

Influence of diabetes mellitus on surgical outcomes in cervical myelopathy

Shinji Tanishima¹⁾ Atsushi Tanida¹⁾ Tokumistu Mihara¹⁾
Chikako Takeda¹⁾ Tsugutake Morishita²⁾ Masaaki Murata³⁾
Toshiaki Takahashi⁴⁾ Yasuo Morio⁵⁾ Yoshiro Nanjo⁶⁾
Yuki Hamamoto⁷⁾ Toshiyuki Dokai⁸⁾ Hideki Nagashima¹⁾

1)Tottori University

3)Tottori Prefectural Central Hospital

5)Misasa Onsen Hospital

7)Matsue City Hospital

2)Tottori City Hospital

4)Tottori Red Cross Hospital

6)Sanin Rosai Hospital

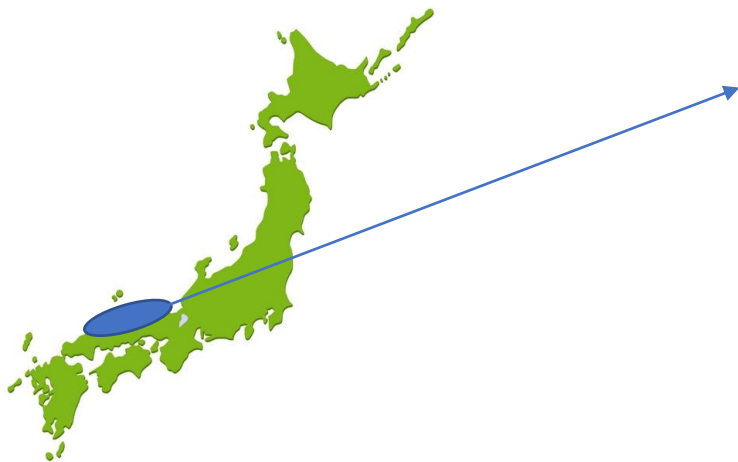
8)Masuda Red Cross Hospital

Purpose

To investigate the influence of diabetes mellitus on surgical outcomes in cervical myelopathy.

Study Design

-A prospective multi-center study-



8 Participant Hospitals

- ❑ **Tottori-University**
- ❑ Totori City Hospital
- ❑ Tottori Prefectural Central Hospital
- ❑ Tottori Red Cross Hospital
- ❑ Misasa Onsen Hospital
- ❑ Sanin Rosai Hospital
- ❑ Matsue City Hospital
- ❑ Masuda Red Cross Hospital

Period: April 2012 – March 2015

Background and Clinical outcomes

- Gender
- Age
- Height
- Weight
- Body Mass Index (BMI)

- Japanese Orthopaedic Association score (JOA score)

Recovery ratio(RR%) =

$$\frac{(\text{JOA after 1 year} - \text{JOA pre-surgery}) \times 100}{(17 - \text{JOA pre-surgery})}$$

- JOA Cervical Myelopathy Evaluation Questionnaire (JOACMEQ)

The degree of improvement
 = each parameter score after 1 y
 - pre-surgery score

Laboratory evaluation

Fasting Blood Glucose(FBG)
 HbA1c

The Peripheral conduction time(PCT)

