

## APSS MEDTRONIC CLINICAL SPINE FELLOWSHIP 2015-2016

Duration: 23 May 2016 – 19 August 2016

Fellow:

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Tseung Kwan O Hospital, Hong Kong

Prince of Wales Hospital, The Chinese University of Hong Kong

Host spine center:

Kyung Hee University (KHU) Hospital at Gangdong, Seoul, Korea



Host spine surgeons:

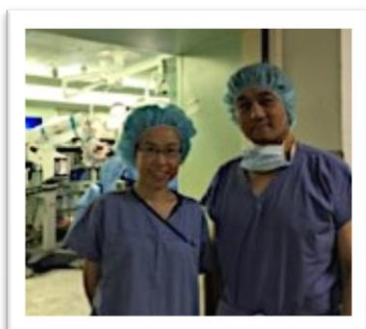
Prof. KIM Ki Tak, Chairman, Dept. Orthopaedic Surgery (Deformity correction & degenerative spine)



Prof. LEE Sang Hun, Dept. Orthopaedic Surgery (Cervical spine & degenerative spine)

Prof. KIM Yong Chan, Dept. Orthopaedic Surgery (Deformity correction & degenerative spine)

Prof. JO Dae Jean, Dept. Neurosurgery (Deformity correction & degenerative spine)



## Introduction

The APOA-APSS Clinical Spine Fellowship Program is well-known to develop enthusiastic spine fellows by providing surgical exposure and training in excellent spine centers of Asia Pacific region. I was so excited once received the acceptance from the APOA committee in early 2015. The most important was being chosen in the spine center led my Professor Kim Ki Tak, who I have been longed to learn from him for adult spine deformity correction. Although my arrival in Korea has been deferred one year after 2015 due to the MERS incidence, nothing can eliminate my eagerness to attend this precious spine training in Seoul.

After the SpineweeK 2016 Congress in Singapore, I began my training journey in Seoul on 23 May 2016. I felt honored and secured with Professor Kim's cordial arrangements of the travel from airport and a comfortable hotel to stay. I was welcome by his spine fellow on the night I arrived my hotel at Gil-dong. He showed me the way to hospital by subway, brought me to check-in the operating theatre and invited me for dinner on my first night of stay in Gangdong. I met Professor Kim in the operating theatre on the Tuesday morning. He nicely introduced me to all staff and about the surgical schedule. I was impressed by the great numbers and varieties of spinal operations. Then I started my 3-month's fellowship life in the spine team of KHU Hospital of Gangdong. I spent 4 days in a week to observe and assist spine surgeries in the operating theatre. Every Thursday, I joined the out-patient spine clinic, saw the inpatients in grand round with Prof. Kim and studied half day in my office with computer facilities. I was lucky to participate in a saw-bone workshop taught by Prof. Kim.



Weekly working schedule of Spine team of KHU Hospital at Gangdong

	Monday	Tuesday	Wednesday	Thursday	Friday
<b>AM</b>	08:00 – 13:00 Operation (Prof SH Lee)	08:00 – 13:00 Operation (Prof KT Kim)	07:00 – 08:00 Spine conference  08:00 – 13:00 Operation (Prof KT Kim)	07:00 – 08:00 O&T academic meeting  09:00 – 12:30 Spine clinic (Prof KT Kim)	08:00 – 13:00 Operation (Prof SH Lee) /  Operation (Prof DJ Jo)
	13:00 – 18:00 Operation (Prof SH Lee) /  Operation (Prof DJ Jo)	13:00 – 18:00 Operation (Prof KT Kim)	13:00 – 18:00 Operation (Prof KT Kim) /  Spine clinic (Prof SH Lee)	13:30 – 14:30 Grand-round (Prof KT Kim)  14:30 Self-study	13:00 – 18:00 Operation (Prof SH Lee) /  Operation (Prof DJ Jo)

Logbook of spine surgeries observed & assisted in KHU Hospital at Gangdong (23 May – 19 Aug 2016)

No.	Date	Sex/ Age	Diagnosis	Procedure	Surgeon	Role	Remarks
1	24-May	F/67	Degenerative Flatback syndrome of previous T9-L4 PSF & L5 osteoporotic fracture	PSIF T9-sacral-iliac	Kim KT	Observer	Distal ASD; 1st stage OT: ALIF L45 & L51 one week ago; 2nd stage OT: Revision PSIF; cut rod at L1, rod connector, double rods system
2	24-May	F/ 56	Spondylolisthesis L45 & spinal stenosis L5S1	PLIF L45 & L5S1	Kim KT	Observer	Common origin of L4 & L5 roots, one sided PLIF
3	24-May	F/70	Spondylolisthesis L45	PLIF L45	Kim KT	Observer	distraction -> cage insertion -> compression
4	25-May	F/79	Spondylolisthesis L45	PLIF L45	Kim KT	Observer	
5	25-May	F/72	Degenerative flatback with iatrogenic L45 listhesis	Posterior release + L1-S1 Instrumentation	Kim KT	Observer	L5 right pars metastasis
6	25-May	F/76	Broken rod at L2 in T6-S1 PSIF & T9 PSO	Removal of rod & revision of implants	Kim KT	Observer	1 <sup>st</sup> stage: T10-S1 PSF & L4-S1 ALIF for Degenerative Flatback after L3-5 PLIF; 2 <sup>nd</sup> stage: T6-S1 PSIF & T9 PSO for T9 # adjacent to T10-S1 PSIF; Findings: loosen L2 screws with fracture union & solid fusion
7	30-May	M/77	C5M with C56, C7T1 Spondylolisthesis	ACDF C56 +C67 and posterior instrumentation	Lee SH	Observer	1st stage: posterior laminectomy + instrumentation C3-5 lateral mass & C7-1 pedicle screws one week ago; ACDF by allograft blocks;
8	30-May	F/53	OPLL C5, C6	Laminoplasty C4-6 + right C56 Foraminotomy	Lee SH	Observer	Open door, plating

