

IMPACT OF SPINAL ANESTHESIA ON POSTOPERATIVE COGNITIVE DYSFUNCTION

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Abstract

Introduction: Postoperative cognitive dysfunction (POCD) is a common and well-known complication among elderly surgical patients. While several reports have stated that there is no significant difference in POCD incidence after anesthesia, either general or regional, little is known about the incidence of POCD after spinal anesthesia without sedation. We aimed to evaluate the impact of spinal anesthesia on POCD.

Methods: After the approval of the IRB, we enrolled patients over 65 years of age whose ASA Physical Status was 1–3 and had planned to undergo elective surgery under spinal anesthesia. Patients with a known history of allergy to local anesthetics were excluded. The patients' preoperative and postoperative cognitive functions were compared using the postoperative quality of recovery scale (PQRS). The PQRS cognition testing performed preoperatively as the baseline. The test was repeated on postoperative days 1 and 3. We assessed the cognitive function on the basis of the following 5 parameters: orientation to name, place, and date of birth; digits forward; digits backward; word recall; and word generation. The change scores to determine recovery were ≥ 0 for orientation, ≥ 2 for digits forward, ≥ -1 for digits backward, ≥ -3 for word recall, and ≥ -3 for word generation. The mean and standard deviation values of each item of the PQRS were used for statistical examination.

Results: Seventeen patients (14 men and 3 women; age, 77.5 ± 6.81 years) participated in this study. Baseline values for the PQRS testing were as follows: orientation, 3 ± 0 ; digits forward, 4.25 ± 0.93 ; digits backward, 2.44 ± 0.96 ; word recall, 3.69 ± 1.92 ; and word generation, 6.69 ± 2.39 . The respective change scores at day 1 were 0 ± 0 , 0.15 ± 0.69 , 0.08 ± 0.86 , 0.85 ± 2.08 , and -1.46 ± 2.26 . The respective change scores at day 3 were 0 ± 0 , 0.5 ± 1.17 , 0.33 ± 0.89 , 0.58 ± 1.56 , and -1.33 ± 2.06 . The postoperative cognitive recovery rates at day 1 and day 3 were 88.2% and 82.3%, respectively. The diagnostic factor for POCD was the change score for word generation.

Discussion: After surgery with spinal anesthesia (no sedation), the cognitive recovery rates at day 1 and day 3 were 88.2% and 82.3%, respectively, using PQRS. These results were compatible with those of previous reports of surgical patients after general anesthesia. With respect to PQRS, a small positive value in the mean change scores of word generation was reported to indicate a learning effect. Contrary to these previous reports, almost POCD patients in this study showed a negative change score of word generation. These results may possibly be caused by specific problems attributed to the Japanese translation of PQRS, although this negative change can be partially explained that the baseline word generation value of the patients with POCD was higher than the baseline value of the patients without POCD. Further clinical studies are required to evaluate the Japanese version of the PQRS.

Conclusions: We presented POCD incidence after the spinal anesthesia using PQRS. Further clinical studies are required.

Postoperative cognitive dysfunction (POCD)

- Decrease in cognition measured by neuropsychological tests after anesthesia and surgery
- Increasing age is a risk factor
- Early POCD has major negative impact on patients
 - ⇒ Delay discharge from hospital
 - ⇒ Increased mortality

