Red Flags: Imaging the Risk

Imaging plays a critical role in identifying unstable plaques:

- Ulcerated plaque – irregular surface with cavitations on CTA or Doppler
- Near-occlusion or string sign – critical narrowing with reduced flow
- Poor circle of Willis collaterals – limited cerebral compensation
- Multiple DWI lesions on MRI – indicates active embolization
- Intraplaque hemorrhage (IPH) – key marker of plaque instability

Spotlight: Intraplaque Hemorrhage – The Hidden Danger

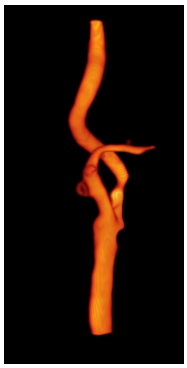
Intraplaque hemorrhage (IPH) is a crucial predictor of stroke, visible only on specialized MRI sequences like T1-weighted MPRAGE or TOF source images.

Imaging Appearance:

- Bright (hyperintense) signal within the plaque on T1W
- Associated with methemoglobin accumulation
- Seen as a crescentic, eccentric area within the carotid bulb plaque

Significance : IPH triples the risk of stroke and is now considered a strong independent surgical indication, even in borderline stenosis.

Preoperative Evaluation Protocol at Neuroone



Preop

Preop

Each patient undergoes:

- Doppler + CTA/MRA
- MRI Brain with DWI + MPRAGE to assess infarct burden and IPH
- Assessment of collateral flow via CTA
- Anesthesia clearance
- Baseline EEG and cerebral oximetry setup for intraoperative monitoring

Our Surgical Technique :
A No-Shunt, No-Patch, Precision Approach

At Neuroone Hospital, we emphasize pure dissection-based CEA — no patch, no shunt — guided entirely by meticulous technique and real-time cerebral monitoring.

Key Steps:

1. Curvilinear incision along SCM
2. Identification and protection of key nerves:
   - Hypoglossal
   - Vagus
   - Marginal mandibular
3. Plaque dissection with precise endpoint identification to avoid residual intimal flaps
4. Primary closure, confirmed with intraoperative flushing and EEG guidance

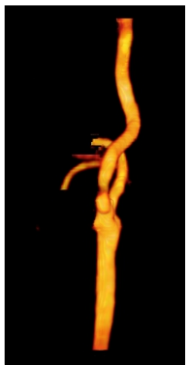
Outcomes and Complications: Neuroone's Experience

Complication	No. of Cases
Stroke (1 major, 2 minor)	3
Operative site hematoma	1
Hoarseness (RLN injury)	1
Restenosis	1

- **No perioperative mortality**
- **Wound hematoma : 1 case requiring re-exploration**

Each complication triggered protocol improvements, such as more meticulous nerve identification, refined flap closure.

Postoperative Outcomes



Postop

Postop

- ☑ Mean hospital stay: 3 days
- ☑ No strokes or TIAs post-op patients
- ☑ Mean follow-up duration: 14 months
- ☑ Duplex scan / CTA follow-up at 3 months showed restenosis in one case
- ☑ Patients reported improved quality of life and reduced anxiety about stroke

Key Learnings and Surgical Refinements

From complications, we refined our protocol with:

- Routine intraoperative EEG + cerebral oximetry
- Stepwise, careful dissection around cranial nerves
- Mini-incision approach for better cosmesis and quicker recovery
- Strict postoperative blood pressure monitoring
- Regular Doppler surveillance for restenosis

Cerebral Monitoring: Our Intraoperative Safety Net

- EEG detects electrical changes due to ischemia during clamping
- Cerebral oximetry (NIRS) measures regional oxygen saturation over both hemispheres

Together, they allow us to operate safely without a shunt, maintaining continuous brain protection throughout the procedure.

CEA vs CAS: Evidence-Based Superiority of Surgery

Carotid Endarterectomy (CEA) remains the **"GOLD STANDARD"** for managing significant carotid stenosis, particularly in symptomatic patients over 70 years of age. Multiple large-scale randomized controlled trials have established CEA's superior safety and efficacy compared to Carotid Artery Stenting (CAS). The CREST trial (Carotid Revascularization Endarterectomy vs Stenting Trial), involving over 2,500 patients, showed that while the overall composite endpoint was similar between groups, CAS had significantly higher periprocedural stroke rates. However, stroke carries a more disabling and irreversible outcome, making CEA the preferred option in neurological practice.

Further, the ICSS (International Carotid Stenting Study) demonstrated that perioperative stroke or death was nearly double in the CAS group (8.5%) compared to CEA (5.2%), reinforcing concerns about embolic risks during stenting. In older adults, tortuous anatomy, extensive plaque burden and aortic arch manipulation during CAS further elevate risk. CEA, with direct visualization and removal of plaque under controlled cerebral protection using EEG and Oximetry, offers more consistent results, lower stroke recurrence and a well-established safety profile.

Thus, while CAS may be considered in selected high-risk surgical candidates, CEA remains the definitive procedure of choice in the majority of patients, particularly when performed in high-volume centers with experienced surgical teams.

Conclusion : Elevating Stroke Prevention Through Neurosurgery

Carotid endarterectomy at Neuroone is more than a vascular procedure — it is a neurosurgical precision intervention. By combining detailed imaging, refined microsurgical technique and vigilant monitoring, we have significantly improved patient safety and outcomes.

" With every carotid endarterectomy, we don't just restore blood flow — we reclaim lives at the edge of A second stroke."

Dr **S.Vijay Kumar** MCh.,

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