9	30-May	F/53	Left L45, Right L51 PID	Open Discectomy	Lee SH	Observer	
10	30-May	F/63	Cerebral palsy, C12 instability & cervical kyphosis with loosening C3-6 lateral mass screws of previous fixation	ACDF C3-6 & PSIF C1-7 with allograft	Lee SH	Observer	1st stage OT: C1 lateral mass, C2 pedicle, C3-7 revision instrumentation (one side pedicle, one side lateral mass) one week ago
11	31-May	F/72	Lumbar Degenerative Kyphosis with posterior release	ALLIF L2-S1 + PSIF L1-Sacral-Ilium	Jo DJ	Assistant	Iliac screw instead of alar screw, direction of lordotic reduction more physiological
12	31-May	F/73	Spondylolisthesis L45, spinal stenosis L34 & L45	PLIF L3-5	Kim KT	Assistant	
13	31-May	M/74	Spondylolisthesis C45, retrolisthesis C4-7	ACDF C4-7 & PSF C4-7	Lee SH	Observer	Twisting cobb 90degrees to open disc space, Keep PLL intact as tension band
14	1-Jun	F/70	Spondylolisthesis L45	PLIF L45	Kim KT	Assistant	
15	1-Jun	M/78	Foraminal stenosis L4/5	PLIF L45	Kim KT	Assistant	
16	1-Jun	M/66	HNP L4/5 right	Open Discectomy L4/5 right	Kim KT	Assistant	
17	1-Jun	M/34	HNP L5/S1 left	Open Discectomy L5/S1 left	Kim KT	Assistant	
18	3-Jun	F/23	HCD C5/6	Foraminotomy & Discectomy C5-6 left	Lee SH	Observer	Mongolian dancer; Rectangular Foraminotomy: 76% paracentral soft disc; Skull tong traction 15kg; Paramedian incision; 50% ipsilateral medial facet; 3mm match burrs IAF; retagular window 12-15mm; Until tip of SAF reached, 1mm burr for inner corner of SAF; Retract nerve root superiorly; discectomy at axilla; Contralateral Funnel Foraminotomy for far lateral disc
19	3-Jun	M/55	L1 burst fracture	PSIF T12-L2	Lee SH	Assistant	multi-level # (T10 anterior column, T11 lamina, L3 wedge); complete bedrest 2 weeks
20	3-Jun	F/53	Neurofibromatosis, Kyphoscoliosis T5-7	PSIF T4-12 + VCR interbody fusion with cage	Jo DJ	Observer	Grade 2 paraparesis, Pseudomeningocele, dystrophic pedicles
21	7-Jun	F/54	isthmic Spondylolisthesis L34	PLIF L34	Kim KT	Assistant	
22	7-Jun	M/73	Foraminal stenosis right L45 & Both L51	PLIF L4-S1	Kim KT	Assistant	
23	7-Jun	F/63	Spondylolisthesis L3-5	DLIF L3-5	Kim KT	Assistant	
24	7-Jun	M/44	HNP L45 right	Open Discectomy	Kim KT	Assistant	
25	7-Jun	M/45	Herniated cervical disc C5-7	Laminoplasty C56, & Foraminotomy C67 right	Lee SH	Assistant	
26	7-Jun	M/21	OA facet joint C45	Facet fusion C45	Lee SH	Assistant	
27	8-Jun	M/62	Foraminal stenosis L4-S1	PLIF L4-S1	Kim KT	Assistant	
28	8-Jun	F/70	Spondylolisthesis L45	PLIF L45	Kim KT	Assistant	
29	8-Jun	F/38	Recurred HNP L5S1 left	Revision Discectomy L5S1 left	Kim KT	Observer	
30	8-Jun	M/42	HNP L34 left & L45	Posterior decompression L3-5	Kim KT	Observer	

31	10-Jun	M/76	HNP L34 left & L45 right	Open Discectomy L34 & L45	Lee SH	Observer	
32	10-Jun	F/48	Os odontoideum with C12 instability	Posterior instrumentation & fusion C1-2	Lee SH	Assistant	C1 lateral mass & C2 pedicle screws; Intra-axial VA: part of VA passing via transverse foramen of C2 Medial-shifting (coronal cut) & High-riding (Sagittal cut) VA in 25% population. Lee SH, et al. Spine 2014. Analysis of 3-dimensional course of the intra-axial vertebral artery for C2 pedicle screw trajectory: a CT study.
33	13-Jun	M/46	CSMR C56 & Foraminal stenosis C5/6 right	Laminectomy C56 & Foraminotomy C5-6	Lee SH	Observer	Rectangular foraminotomy vs traditional oval-shape foraminotomy, SAF impinges against nerve root
34	13-Jun	M/45	CSMR with HCD C5/6 & C6/7 right	Laminoplasty C5/6 & Foraminotomy C6/7	Lee SH	Assistant	Skip laminectomy & laminoplasty for multilevel CSM (Shiraishi. TSJ 2002). Techniques see notes.
35	14-Jun	M/57	Isthmic spondylolisthesis L5S1	PLIF L5S1	Kim KT	Assistant	
36	14-Jun	F/57	DLS & Foraminal stenosis L5S1	TLIF L5S1	Kim KT	Assistant	
37	14-Jun	F/68	HNP L45 left	Open Discectomy L45	Kim KT	Observer	
38	14-Jun	F/75	Flatback syndrome with ALIF L3-5 cx with L2 #	Kyphoplasty L2	Kim KT	Observer	
39	15-Jun	F/60	Isthmic spondylolisthesis L5S1	PLIF L5S1	Kim KT	Assistant	Grade 2, PLIF in case of preserved dynamic mobility
40	15-Jun	F/55	Isthmic spondylolisthesis L45	OLIF L45 + posterior decompression & instrumentation	Kim KT	Assistant	Above grade 2 spondylo & severely narrowed space, need anterior disc height restoration; Techniques see notes
41	15-Jun	M/55	lumbar HNP L34 left	Open Discectomy L34 left	Kim KT	Observer	
42	17-Jun	M/67	OPLL with C4-6 cord compression	Laminoplasty C4-6 + Foraminotomy right C56	Lee SH	Observer	Open door on right; Techniques see notes
43	17-Jun	F/73	Proximal junctional fracture T11 of previous T12-S1 PSF + L2-S1 ALIF	Revision PSF T9-S1 with shortening osteotomy at T11	Jo DJ	Observer	
44	17-Jun	M/64	Old TB spondylitis with previous laminectomy at kyphus, T9-L2 infected fusion	Posterior decompression and instrumentation T6-L5 with T9 shortening osteotomy and interbody fusion T9-11 with cage	Jo DJ	Observer	Right foot drop, neuropathic pain, T8/9 creep. Screw fix to T6-9 & L1-4, laminar hook to L5, VCR osteotomy T9, laminar hook distally serves as outrigger for stability of construct
45	20-Jun	F/26	HNP L45 right	Open Discectomy L45	Lee SH	Observer	
46	20-Jun	M/95	Compression fracture L1	Kyphoplasty L1	Lee SH	Observer	
47	20-Jun	F/69	HCD C6-T1 & Foraminal stenosis C56 left & C67 both & C7T1 left	Laminoplasty C5-7 & Foraminotomy C56 left & C67 both & C7T1 left	Lee SH	Assistant	Open door on left side, foraminotomy at right C56 hinge side first
48	20-Jun	M/74	Fracture dislocation C67	Anterior Discectomy C67 + Posterior ORIF + ASF C67	Lee SH	Assistant	One-stage APA approaches; R side locked, L side fracture, fall from 2m height after drunk, tetraplegia, one side grade 0, other side grade 2

49	21-Jun	F/75	LDK with L2-S1 fusion cx with L1 collapse	Screw removal L2 & posterior release T10-S1	Kim KT	Assistant	Smith Peterson Osteotomy
50	21-Jun	F/61	Spinal stenosis L4-S1 with PLIF cage displacement	Cage reposition L45	Kim KT	Observer	
51	21-Jun	M/72	Spondylo L45 with previous PLIF cx with cord compression spinal stenosis	Posterior decompression and instrumentation with PSF	Lee SH	Observer	T9/10 PID, T11/12 OYL, L2/3 stenosis; Unilateral left L23 fenestration for bilateral decompression, T11/12 OYL excision, T9/10 Discectomy (left sided approach, coagulate left T9 nerve root), facetectomies T9-12, rod insertion & BG fusion
52	22-Jun	M/76	Spondylolisthesis L45	PLIF L45	Kim KT	Assistant	
53	22-Jun	M/71	Spinal stenosis L5S1	PLIF L5S1	Kim KT	Assistant	
54	22-Jun	F/69	Foraminal stenosis L5S1 right	TLIF L5S1	Kim KT	Assistant	
55	24-Jun	M/44	Recurrent HNP L45 right	Revision open Discectomy	Lee SH	Observer	
56	24-Jun	F/74	Degenerative kyphoscoliosis	Post release+ screw fix L1-S1	Jo DJ	Observer	Plan 2nd stage: ALLIF L1-S1 + PSF L1-iliu next week; P-AP (2-stage) approach for scoliosis by 360deg release and de-rotation correction; AP (1-stage) approach for deg. kyphosis without scoliosis; left lumbar curve, left L5S1 Foraminal stenosis
57	24-Jun	M/57	HNP L34 & L5S1	Open Discectomy L34 & L5S1	Lee SH	Observer	
58	27-Jun	M/85	Spondylolisthesis C23 & CSM C4-6	Laminectomy C3 & Laminoplasty C4-6 & dome osteotomy C2	Lee SH	Observer	C2 Dome osteotomy inferior half laminar base to avoid fracture C2; confirm on XR with a probe
59	27-Jun	M/38	Foraminal stenosis C5-7 left	Foraminotomy C5-7	Lee SH	Observer	
60	27-Jun	M/48	OPLL C4-6	Laminoplasty C4-6	Lee SH	Observer	
61	28-Jun	F/47	Pathological fracture L3 of met CA breast with previous corpectomy L3 & post instrumentation L1-5 complicated with screw breakage L5	ALLIF L4-S1 & post instrumentation L1-S1-iliu	Jo DJ	Assistant	Revision of implants (L4, L5 screws)
62	28-Jun	F/69	Spondylolisthesis L45 with spinal stenosis L3-5	PLIF L45 and posterior decompression L34	Kim KT	Assistant	
63	29-Jun	F/75	LDK with L2-S1 fusion cx with L2 collapse	DLIF L1-3 & post instrumentation T10-S1	Kim KT	Assistant	1st stage implant revision & post release T10-S1 on 21/6
64	29-Jun	M/70	Spinal stenosis	PLIF L3-5	Kim KT	Assistant	
65	5-Jul	F/ 78	Spinal stenosis L3-5, Spondylolisthesis L34	PLIF L34 & Post decompression L45	Kim KT	Assistant	
66	5-Jul	F/71	Spinal stenosis L45	PLIF L45	Kim KT	Assistant	
67	5-Jul	F/54	ASD L45 of PLIF L5S1	PLIF L4-S1	Kim KT	Assistant	
68	6-Jul	F/28	Old burst fracture L1 with implant	Removal of implants & Post	Kim KT	Assistant	screw head dislodged & rod breakage

