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70th ESCVS

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7th IMAD meeting

Clinical Response to Procedural Stroke Following Carotid Endarterectomy: A Delphi Consensus Study

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WHAT THIS PAPER ADDS

This study provides valuable insight into expert opinion regarding the optimal clinical management of a patient who experiences an in hospital stroke during or following CEA. Quick diagnostics should be performed initially in most phases, but re-exploration of the index carotid artery should be performed in patients who experience an ipsilateral intra-operative stroke during restoration of blood flow until the end of the CEA procedure. If diagnostics should be performed, an expedited CT brain combined with a CTA or duplex ultrasound of the carotid arteries is recommended.



- Disclosure: EJVES section editor

Long-term outcomes of stenting and endarterectomy for symptomatic carotid stenosis: a preplanned pooled analysis of individual patient data.

Brott TG¹, Calvet D², Howard G³, Gregson J⁴, Algra A⁵, Becquemin JP⁶, de Borst GJ⁷, Bulbulia R⁸, Eckstein HH⁹, Fraedrich G¹⁰, Greving JP¹¹, Halliday A⁸, Hendrikse J¹², Jansen O¹³, Voeks JH¹⁴, Ringleb PA¹⁵, Mas JL², Brown MM¹⁶, Bonati LH¹⁷; Carotid Stenosis Trialists' Collaboration.

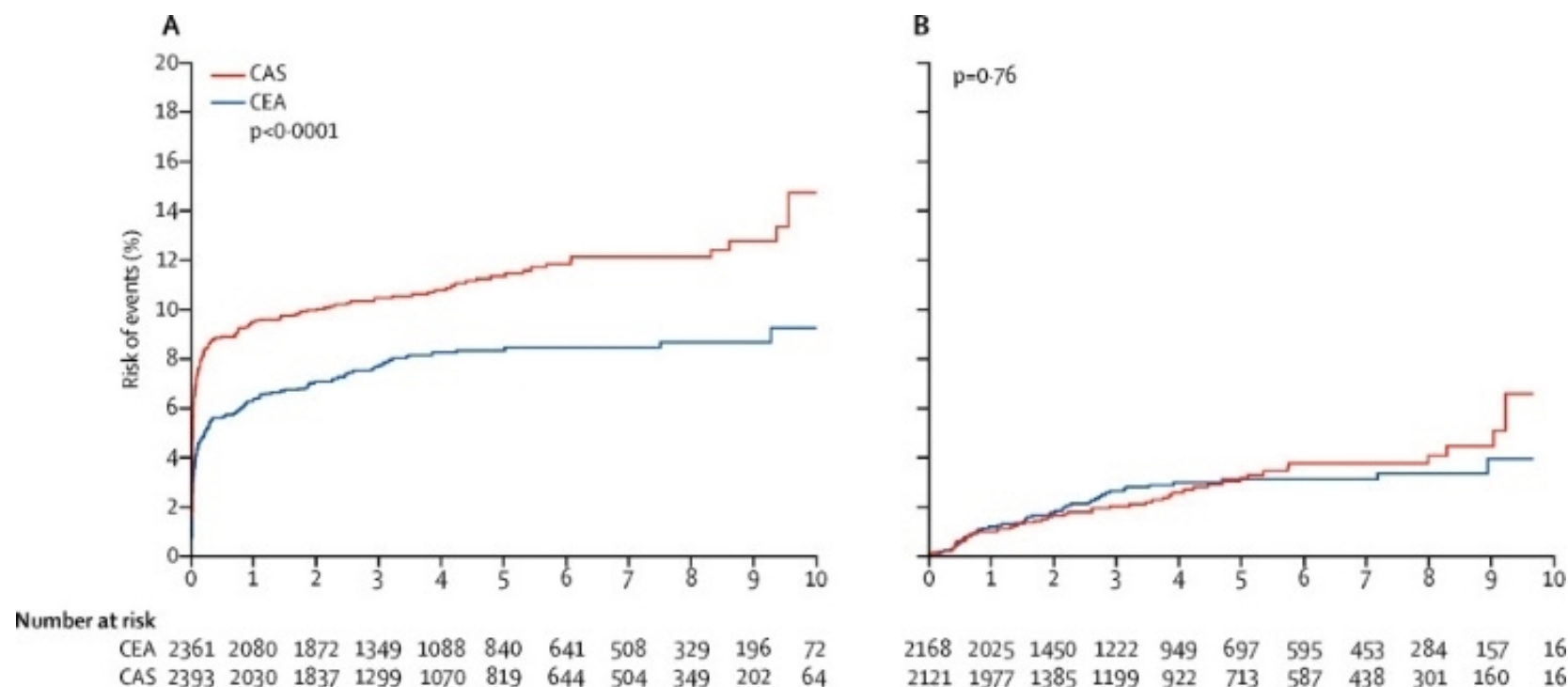


Figure 2: Kaplan-Meier estimates of risk of events for the primary outcome, postprocedural ipsilateral stroke, and the secondary outcomes of major stroke, minor stroke, and all stroke

(A) Primary outcome. (B) Postprocedural ipsilateral stroke. (C,D) Major stroke. (E,F) Minor stroke. (G,H) All stroke. The risk of events estimates are provided for all outcomes, including both periprocedural and postprocedural events on the left of the figure (A, C, E, G) and for postprocedural events only (ie, >120 days; B, D, F, H) on the right of the figure. p values are for treatment differences using the log-rank test. CAS=carotid artery stenting. CEA=carotid endarterectomy.