- ① Ulnar Nerve
- ② Tibia Nerve

PCT= (M-wave latency +F-wave latency-1)/2

Kimura et al Ann Neurol. 1984

Evaluation schedule

Pre surgery

- Physical examination
- JOA,JOACMQ
- HgA1c, FBG
- PCT

1 week

- HgbA1c, FBG

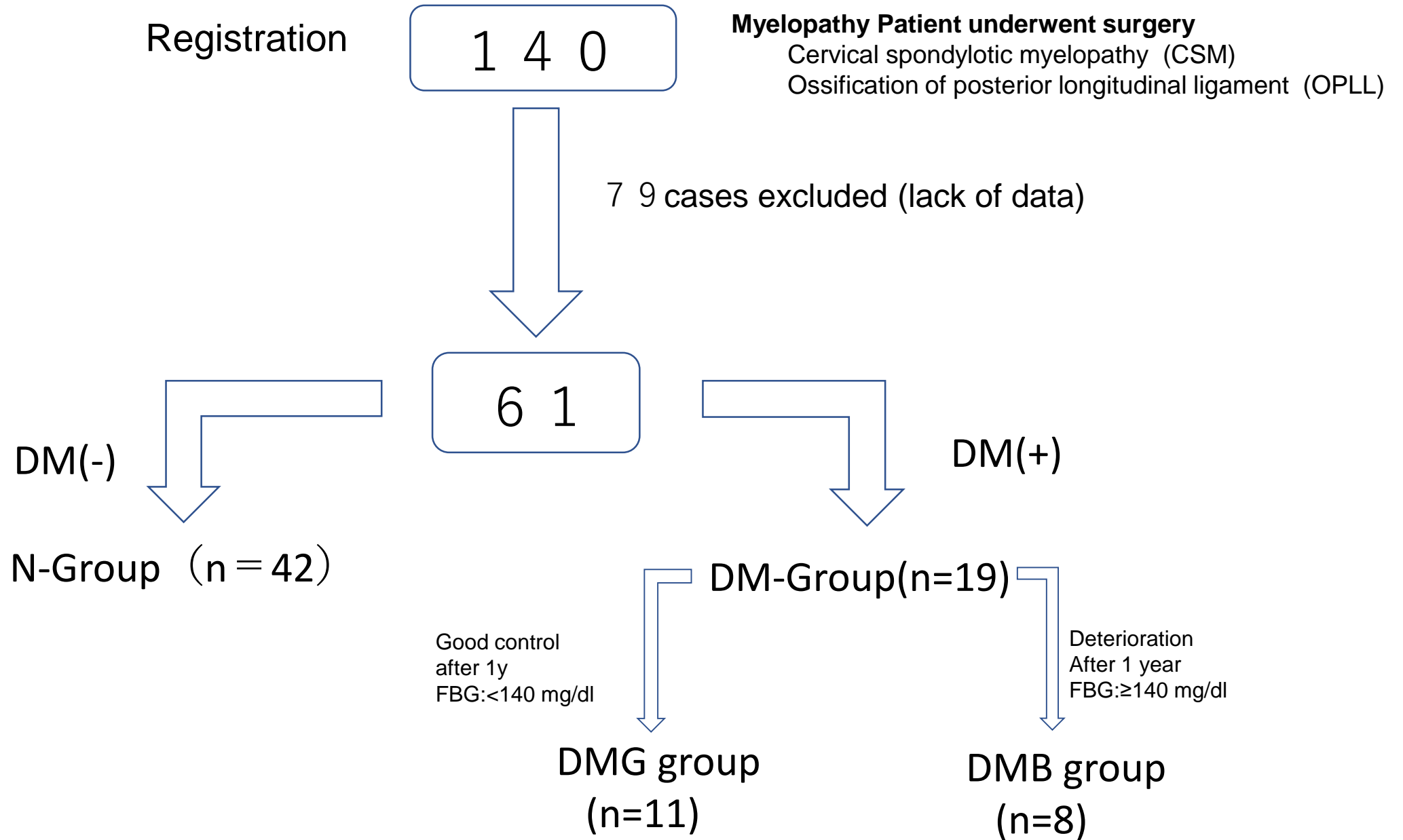
4 week

- HgbA1c, FBG

1 year

- Physical examination
- JOA,JOACMQ
- HgA1c, FBG

Patients classification



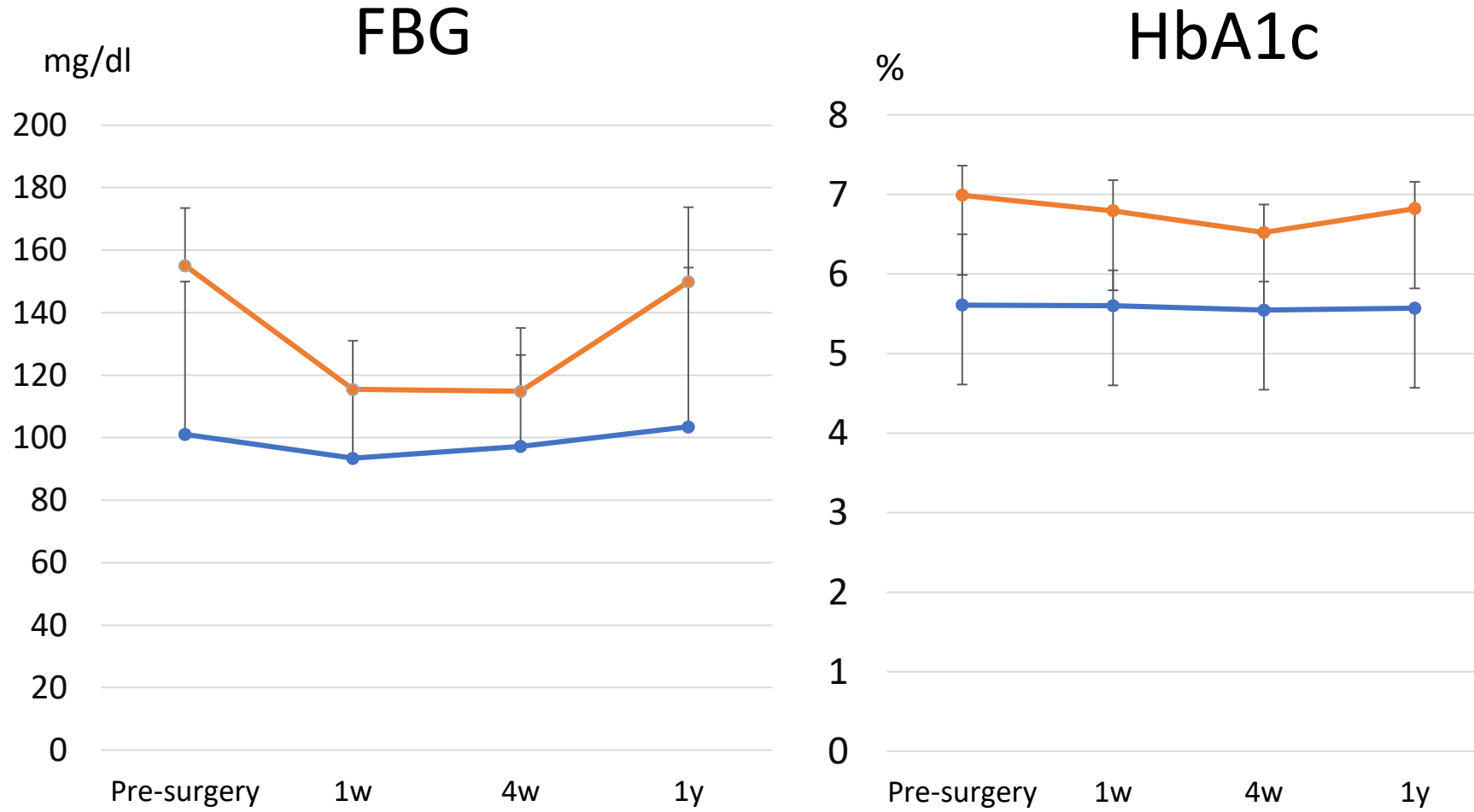
Demographic data

		N group n=42	DM group n =19	P-value
Age		69.6 ± 13.3	69.3 ± 10.7	0.77 [#]
Gender		25:11	12:17	0.79 ^{##}
Height		158.5 ± 9.6	160.7 ± 10.2	0.43
Weight		57.6 ± 12.2	60.1 ± 11.7	0.28
BMI		22.8 ± 3.4	23.2 ± 3.7	0.72 [#]
CSM:OPLL		29:13	14:5	0.71 ^{##}
PCT	Ulna (rt.)	15.3 ± 2.3	17.4 ± 6.2	0.05 [#]
	Ulna(lt.)	15.5 ± 2.7	17.3 ± 5.2	0.08 [#]
	Tibia(rt.)	25.6 ± 2.9	27.1 ± 3.0	0.09 [#]
	Tibia (lt.)	25.6 ± 3.1	26.8 ± 3.0	0.14 [#]
JOA(total)		10.9 ± 2.8	10.8 ± 7.5	0.80 [#]
JOACMEQ	Cervical	70.5 ± 30.7	62.6 ± 30.2	0.37
	U/E	66.7 ± 23.7	72.4 ± 18.2	0.47
	L/E	52.3 ± 31.7	52.3 ± 26.4	0.91
	Bowel	68.9 ± 19.2	71.7 ± 16.1	0.98
	QOL	45.3 ± 16.0	38.6 ± 18.9	0.15

