TITLE: METABOLIC AND ENDOCRINE RESPONSES TO GENERAL ANESTHESIA AND SURGERY IN THE DIABETIC PATIENT.

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The aim of this prospective study was to evaluate the metabolic and endocrine responses, to general anesthesia and surgical stress, in diabetic and non diabetic patients.

Following institutional approval, 10 diabetic patients (group A) and 10 non diabetic patients (group B) undergoing general anesthesia for elective operative procedures (vitrectomy) before 10 a.m., were compared. Patients were matched with regard to sex, age, body surface area and treatment for cardiovascular disease. The two groups were comparable for premedication and anesthetic agents (thiopental, enflurane, vecuronium). In group A insulin was supplied by a continuous infusion (1.25 U/h). The study began just before induction and finished two hours after surgery. Blood glucose levels were measured every 15 min. Serum lactates, pyruvates, ketone bodies, insulin, C peptide and counterregulatory hormones were measured on three occasions: before induction (Sample 1: S1), midway through surgery (S2) and in the recovery period (S3). Comparisons were performed using the student t-test.

In spite of an increase of blood glucose level (mean±sem) before induction in group A (8.3 ± 1 mmol/l) versus B (5.5 ± 0.4 mmol/l) mean of blood glucose level measured every 15 min were comparable in two groups. No significant differences were noted for serum lactates, pyruvates, ketone bodies, cortisol and GH. On the contrary, the level of glucagon is always higher in group A than in group B and, of more interest, while epinephrine level has the same evolution, norepinephrine has not: at the recovery period its level was more than three times higher in group B than in group A ($p<0,05$)(table).

We conclude that, while most of the metabolic and hormonal responses to anesthesia and surgery have the same profile in the diabetic and non diabetic patients, glucagon and norepinephrine have not. For norepinephrine, its low level during the recovery period in the diabetic patient could be explained by the presence of a diabetic autonomic neuropathy.

		S1	S2	S3
Glucagon ng/l	A	118.2±24 *	108.8±21 *	116.2±21
	B	60.7±8	46.2±8	89.1±30
Cortisol µmol/l	A	0.41±0.07	0.33±0.13	0.52±0.13
	B	0.38±0.07	0.26±0.5	0.31±0.08
GH µg/l	A	3.5±1.9	8.4±3.8	13.2±5
	B	3.7±1.47	8.6±3.3	5.65±2
Norepinephrine nmol/l	A	1.94±0.3	1.3±0.2	1.9±0.3 *
	B	2.04±0.3	1.4±0.1	6.8±1.8
Epinephrine nmol/l	A	0.38±0.08	1.52±1	0.58±0.12
	B	0.36±0.04	0.42±0.1	0.7±0.11

* $p<0.05$

A249

TITLE: INFLUENCE OF TYPES OF DIABETES MELLITUS AND INSULIN THERAPY ON METABOLIC AND ENDOCRINE PARAMETERS DURING ANESTHESIA AND SURGERY.

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The aim of this prospective randomized study was to evaluate the effect of two types of insulin therapy (continuous intravenous infusion vs direct intravenous bolus, DIV bolus) on the metabolic and endocrine responses to general anesthesia and surgery on the two types of diabetic patients: insulin-dependent (IDDM) and non-insulin-dependent diabetes mellitus (NIDDM).

After institutional approval and informed consent had been obtained, 58 adult diabetics (32 IDDM, 26 NIDDM) undergoing general anesthesia for elective procedures (abdominal and orthopedic surgery, vitrectomy) before 10 a.m. were studied. Patients with preoperative glucose imbalance (blood glucose> 16.5 mmol/l or < 3.3 mmol/l) were excluded. By randomization insulin was supplied by 1.25 U/h in continuous IV infusion (12 NIDDM, 16 IDDM) or by DIV bolus, 10 U every two hours (14 NIDDM, 16 IDDM). In all groups glucose supply was 125 ml/h of 5% glucose; if intraoperative blood sugar exceeded 11 mmol/l an additional 5 U bolus was administered. The study began just before induction and finished two hours after surgery. Blood glucose levels were measured every 15 min with glucose reagent strips. Serum lactates, pyruvates, ketone bodies, insulin, C peptide, counterregulatory hormones were measured on three occasions: before induction (sample 1: S1), midway through surgery (S2) and in the recovery period (S3). Sex, severity and duration of operation, blood glucose level before induction and HbA1C were comparable in both groups. Comparisons were performed using a two way-ANOVA ($p<0.05$).

Mean blood sugar values were comparable between IDDM and NIDDM (F1: IDDM vs NIDDM) whatever insulin therapy was used (F2: continuous infusion vs DIV bolus) and there were no interactions (I: F1 vs F2) between these two factors (table). There were no statistically significant differences for the other metabolic and endocrine data.

We conclude that during the perioperative period there are no significant differences in the metabolic and endocrine responses to surgical stress between IDDM and NIDDM: wathever the technique used, continuous infusion or DIV bolus, it's not necessary to modify insulin therapy according to type of diabetes.

		continuous infusion	DIV bolus	F1	F2	I
S1	IDDM	7.47±0.86	8.42±0.65	N	N	N
	NIDDM	7.79±0.70	7.86±1.05	S	S	S
S2	IDDM	8.63±0.41	7.12±0.52	N	N	N
	NIDDM	8.13±0.53	8.58±0.90	S	S	S
S3	IDDM	8.22±0.67	8.40±0.38	N	N	N
	NIDDM	8.08±0.44	8.38±0.70	S	S	S

Blood glucose (mmol/l, mean ±sem)