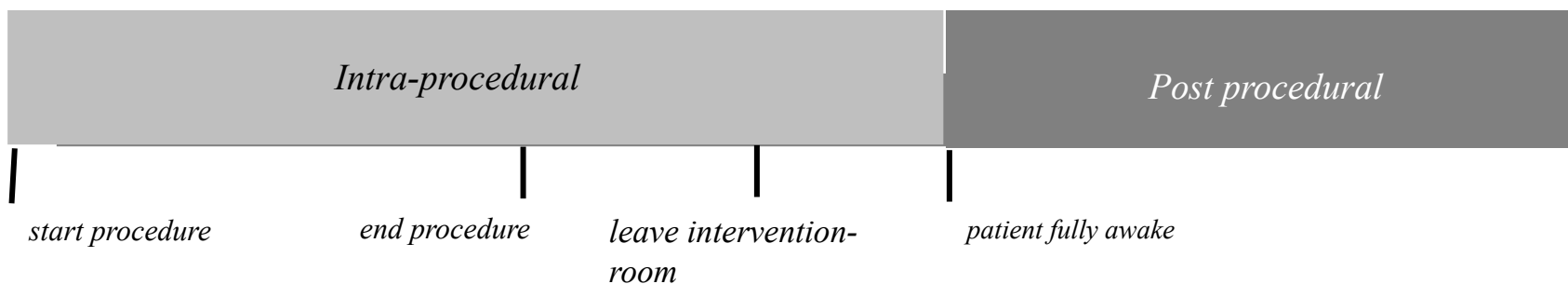
In the end.....it is all about the beginning !

**Periprocedural events dominate outcomes
of carotid stenting and endarterectomy**

	Symptomatic patients		Asymptomatic patients
	CEA (n=27)	CAS (n=58)	CEA (n=53)
Stroke type			
- ischaemic	21 (78)	56 (97)	43 (81)
- haemorrhagic	5 (19)	2 (3)	4 (8)
- unknown	1 (4)		6 (11)
Arterial Territory			
- ipsilateral	25 (93)	52 (90)	42 (79)
- contralateral / vertebrobasilar	2 (7)	4 (7)	9 (17)
- unknown		2 (3)	2 (4)
- Thrombo-embolism	12(45)	38 (62)	28 (56)

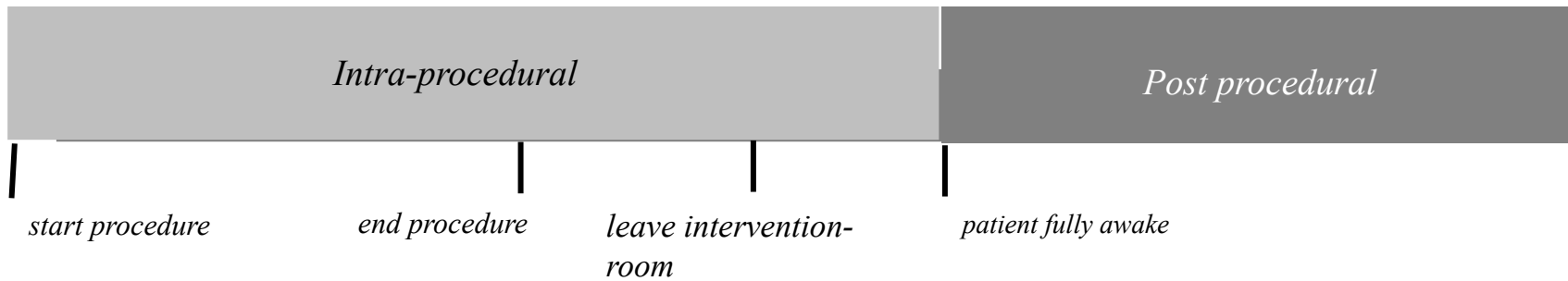
Timing of procedural stroke

*Procedure performed under **general anaesthesia** (symptom free interval)*

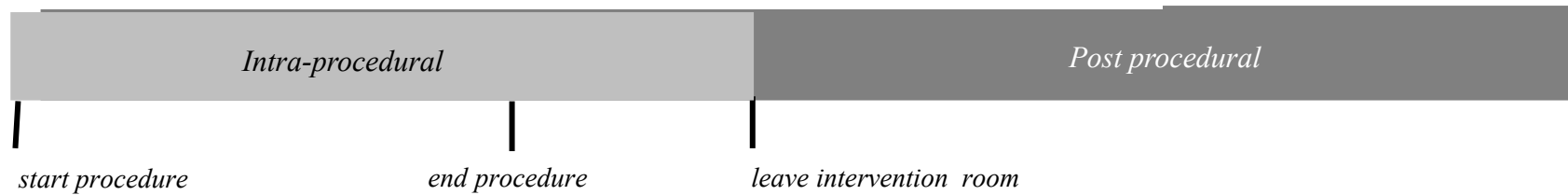


Timing of procedural stroke

*Procedure performed under **general anaesthesia** (symptom free interval)*



*Procedure performed under **local anaesthesia***



Etiology of *intra*-procedural stroke

- **Emboli**
 - unstable carotid plaque
 - manipulation (stent, dissection, shunt insertion)
 - cardiac emboli
 - Air embolisation (shunt dysfunction)
- **Hypoperfusion**
 - clamping, difficulty placing shunt, balloon dilation
 - hypotension (baroreceptor)
- **Thrombus**
 - shunt / artery thrombosis
 - secondary to hypotension