Mann-Whitney U test ## Chi-squer test

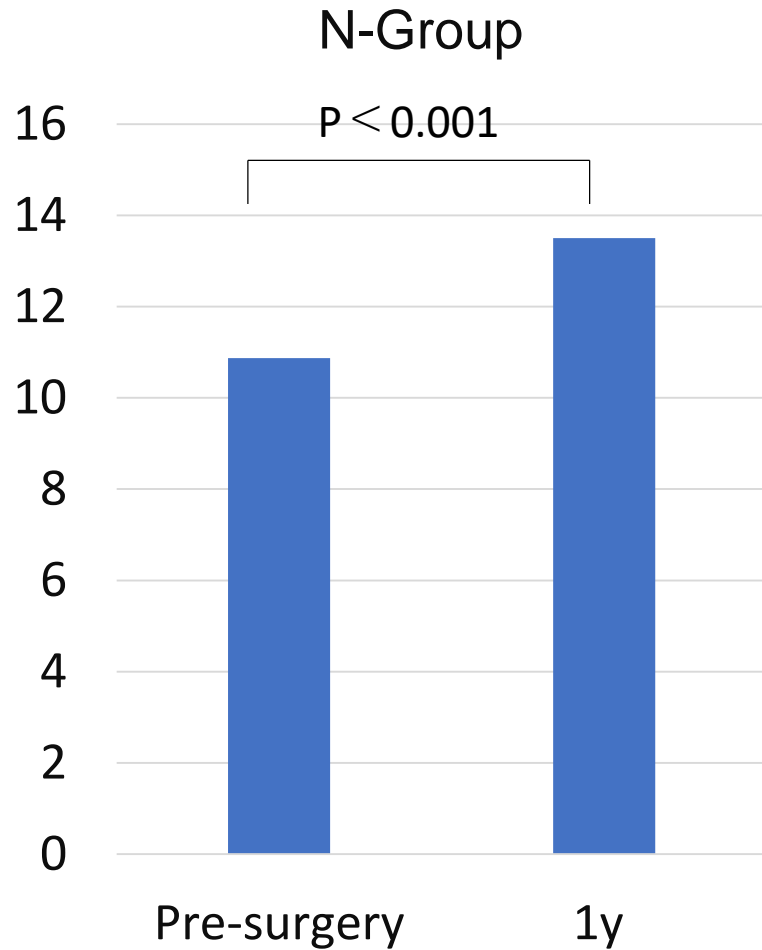
Change FBG and HbA1c

N group — DM group

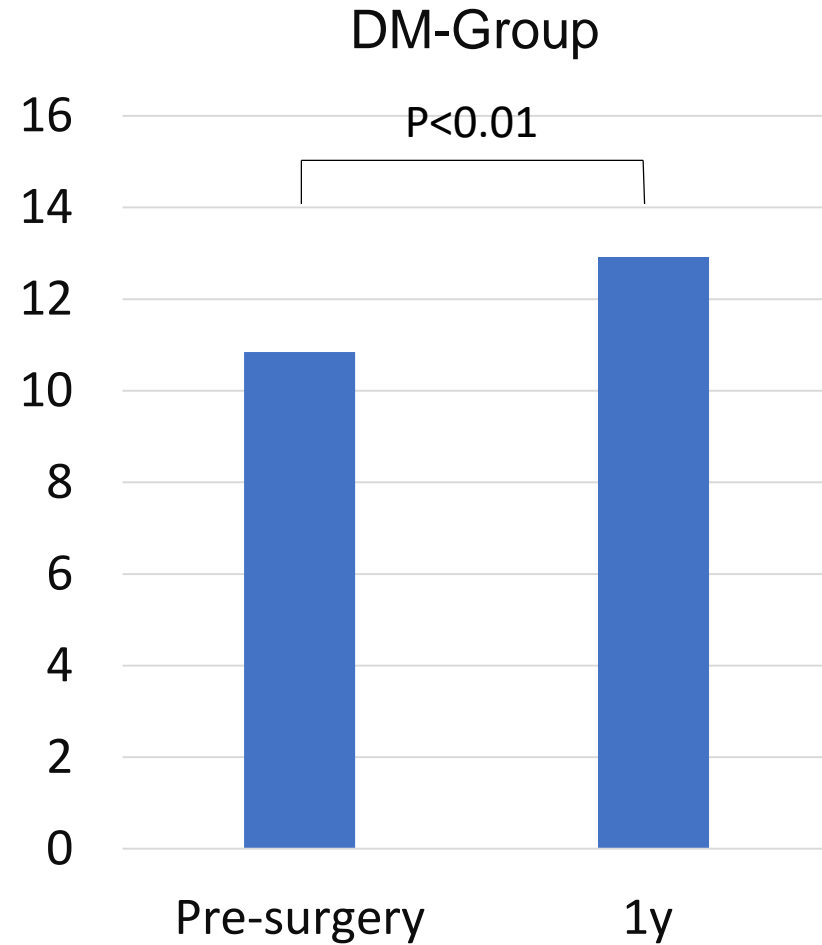


