## ISNVD



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Is local anaesthesia the best method to avoid complications during carotid cross clamping?

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# General anaesthesia versus local anaesthesia for carotid surgery (GALA): a multicentre, randomised controlled trial

GALA Trial Collaborative Group\*

#### Summary

Lancet 2008; 372: 2132-42

Published Online November 27, 2008 DOI:10.1016/S0140-6736(08)61699-2 **Background** The effect of carotid endarterectomy in lowering the risk of stroke ipsilateral to severe atherosclerotic carotid-artery stenosis is offset by complications during or soon after surgery. We compared surgery under general anaesthesia with that under local anaesthesia because prediction and avoidance of perioperative strokes might be easier under local anaesthesia than under general anaesthesia.

## No definite difference in outcomes between GA and LA

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under general (n=1753) or local (n=1773) anaesthesia between June, 1999 and October, 2007. The primary outcome was the proportion of patients with stroke (including retinal infarction), myocardial infarction, or death between randomisation and 30 days after surgery. Analysis was by intention to treat. The trial is registered with Current Control Trials number ISRCTN00525237.

Findings A primary outcome occurred in 84 (4.8%) patients assigned to surgery under general anaesthesia and 80 (4.5%) of those assigned to surgery under local anaesthesia; three events per 1000 treated were prevented with

## ...but during GA cerebral monitoring is mandatory

contralateral carotid occlusion, and baseline surgical risk.

Interpretation We have not shown a definite difference in outcomes between general and local anaesthesia for carotid surgery. The anaesthetist and surgeon, in consultation with the patient, should decide which anaesthetic technique to use on an individual basis.

Funding The Health Foundation (UK) and European Society of Vascular Surgery.

#### GALA Trial Collaborative Group. Lancet. 2008

### **Original Contribution**

#### Intraoperative Completion Studies, Local Anesthesia, and Antiplatelet Medication Are Associated With Lower Risk in Carotid Endarterectomy

Christoph Knappich, MD; Andreas Kuehnl, MD, MPH; Pavlos Tsantilas, MD; Sofie Schmid, MD; Thorben Breitkreuz; Michael Kallmayer, MD; Alexander Zimmermann, MD, MHBA; Hans-Henning Eckstein, MD, PhD

## German Carotid Registry 2009-2014

and perioperative variables and in-hospital stroke or death rates after carotid endarterectomy.

*Methods*—Between 2009 and 2014, overall 142074 elective carotid endarterectomy procedures for asymptomatic or symptomatic carotid artery stenosis were documented in the database. The primary outcome of this secondary data analysis was in-hospital stroke or death. Major stroke or death, stroke, and death, each until discharge were secondary outcomes. Adjusted relative risks (RRs) were assessed by multivariable multilevel regression analyses.

Results—The primary outcome occurred in 1.8% of patients, with a rate of 1.4% in asymptomatic and 2.5% in symptomatic

## 142074 Patients

duplex ultrasound (RR, 0.74; 95% CI, 0.63–0.88) or angiography (RR, 0.80; 95% CI, 0.71–0.90), and perioperative antiplatelet medication (RR, 0.83; 95% CI, 0.71–0.97). No shunting and a short cross-clamp time were also associated with lower risks; however, these are suspected to be confounded.

*Conclusions*—Local anesthesia, patch plasty compared with primary closure, intraoperative completion studies by duplex ultrasound or angiography, and perioperative antiplatelet medication were independently associated with lower in-hospital stroke or death rates after carotid endarterectomy. (*Stroke*. 2017;48:00-00. DOI: 10.1161/STROKEAHA.116.014869.)

Key Words: anesthesia ■ angiography ■ death ■ endarterectomy, carotid ■ stroke

#### Knappich C. et al. Stroke. 2017



Knappich C. et al. Stroke. 2017

# BJA Intraoperative neuromonitoring in major vascular surgery

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Monitor (number of studies)	Sensitivity (95% CI)	Specificity (95% CI)	Diagnostic odds ratio (95% CI)	Cut-off points
EEG (n=5)	0.70 (0.58–0.80)	0.96 (0.94–0.97)	65.3 (20.51–207.71)	
Evoked potentials (n=3)	0.84 (0.66–0.95)	0.78 (0.69–0.86)	17.7 (2.38–123.85)	Response amplitude 0–50% of baseline
Transcranial Doppler (n=8)	0.81 (0.69–0.91)	0.92 (0.89–0.94)	58.1 (23.0–146.3)	48–70% reduction
Near-infrared spectroscopy (n=5)	0.74 (0.54–0.89)	0.82 (0.76–0.88)	12.1 (3.52–41.24)	15–20% reduction
Stump pressure (n=15)	0.75 (0.69–0.81)	0.88 (0.86–0.89)	27.84 (13.38–57.94)	25–50 mm Hg