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- secondary to hypotension

Etiology post-procedural stroke

- **Emboli**
 - endarterectomized surface, intimal flap
 - external carotid artery
 - cardiac emboli
- **Hypoperfusion**
- **Hyperperfusion**
- **Thrombus**
 - surface thrombosis
 - disturbed haemostasis
 - technical errors

Etiology post-procedural stroke

- **Emboli**
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Aim

to develop a treatment algorithm if an in-hospital stroke occurred during or after CEA

Methods

- Delphi consensus study
- Multinational panel
- N=31
- Vascular surgeon or neurologist
- Expertise on stroke care
- 4 rounds

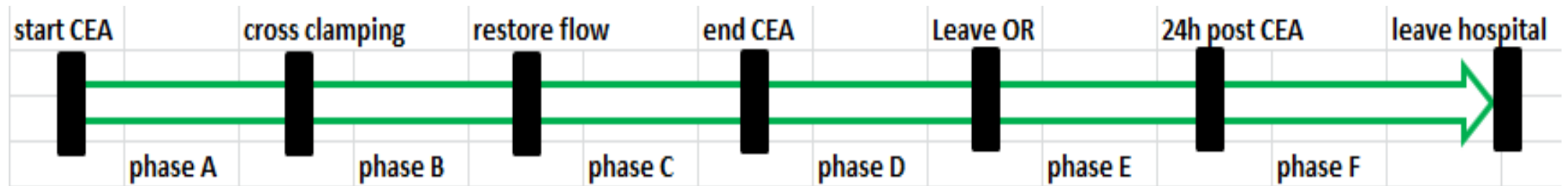
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H. Eckstein
P Glovizcki
A Halliday
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I Koncar
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D Radak
M Schermerhorn
H Sillessen
V Tolva
M Vega de Ceniga
F Vermassen
C Zeebregts
F Bastos Goncalves

J Bismuth
JM Antti
L Bonati
T Brott
D Calvet
S Engelter
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P Nederkoorn
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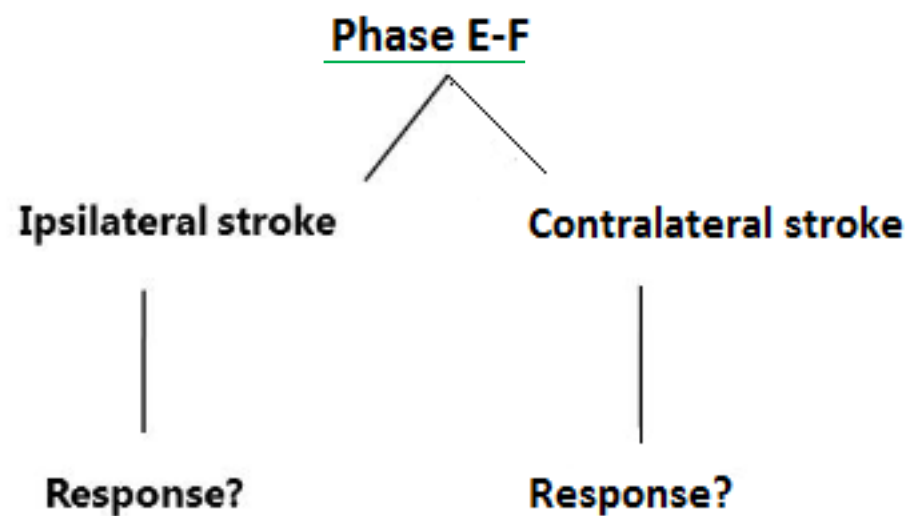
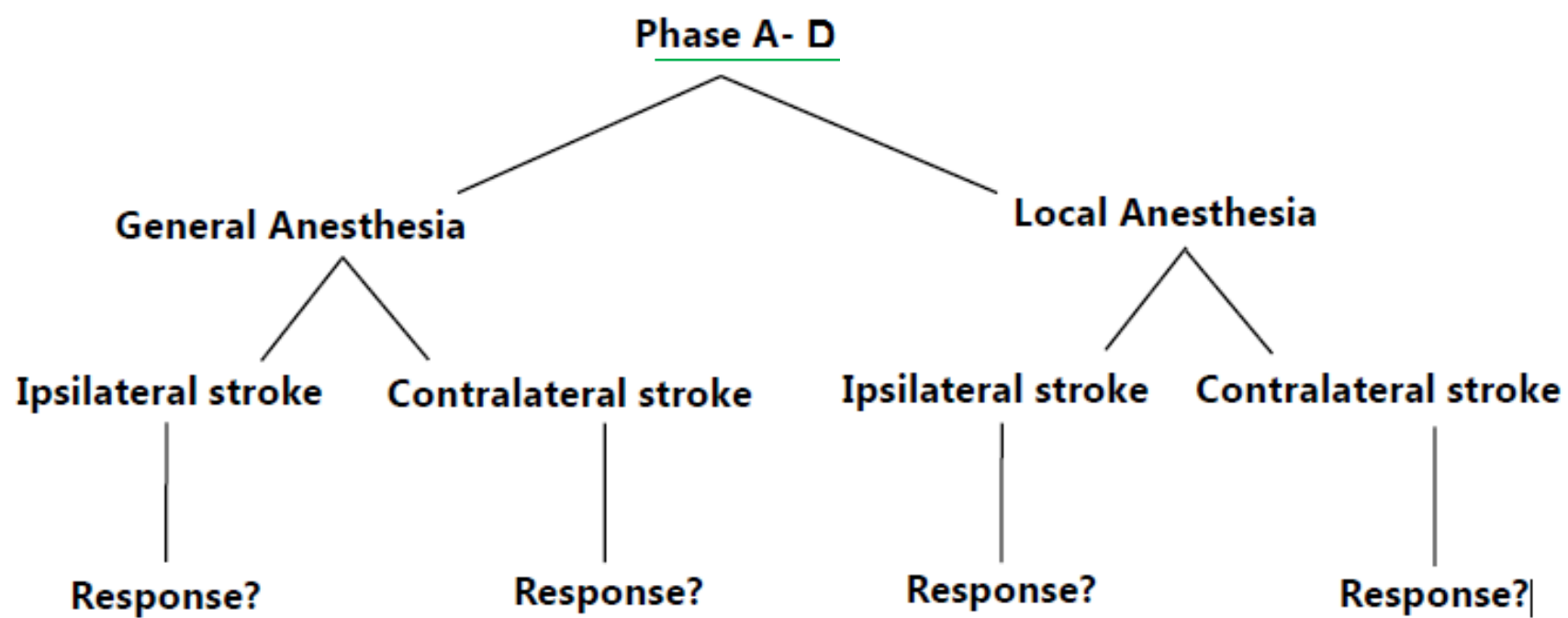
Methods – Round 1