			failure of post instrumentation T11-L3	instrumentation T11-L3			
69	6-Jul	F/86	Spinal stenosis L2-5	Posterior decompression L2-5	Kim KT	Observer	
70	6-Jul	F/35	HNP L45 left	Open Discectomy	Kim KT	Observer	
71	8-Jul	F/73	Degenerative flat back with collapse L4	Posterior release + L1-S1 Instrumentation	Jo DJ	Observer	L4 wedge shape, inclined pedicle screw insertion, with power drill & tap
72	8-Jul	M/86	L1 fracture nonunion after vertebroplasty with cord compression	Posterior decompression T12/L1 discectomy + L1 PPSO + ASF with mesh cage + Posterior instrumentation T10-L4	Jo DJ	Assistant	PPSO (preserve L1 lower pedicle & L1 roots, osteotomise L1 upper pedicle only); ASF with mesh cage (distraction then compression), PSIF (T10-L3 pedicle screws, L4 laminar hooks)
73	8-Jul	F/73	Proximal Thoracic Kyphosis (T8, T10, L1 old # nonunion)	PPSO L1 + PSF T10-L3	Jo DJ	Assistant	Haemodynamic shock to ICU
74	8-Jul	M/60	Right C34567 Foraminal stenosis	ACDF C3-7	Jo DJ	Observer	
75	11-Jul	F/79	Postoperative infection with left psoas & epidural abscess	Post decompression + L4 PSO + revision of implants L2-5	Jo DJ	Assistant	Previous L3/4 m-TLIF by private; L2-5 pedicle screws with laminar hooks
76	12-Jul	F/60	Spondylolisthesis L45 with spinal stenosis	PLIF L45	Kim KT	Assistant	
7	12-Jul	F/64	Spondylolisthesis L45	PLIF L45	Kim KT	Assistant	
78	12-Jul	F/28	Old burst # L1 cx with posterior rod breakage, with fixation removal & posterior instrumentation T11-L3	ALLIF T12-L2	Kim KT	Assistant	Anterolateral lumbar interbody fusion, extrapleural retroperitoneal approach
79	12-Jul	M/44	L45 PID left paracentral	Open Discectomy L45 left	Kim KT	Observer	
80	13-Jul	F/63	PTK with old # T11-L1 & Spondylolisthesis L45	Posterior release & pedicle screw fix T9-L2	Kim KT	Assistant	SPO- lateral to SAF & superior to pedicle
81	13-Jul	M/55	HNP L45 (ASD of PLIF L5S1)	PLIF L45 + rod extension	Kim KT	Assistant	
8	18-Jul	F/70	Foraminal stenosis L4/5 right & K5S1 left	PLIF L4-S1	Kim YC	Assistant	
83	18-Jul	F/85	Compression # T11	Kyphoplasty T11	Kim YC	Observer	
84	19-Jul	M/77	Spondylolisthesis L45	PLIF L45	Kim KT	Assistant	
85	19-Jul	M/76	Spinal stenosis L3-5	PLIF L3-5	Kim KT	Observer	
86	19-Jul	F/65	Spondylolisthesis L45	PLIF L45	Kim KT	Assistant	
87	19-Jul	F/58	HNP L34 left	Open Discectomy L34 left	Kim KT	Observer	
88	20-Jul	F/71	Degenerative Lumbar Scoliosis & spinal stenosis	Posterior release + L1-S1 Instrumentation	Kim KT	Assistant	
89	20-Jul	F/63	PTK with old compression # T11-L1 with post release & screw fixation T9-L2	Anterior corpectomy T12 & T12 PPSO + posterior instrumentation T9-L3	Kim KT	Assistant	Extrapleural retroperitoneal approach T11 rib; Expandable cage; PPSO (upper pedicle); Compression (shortening) bilaterally with Bulldock; L2 laminar hook
90	22-Jul	F/68	Fracture nonunion L1	Kyphoplasty L1	Kim YC	Observer	

91	22-Jul	F/83	CSM with cervical kyphoscoliosis	Laminectomy + PSIF C3-7	Jo DJ	Assistant	1st stage: C3-6 lateral mass screws + C7 pedicle screw; plan 2nd stage ACDF C3-7 next week
92	22-Jul	M/59	L34 infective discitis with previous right L4 laminotomy (L5 sacralisation)	Posterior decompression + L34 Discectomy + L3-L5 instrumentation	Jo DJ	Assistant	1st stage OT; plan 2nd stage ASF L34 & L45 one week later
93	22-Jul	F/74	OPLL with cord compression C3-T2	Laminectomy + PSIF C3-T2	Jo DJ	Observer	plan 2nd stage ACDF C3-7 one week later
94	22-Jul	M/65	L3 fracture	PSIF L2-L4	Jo DJ	Assistant	Screw & laminar hooks; decortication & allograft; posterior compression distracts anterior column; lock screws gradually for distraction of spine against the rod (ligamentotaxis) in osteoporotic bone
95	25-Jul	M/76	Spondylolisthesis L45	PLIF L45	Kim YC	Observer	
96	25-Jul	M/55	HCD C45 right	ACDF C45	Kim YC	Observer	
97	26-Jul	F/71	Deg Lumbar Scoliosis & spinal stenosis L1-5 with post release L1-S1 on 20/7	ALLIF L1-S1 & posterior instrumentation	Kim KT	Assistant	Incision from between floating rib & fixed rib to midway of pubic symphysis & ASIS; Sympathetic ganglions: landmarks of intervertebral discs
98	26-Jul	F/69	Flatback syndrome with old compression # T11-L2 & spinal stenosis L1-L5	Posterior release T9-S1	Kim KT	Assistant	
99	27-Jul	M/48	Ankylosing spondylitis	PSO L2 & posterior instrumentation T11-L5	Kim KT	Assistant	
100	27-Jul	M/55	HNP L45 right	Open Discectomy L45 right	Kim KT	Observer	
101	27-Jul	M/31	HNP L45 left	Open Discectomy L45 left	Kim KT	Observer	
102	29-Jul	M/28	HNP L45 right	Open Discectomy L45 right	Kim YC	Observer	
103	29-Jul	F/83	CSM with cervical kyphoscoliosis with C3-7 Laminectomy + PSIF on 22/7	C3-7 ACDF	Jo DJ	Observer	
104	29-Jul	F/80	Kummel's disease L4	Kyphoplasty L4	Kim YC	Observer	
105	29-Jul	M/39	Recurred PID L45 left with Rev open Discectomy	Re-revision Open Discectomy	Kim KT	Observer	Approach from left, pain on left, neurology on right, previous approach on right
6	29-Jul	F/88	T8 compression fracture	Kyphoplasty T8	Kim YC	Observer	Left pedicle only
107	29-Jul	F/83	Compression fracture T7	Kyphoplasty T7	Kim YC	Observer	
108	29-Jul	F/89	Compression fracture L1	Vertebroplasty L1	Jo DJ	Observer	
109	29-Jul	F/81	T1, T3 osteoporotic fracture with flat back syndrome	Vertebroplasty T1, T3	Jo DJ	Observer	
110	29-Jul	F/77	Degenerative scoliosis & L45 Spondylolisthesis with foraminal stenosis	ALLIF L34 & L45 + Posterior decompression & instrumentation	Jo DJ	Assistant	
111	29-Jul	M/59	L34 infective discitis with posterior	ASF L34, L45 + Posterior	Jo DJ	Assistant	



