The prevalence of cardiovascular autonomic neuropathy and its influence on post induction hemodynamic variables in patients with and without diabetes; a prospective cohort study

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Introduction

Cardiovascular autonomic neuropathy (CAN) is a known complication of diabetes, but is also diagnosed in patients without diabetes. CAN may be related to perioperative hemodynamic instability. Our objective was to investigate if patients with diabetes would have a higher prevalence of CAN compared to patients without diabetes undergoing surgery. We further studied its relation to changes in post-induction hemodynamic variables.

Methods

We prospectively included 82 adult patients, 55 with DM, 27 without DM, scheduled for major abdominal or cardiac surgery. CAN was assessed with the Ewing’s testbattery and with the baroreflex sensitivity (BRS). Patient performed the four tests of the testbattery on the day before surgery.

- Primary outcomes were the prevalence of CAN and the relation between CAN and severe post-induction hypotension, defined as mean arterial pressure (MAP) < 50 mmHg or ≥ 50% decrease from baseline.
- Secondary outcomes were the relation between CAN, intraoperative hypotension, MAP < 65 mmHg for more than 13 minutes, and the use of vasopressor therapy. Furthermore, the relation between the stages of CAN according to the testbattery and the BRS were evaluated.

Table 1: Patient characteristics

	All patients (n=82)	Diabetes + (n=55)	Diabetes – (n=27)	p-value
Male	58 (70.7)	36 (65.5)	22 (81.5)	.134
Age (years)	63 (11)	64 (10)	62 (12)	.499
ASA classification status				.064
ASA II	34 (41.5)	21 (38.2)	13 (48.1)	
ASA III	46 (56.1)	34 (61.8)	12 (44.4)	
History of:				
Hypertension	43 (52.4)	35 (63.6)	8 (29.6)	.004
Myocardial infarction	20 (24.4)	16 (29.1)	4 (14.8)	.157
Aorta valve stenosis	18 (22.0)	10 (18.2)	8 (29.6)	.239
Malignancy	27 (32.9)	17 (30.9)	10 (37.0)	.579
Diabetes	55 (67.1)			
Type of surgery				.941
Cardiac surgery	39 (47.6)	26 (47.3)	13 (48.1)	
Abdominal surgery	43 (52.4)	29 (52.7)	14 (51.9)	
Duration of surgery (min)	222 (78)	215 (73)	236 (87)	.258

Results

The prevalence of CAN in patients with or without DM was 71% versus 63%, (p=0.437, figure 1). CAN was not associated with severe post induction hypotension (CAN+ vs. CAN–: 21% vs. 19.2%, p=0.819) nor with intraoperative hypotension (16% vs. 15%, p=0.937). Patients with CAN received more norepinephrine in the postoperative period (0.06 mcg/kg/min (IQR 0.04 – 0.13) vs. 0.04 (IQR 0.02 – 0.05) p=0.033). The results of the testbattery and the BRS correlated well (figure 2).

Figure 1. Prevalence of CAN
Left panel: patients with DM (n=55), right panel: patients without DM (n=27) p=0.437

Figure 2. Level of agreement between stages of CAN according to the testbattery and BRS

Conclusion

The majority of patients studied had mild to moderate CAN, regardless of the presence of DM. Assessing CAN before surgery did not identify patients at risk for post induction and intraoperative hypotension in our cohort.