

Carotid Endarterectomy

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Introduction

Stroke –

- **3rd cause of mortality**
- **2nd Cardiovascular after MI**
- **mortality**
- **morbidity with socioeconomic burden for the patient, family & society**

- **Incidence cases/year
(per 1 million inhabitants):**
 - **500 transient ischemic attacks**
 - **2,400 strokes (75%: first ever strokes)**

History

- **1875 – Gowers: first report stroke/extracranial disease**
- **1937 – Monitz: Angiography for carotid disease**
- **1954 – Eastcot: first successful operation for carotid stenosis**

Aim

- **Ameliorate neurological symptoms**
- **Prevent stroke**

Anatomy

95% Aorta

• **Innominate Lt carotid Lt Subclavian**

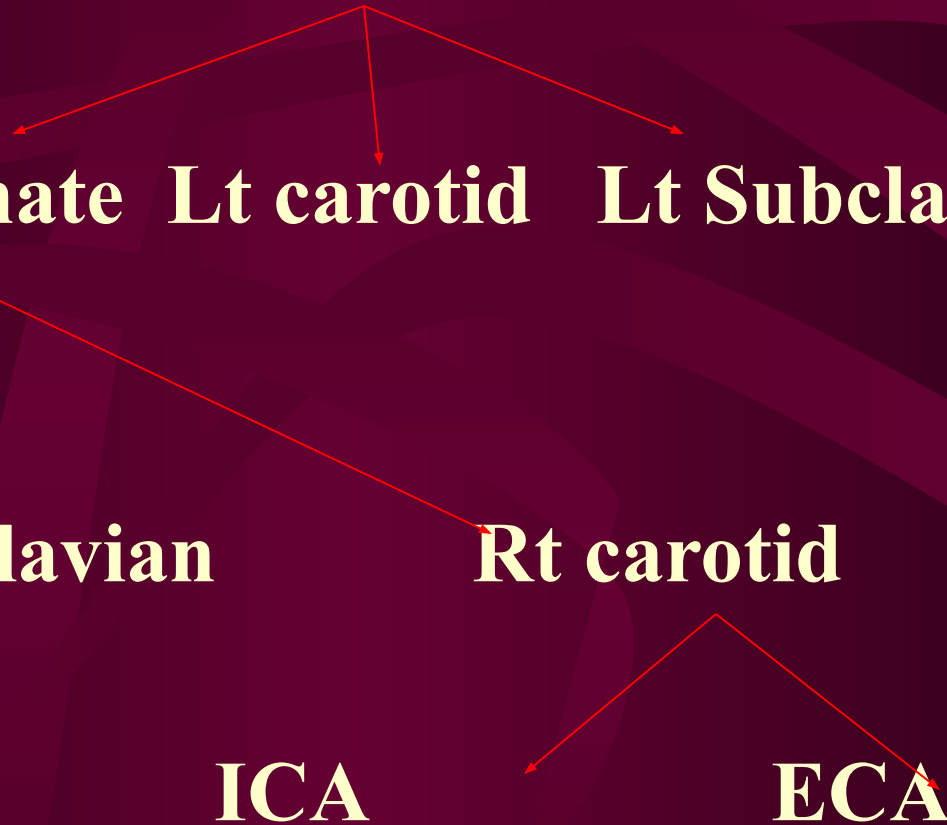
• **Rt Subclavian**

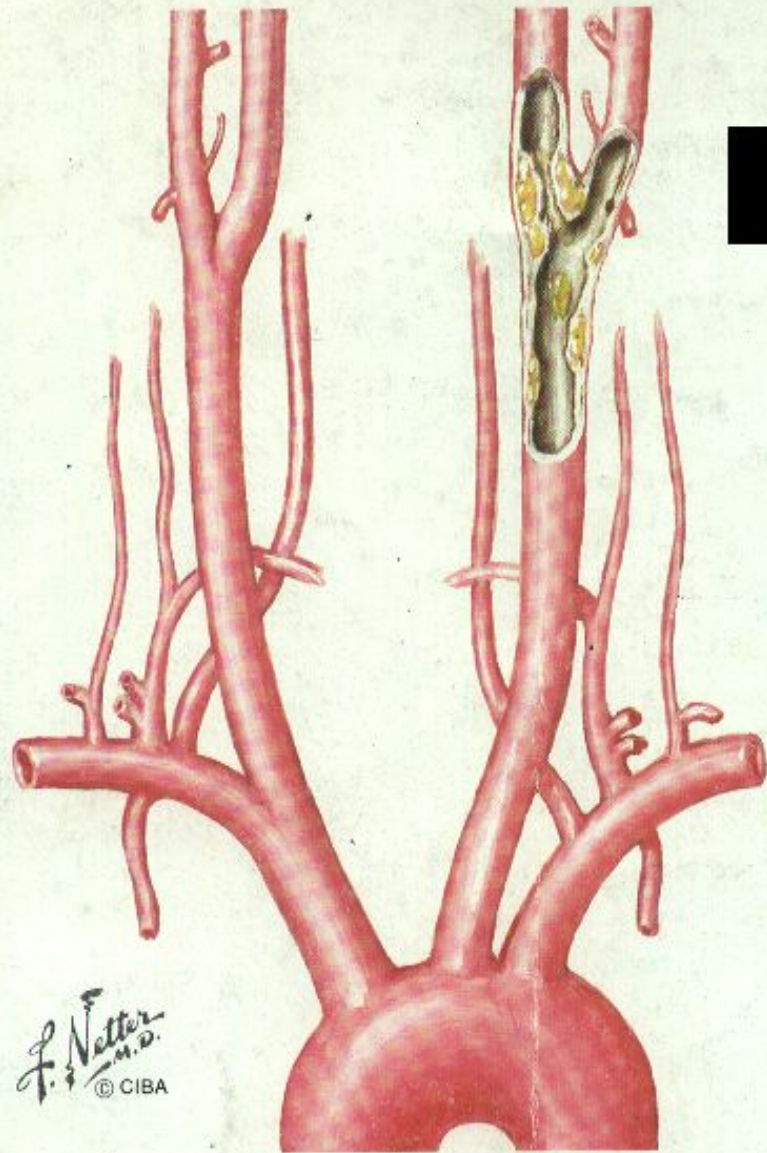
Rt carotid

•

ICA

ECA





Pathology

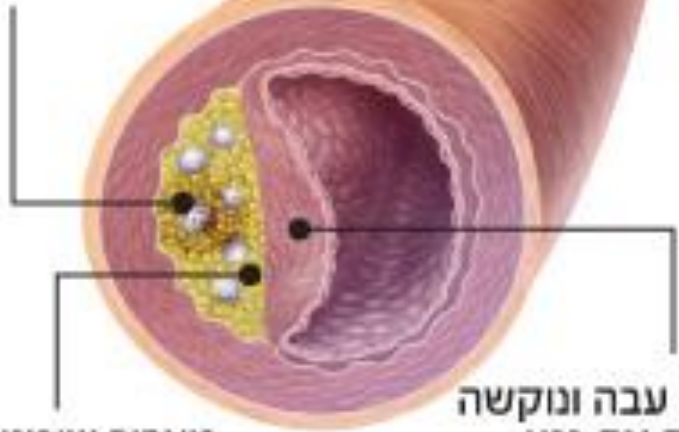
- **Atherosclerosis 90%**
- **Usually in bifurcation**
- **Intracranial : Extracranial**
33% 67%

Plaque growth: - Slow

- Rapid (Intraplaque hemorrhage)

STABLE PLAQUE

ריכוז נמוך
של האנזים
Lp-PLA₂

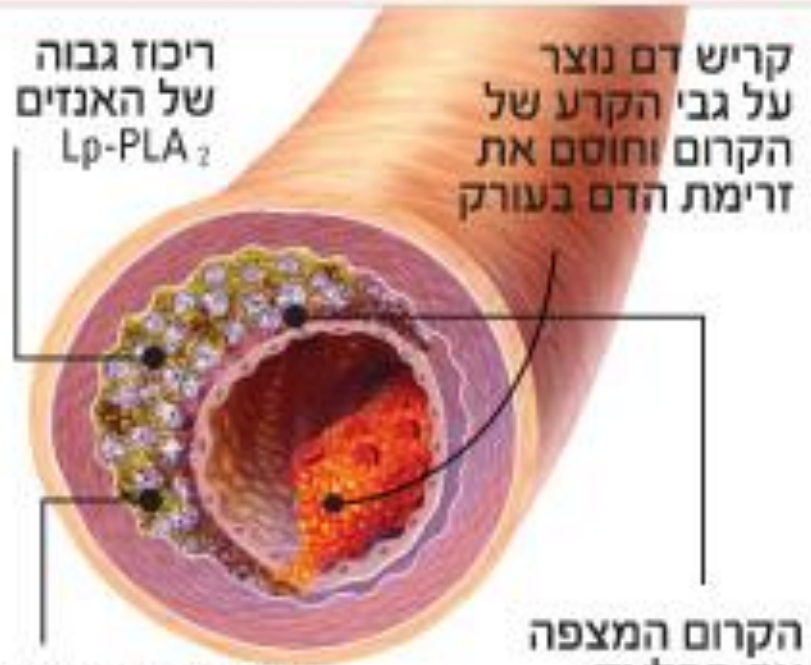


מצבור שומנים
בנגע הטרשת

קרום עבה ונוקשה
מכסה את נגע
הטרשת

RUPTURED PLAQUE

ריכוז גבוה
של האנזים
Lp-PLA₂



קריש דם נוצר
על גבי הקרע של
הקרום וחוסם את
זרימת הדם בעורק

שומני נגע הטרשת
עוברים חימצון

הקרום המצפה
את הפלאק
נקרע בקלות

Risk Factors

- **Diabetes**
- **Smoking**
- **Hyperlipidemia**
- **Hypertension**
- **Genetics**

