Arterial pressure management during Carotid Endarterectomy under Regional anesthesia and neurological complications: a retrospective study

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Introduction: Carotid endarterectomy (CEA) is the surgical treatment for patients with high-grade carotid artery stenosis performed, either under general anesthesia (GA) or regional anesthesia (RA) to reduce the risk of stroke (1). Intraoperative neurological assessment, especially during carotid cross-clamping is mandatory and can be easily realized under RA in the awake patient. Moreover, during the procedure, hemodynamic control is predictable and hospital stay is consistently shorter compared to GA (2). The management of mean arterial pressure (MAP) during clamping in order to reduce risk of ischemic stroke is debated. Routine practice is to keep $MAP \geq 20\%$ above baseline to optimize collateral cerebral blood flow (1). In particular, MAP management under RA has been poorly investigated (3). The primary objective of this retrospective study was to evaluate the risk of neurological complications depending on different levels of MAP during carotid cross-clamping under RA (intermediate cervical block).

Echoguided cervical block

Materials and methods: After ethical committee approval, 77 patients operated for CEA between January 2014 and October 2017, were included in the study.

G1: $MAP_c < MAP_b$
G2: $MAP_b \leq MAP_c < MAP_b + 10\%$
G3: $MAP_b + 10\% \leq MAP_c < MAP_b + 20\%$
G4: $MAP_c \geq MAP_b + 20\%$

Primary endpoint: occurrence of minor (confusion, delirium, agitation) and major (TIA/stroke) neurological complications.

Secondary endpoints: renal and cardiac postoperative complications. (Anesthesia department and Intensive Care Unit records).

Statistical analysis: ANOVA, Tukey, Kruskal-Wallis, chi-square test. Patients characteristics were calculated as mean (SD), median (25th to 75th percentile), or frequency (%) as appropriate, $p < 0,05$.

References

1. Heyer EJ, and al.; Neurosurgery. 2014 Mar; 74(3):245-51.
2. Stoneham MD, and al. ; Br J Anaesth. 2015 Mar; 114(3):372-83.
3. Hoefer J, and al.; J Vasc Surg. 2015 Jul; 62(1):57-67.

Results

Fig 1: Minor neurological complications, were observed in 11.68% of all patients; **G1 (44.44%); G2 (33.33%); G3 (11.11%) and G4 (11.11%).** No statistically different.

Fig 2: 16 patients had RIFLE injury : **G1 (62.5%) ; G2 (25%) ; G3 (12.5%) ; G4 (0%).** No statistically different.

Variable	No neurological complications (n=68)	Neurological complications (n=9)	p-value
Ischemic heart disease	13/68 (19.12%)	5/9 (55.56%)	0.04462
Hypertension	52/68 (76.47%)	9/9 (100%)	0.231
Previous CABG	6/68 (8.82%)	2/9 (22.22%)	0.5114
Previous PTCA	6/68 (8.82%)	2/9 (22.22%)	0.5114
Hyperlipidemia	52/68 (76.47%)	9/9 (100%)	0.231
Diabetes mellitus	18/68 (26.47%)	3/9 (33.33%)	0.9711
Cognitive disorders	8/68 (11.76%)	2/9 (22.22%)	0.7268
Antihypertensive - overall	49/68 (72.06%)	9/9 (100%)	0.1568
Antihypertensive - Ca blockers	22/68 (32.35%)	8/9 (88.89%)	0.003676
Antihypertensive - ACE inhibitor ARB	36/68 (52.94%)	7/9 (77.78%)	0.2924
Antihypertensive - Diuretic	11/68 (16.18%)	1/9 (11.11%)	1.000
Insuline	4/64 (5.88%)	3/9 (33.33%)	0.03798
Serum creatinine	0.85 [0.74 - 1.04]	1.11 [0.88 - 1.48]	0.03632

Table 1: In a multivariate logistic regression model, history of ischemic heart disease, antihypertensive therapy, insulin use and serum creatinine were independently associated with minor neurological complications; respectively $p = 0,044$; $p = 0,003$; $p = 0,037$; $p = 0,036$.

Conclusion: We could not find statistical differences between the 4 groups concerning primary outcome.

Nevertheless we did observe a tendency in favour of keeping MAP above $>10\%$ baseline, in order to minimize neurological complications.

History of ischemic heart disease, antihypertensive therapy, insulin use and serum creatinine are independent risk factors for neurological complications.