

A 77-year-old Man with Exertional Dyspnea for 10 months

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M/77

- C/C
 - Dyspnea for 10 months & progressive both shoulder motor weakness
- Brief history
 - 7개월 전 OPLL & FS on C4-5-6-7로 NS에서 posterior approach & laminoplasty on C4,5,6,7 시행한 환자로 수술적 치료 이후 걸음걸이는 호전되었으나 both arm weakness 지속되고 숨이 많이 차서 NS에서 의뢰됨
 - 6개월 전 수술 당시 preop evaluation상 COPD 진단받고 LAMA/MABA Tx 중이나 별다른 호전 없고 숨이 점점 많이 참
 - No swallowing difficulty

Past medical history/ Social history

- HTN (-)
- DM (-)
- Ex-smoker: 1년 전 금연, 흡연력 50 pack-years (1ppd × 50 yrs)
- Alcohol: (-)
- 2011년 lumbar disc disorder로 수술
- 2021년 8월 OPLL & FS on C4-5-6-7로 NS에서 posterior approach & laminoplasty on C4,5,6,7 시행

Physical examination

- RR: 26-28회/분
- mMRC 4
- cough (-) sputum(-) fever (-) chilling sensation (-)
- No jugular vein distension
- Accessory muscle breathing (+)
- Swallowing difficulty 없지만 숨이 차서 식사 하기 어려움
- Unremarkable chest simple radiograph

Physical examination

- MMT

		Right	Left
shoulder	flexion	F-	F-
	abduction	F-	P
elbow	flexion	F	P
	extension	F	P
finger	flexion	F	F-
	extension	F	F-

- L/E motor: all G-/G-
- Independent gait (+)

- DTR

- BJ (-/-)
- TJ(-/-)
- KJ(++/-)

- Hoffman sign (-/-)
- Both hand intrinsic atrophy(+)
- Fasciculations on both upper extremities (+)
- No dysarthria
- No tongue fasciculations/atrophy

NCS-EMG (2022.03.30)

Motor Nerve Conduction:

Nerve and Site	Latency	Amplitude	Segment	Latency Difference	Distance	Conduction Velocity
Median.R						
Wrist	4.1 ms	5.4 mV		ms	mm	m/s
Elbow	8.5 ms	4.8 mV	Wrist-Elbow	4.4 ms	240 mm	55 m/s
Ulnar.R						
Wrist	2.4 ms	8.6 mV		ms	mm	m/s
Below elbow	6.3 ms	7.5 mV	Wrist-Below elbow	3.9 ms	230 mm	59 m/s
Above elbow	8.6 ms	7.4 mV	Below elbow-Above elbow	2.3 ms	130 mm	57 m/s
Radial.R						
Forearm	2.1 ms	5.8 mV		ms	mm	m/s
Lateral brachium	4.8 ms	5.7 mV	Forearm-Lateral brachium	2.7 ms	135 mm	50 m/s
Musculocutaneous.R						
Erb's point	5.4 ms	5.1 mV	Biceps brachii-Erb's point	5.4 ms	mm	m/s
Axillary.R						
Erb's point	5.4 ms	1.9 mV	Deltoid-Erb's point	5.4 ms	mm	m/s
Median.L						
Wrist	3.6 ms	6.0 mV		ms	mm	m/s
Elbow	7.6 ms	5.2 mV	Wrist-Elbow	4.0 ms	235 mm	59 m/s
Ulnar.L						
Wrist	2.9 ms	5.3 mV		ms	mm	m/s
Below elbow	6.6 ms	5.2 mV	Wrist-Below elbow	3.7 ms	220 mm	59 m/s
Above elbow	9.2 ms	4.9 mV	Below elbow-Above elbow	2.6 ms	140 mm	54 m/s
Axilla	11.2 ms	4.7 mV	Above elbow-Axilla	2.0 ms	120 mm	60 m/s
Peroneal.R						
Ankle	3.7 ms	3.7 mV		ms	mm	m/s
Fibula (head)	10.2 ms	3.0 mV	Ankle-Fibula (head)	6.5 ms	295 mm	45 m/s
Fibula (head) by TA	3.0 ms	4.3 mV	Fibula (head)-Knee	7.2 ms	mm	m/s
Peroneal.L						
Ankle	5.2 ms	0.4 mV		ms	mm	m/s
Fibula (head)	12.2 ms	0.3 mV	Ankle-Fibula (head)	7.0 ms	300 mm	43 m/s
Fibula (head) by TA	3.3 ms	4.1 mV	Fibula (head)-Knee	8.9 ms	mm	m/s
Tibial.L						
Ankle	3.4 ms	16.6 mV		ms	mm	m/s
Popliteal fossa	11.9 ms	9.0 mV	Ankle-Popliteal fossa	8.5 ms	370 mm	44 m/s