Table 2 Sensitivity, specificity, and diagnostic odds ratio reported by Guay and Kopp<sup>35</sup>

## Sensitivity 70-85%

## Specificity 78-96%

So V.C. and Poon C.C. et al. British J Anaesth. 2016



The sensibility and specificity of cerebral oximetry, measured by INVOS – 4100, in patients undergoing carotid endarterectomy compared with awake testing



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Comparison of the INVOS-4100 cerebral oximeter and the neurologic functions, by means of detecting cerebral ischemia induced by carotid cross-clamping, in patients undergoing CEA under LA.

#### Methods:

- 100 consecutive patients scheduled for CEA under LA from January 2009 to December 2010.

- A drop greater than 20% was considered as an indicator of cerebral ischemia that might predict the need for carotid shunting.

- Patients were only shunted based on the awake testing.

Stilo F. et al. Minerv Anestesiol. 2012

Figure 1.—Summarized algorithm of all patients.



The usefulness of CO in predicting cerebral ischemia is modest. Cerebral monitoring with INVOS-4100 has a high negative predictive value but the positive predictive value is low.

Stilo F. et al. Minerv Anestesiol. 2012

General anaesthesia versus local anaesthesia in carotid endarterectomy: a systematic review and meta-analysis

Amer Harky, Jeffrey Shi Kai Chan, Thompson Ka Ming Kot, Dilan Sanli, Rashad Rahimli, Zlatka Belamaric, Marcus Ng, Ian Yu Yeung Kwan, Christiana Bithas, Ragai Makar, Ramasubramanyan Chandrasekar, Sameh Dimitri



LA was associated with shorter operative time (weighted mean difference -9.15 minutes [-15.55, -2.75], p=0.005), and less stroke (odds ratio (OR) 0.76 [0.62, 0.92], p=0.006), cardiac complications (OR 0.59 [0.47, 0.73], p<0.00001), and in-hospital mortality (OR 0.72, [0.59, 0.90], p=0.003))

Harky A. et al. J Cardiothorac Vasc Anesth. 2019

## **Our current technique for LA during CEA:**

Ultrasound-guided

## superficial and intermediate cervical plexus block

Neither pericarotid infiltration nor skin infiltration

To reduce block-related side effects:

- Hoarseness
- Cough
- Dysphagia
- Horner's syndrome
- Hypoglossal paralysis



## **Our current technique for LA during CEA:**



The patient is placed in the supine position with the head rotated contralaterally by 30 °

The 22G 50 mm needle, with a posterior approach, is inserted between the posterior edge of the sternocleidomastoid muscle and the levator scapula muscle

## **Our current technique for LA during CEA:**

## Ultrasound-guided

## superficial and intermediate cervical plexus block

PushiersbangerdenwetilebanerionbeardreatshassGe a Superficia **perficial cervical block** by injecting 3 ml of Ropivacaine 5mg/ml is done 9-12 ml of Ropivacaine 5mg/ml into the middle cervical fascia is done

## **Personal experience – Golden Rules:**

- Antiplatelet medication
- Loco-regional anesthesia
  with Awake testing and Selective Shunting
- Eversion CEA avoiding patch plasty

Early systemic heparinizzation

**Gentle vessels dissection** (in some cases bulb and internal dissection after common carotid clamping)

**Sequential cross-clamping** and **meticulous declamping** avoiding debrides migration

## **UCBM Experience**



## **481 Pts** From May 2014 to April 2019

## 301 (62.5%) SYMPTOMATIC 181 (37.5%) ASYMPTOMATIC

## Shunt rate 3%

#### **30-days results**

	n	(%)
Stroke	2	0.4
Cardiac Events	2	0.4
Death	1	0.2

Stroke-death rate 0.4 %

## Conclusions

Ultrasound-guided **superficial** and **intermediate** cervical plexus block:

Avoids accidental vascular punctures and nerve dysfunction Reduces local anesthetic drugs No need for additional anesthetic infiltration by the surgeon No need for additional administration of opioids/sedatives

High patient comfort

LA makes CEA compelling for patients and doctors