Does the depth of neuromuscular blockade influence surgical conditions during paediatric laparoscopic surgery?

Preliminary results of a randomized controlled study

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Introduction

Muscle relaxants, including cisatracurium and rocuronium, are a necessary part of laparoscopic surgery even in paediatric patients. The aim of the PedLapBlock trial is to investigate whether the depth of the muscle relaxation can improve the quality of the surgical field and thus increase the comfort of the surgeon.

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NCT02546843

Materials and Methods

Since February 2016, we have randomly assigned eligible patients between 2 years 0 days and 17 years 364 days of age, who were planned for laparoscopic surgery, in two groups according to the depth of neuromuscular blockade. Group A received rocuronium (starting dose 0.6 mg/kg, boluses 0.3 mg/kg) to induce and maintain deep neuromuscular blockade (train-of-four count [TOF] 0 and post-tetanic count [PTC] 1) followed by sugammadex reverse (2-4 mg/kg, depending on TOF). In Group B, intermediate neuromuscular blockade (TOF 1-2) produced by cisatracurium (starting dose 0.15 mg/kg, boluses 0.03 mg/kg) was reversed using neostigmine (0.03 mg/kg) and atropine (0.02 mg/kg). To assess surgical conditions during laparoscopy, a 5-point scoring system (from 1=optimal to 5=extremely poor conditions) was adopted. Means were compared using t-test.

Results (as of December 7, 2016)

	Patient	Muscle relaxant [mg]	Reversal [mg]	Age [years]	Weight [kg]	ASA	Mallam-pati	Laparo-scopy	Capnoperitoneum		Time to first EtCO ₂ wave [s]	Last stitch to extubation* [s]	Satisfaction of surgeons (1-5)
									pressure [mmHg]	duration [min]			
Group A	1	ROC 50	Sug 120	16	58	1	1	APPE	10	31	66	214	1
	3	ROC 60	Sug 100	13	56	2	1	SPLE	10	68	77	520	2
	4	ROC 45	Sug 100	13	47	1	1	APPE	10	25	128	676	3
	5	ROC 60	Sug 80	5	20	1	1	PYE	8	188	70	907	1
	6	ROC 50	Sug 120	15	60	1	1	APPE	10	30	123	767	1
	9	ROC 30	Sug 140	8	35	1	1	APPE	8	21	147	809	2
	12	ROC 30	Sug 200	16	55	1	2	APPE	9	17	157	840	1
	17	ROC 45	Sug 200	12	48	1	N/A	APPE	10	16	168	903	1
	18	ROC 40	Sug 200	16	56	1	2	APPE	7	39	129	671	1
Mean				12,7	48,3	1,1	1,3		9,1	48,3	118,3	700,8	1,4
Standard deviation				3,7	12,4	0,3	0,4		1,1	51,6	36,2	208,2	0,7
Group B	2	CIS 10	N 2 , A 1	17	65	1	1	APPE	12	30	162	1309	1
	7	CIS 13	N 2 , A 1	15	70	1	1	PYE	9	30	236	1629	1
	8	CIS 11	N 2 , A 0.75	17	75	2	1	CHCE	12	22	138	1089	1
	10	CIS 7	N 1 , A 0.5	12	42	1	2	APPE	10	50	156	659	2
	11	CIS 18	N 2 , A 0.9	16	90	1	2	APPE	8	45	162	620	1
	13	CIS 7.5	not used	15	50	1	2	APPE	10	59	108	692	1
	14	CIS 6	N 1.5, A 0.75	11	50	1	1	APPE	12	32	286	1138	2
	15	CIS 4	N 1, A 0.5	9	37	1	1	APPE	9	27	170	549	1
	16	CIS 8	N 0.5, A 0.5	13	53	2	2	APPE	10	28	175	1091	1
	19	CIS 9	N 1.5, A 1	14	52	1	2	APPE	9	17	170	1188	1
	20	CIS 6	N 1, A 0.5	17	47	1	2	APPE	10	14	190	1186	1
Mean				14,2	57,4	1,2	1,5		10,1	32,2	177,5	1013,6	1,2
Standard deviation				2,6	15,1	0,4	0,5		1,3	13,2	45,5	323,8	0,4
T-test comparison				p=.30	p=.16	p=.54	p=.36		p=.08	p=.33	p<.01	p=.02	p=.43

* time from the last skin stitch to extubation, roughly corresponding to recovery time from neuromuscular blockade
Abbreviations: ROC, rocuronium; CIS, cisatracurium; Sug, sugammadex; N, neostigmine; A, atropine; N/A, not available; APPE, appendectomy; SPLE, splenectomy; PYE, pyeloplasty; CHCE, cholecystectomy

Conclusion

The presented preliminary results show that both levels of neuromuscular blockade (deep versus intermediate) are feasible in paediatric patients undergoing laparoscopic surgery.