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# Type A aortic dissection involving the supra-aortic branches – modern treatment strategies

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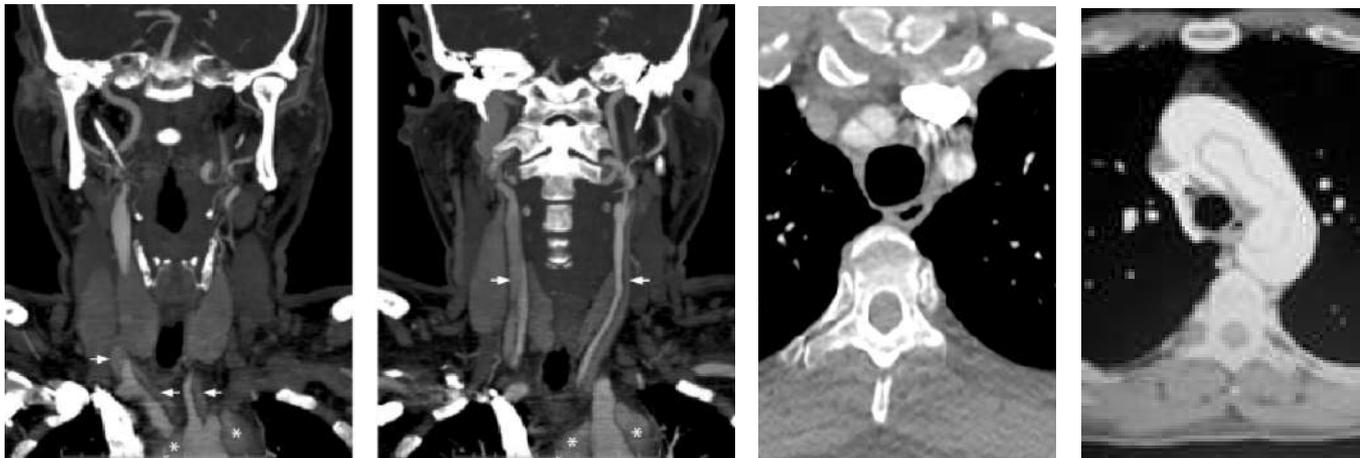
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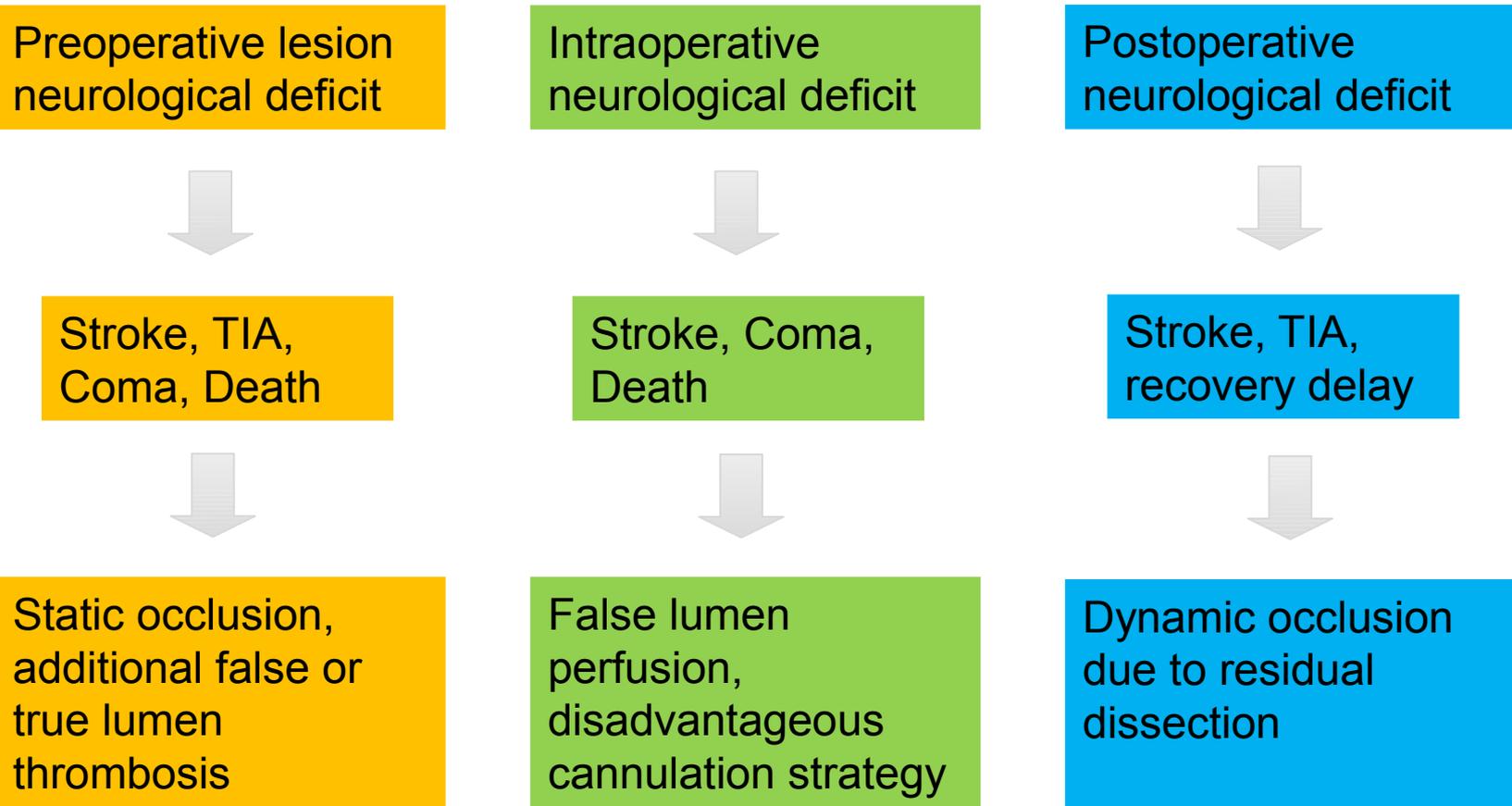
# Overview