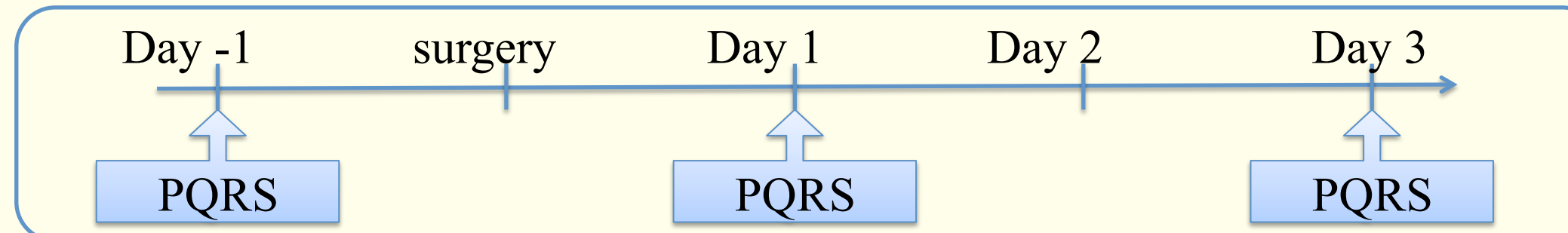
Purpose

Little is known about the incidence of POCD after spinal anesthesia without sedation

➔ To evaluate the impact of spinal anesthesia on POCD

Methods

- After the approval of the IRB
- Patients:
 - Age: >65 years
 - ASA Physical Status: 1–3
 - Planned to undergo elective surgery under spinal anesthesia
- Exclusion criteria:
 - History of allergy to local anesthetics
- Neuropsychological tests:
 - The Japanese version of Postoperative quality of recovery scale (PQRS)
 - Via face-to-face interview
- Timing of the PQRS



Definition of recovery in cognitive domain

- Orientation: The change scores ≥ 0
- Digits forward: The change scores ≥ -2
- Digits backward: The change scores ≥ -1
- Word recall: The change scores ≥ -3
- Word generation: The change scores ≥ -3

PQRS

- Published in *Anesthesiology* in 2010
- A tool to measure quality of recovery after surgery and anesthesia using the scoring sheet
- The cognitive domains are based on conventional neuropsychological tests such as the MMSE
- The Japanese version of PQRS was established in 2012

Results

Patients:
17 patients (14 men and 3 women; Age, 77.5 ± 6.81 year)

Baseline Scores and Change Scores

	Baseline	Day 1 change	Day 3 change
Orientation	3.00 ± 0	0 ± 0	0 ± 0
Digits forward	4.25 ± 0.93	0.15 ± 0.69	0.50 ± 1.17
Digits backward	2.44 ± 0.96	0.08 ± 0.86	0.33 ± 0.89
Word recall	3.69 ± 1.92	0.85 ± 2.08	0.58 ± 1.56
Word generation	6.69 ± 2.39	-1.46 ± 2.26	-1.33 ± 2.06

The scores of word generation showed negative changes

Values are mean \pm SD. Baseline values are the raw score
All other time points are the change scores (e.g., Day 1–baseline)

Proportion of patients (%) scored as recovered

	Day 1	Day 3
Orientation	100 %	100 %
Digits forward	100 %	100 %
Digits backward	100 %	100 %
Word recall	100 %	100 %
Word generation	88.2 %	82.3 %

The diagnostic factor for 'Non-recovered' was the change score for word generation

The baseline demographic

	Recovered n = 13	Non-recovered n = 4	P value
Age, year	77.5 ± 6.55	77.5 ± 6.80	0.622
Education, year	14.9 ± 2.21	14.0 ± 1.41	0.498
Weight, kg	59.1 ± 5.02	63.8 ± 8.62	0.234
Height, cm	160.7 ± 8.93	161.5 ± 5.37	0.874
Body mass index, kg/m ²	23.0 ± 3.08	24.3 ± 1.79	0.494
Alcohol, standard units	1.8 ± 2.62	5.0 ± 2.0	0.060
Male gender	84.6	75.0	1.00
Non-smoker	30.7	0	
Current-smoker or Ex-smoker	53.8	100	0.298
Ex-smoker	15.4	0	
Not employed	92.3	75	0.427
Employed – to return	7.69	25	
ASA 1	30.8	25	
ASA 2	69.2	50	0.177
ASA 3	0	25	
Diabetes	15.4	50	0.219
Hypertension	53.8	25	0.577
Hypercholesterolemia	7.69	0	1.00
Type of surgery	TUR-BT 61.5, TUR-P 38.5	TUR-BT 100	0.260
Duration of anesthetic, min	92.3 ± 50.6	57.8 ± 12.3	0.187

Values are Mean \pm SD, or %. Student t-test for parametric data, and chi-square and fisher exact test analysis for non-parametric data.