Round 1

1. Traditional division sufficient ?



2. Clinical responses
3. Stroke characteristics that may influence the response



Methods – Round 2,3,4

- a) Perform diagnostics
- b) Re-open the carotid
- c) Wait and see

Results

Response rate

Round 1: 100%

Round 2: 90%

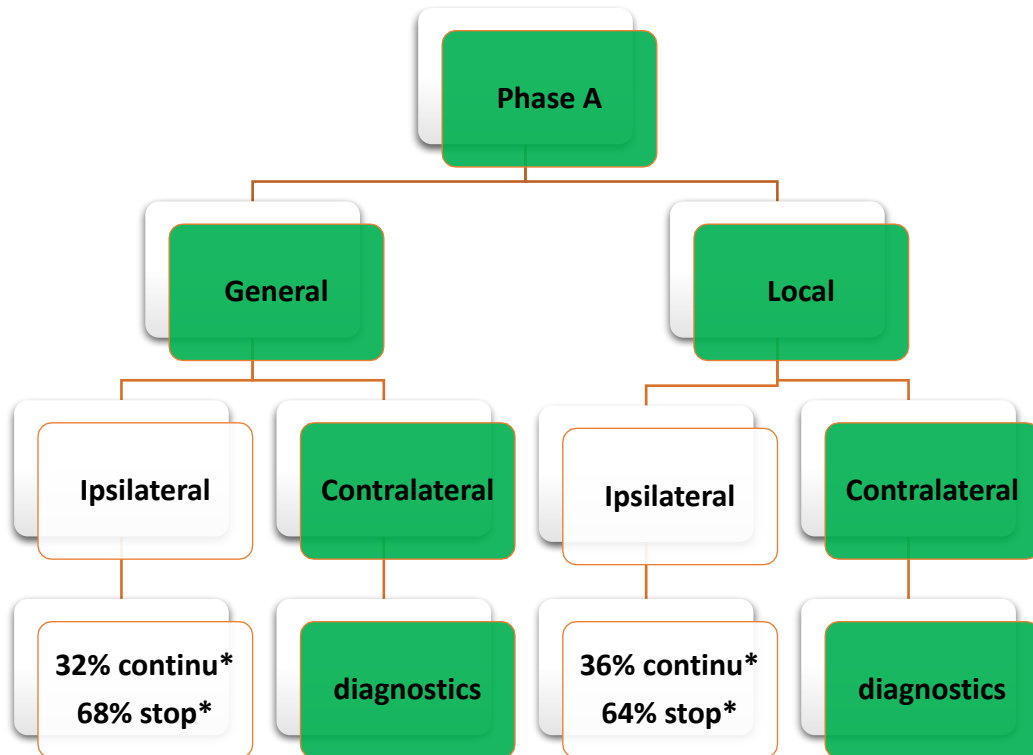
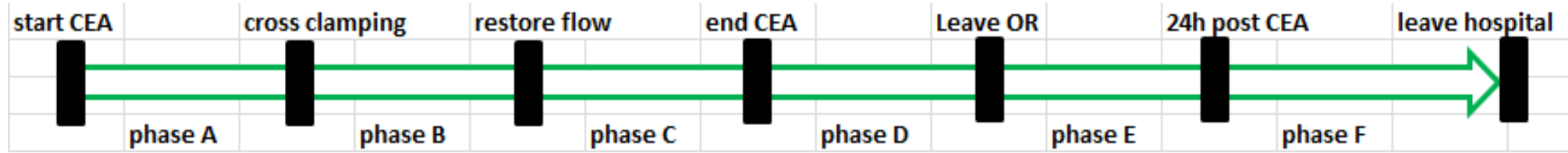
Round 3: 87%