28% supra-aortic branch involvement in acute Type A aortic dissection, of these 6% – 20% suffer stroke, preop. vs. intraop. vs. postop. cerebral ischemia

- Modes of occlusive mechanisms, indications of treatment
- Alternative and potentially useful arterial cannulation strategies
- Reported techniques of early carotid reperfusion and thrombectomy
- Report of endovascular treatment

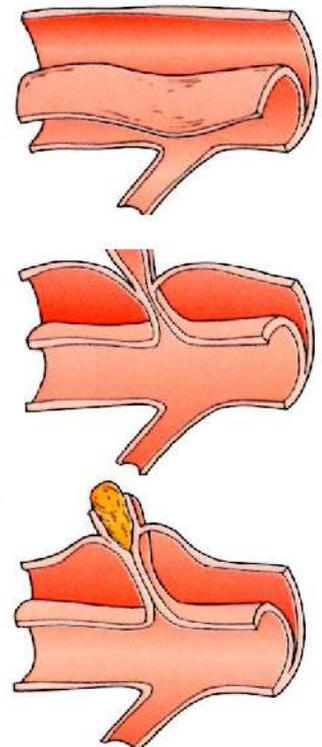


# Time of neurological deficit with respect to aortic surgery and modes of occlusion



# Indications of treatment – individual, case by case decisions

- Patient presenting with stroke or coma, confirmed involvement of supraaortic branches?
- Infarction confirmed, brain edema?
- Static vs. dynamic occlusion vs. thrombosis?
- Brain ischemia time?
- Acute cerebral malperfusion after initiation of CPB via femoral artery?
- Patient suffering postoperative cerebral ischemia, confirmed residual dissection of supraaortic branches?



Preoperative neurological deficits often resolve after conventional surgical treatment of Type A dissection<sup>1,2</sup>

Di Eusanio M, Patel HJ, Nienaber CA, Montgomery DM, Korach A, Sundt TM, Devinciis C, Voehringer M, Peterson MD, Myrmel T, Folesani G, Larsen M, Desai ND, Bavaria JE, Appoo JJ, Kieser TM, Fattori R, Eagle K, Di Bartolomeo R, Trimarchi S. **Patients with type A acute aortic dissection presenting with major brain injury: should we operate on them?** *J Thorac Cardiovasc Surg.*145:S213-221 e211.