Discussion

Incidence of POCD

In this study

- Day 1 was **11.8%**, day 3 was **17.7%**

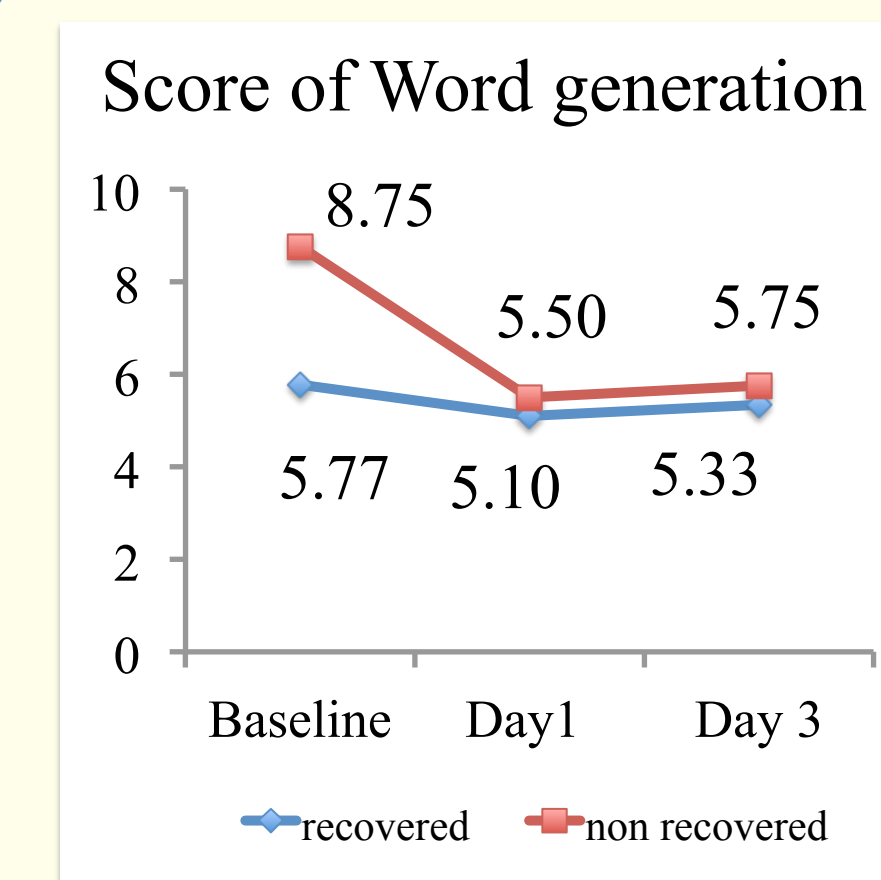
↔ Previous study - in the *spinal anesthesia without sedation*

- Day 7 was **11.9%** (age 56–81 year)
Br J Anaesth 2014; 113 (5): 784–91.
- Day 1 was **53%**, day 7 was **6%** (age > 65 year)
Eur J Anaesthesiol 2003; 20: 640–6.

↔ Previous study - in the *general anesthesia*

- Day 1 was **16.5%**, day 3 was **13.6%** (age 6–95 year)
Anesthesiology 2013; 119: 576–81.
- Day 1 was **60%**, day 7 was **20%** (age > 65 year)
Eur J Anaesthesiol 2003;20:640–6.

Japanese version of PQRS



Almost patients showed a negative change score of word generation

↔ Previous study

A small positive value in the mean change scores, to indicate a learning effect

Anesthesiology 2013; 119: 576–81.

These results may possibly be caused by specific problems attributed to the Japanese translation of PQRS

limitation

- Small sample size
- There are no comparison to other neuropsychological examination

Conclusion

- We presented POCD incidence in elderly patients after the spinal anesthesia using PQRS
- Further clinical studies are required