FBG control deteriorated after 1 y

Surgical outcome: JOA score



Recovery Ratio **40.1%**

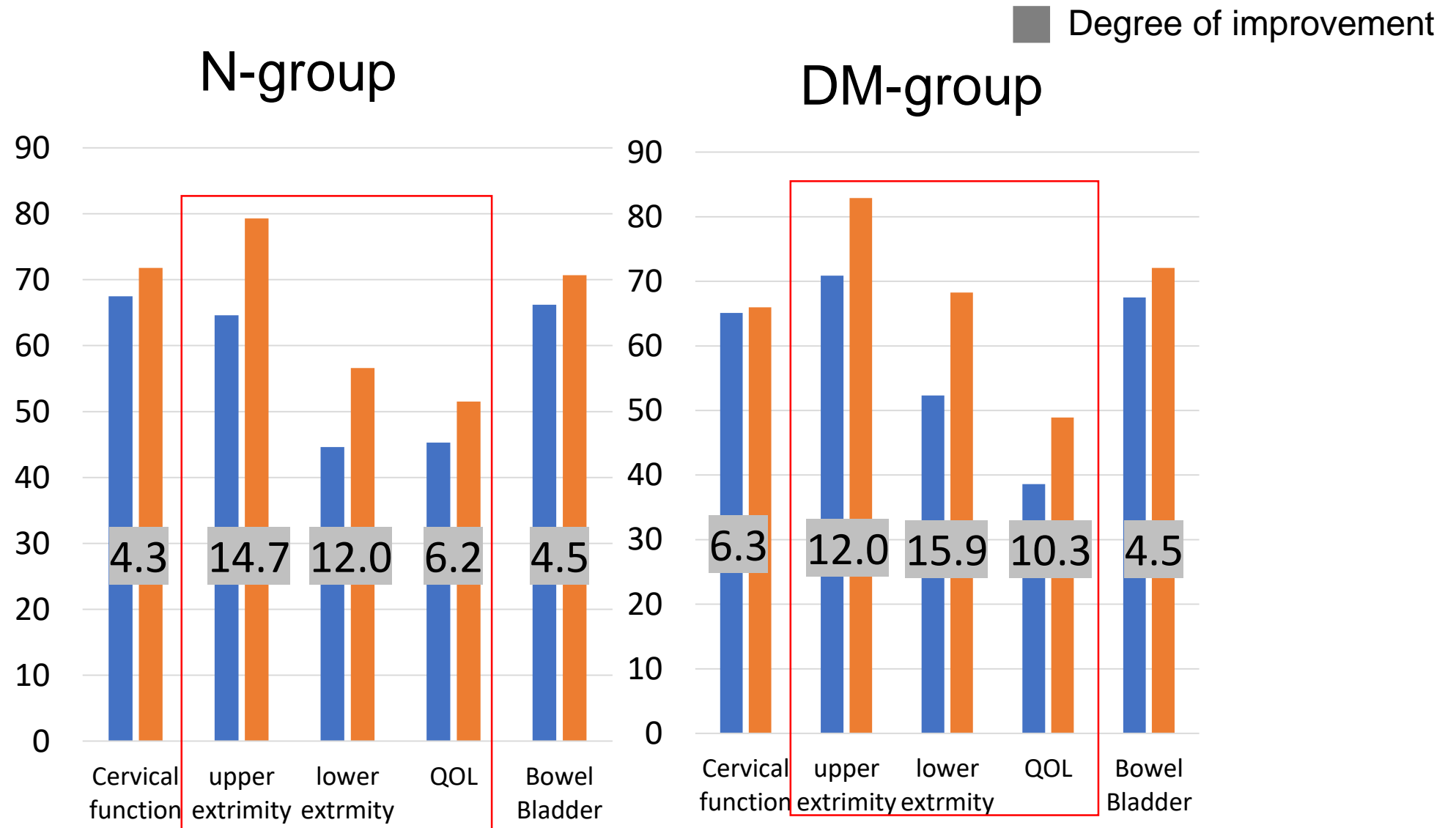