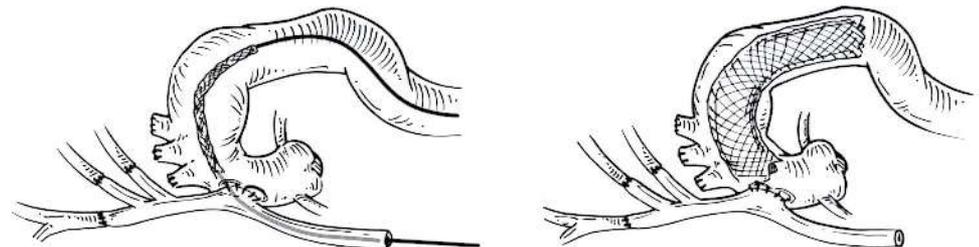
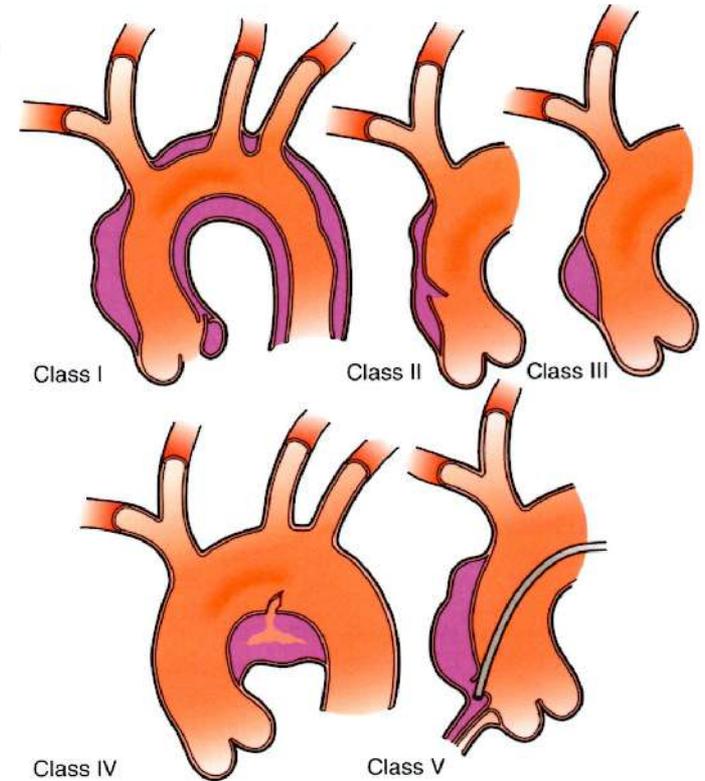
Nakamura Y, Tagusari O, Ichikawa Y, Morita A. **Impact of immediate aortic repair on early and midterm neurologic status in patients with acute type a aortic dissection complicated by cerebral malperfusion.** *Ann Thorac Surg.* 2011;92:336-338.

# Does the arch need to be treated and what is the treatment strategy?

- Destroyed or aneurysmatic arch
- Multiple entries and re-entries
- (Marfan-Syndrome)
- No arch
- Hemiarch
- Full Arch



- Cannulation strategy
- Option to treat supraaortic branches conventionally incl. trifurcated graft



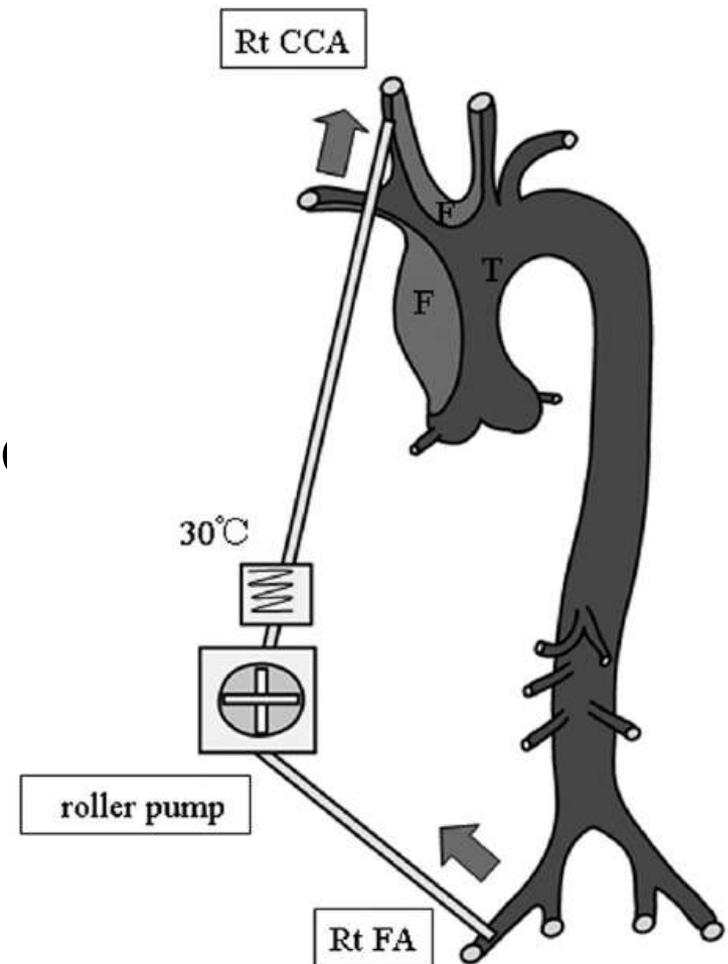
# Type A Dissection presenting as acute stroke - Early carotid reperfusion

