EFFECTS OF NEUROMUSCULAR BLOCK REVERSAL WITH SUGAMMADEX VERSUS NEOSTIGMINE ON POSTOPERATIVE RESPIRATORY OUTCOMES AFTER MAJOR ABDOMINAL SURGERY. A RANDOMIZED CONTROLLED TRIAL.

Alday E., Muñoz M., Mata E., Alvarez C., Planas A. Hospital Universitario La Princesa, Madrid, Spain.

Background: Postoperative pulmonary complications may be reduced when neuromuscular block is reverted with sugammadex due to a lower incidence of residual block and to impairment of diaphragm function after neostigmine administration.

Objectives: The aim of the study is to compare lung function after major abdominal surgery when reversal of neuromuscular blockade is carried out with sugammadex or neostigmine.

Design: A randomized controlled trial.

Setting: A tertiary teaching hospital in Spain.

Patients: Adults scheduled for major abdominal surgery under combined general and epidural anaesthesia with no contraindications for any of the study drugs.

Interventions: Spirometry and lung ultrasound were performed before surgery and one hour and 24 hours postoperatively. Differences in mean changes from baseline were analyzed with repeated measures ANOVA.

Main outcomes measures: Forced vital capacity (FVC) loss, rate and size of atelectasis one hour after surgery in patients reverted with 40µg/kg of neostigmine versus 4mg/kg of sugammadex.

Results: One hundred and twenty-six patients were included for the main analysis.

	Neostigmine (n=64)	Sugammadex (n=62)
Surgery procedure n (%)		
Gastric/small bowel n (%)	7 (10.94)	6 (9.67)
Liver resection n (%)	7 (10.94)	8 (12.9)
Pancreatic resection n (%)	6 (9.38)	4 (6.45)
Colorectal n (%)	41 (64.06)	39 (62.9)
Others n (%)	3 (4.68)	5 (8.06)
Surgical approach		
Laparoscopic n (%)	39 (60.94)	30 (48.39)
Open surgery n (%)	25 (39.06)	32 (51.61)
Anesthetic management		
tV ml/kg mean ±SD	8.06±1.12	8.09±1.19
PEEP mean ± SD	7.68±5.6	7.70±2.49
FiO ₂ (mmHg) mean ± SD	0.51±0.7	0.52±0.9
Rocuronium dose (mg) media ± SD	112.45±41.4	125.56±39.06
Reversal drug dose (µg/kg or mg/kg) mean ± SD	39.33±2.7	3.96±0.43
Intraoperative balance (ml/kg/h) mean ±SD	5.93±4.24	5.15±2.87
Surgery duration (min) mean ± SD	216.95±97.20	230.40±105.46
TOF=0 before reversal n (%)	3 (4.76) *	13 (21.31) *
Residual NMB (TOF<90%) n (%)	45 (71.73) **	19 (31.15) **
Residual NMB (TOF<70%) n (%)	11 (17.46)	4 (6.53)
tV: Tidal volume adjusted to ideal weight, PEEP: positive end expiratory pressure, FiO ₂ : fraction of inspired oxygen, Intraoperative balance= (crystalloids (ml)+colloids (ml)+hemoderivatives (ml)-urine output (ml)-bleeding (ml)) / (surgery duration (hours)) X (Weight (kg)), TOF: Train of four. NMB: neuromuscular block defined as TOF<90% immediately after extubating.		
* p-value =0.007 ** p-value<0.001		

	Neostigmine		Sugammadex	
	1 st hour (n=64)	24 hours (n=61)	1 st hour (n=62)	24 hours (n=58)
VAS =0 n (%)	39 (60.94)	24 (39.34)	32 (51.61)	34 (58.6)
VAS 1-4 n (%)	22 (34.38)	27 (44.6)	33 (35.48)	17 (29.31)
VAS 5-7 n (%)	3 (4.69)	10 (16.39)	7 (11.29)	7 (12.07)
VAS 8-10 n (%)	0 (0)	0 (0)	1 (1.61)	0 (0)

VAS: Visual analogic scale.

Postoperative pain

	Basal FVC (l) mean ±SD (CI _{95%})	1 st hour FVC (l) mean ±SD (CI _{95%})	24 th hours FVC (l) mean ±SD (CI _{95%})
Neostigmine n=64	2.98 ± 0.13 (2.76 - 3.24)	2.5 ± 0.12 (2.27 - 2.74)	2.23 ± 0.11 (2.01 - 2.46)
Sugammadex n=62	3.02 ± 0.13 (2.76 - 3.29)	2.58 ± 0.12 (2.35 - 2.81)	2.22 ± 0.11 (1.99 - 2.44)

Evolution of FVC in both groups.

	Neostigmine		Sugammadex	
	1 st hour	24 th hours	1 st hour	24 th hours
Atelectasis (n, %)	24 (39.34%)	43 (74.14%)	18 (29.51%)	39 (66.1%)
Size (cm ²)	14.8 (CI _{95%} : 6.58-22.03)	19.07 (CI _{95%} : 13.98-24.16)	8.0 (CI _{95%} : 5.78-10.22).	18.93 (CI _{95%} : 13.55-24.31)

Postoperative lung ultrasounds

Conclusions: We could not find differences in pulmonary function after reversal with sugammadex or neostigmine in a high-risk population.