Completed Stroke

- **Embolic occlusion of critical artery**
- **Thrombosis of end vessel (local or propagation)**
- **Sudden decrease in blood flow due to proximal occlusion and no collaterals**

.T.I.A

- **Arterial Stenotic Theory ?**

CBF
↓

- **Cerebral Embolic Theory ?**

10-15% of patients have a stroke within 3 months, with half occurring within 48 hours

– Diagnosis

- **Duplex**
- **CT Angiography**
- **MRA**
- **Angiography**

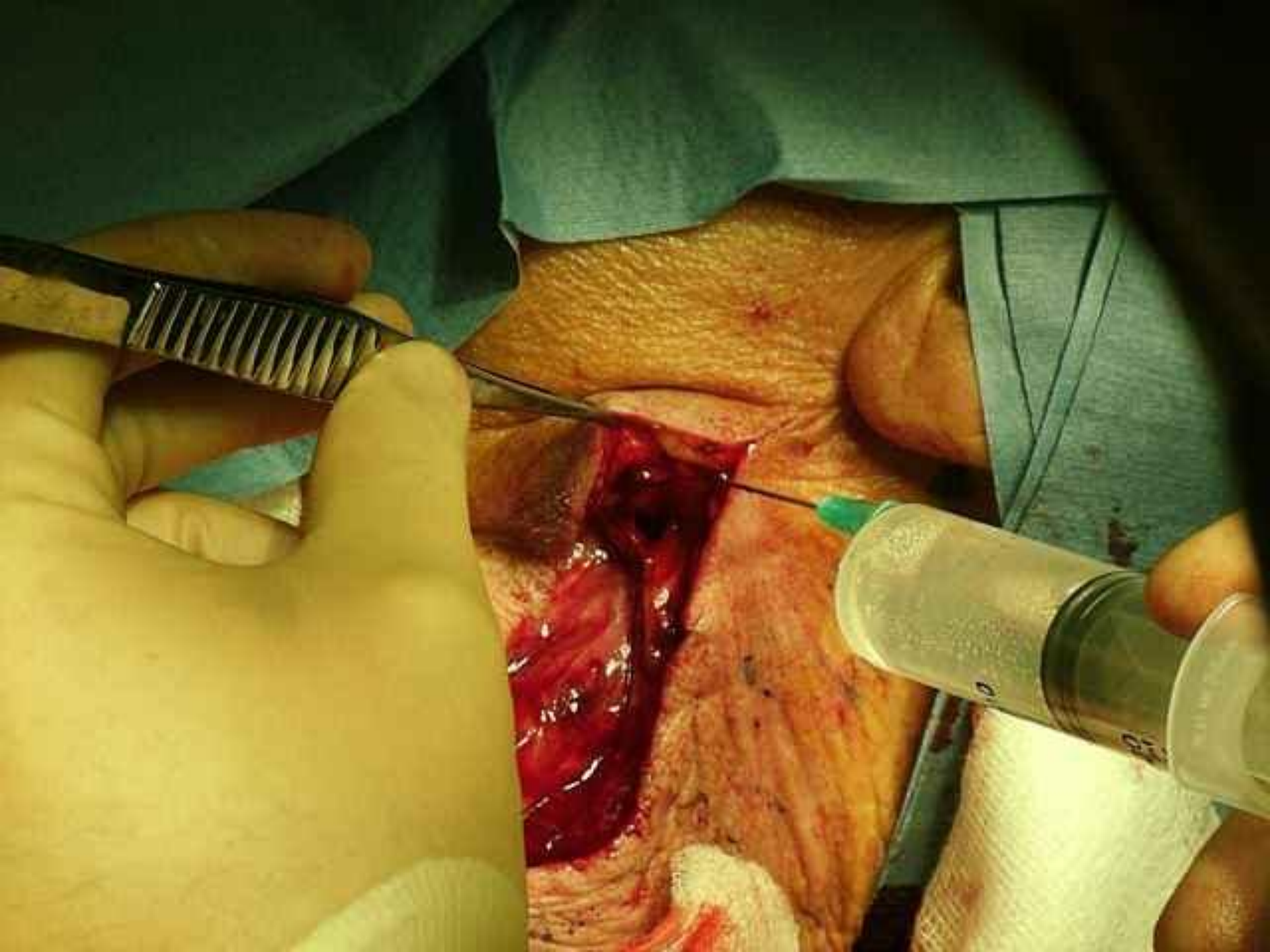
ABCD-I

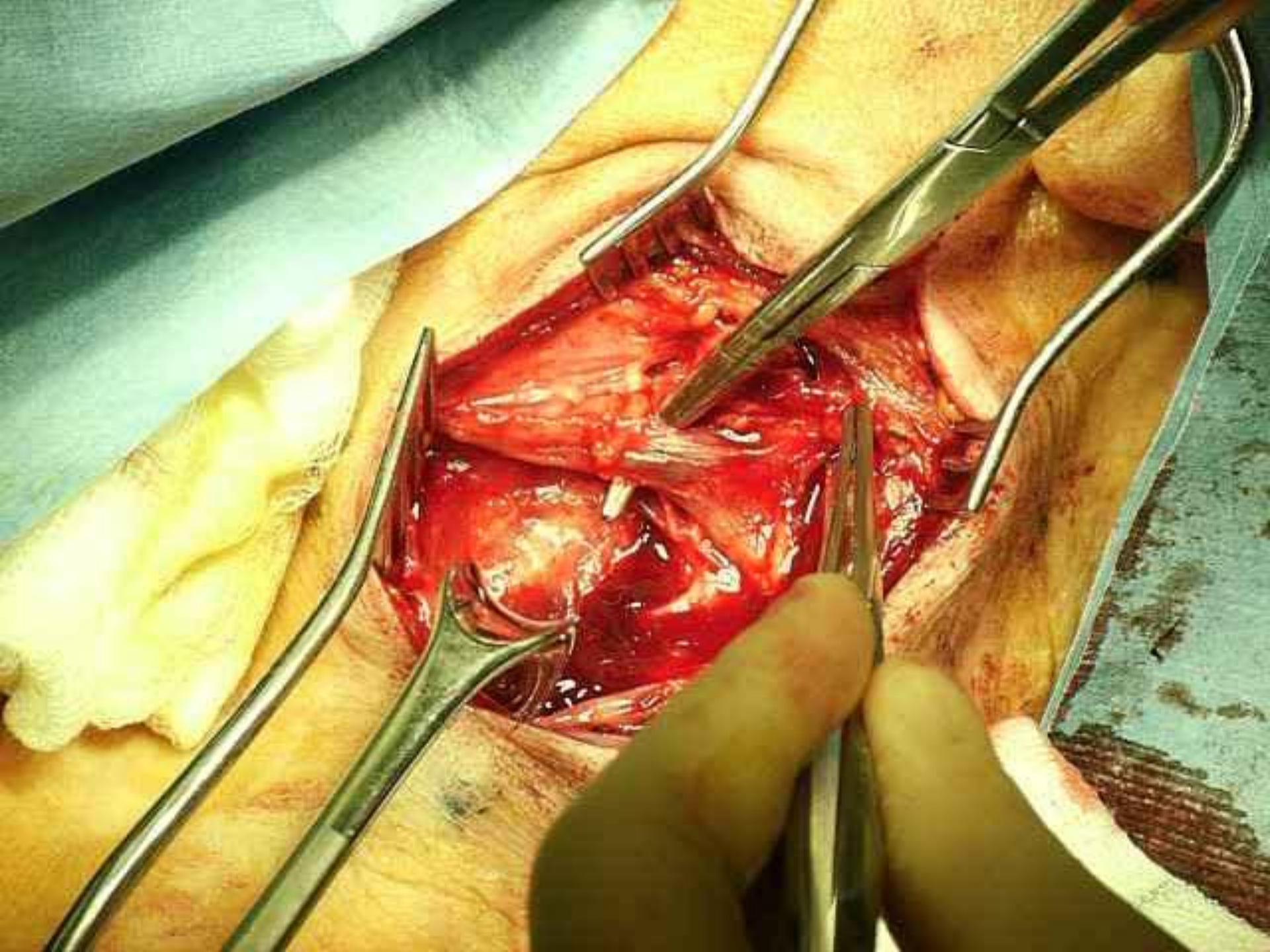
- **Age** (>60 yrs. = 1 point)
- **Blood Pressure** (>140/90 = 1 point)
- **Clinical Signs** (hemisyndrome = 2; speech =1)
- **Diabetes** (DM=1; Duration: <10 min=0; >60=2)
- **I –Imaging (Duplex/CTA for Carotid Stenosis)**
(MRI/MRP for minor stroke)
(Recurrent TIA)

Max -13 points. More than 7=8% stroke in 48 hrs.