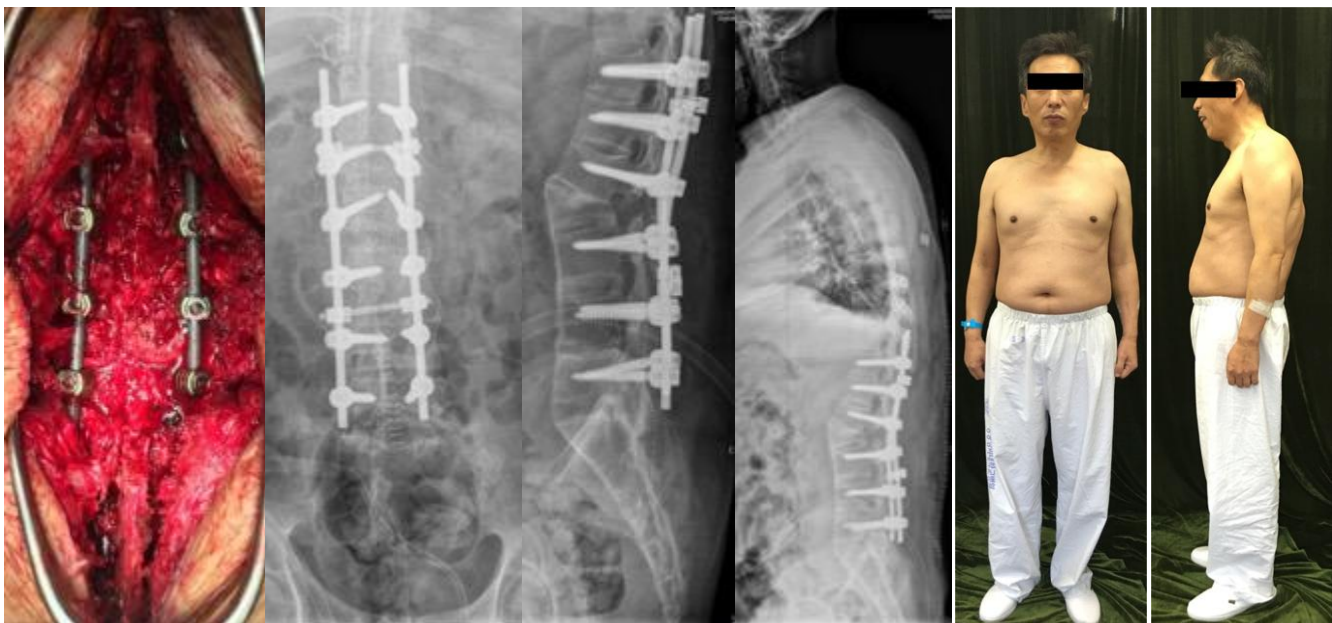
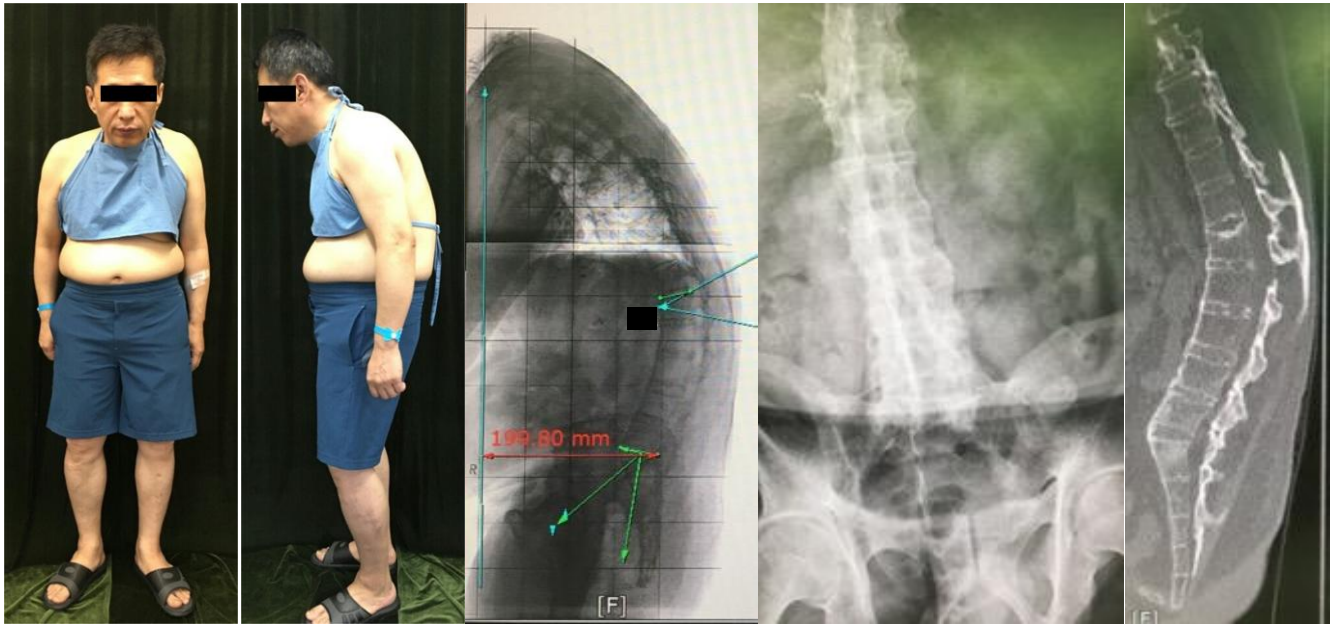
			decompression + L34 Discectomy + pedicle screw fixation L3-L5 on 22/7	Instrumentation			
112	1-Aug	M/74	HNP L23 left	Open Discectomy L23	Kim YC	Observer	
113	1-Aug	M/61	isthmic Spondylolisthesis L45 spinal stenosis L3-5	PLIF L3-5	Kim YC	Observer	
114	1-Aug	F/81	Compression fracture L1	Kyphoplasty L1	Kim YC	Observer	
115	2-Aug	F/69	Flatback syndrome with compression # T11-L2 & spinal stenosis L1-L5 with posterior release T9-S1 on 26/7	ALLIF L2-S1 & posterior instrumentation T9-S1 + L3 PSO	Kim KT	Assistant	
116	2-Aug	M/59	HNP C34 left	ACDF C34	Kim KT	Observer	
117	2-Aug	F/55	Spondylolisthesis L45	PLIF L45	Kim KT	Assistant	
118	2-Aug	F/43	HNP L34 left	Open Discectomy L34 left	Kim KT	Observer	
119	2-Aug	M/57	Flexion distraction injury L2	Posterior instrumentation T12-L3	Kim KT	Observer	
120	3-Aug	M/58	Ankylosing spondylitis	PSO L2 & posterior instrumentation T11-L5	Kim KT	Assistant	
121	4-Aug	M/70	C67 facet dislocation	Posterior open reduction + instrumentation C6-7	Kim YC	Observer	Neck injured on 1/8 by object against occiput, right LL weakness improved to normal on 3/8. Partial facetectomy + lateral mass screws. 2nd stage ACDF.
122	4-Aug	F/51	OPLL cervical spine with incomplete SCI	Laminectomy & posterior instrumentation C3-6	Kim YC	Observer	grade 3 proximal, grade 2 distal
123	5-Aug	M/82	Spondylolisthesis L45 and L34	PLIF L3-5	Kim YC	Observer	
124	5-Aug	F/46	TB gibbus L3-S1, ASD L23 with spinal stenosis & sagittal imbalance	ALLIF L1-L3 + PSIF T10-iliac	Jo DJ	Assistant	Double iliac screws, dual rod, pedicle screws T10,11,12,L1,2,3; Sympathetic ganglion the landmark of intervertebral disc, below diaphragm, retract kidneys, which lies below rib cage
125	5-Aug	F/64	L4-S1 DDD with spinal stenosis	ALIF L45 & L51 + posterior decompression & instrumentation L4-S1	Jo DJ	Assistant	Left sided, z pasty incision of fascia, lateral to rectus abdominus, L51 narrow window between both common iliac vessels, L45 lateral to left CIA; superior articular facetectomy to complete SPO; lip medial edge of SAF before osteotomy
126	5-Aug	M/43	HCD C67	ACDF C67	Jo DJ	Observer	
127	8-Aug	F/74	Spondylolisthesis L2-5 with spinal stenosis & compression fracture L2-4	Posterior decompression L2-5 & instrumentation T12-L5	Kim YC	Observer	Osteoporotic bone; L4, L5 screw insertion with cement augmentation
128	8-Aug	M/70	C67 fracture dislocation with OR & posterior instrumentation C67 on 4/8	ACDF C67	Kim YC	Observer	
129	8-Aug	M/72	Spinal stenosis L4-S1	PLIF L4-S1	Kim YC	Observer	
130	8-Aug	F/87	Compression fracture T12	Kyphoplasty T12	Kim YC	Observer	