CRS – “cerebral reperfusion system”

1. Early brain reperfusion through direct cannulation of the true lumen
2. Low-flow reperfusion before aortic repair to reduce brain ischemic-reperfusion injury

- 74 y/o, preop presentation with acute stroke, hemiplegia
- Early reperfusion via fem-right-carotid ECA circuit in emergency department
- Conventional ascending and hemiarch replacement afterwards
- Reduce ischemic interval (30 min vs. 2h)
- Reduce brain edema
- About 1/3 of normal CCA flow
- Good neurological and surgical outcome

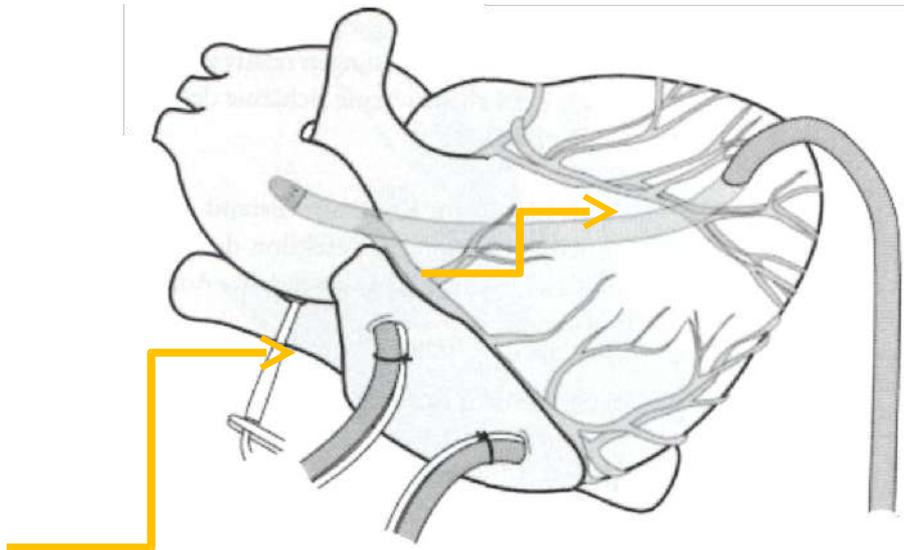
Munakata H, Okada K, Kano H, Izumi S, Hino Y, Matsumori M, Okita Y. **Controlled earlier reperfusion for brain ischemia caused by acute type A aortic dissection.** *Ann Thorac Surg.* 2009;87:e27-28.



# Alternative cannulation strategies for ascending aortic repair

Subclavian artery, innominate artery, carotid artery, dissected aorta, direct true lumen, femoral artery, left ventricular apex, left atrium

- Prefer techniques which guarantee true lumen perfusion
- Accept minimal prolongation of procedure
- Kiel **transatrial** arterial cannulation (Cremer, Kiel)
- Left **ventricular apex** cannulation (Kallenbach, Heidelberg)

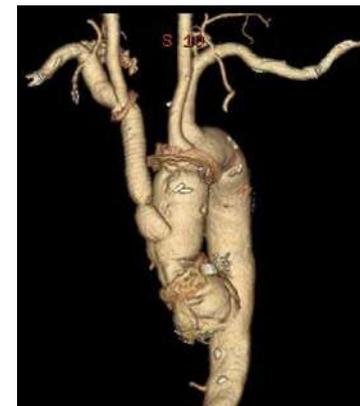
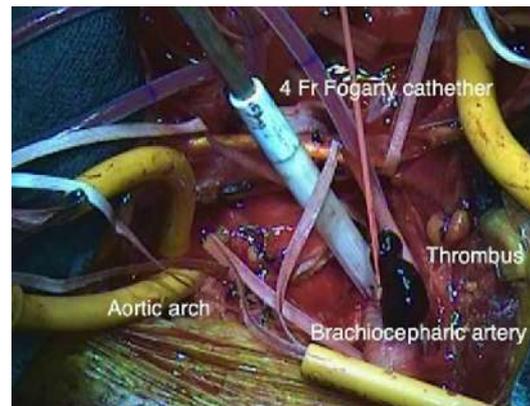
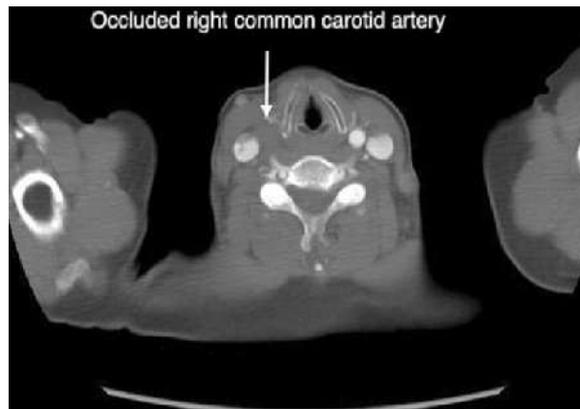