NCS-EMG (2022.03.30)

Sensory Nerve Conduction:

Nerve and Site	Peak Latency	Amplitude	Segment	Latency Difference	Distance	Conduction Velocity
Median.L						
Wrist	2.2 ms	20 μ V	Digit II (index finger)-Wrist	2.2 ms	mm	m/s
Ulnar.L						
Wrist	2.2 ms	13 μ V		ms	mm	m/s
Median.R						
Wrist	2.2 ms	22 μ V	Digit II (index finger)-Wrist	2.2 ms	mm	m/s
Ulnar.R						
Wrist	2.1 ms	20 μ V		ms	mm	m/s
Radial.R						
Forearm	1.8 ms	20 μ V	Anatomical snuff box-Forearm	1.8 ms	mm	m/s
Superficial peroneal.L						
Lower leg	No Response	No Response	Ankle-Lower leg	ms	mm	m/s
Sural.L						
Lower leg	2.2 ms	7 μ V	Ankle-Lower leg	2.2 ms	105 mm	48 m/s
Superficial peroneal.R						
Lower leg	2.6 ms	4 μ V	Ankle-Lower leg	2.6 ms	mm	m/s
Sural.R						
Lower leg	2.3 ms	4 μ V	Ankle-Lower leg	2.3 ms	mm	m/s

NCS-EMG (2022.03.30)

Muscle	Fib.	+Waves	Insert.ac.	Bizz.	NMU	LMU	Long po.	Short po.	Interf.pattt
Cervical paraspinal.R		+1			+				
Thoracic paraspinal.R					+				
Lumbar paraspinalis.R		+1			+				
Cervical paraspinal.L		+2			+				
Thoracic paraspinal.L					+				
Lumbar paraspinalis.L		+1			+				
Hypoglossal.R					+				C
Hypoglossal.L					+				C
Deltoid.R		+2			+				N
Biceps brachii.R		+1			+				PC
Triceps brachii.R					+				SP
Flexor carpi radialis.R					+				C
Extensor carpi radialis longus.R		+1			+				NC
Abductor pollicis brevis.R		+1			+				NC
1st dorsal interossei .R		+1			+				NC
Abductor digiti mini.R		+1			+				NC
Deltoid.L		+1			+			+	N
Biceps brachii.L		+1			+				P
Triceps brachii.L					+				C
Flexor carpi radialis.L					+				C
Extensor carpi radialis longus.L		+1			+				NC
Abductor pollicis brevis.L					+				NC
1st dorsal interossei .L					+				NC
Abductor digiti mini.R		+2			+				NC
Vastus medialis.R					+				C
Tibialis anterior.R		+2			+				NC
Peroneus longus.R					+				C
Tensor fasciae latae.R					+				C
Gastrocnemius (Medial head).R		+1			+				NC
Vastus medialis.L					+				C
Tibialis anterior.L					+				C
Peroneus longus.L					+				C
Tensor fasciae latae.L					+				C
Gastrocnemius (Medial head).L					+				C