Round 4: 77%

Consensus rate

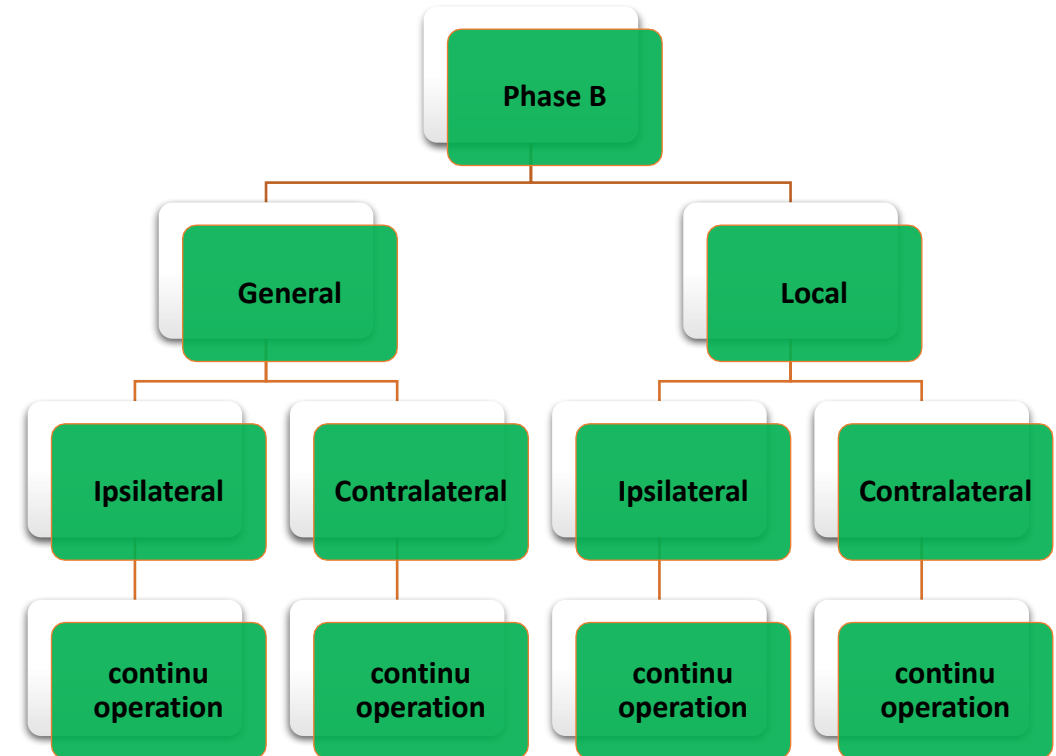
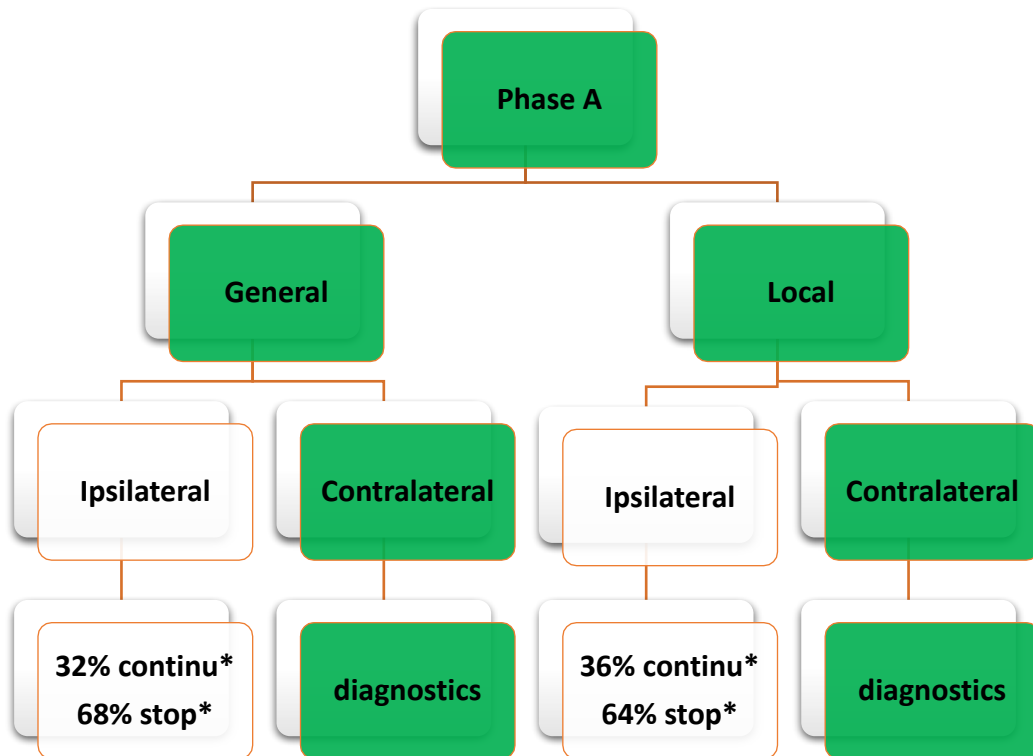
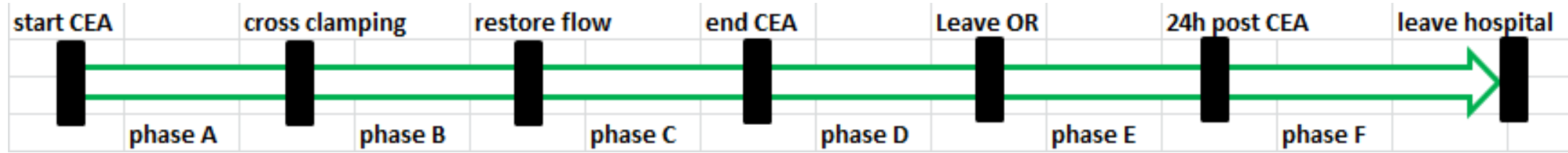
16/20 = 80%