131	8-Aug	M/82	L4 infective spondylitis (L4 osteomyelitis & L45 discitis) with previous percutaneous cement augmented screws T12-L2	L4 VCR + Posterior decompression + instrumentation T12-S1-iliium + interbody fusion L3-5 + PSF with autograft	Jo DJ	Assistant	Leave anterior cortex & ALL intact. Free posterior wall from dura by down curette. Hinge at cage when closing wedge. Interbody fusion with BG only coz infection. Bilateral compression same time. Placed reduction screws distally at lordotic depth, fit proximal rod to screw rod pusher. Bend distal rod nearly 90 curve, reduce pullout force upon distal screws & add sufficient lordosis
132	9-Aug	M/73	Spinal stenosis L4-S1 (spondylolysis L5S1)	PLIF L4-S1	Kim KT	Assistant	S1 screw insertion after decompression, identify S1 direction with a probe from central canal. Far lateral discectomy on opposite, osteotomy osteophyte at axilla
133	9-Aug	M/16	HNP L45 right	Open Discectomy L45 right	Kim KT	Observer	
134	9-Aug	F/64	Spondylolisthesis L34 & spinal stenosis L45	DLIF L3-5 + posterior instrumentation L3-5	Kim KT	Assistant	
135	9-Aug	F/41	HNP L5S1right	Open Discectomy L5S1 right	Kim KT	Observer	
136	10-Aug	F/69	Flatback syndrome with previous L3-S1 PSIF	Posterior release & instrumentation T11-S1	Kim KT	Assistant	1st staged. 3 levels SPO as posterior release
137	10-Aug	F/72	Spondylolisthesis L5/S1	Anterior release + PLIF L5-S1	Kim KT	Assistant	Aborted ALIF L5/S1 due to difficult L5/S1 disc space identification in grade 2 listhesis
138	12-Aug	F/69	spinal stenosis L3-5	PLIF L3-5	Kim YC	Assistant	
139	12-Aug	M/71	C1 metastatic lesion with instability pain	OCF + C1 tumor excision	Jo DJ	Observer	(left C1 arch, left VA dominant)
140	16-Aug	M/62	Spondylolisthesis L45 with spinal stenosis	PLIF L45	Kim KT	Assistant	
141	16-Aug	F/61	Spinal stenosis L45	TLIF L45	Kim KT	Assistant	left L45 neural foraminal stenosis
142	16-Aug	F/57	Spinal stenosis L5S1	TLIF L5S1	Kim KT	Observer	
143	16-Aug	F/60	Spondylolisthesis L45 with HNP	PLIF L45	Kim KT	Assistant	right foraminal, with previous right laminotomy
144	17-Aug	F/69	Flatback syndrome after PLIF with posterior release T11-S1 on 10/8	ALLIF L1-4 & posterior instrumentation T11-S1-iliium	Kim KT	Assistant	
145	19-Aug	F/70	Spinal stenosis L2-5 with Spondylolisthesis L45	ALLIF L2-5 + Posterior instrumentation L2-5	Jo DJ	Assistant	AP approach
146	19-Aug	F/67	Cervical Spondyloitic Myelopathy	C3-7 Laminectomy + C3-T1 posterior instrumentation	Jo DJ	Observer	C3-6 lateral mass, C7,T1 pedicle screws. Dual rod system
147	19-Aug	F/60	Wound infection of Sacral chordoma with tumor excision and posterior instrumentation in Nov 2015	Wound exploration + debridement	Jo DJ	Observer	

## Operated case examples

### 1. Ankylosing Spondylitis

A 58 years old male patient with Ankylosing Spondylitis standing in a kyphotic posture with failed horizontal gauze & compensated knee flexion was operated with L2 pedicle subtraction osteotomy (PSO) and posterior instrumentation T11-L5 with spinal fusion. Pre-op. planning, intra-op. position and post-op. radiologic-clinical correction were shown. (27/7)



## 2. Degenerative flat back syndrome

A 69 years old female suffered from degenerative flat back with lumbar spinal stenosis. Two-staged operations by P-AP (Posterior-Anteroposterior) approach were performed. First stage was posterior release by Smith-Peterson osteotomies (SPO) & T10-S1 pedicle screws fixation. Second stage was Antero-lateral lumbar interbody fusion (ALLIF) L2-S1 through retro-peritoneal approach. Patient was placed in semi-lateral position. Incision was made from mid-point between floating rib and the last rigid rib to the mid-point between pubic symphysis and ASIS. Disc space was accessed through Oblique lumbar interbody fusion (OLIF) approach between corridor antero-medial to psoas & lateral to aorta for L2-L5 levels. Anterolateral annulus was incised with ALL left intact for discectomy. Interbody fusion was done by allograft in PEEK cage. Standard ALIF was done at L5/S1. Patient was turned prone for L3 partial pedicle subtraction osteotomy (PPSO) and posterior instrumentation of T10-S1-iliac screws. (Kim KT, et al. Three different methods in deformity correction of degenerative flat back. Asian Spine J 2015.)



Two third of the upper pedicle was resected in PPSO. Target of osteotomy was the upper 1/3 of VB with upper endplate remained intact. Preserving bony continuity of 3 columns through a pedicle maintains stability and improves bony union by reducing posterior fusion bed defects. The intact lower part pedicle can prevent injury to exiting nerve root. (Kim KT, et al. Partial pedicle subtraction osteotomy as an alternative option for spinal sagittal deformity correction. Spine 2013.)