Surgery

- *Symptomatic* :
 - Severe stenosis $> 70\%$
 - Good surgical risk patients with Moderate stenosis 50-70% and expected morbidity $< 3\%$
- *Asymptomatic* :
 - Controversial



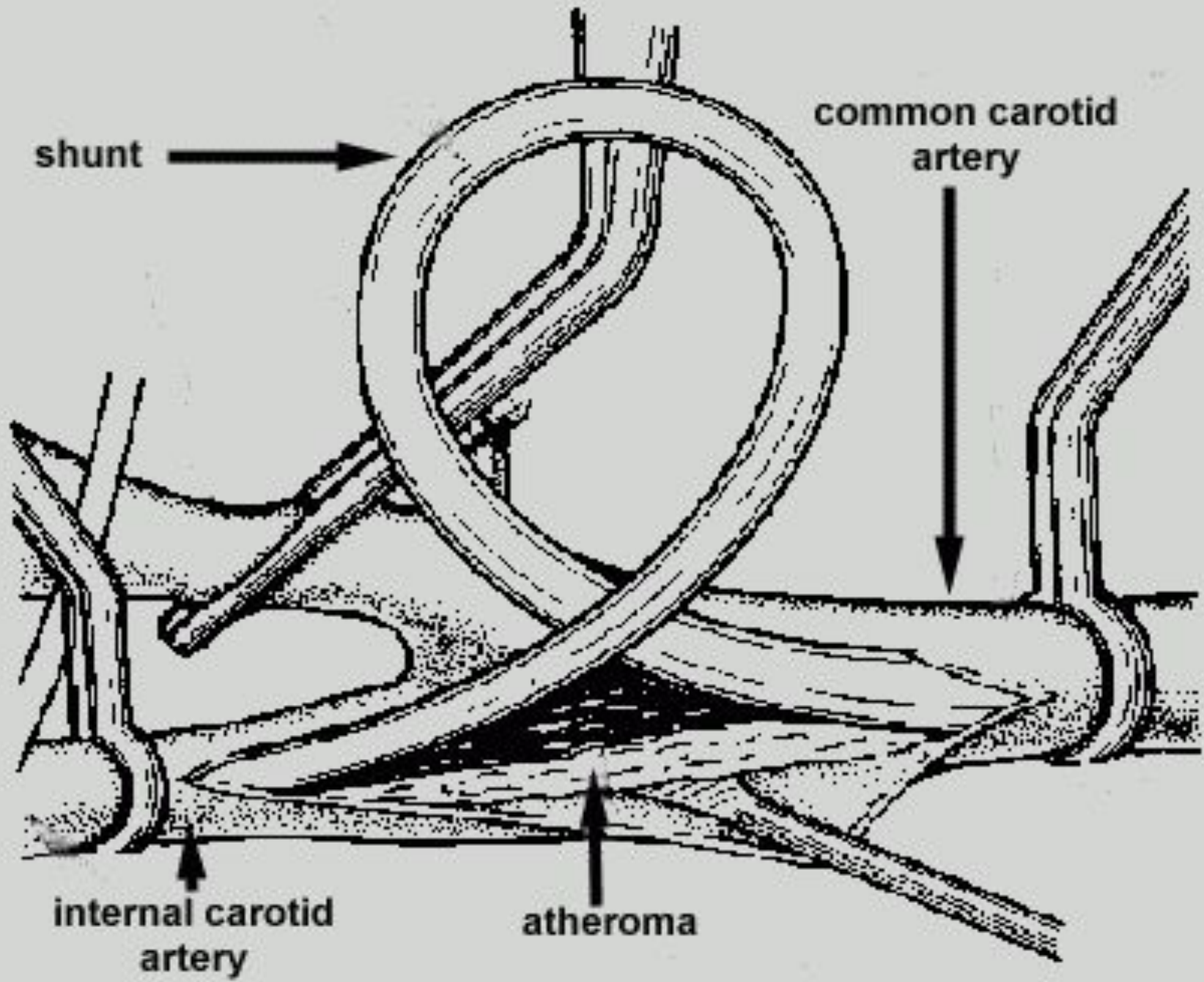


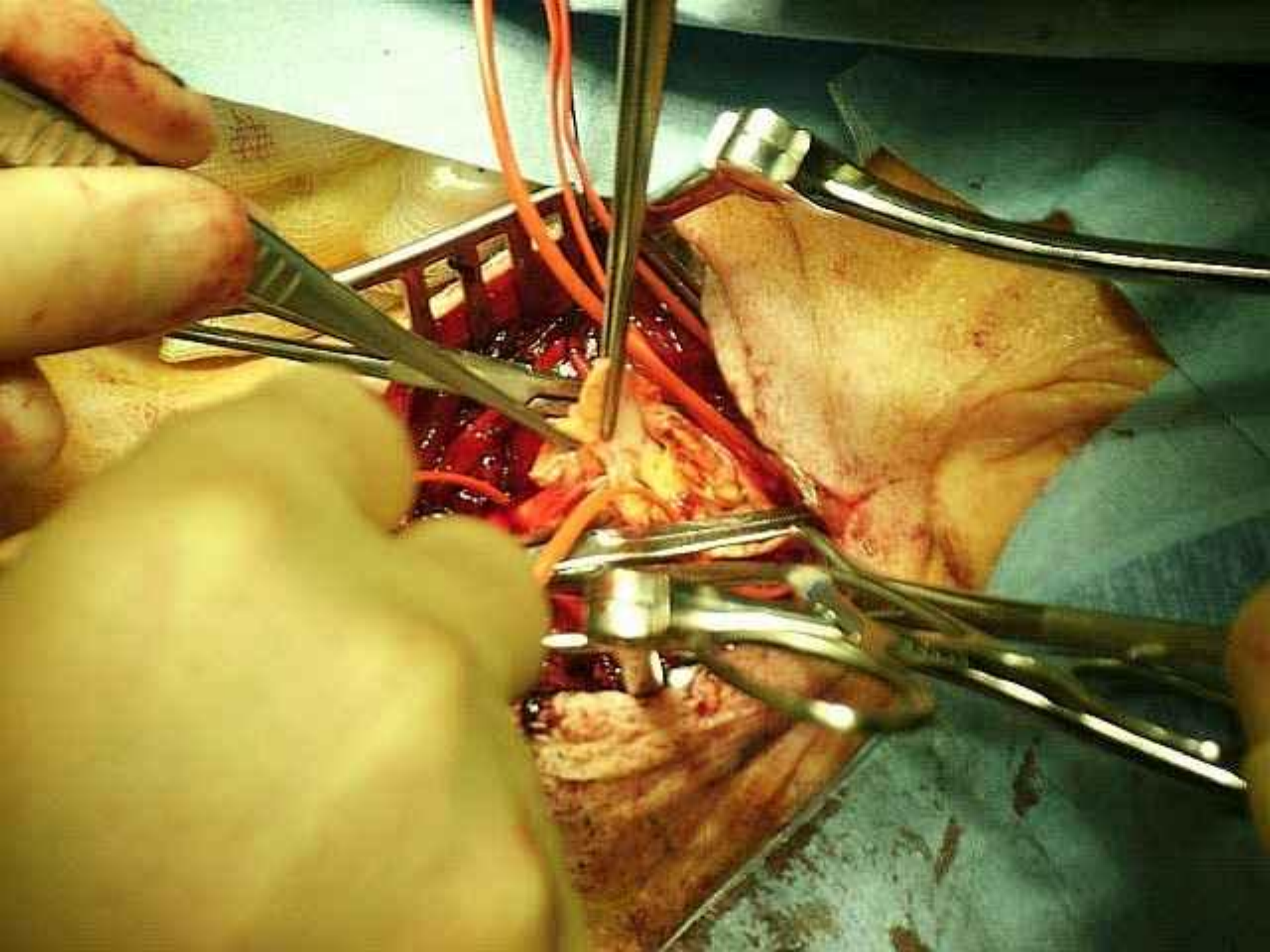
Cross clamping



Carotid Endarterectomy

- Stump pressure / Selective use of Javid Shunt
- Endarterectomy – longitudinal eversion
- Selective use of patch / Graft





COMPLICATIONS

- **Hematoma**
- **Infection**
- **Hypo/Hypertension**
- **Intracranial hemorrhage**
- **Hyperperfusion**
- **CVA**
- **Re-stenosis**

Morbidity / Mortality

- **Asymptomatic 1-3%**
- **Symptomatic 3-5%**

- **Cranial nerve Dysfunction:**
 - Vagus- Rec Laryngeal**
 - Sup Laryngeal**
 - Hypoglossus**
 - Glossopharyngeus**

Contraindications

- **Fresh CVA**
- **Severe non rehabilitated stroke**
- **High cardiac risk**
- **Short life expectancy**