Results



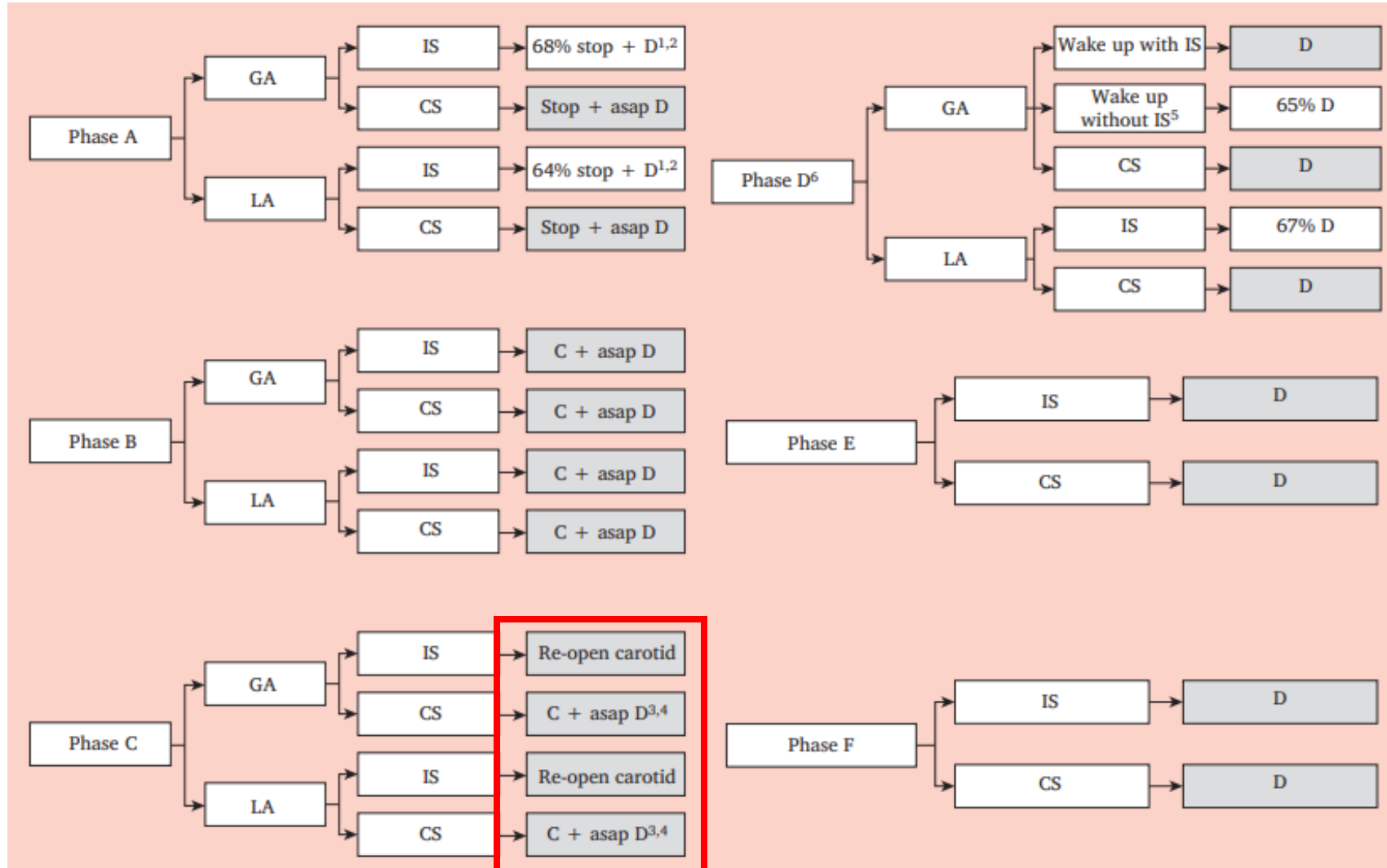
*Severe stroke: stop; mild stroke: continu