# Intraoperative thrombectomy for static occlusion due to thrombosis

- Two cases 57 and 89 y/o, carotid occlusion due to thrombus formation
- Cannulation for ascending aortic replacement: right femoral artery, Carotid thrombectomy using Fogarty catheter during DHCA
- No neuro deficits, but 1 died from mediastinitis and septic shock at day 18

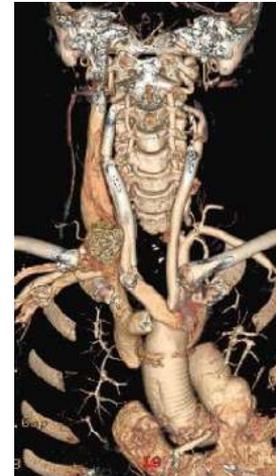
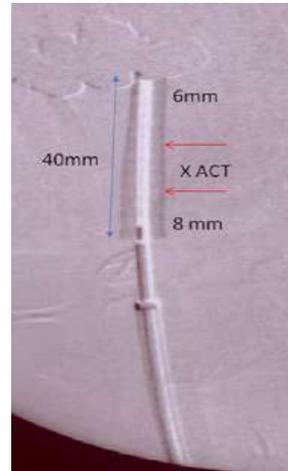
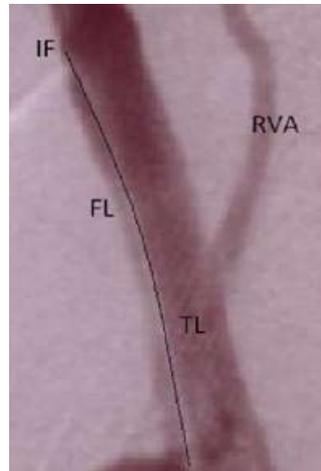
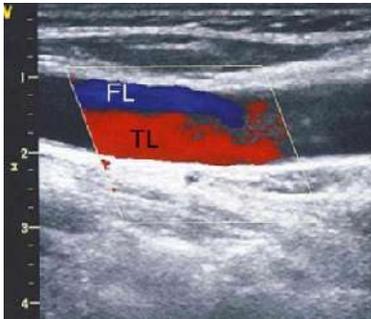
Authors recommend in cases of

- 1) absence of an intimal tear in the thrombosed carotid artery
- 2) total occlusion or severe stenosis
- 3) the presence of neurological signs and symptoms



# Carotid Stentgrafting in the setting of Type A Dissection

- 66 y/o, female
- V-SARR, cannulation left femoral artery, DHCA
- During awakening from anesthesia: complete left hemiplegia
- CT scan showed frontal ischemic area
- Sent to Neuro Rehab - Multiple hemispheric TIA
- Doppler: dynamic occlusion of right common carotid artery
- Nitinol-tapered stent from carotid bifurcation to internal carotid artery in order to exclude the dissection intimal flap
- Common carotid artery was treated using 2 carotid wall stents
- No more drop attacks, back to neuro rehabilitation unit in good condition



# Conclusions

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- Patient substrate to operate on still debatable
- Aortic surgery improves neurological symptoms in many patients
- Management of supra-aortic pathologies in Type A dissection:
  - Clinical presentation
  - Mode of occlusion
  - Strategy for aortic arch repair
- For patients presenting with severe stroke, early reperfusion needs to be established, maybe even preoperative
- Intraoperative thrombectomy can result in good outcomes in selected cases
- Arterial cannulation in conventional Type A repair should be adapted and methods guaranteeing true luminal flow should be chosen
- postoperative TIA or stroke due to multifactorial mechanisms in case of residual dissection can be treated endovascularly

Thank you