Insert.ac.: insertional activity

+Waves: positive sharp wave

Fib.: fibrillation

Bizz.: bizarre potential

NMU: normal motor unit

LMU: large motor unit

Long po.: long duration polyphasic potential

Short po.: short duration polyphasic potential

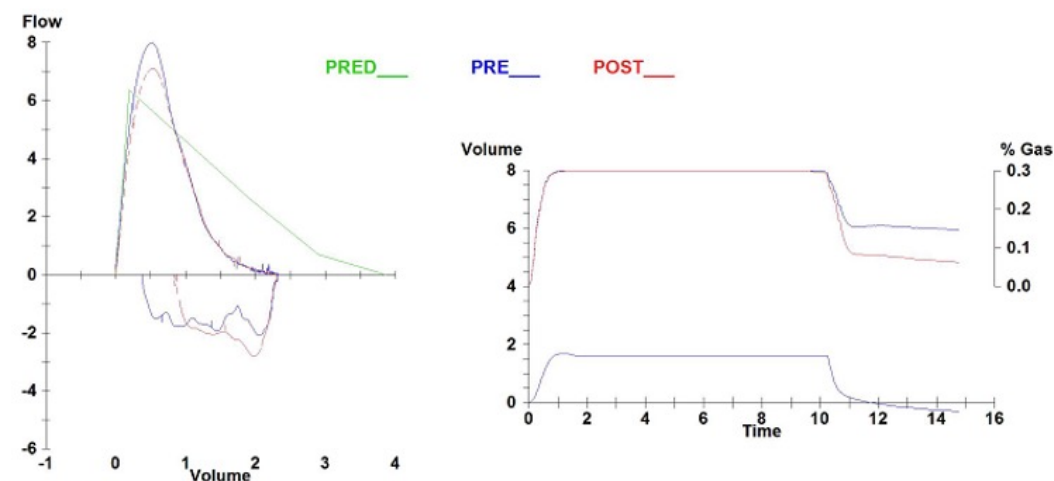
Interf.pattt: interference pattern

- Laboratory findings, Echocardiogram: N-S
- PFT

2021.08.10.

Spirometry (BTPS)		PRED	PRE-RX		POST-RX		% Chg
			BEST	%PRED	BEST	%PRED	
FVC	Liters	3.87	2.33	60	2.30	59	-1
FEV1	Liters	2.43	1.77	73	1.79	74	1
FEV1/FVC	%	69	76		78		
FEF25-75%	L/sec	2.00	1.45	73	1.63	82	12
FEF50%	L/sec	2.57	3.29	128	3.46	135	5
PEF	L/sec	6.34	7.99	126	7.09	112	-11
FEV6	Liters		2.27		2.25		-1
PIF	L/sec		2.08		2.81		35

Diffusion				
DLCO	mL/mmHg/min	16.2	13.7	84
DL Adj	mL/mmHg/min	16.2	13.7	84
DLCO/VA	mL/mHg/min/L	3.62	4.54	125
DL/VA Adj	mL/mHg/min/L		4.54	
VA	Liters		3.02	

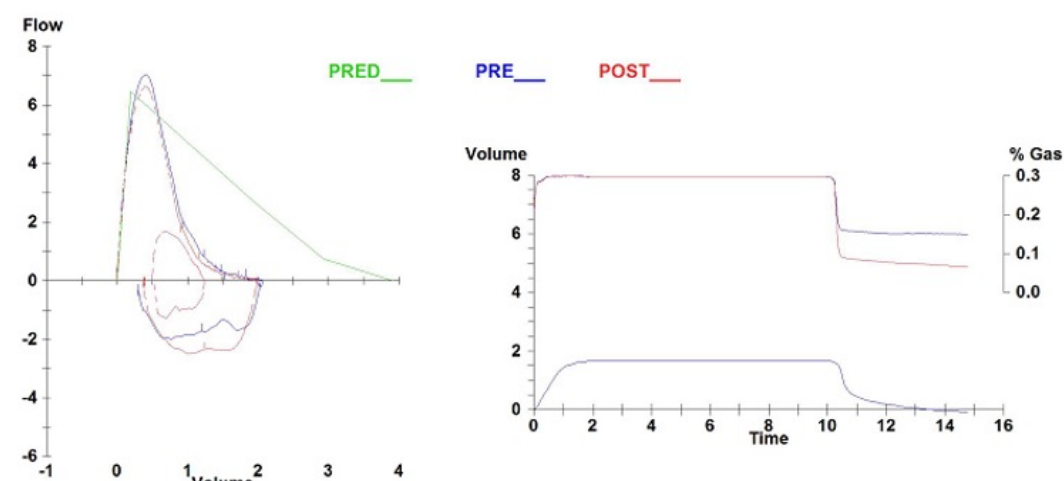


Comments:

2022.04.07.

Spirometry (BTPS)		PRED	PRE-RX		POST-RX		% Chg
			BEST	%PRED	BEST	%PRED	
FVC	Liters	3.92	2.06	53	2.01	51	-3
FEV1	Liters	2.48	1.49	60	1.41	57	-6
FEV1/FVC	%	69	72		70		
FEF25-75%	L/sec	2.03	0.97	48	0.80	40	-18
FEF50%	L/sec	2.65	1.73	65	1.64	62	-5
PEF	L/sec	6.45	7.05	109	6.64	103	-6
FEV6	Liters		1.99		1.89		-5
PIF	L/sec		1.98		2.50		26

Diffusion				
DLCO	mL/mmHg/min	16.6	13.3	80
DL Adj	mL/mmHg/min	16.6	13.3	80
DLCO/VA	mL/mHg/min/L	3.61	4.73	131
DL/VA Adj	mL/mHg/min/L		4.73	
VA	Liters		2.82	



Comments:



Overnight capnography

검사일	시간	ETCO2	SPO2	Tx차수
2022/04/07	22:00	42.9	97	1
2022/04/07	23:00	41.6	97	1
2022/04/08	00:00	38.2	98	1
2022/04/08	01:00	37.3	98	1
2022/04/08	02:00	40.7	98	1
2022/04/08	03:00	39.6	98	1
2022/04/08	04:00	41.3	98	1
2022/04/08	05:00	41.6	96	1
2022/04/08	06:00	39.9	97	1

- NIV launching (9pm-6am)

→ 낮동안 호흡곤란/Accessory muscle breathing 호전 보임

- Both upper extremities motor weakness: slowly worsening

6 months after initial RM visit (2022.10.24)

- MMT

		Right	Left
shoulder	flexion	P	P-
	abduction	P+	P-
elbow	flexion	P	P-
	extension	P	P-
finger	flexion	F	F-
	extension	F	F-

- L/E motor: all G-/G-
- Independent gait (+)

- DTR

- BJ (-/-)
- TJ(-/-)
- KJ(++/-)

- Hoffman sign (-/-)
- Both hand intrinsic atrophy(+)
- Fasciculations on both upper extremities (+)
- No dysarthria
- No tongue fasciculations/atrophy

NCS-EMG (2022.10.24)

Motor Nerve Conduction:

Nerve and Site	Latency	Amplitude	Segment	Latency Difference	Distance	Conduction Velocity
Median.L						
Wrist	3.7 ms	5.9 mV		ms	mm	m/s
Elbow	7.5 ms	3.4 mV	Wrist-Elbow	3.8 ms	210 mm	55 m/s
Ulnar.L						
Wrist	3.6 ms	2.0 mV		ms	mm	m/s
Below elbow	7.4 ms	1.5 mV	Wrist-Below elbow	3.8 ms	200 mm	53 m/s
Above elbow	10.1 ms	1.5 mV	Below elbow-Above elbow	2.7 ms	140 mm	52 m/s
Peroneal.R						
Ankle	4.1 ms	6.4 mV		ms	mm	m/s
Fibula (head)	10.8 ms	5.2 mV	Ankle-Fibula (head)	6.7 ms	290 mm	43 m/s
Tibial.R						
Ankle	3.7 ms	17.6 mV		ms	mm	m/s
Popliteal fossa	13.0 ms	12.4 mV	Ankle-Popliteal fossa	9.3 ms	400 mm	43 m/s

Sensory Nerve Conduction:

Nerve and Site	Peak Latency	Amplitude	Segment	Latency Difference	Distance	Conduction Velocity
Median.L						
Wrist	2.4 ms	21 μ V	Digit II (index finger)-Wrist	2.4 ms	mm	m/s
Ulnar.L						
Wrist	2.3 ms	15 μ V		ms	mm	m/s
Superficial peroneal.R						
Lower leg	No Response	No Response	Ankle-Lower leg	ms	mm	m/s
Sural.R						
Lower leg	2.3 ms	7 μ V	Ankle-Lower leg	2.3 ms	105 mm	46 m/s

NCS-EMG (2022.10.24)

Needle EMG Examination:

Muscle	Fib.	+Waves	Insert.ac.	Bizz.	NMU	LMU	Long po.	Short po.	Interf.pattt
Cervical paraspinal.R		+1			+				
Thoracic paraspinal.R					+				
Lumbar paraspinalis.R		+2			+				
Cervical paraspinal.L		+2			+				
Thoracic paraspinal.L		+1			+				
Lumbar paraspinalis.L		+1			+				
Hypoglossal.R		+1			+				NC
Hypoglossal.L					+				NC
Deltoid.R		+2			+				P
Biceps brachii.R		+2			+				P
Triceps brachii.R					+				P
Flexor carpi radialis.R					+				P
Extensor carpi radialis longus.R		+1			+				P
Abductor pollicis brevis.R		+1			+				P
1st dorsal interossei .R		+1			+				P
Abductor digiti mini.R		+2			+				P
Deltoid.L		+1			+			+	P
Biceps brachii.L		+1			+				P
Triceps brachii.L					+				P
Flexor carpi radialis.L					+				P
Extensor carpi radialis longus.L		+1			+				P
Abductor pollicis brevis.L		+1			+				P
1st dorsal interossei .L					+				P
Abductor digiti mini.R		+2			+				P
Vastus medialis.R					+				NC
Tibialis anterior.R		+2			+				NC
Peroneus longus.R					+				NC
Tensor fasciae latae.R					+				NC
Gastrocnemius (Medial head).R		+1			+				NC
Vastus medialis.L					+				NC
Tibialis anterior.L					+				P
Peroneus longus.L					+				P
Tensor fasciae latae.L					+				PC
Gastrocnemius (Medial head).L					+				P