Results



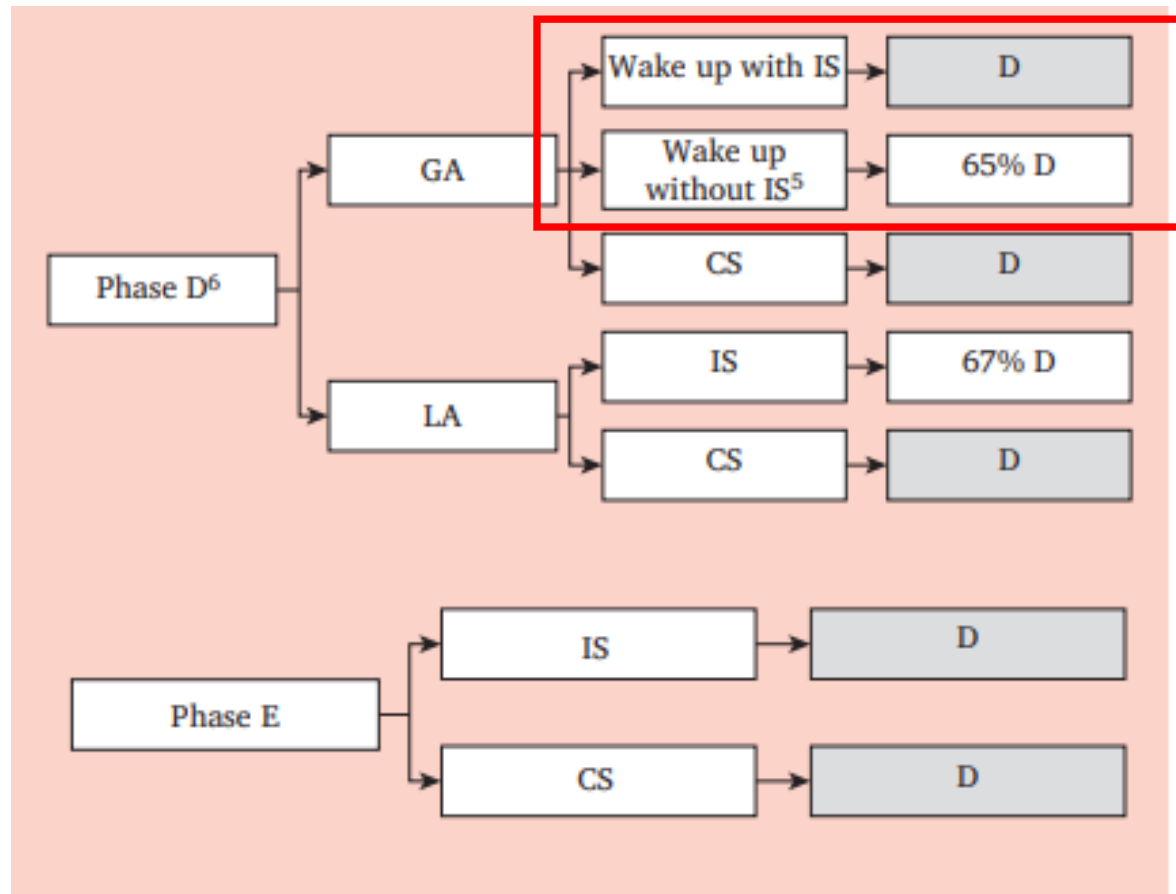
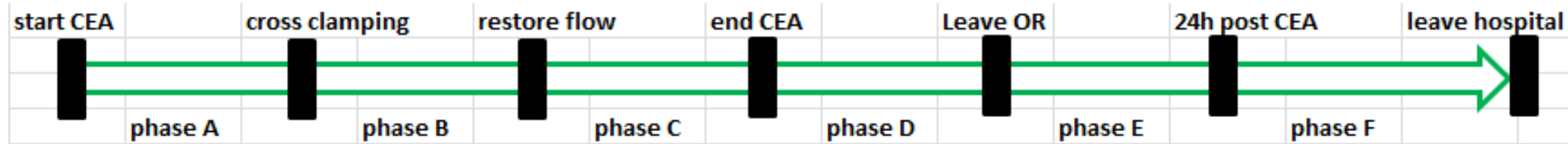
*Severe stroke: stop; mild stroke: continu

Treatment decision tree



- GA= general anesthesia
- LA= local anesthesia
- IS= ipsilat stroke
- CS=contralat stroke
- C = continue operation
- D = diagnostics