Advanced age

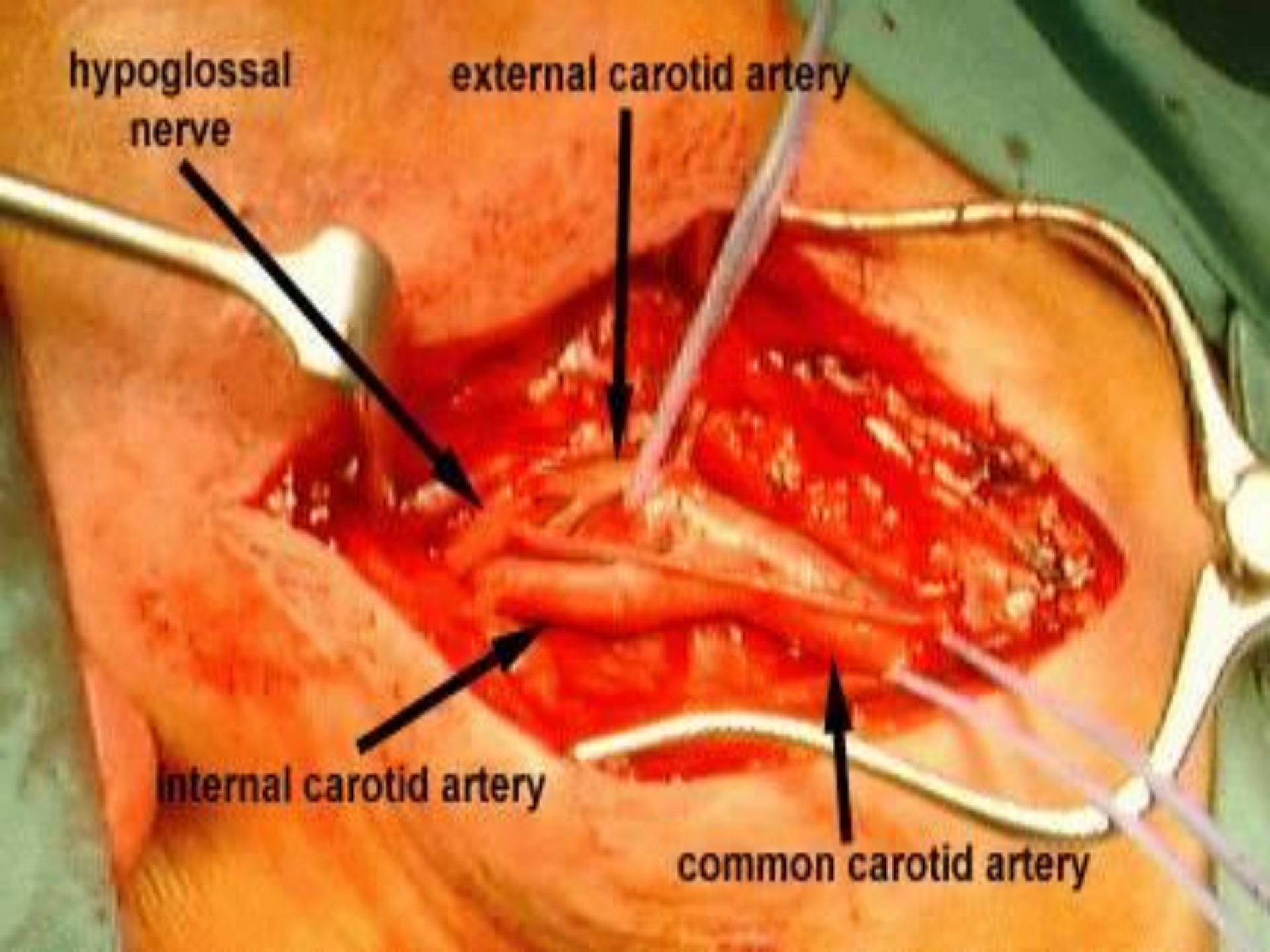
!!!not a contraindication

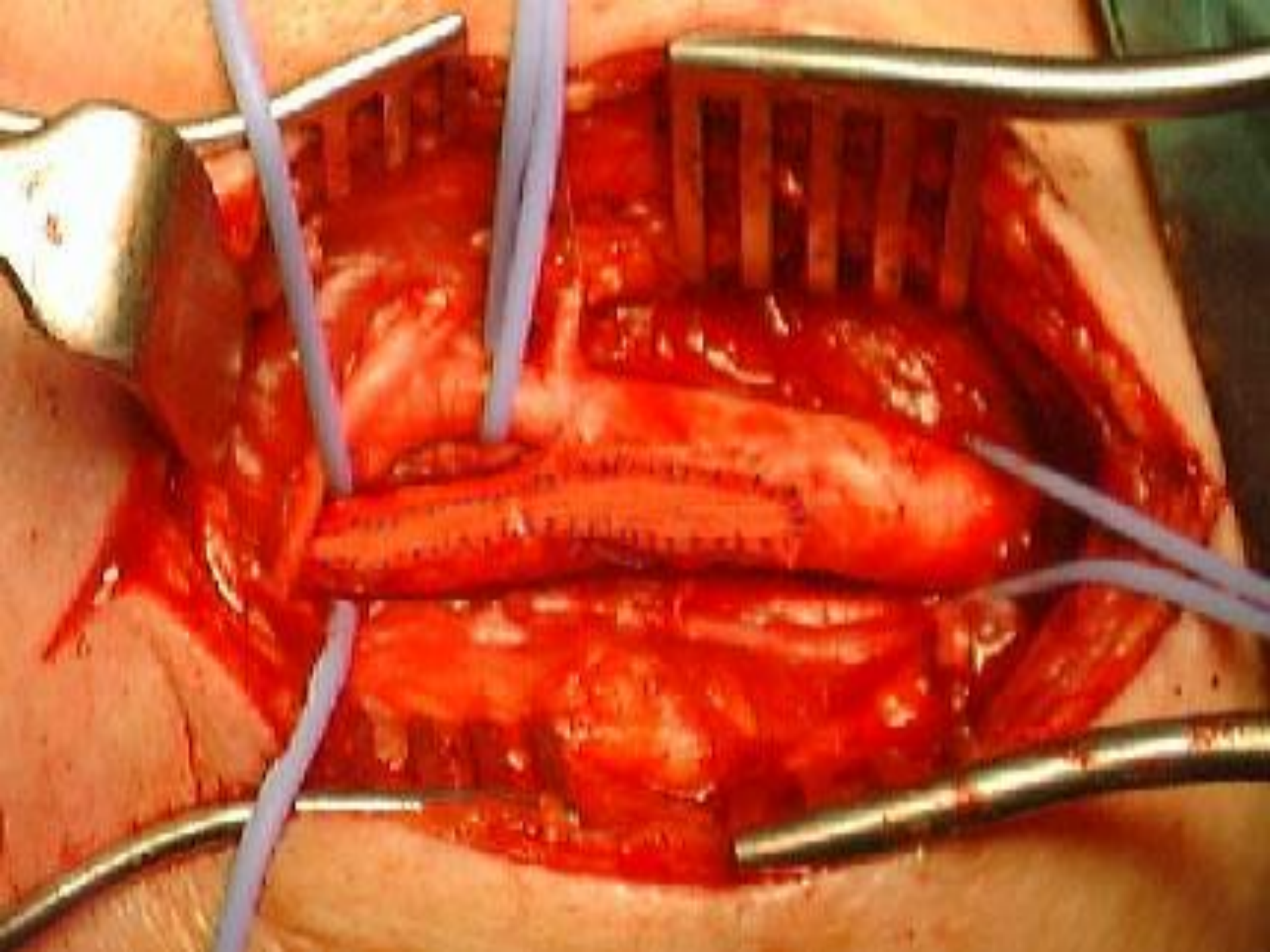
hypoglossal
nerve

external carotid artery

internal carotid artery

common carotid artery





? Surgery or Stent

- Safety ?
- Efficacy ?
- Cost Effectiveness ?
- Long Term Results ?

Common Practice – CEA

- Numerous Reports
- Excellent Results
- Indications widened
- Contraindications Reduced

Missing Data for CAS

- Late Stroke Rate ?
- Late Re-Stenosis Rate ?

Comparative Studies

CEA VS. CAS

- **CREST**
- **CARESS**
- **EVA-3S**
- **CAVATAS**
- **SPACE**
- **ARCHER**

Does the high-risk patient for carotid endarterectomy really exist?

Pulli R, Dorigo W, Barbanti E, Azas L, Pratesi G, Innocenti AA, Pratesi C. Am J Surg. 2005 Jun;189(6):714-9

- To date, definitely accepted criteria to identify "high-risk" patients for carotid endarterectomy (CEA) do not exist
- **CONCLUSIONS:** Carotid endarterectomy is a safe procedure also in so-called high-risk subsets of patients. Severe comorbidities seem to affect only long-term survival.

Carotid artery stenting is associated with increased complications in octogenarians: 30-day stroke and death rates in the CREST lead-in phase . Hobson RW 2nd et al.

J Vasc Surg. 2004 Dec;40(6):1106-11

- Interim results from the lead-in phase of CREST show that the periprocedural risk of stroke and death after CAS increases with age in the course of a credentialing registry. This effect is not mediated by potential confounding factors.
- ... care should be taken when CAS is performed in older patient populations.

CREST - *Conclusions*

- During the periprocedural period, there was a higher risk of stroke with stenting and a higher risk of myocardial infarction with endarterectomy.

Indications for CAS

- **Re-stenosis after CEA**
- **Post Irradiation**
- **“Hostile Neck”**
- **Stiff Neck**
- **“High Risk” for CEA**

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