26.3%

Recovery ratio : N vs DM $P=0.17$

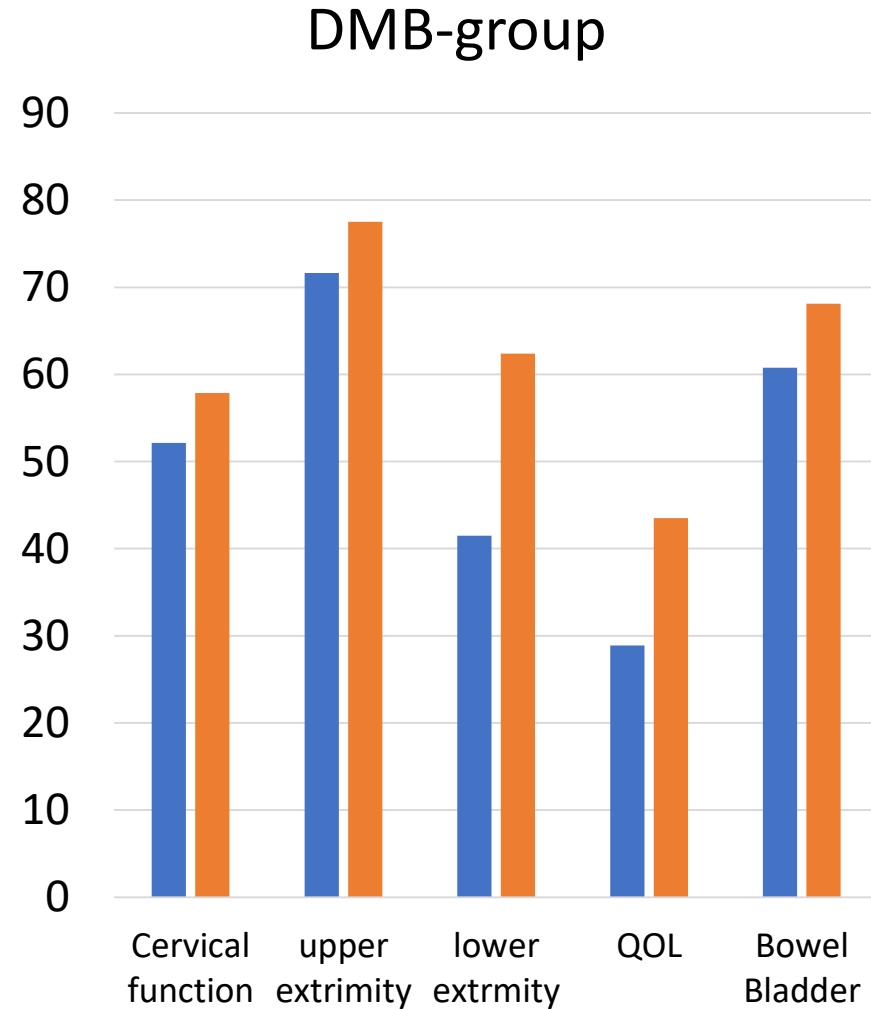
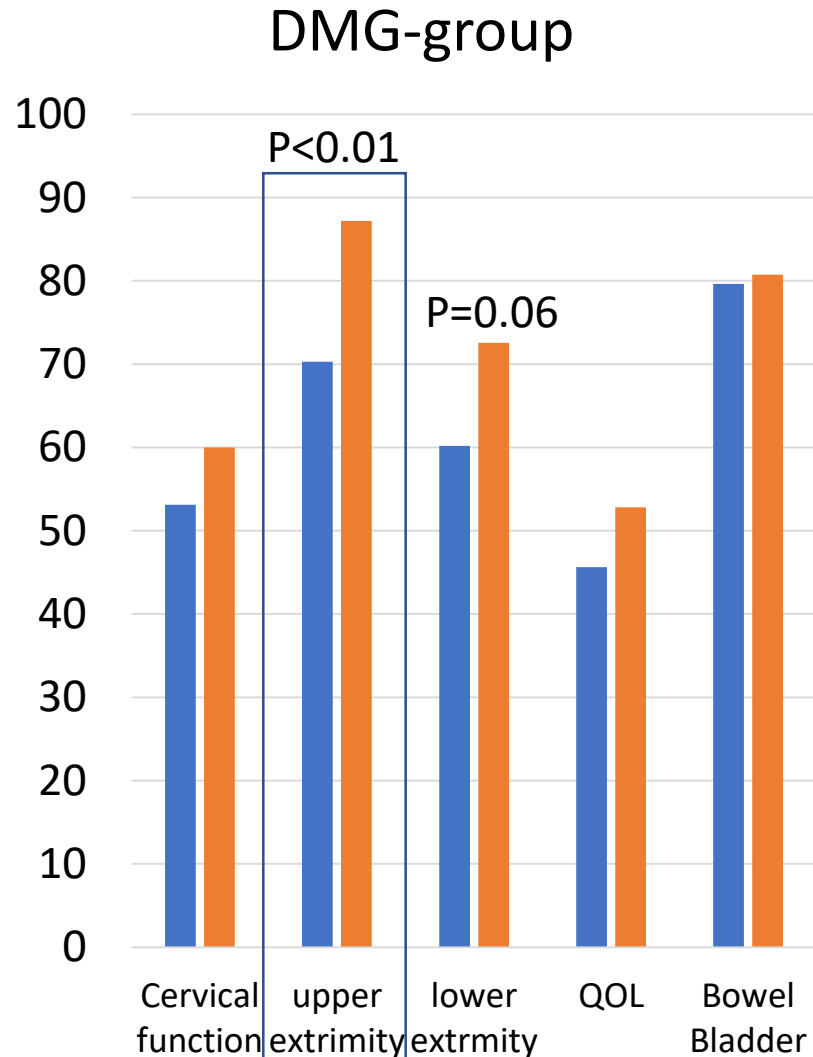
Mann-whitney U