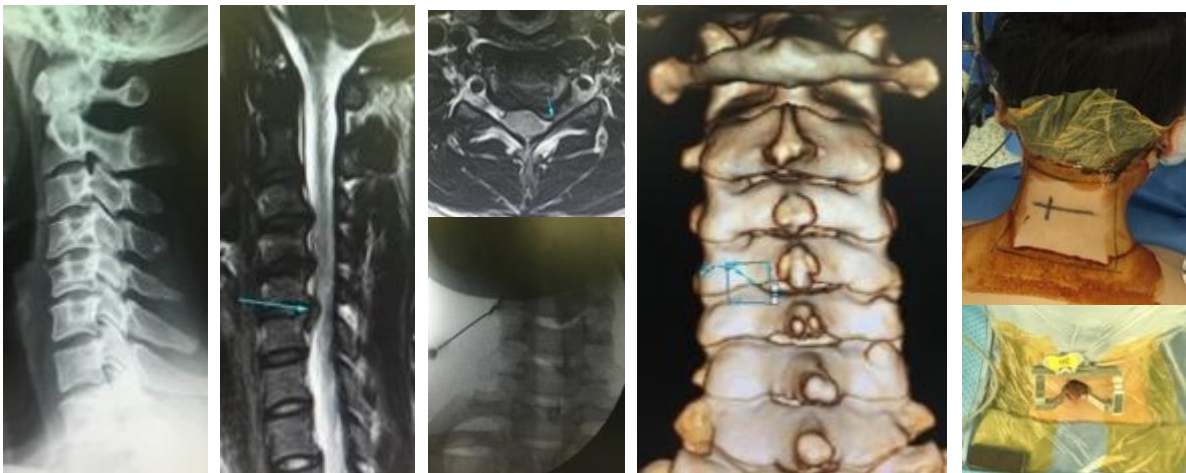
### 3. Post-traumatic Thoracolumbar Kyphosis (13/7, 20/7)

A 63 years old female suffered from old compression fractures T11, T12 and L1 with  $49.5^{\circ}$  focal kyphosis and positive sagittal imbalance. Two-staged operations by P-AP (Posterior-Anteroposterior) approach were performed. First stage was posterior release by 4-level Smith-Peterson osteotomies (SPO) & T9-L2 pedicle screws fixation. Second stage was T12 corpectomy with anterior spinal fusion in expandable cage by extra-pleural retro-peritoneal approach through T11 rib resection. Patient was then turned prone for T12 partial pedicle subtraction osteotomy (PPSO) and T9-L2 posterior instrumentation.

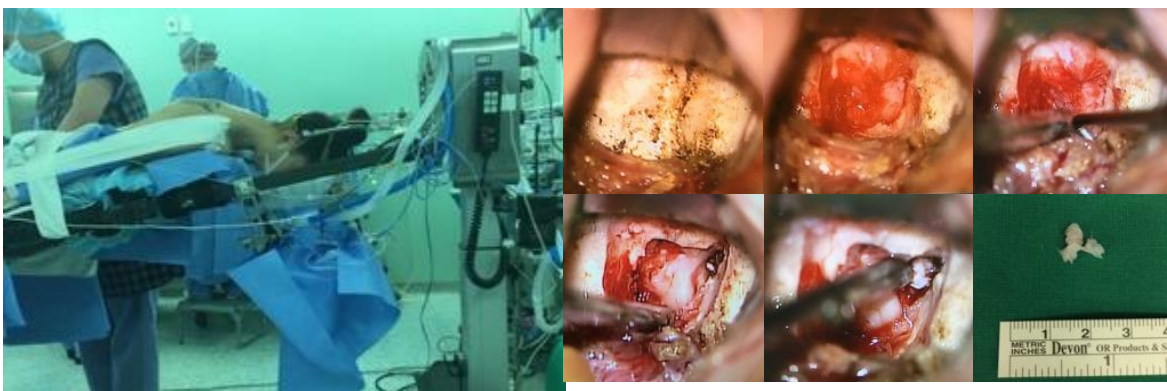


#### 4. Rectangular foraminotomy and open door laminoplasty

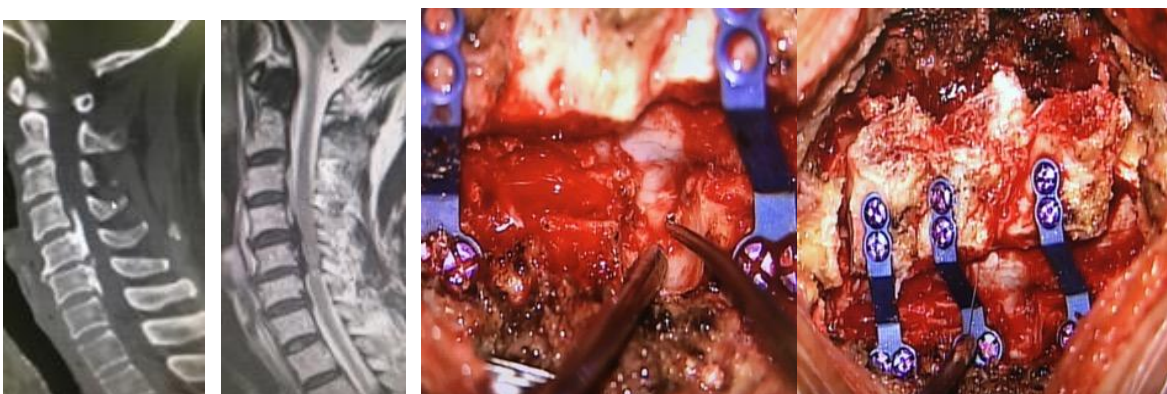
A 23 years old Mongolian dancer suffered from herniated C5/6 cervical disc with left C6 radiculopathy partially relieved by selective nerve root block. Left C5/6 foraminotomy and discectomy was performed through a para-median incision under microscope. Patient was placed prone under skull tong traction. Left C5/6 facet joint was subperiosteally exposed. A 12mm x 15mm rectangular window was made in the medial half facet joint. Adequacy of decompression was confirmed by removing the inner corner of superior articular facet and tracing C6 root until pedicle of the lower segment (with a nerve probe). Discectomy was done at the axilla of left C6 nerve root. 76% paracentral soft disc can be successfully treated by rectangular foraminotomy. (Lee SH, et al. Posterior rectangular foraminotomy for cervical radiculopathy. The 33<sup>rd</sup> Spring Congress KSSS 28 May 2016)