Insert.ac.: insertional activity +Waves: positive sharp wave Fib.: fibrillation Bizz.: bizzar potential NMU: normal motor unit LMU: large motor unit
 Long po.: long duration polyphasic potential Short po.: short duration polyphasic potential Interf.pattt: interference pattern

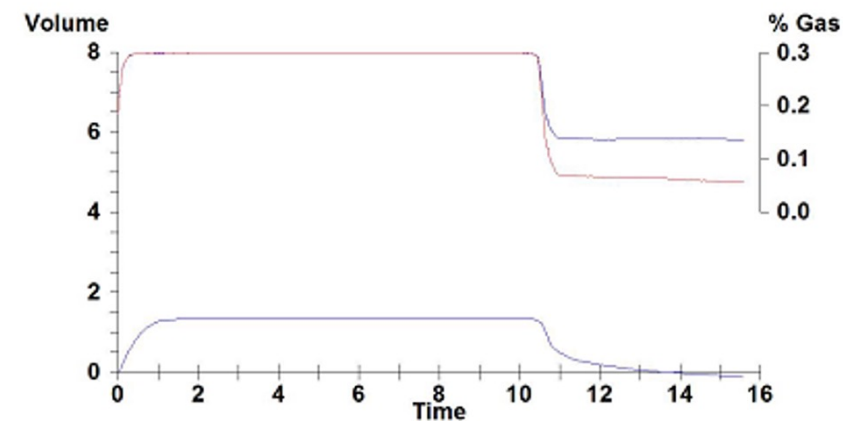
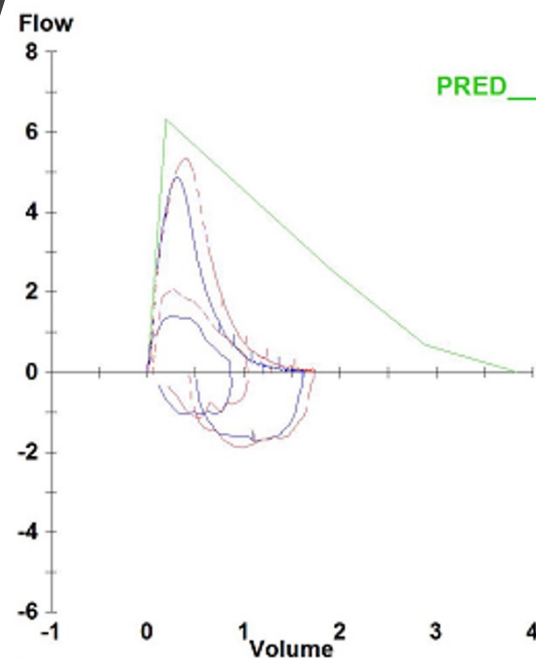
PFT (2022.10)

Spirometry

Spirometry		(BTPS)	PRE-RX			POST-RX		% Chg
			PRED	BEST	%PRED	BEST	%PRED	
FVC	Liters		3.85	1.63	42	1.74	45	7
FEV1	Liters		2.39	1.10	46	1.27	53	15
FEV1/FVC	%		69	68		73		
FEF25-75%	L/sec		1.95	0.54	28	0.82	42	51
FEF50%	L/sec		2.54	1.02	40	1.57	62	55
PEF	L/sec		6.30	4.86	77	5.34	85	10
FEV6	Liters			1.53		1.69		10
PIF	L/sec			1.73		1.88		9

Diffusion

DLCO	mL/mmHg/min	16.0	10.2 63
DL Adj	mL/mmHg/min	16.0	10.2 63
DLCO/VA	mL/mHg/min/L	3.60	4.32 120
DL/VA Adj	mL/mHg/min/L		4.32
VA	Liters		2.35



Comments:

Overnight
capnography
(2022.10.24)

검사일	시간	ETCO2	SPO2	Tx차수
2022/10/24	22:00	42.9	95	2
2022/10/24	23:00	36.3	93	2
2022/10/25	00:00	40.5	91	2
2022/10/25	01:00	40.2	94	2
2022/10/25	02:00	40.4	96	2
2022/10/25	03:00	41.1	96	2
2022/10/25	04:00	43.9	95	2
2022/10/25	05:00	37.2	95	2
2022/10/25	06:00	38.9	95	2