Surgical outcome : JOACMEQ



The degree of improvement are not significantly difference between two groups

Surgical outcome : JOACMEQ



Wilcoxon signed-rank test

All parameters were not improved significantly in DMB group

Diabetic mellitus affect surgical outcomes

Preoperative HbA1c affect surgical outcome

Dokai et al. Arch Orthop Trauma 2012

Kawaguchi et al. Spine 2000

This study

- ❑ There was no correlation between the improvement in JOA score and the preoperative or postoperative HbA1c
- ❑ The improvement of Upper and Lower extremities were affected in DM group over 140mg/dl with FBG



To obtain good surgical outcome, Strict control of FBG is required after surgery

The association between DM neuropathy and surgical outcome

- ❑ The PCTs in cervical myelopathy with DM was longer than CSM without DM group
- ❑ The impairment of JOA correlated with PCT in DM group



Peripheral nerve impairments with DM may affect JOA score

(Nakanishi et al. J Neurosurg Spine 2015)

This study

There was no significant difference in PCT between DM and N groups



- ✓ The influence of DM neuropathy was unclear
- ✓ DM may affect spinal cord recovery directly or other DM complication may affect the outcome after surgery

Conclusion

- Improvement in cervical myelopathy tends to be poor when glycemic control is poor after surgery.
- We consider that poor glycemic control after surgery may prevent functional recovery of cervical myelopathy.

Disclosure of Conflict of Interest

Name of first author: Shinji Tanishima

I have no COI
with regard to our presentation.