3/6



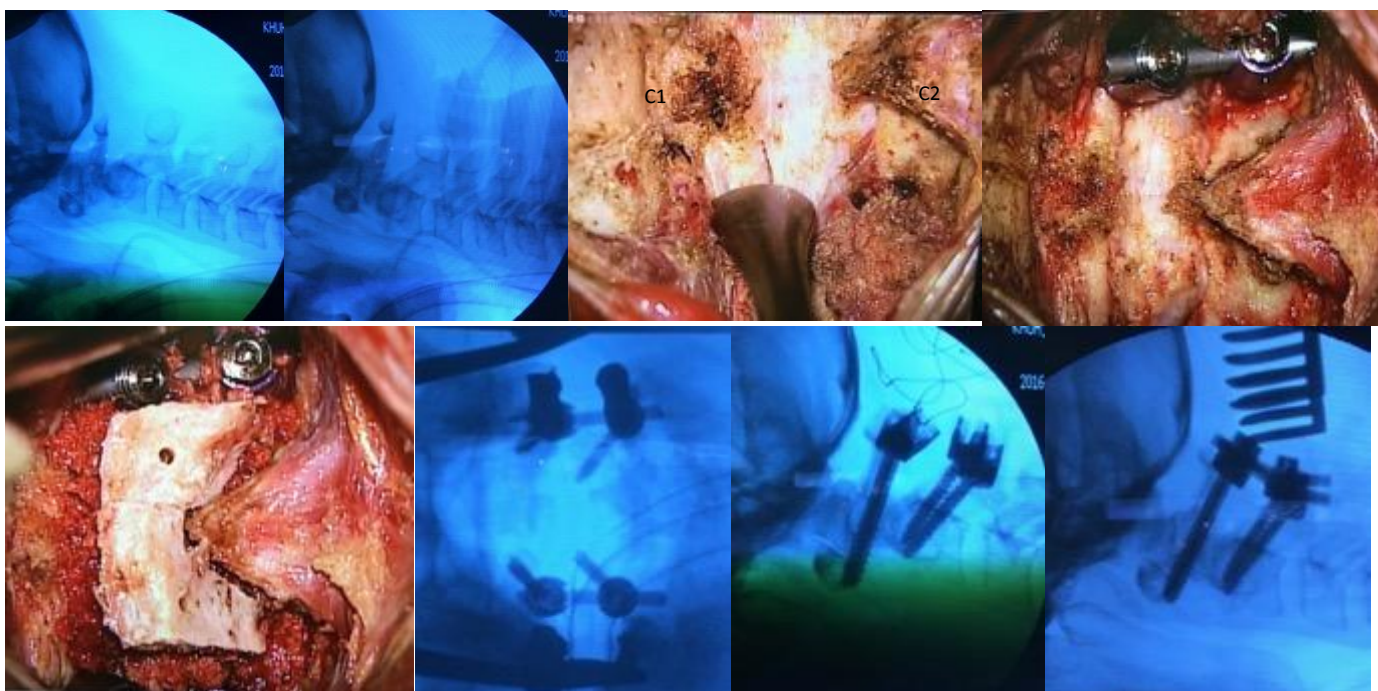
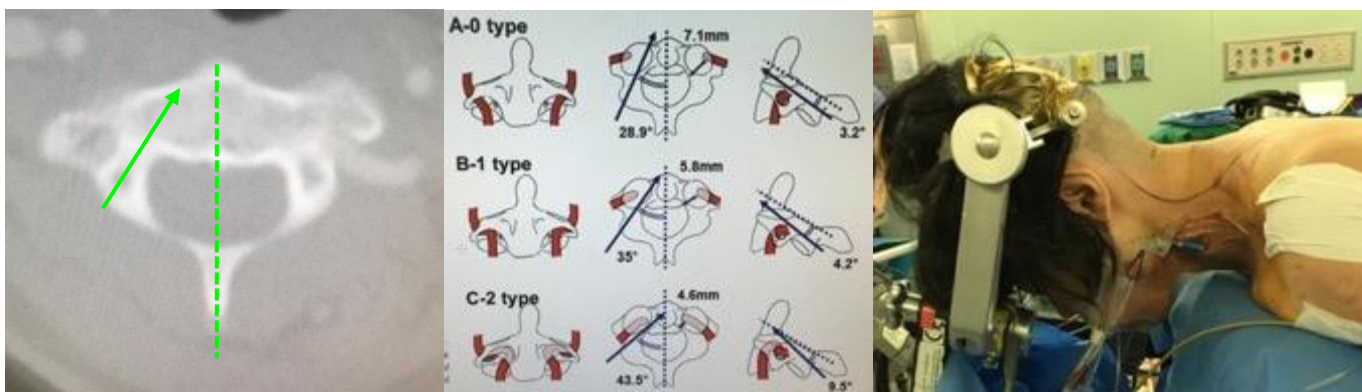
A 67 male patient suffered from OPLL with C4-6 cord compression treated with open door laminoplasty C4-6 and right C5/6 foraminotomy. Lamina doors were opened on right side and fixed by plate and screws. Plates were applied to the uppermost and lowermost segments. Screw holes were drilled to C5 lateral mass for the decided C5 plate position. Rectangular foraminotomy at C5/6 facet joint was done before fixing plate. Spinous processes were removed for more symmetrical paraspinal muscle healing.



17/6

5. Os Odontoideum and C1-2 PSF (10/6, case 2, high riding VA)

A 48 years old female suffered from upper neck pain due to Os Odontoideum with C1/2 instability. C1-2 posterior spinal fusion with segmental screw-rod instrumentation was planned. Pre-op. CT was used to analyze the 3D courses of intra-axial vertebral artery or high-riding VA for C2 pedicle screw placement. (Lee SH, et al. Analysis of 3-D course of Intra-axial vertebral artery for C2 pedicle screw trajectory. Spine 2014) Patient was placed in neutral prone position supported by Mayfield clamp. Reducibility of C1-2 was checked by manual extension of cervical spine. C1 posterior arch was bluntly dissected for C1 lateral mass screw insertion. Medial surface of C2 isthmus was palpated for C2 pedicle insertion. Morsarised and cortical iliac crest bone graft was laid and secured on decorticated C1-2 lamina for fusion. Anterior C1 subluxation was reduced by screw-rod system in lordosis.



6. Kyphoplasty (14/6, 18/7, 22/7, 29/7, 1/8)

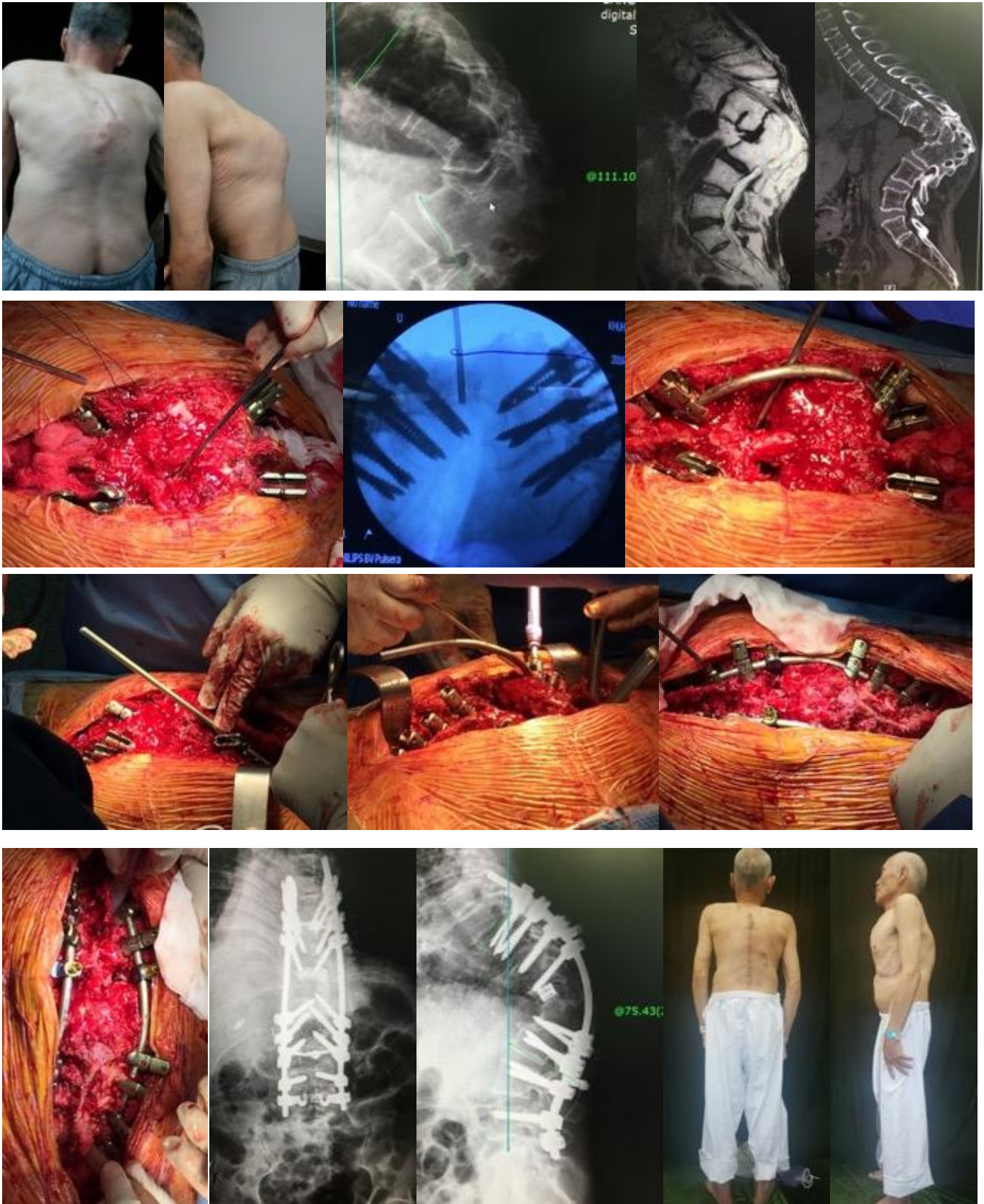
A 68 years old female suffered from compression fracture non-union of L1 vertebrae failed to respond to conservative management was treated with L1 kyphoplasty.