Post procedural stroke – Phase D

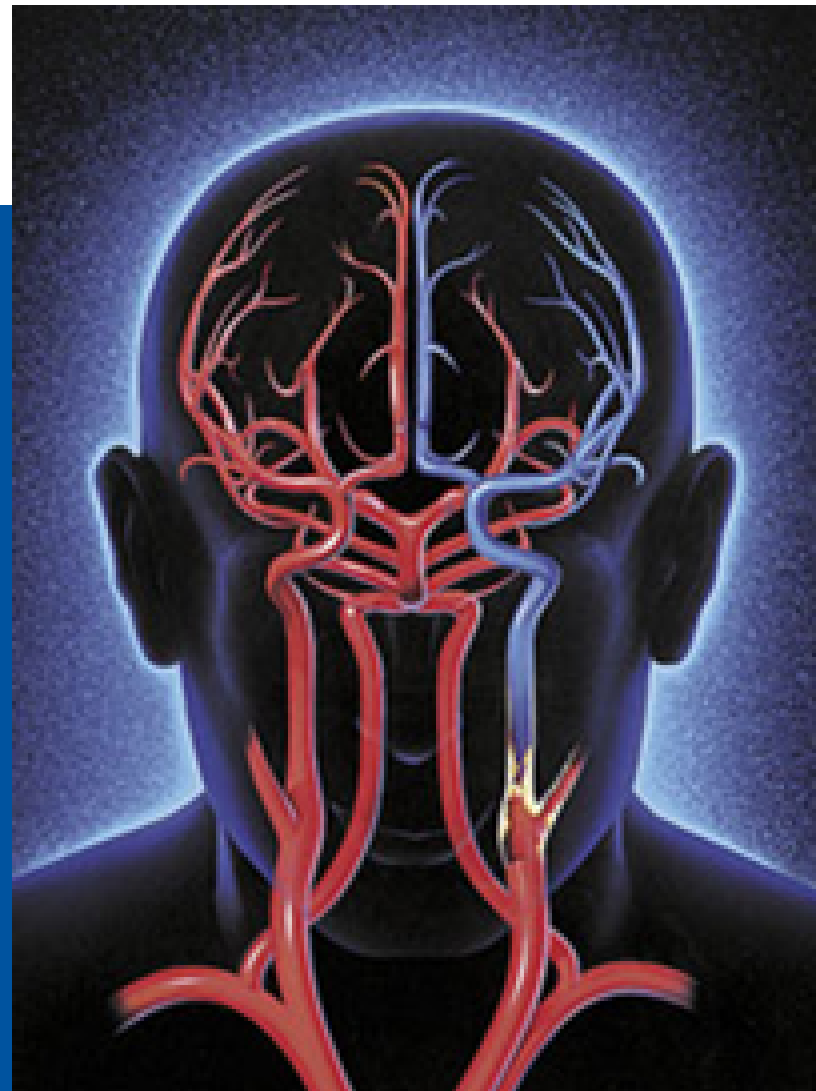


Conclusion

80% consensus for most phases

Conclusion: In patients having a stroke following carotid endarterectomy, expedited diagnostics should be performed initially in most phases. In patients who experience an ipsilateral intra-operative stroke following carotid clamp release, immediate re-exploration of the index carotid artery is recommended.

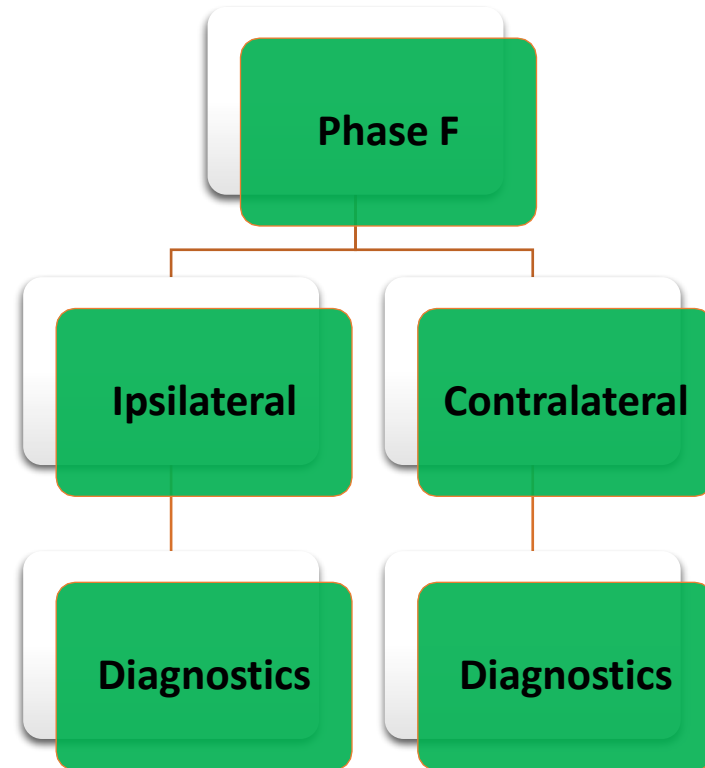
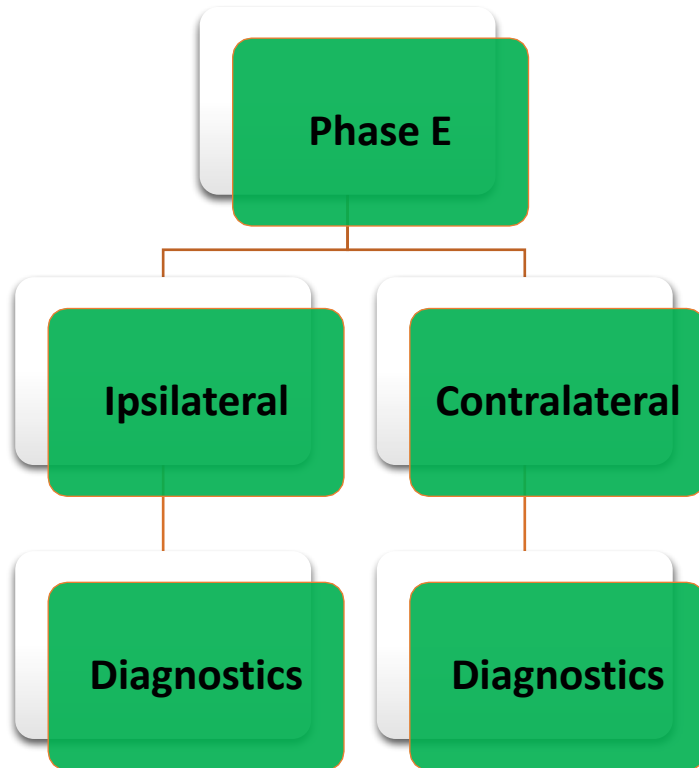
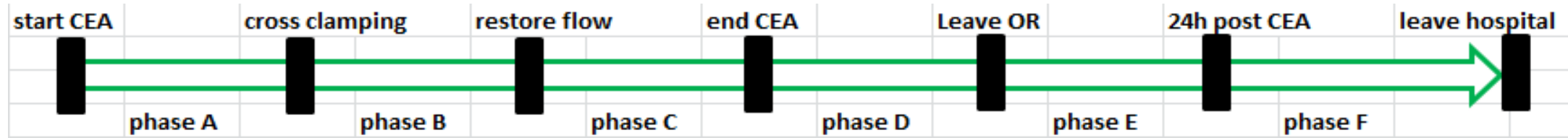
We would like to thank the Delphi consensus study panel!



“Be careful with my brain; it’s my second favourite organ”

Woody Allen

Results



Results

