Prolonged recovery time of PTC 1 to TOF ratio100% from rocuronium-induced muscle relaxation in patients with severe chronic kidney disease after receiving sugammadex in sevoflurane anaesthesia.

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Bachground

It is well known that renal dysfunction, estimated by plasma creatinine concentrations, increased the risk of residual neuromuscular block(RNMB)induced by rocuronium and that there are possibly no relationships between the dose of Sugammadex(SGDX) and recovery from neuromuscular block under renal dysfunctions under various degrees. However, there are no reports, based on the renal function estimated by Glomerular Filtrating Ratio (eGFR),on the relationship between RNMB and renal dysfunction during of sevoflurane (SEV) anaesthesia. Therefore, based on the chronic kidny disease (CKD) severity classification by eGFR, we examined the effect of the SGDX towards the rocuronium in patients under SEV anaesthesia was evaluated by comparing the time required for recovery by determining the time interval between Post tetanic count (PTC) 1 and Train of four (TOF) ratio 100% using TOF monitoring.

Method

We selected twenty-nine adult patients for present study in our hospital, underwent surgery under general anaesthesia. We divided the patients into 2groups.

R group : eGFR values<15

Patients with the severe CKD group. All patients currently undergoing dialysis. (n=14)

N group : eGFR values>90

Control group comprising of patients with normal renal function. (n=15)

Anaesthesia was induced in both groups with 2mg/kg propofol and 0.8mg/kg rocuronium for tracheal intubation and maintained with SEV anaesthesia. The PTC1 state was sustained by administration of an appropriate rocuronium dosage. After confirming the PTC1 value at the end of the surgery, pure oxygen was administered, and then 4mg/kg SGD_X was slowly intravenously injected over 5s. The time interval between PTC1 and TOF ratio 100% was measured. We use the TOF-watch (T.X.)SX [Organon (Ireland) Ltd.].

Patient characteristics

	N (control)group n=15	R (severe CKD)group n=14	P value
Age(year)	60.4±13.0	65.3±15.9	0.37
Sex	M(10):F(5)	M(8):F(6)	0.60
Height(cm)	160.7±9.0	148.4±26.8	0.10
Weight(kg)	63.3±10.2	57.6±16.4	0.27
ASA physical status I/II/III/IV/V	9/6/0/0/0	0/0/13/1/0	
Anesthesia time(min)	185.1±125.0	155.2±69.1	0.44
Operation time(min)	124.6±118.7	93.4±57.6	0.38
Rocuronium(mg)	101.7±41.7	71.8±20.5	0.02
Sugammadex(mg)	246.7±41.3	226.4±62.3	0.31
AST(pre op.)	31.3±24.3	16.8±7.1	0.06
ALT(Pre op.)	33.3±35.3	8.57±7.2	0.02
e GFR	106.5±11.2	6.6±2.6	0.0001

Results

No significant differences were observed between both groups with regard to the patient's age, height, and weight. A statistically significant difference(t -test, P value <0.05 significant)was observed between the time taken by the muscles to recover from relaxation induced by SGD_X in the N group vs that in the R group : [185±118s; vs 447±268 (mean±SD)s. P=0.0016]

Figure : Box plot of the control group and the CKD group muscle relaxation recovery time by sugammadex from rocuronium .Displayed is a box plot (the 25th/50th/75th percentiles) along with 10th/90th percentiles whiskers. The whiskers are lines extending above and below each box.

Discussion

Until now, when we used sugammadex after use of the muscle relaxation rocuronium, it has been said to be not different at muscle relaxation recovery time by a state of the renal function.

However, we used eGFR of new renal function rating system this time. And we measured time to recover from PTC 1 to TOF ratio 100%.

Total dose of rocuronium to keep the PTC 1 was significantly little quantity in R group. Total dose of SGD_X there was no difference between the two groups.

However, the recovery time of PTC 1 to TOF ratio100% was significantrly prolonged in the R group than N group.

We considered that further detailed studies would be more necessary about the cause in future.

Conclusion

■ The muscle relaxation recovery time interval from PTC 1 to TOF ratio 100% was found to be more prolonged in patients with severeCKD than in the normal group patients recovering from rocuronium during SEV anaesthesia when using SGD_X based on the eGFR values. Thus, we recommend that rocuronium should be used with caution in patients with severe CKD.