7. TB kyphoscoliosis (17/6, case 3)

A 64 years old male patient has old TB spondylitis with previous laminectomy done. He suffered from progressive kyphoscoliosis deformity and sudden paraparesis. X ray showed acute kyphosis of  $111^{\circ}$  at T9-L2 fused segment corresponding to the clinical gibbus. MRI and CT showed T8/9 pseudarthrosis and cord compression. Posterior decompression and pedicle screw instrumentation T5-L4 was done, followed by vertebral column resection (VCR) T9 with T9 nerve roots resection. Posterior column compression was hinged at interbody cage with bone graft fusion. Patient recovered from paraparesis after surgery.



8. Occipital cervical fusion for C1 metastatic instability (12/8, case 2)

A 71 years old man suffered from neck pain due to C1 metastasis of unknown origin. X ray showed C1/2 instability. CT showed the completely lost of C1 left posterior arch. The lateral mass tumor was close to vertebral artery and enhanced by contrast on MRI. Occipital-cervical fusion was done by keel plate, C2 pedicle screw and C3, C4 lateral mass screws fixation. Temporary rod fixation was followed by C1 left posterior arch tumor excision and spinal cord decompression under microscope.

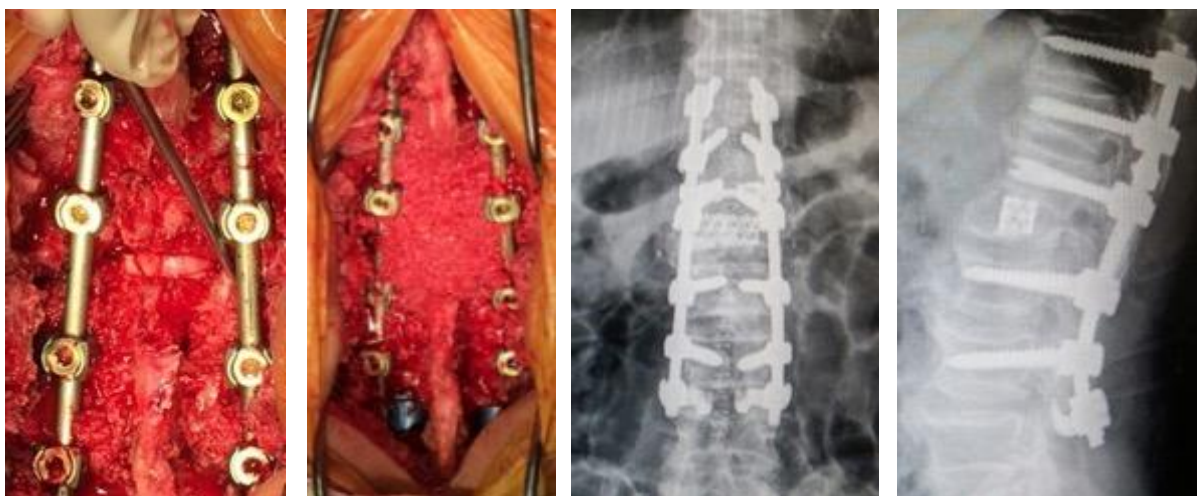


9. Modified partial pedicle subtraction osteotomy (8/7, case 2)

A 86 years old man suffered from L1 fracture nonunion and cord compression after vertebroplasty.



Posterior decompression with L1 cement removal, T12/L1 discectomy and PPSO L1 was done. L1 lower endplate and lower half pedicle was preserved. Interbody fusion T12-L1 was performed with mesh cage and allograft. Posterior spine fusion was done with instrumentation of T10-L3 pedicle screws and L4 laminar hooks.



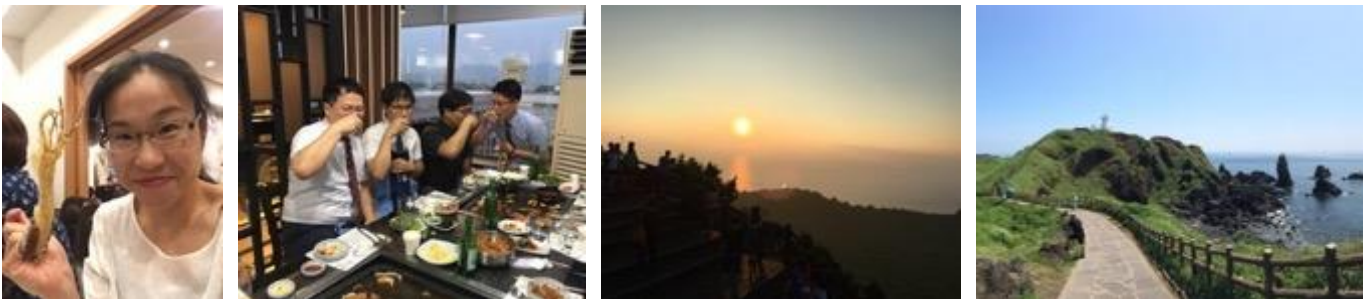
### Korean spine meeting in Busan

I have participated in the 33<sup>rd</sup> Spring Congress Korean Society of Spine Surgery (KSSS) in Busan on 27-28 May 2016. It was a local Korean spine meeting full of up-to-date spinal surgery paper presentations. We spine fellows have good chance to exchange ideas. I was happy to meet Korean friends who introduced Bi-portal Endoscopic Spine Surgery to me. At the end of the day, both the spine teams of Kyung Hee University Hospital & KHU Hospital at Gangdong enjoyed the great time of having Korean seafood together. There I met a female spine fellow from Thailand, Professor Jung- Hee Lee and Professor Kyung-Chung Kang.



## Living in Korea

During the 3-months stay in Korea, I have chance to visit the palace Gyeongbokgung, hike the mountains eg. Achisan, and meet new friends in the church during weekends. It was always great to taste the traditional Korean dine and wine. I am also grateful to travel the beautiful Jeju Island in the holiday of the National Day.



## Conclusion

A period of 3 months was too short to learn from Professor KT Kim. It was really fruitful to observe unique techniques of different spine surgeons in KHU Hospital at Gangdong. I learnt not only the techniques but also the up-to-date principles in treating adult spine deformity, the advanced modifications in osteotomy and, most important, the attitude of being a spine surgeon.



## Acknowledgement

Lastly, I thank APSS which has granted me this treasurable opportunity of overseas spine fellowship training. I would never take it for granted to experience these 3 months of Korean life in such an excellent spine centre.