Asia Pacific Spine Society (APSS)

(Spine Section of APOA)

2024 APSS Medtronic Fellowship Report

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Osaka Metropolitan University, Osaka, Japan

Fellowship period: 17th September, 2024 – 16th December, 2024

Host:

1. **Prof. Dato' Dr. Kwan Mun Keong**

2. **Prof. Dr. Chris Chan Yin Wei**

3. **Associate Prof. Dr. Chiu Chee Kidd**

Fellowship Center:

Department of Orthopaedic Surgery, Faculty of Medicine,
National Orthopaedic Centre of Excellence for Research and Learning (NOCERAL),
Universiti Malaya, Kuala Lumpur, Malaysia.

Introduction

First, I feel truly fortunate to have had the opportunity to participate in this traveling fellowship. I am deeply grateful to the Asia Pacific Spine Society (APSS) and the University of Malaya for providing me with this invaluable experience and for enabling me to complete this fellowship successfully.

Allow me to describe the appeal of this fellowship. The program comprehensively supported me financially, which allowed me to focus on gaining a fulfilling fellowship experience. Another notable aspect of this fellowship is the wide range of host institutions available, enabling participants to select facilities that specialize in their desired subspecialty.

Since I was particularly interested in scoliosis treatment, I chose the University of Malaya as my host institution. At this institution, approximately 250 scoliosis surgeries are performed annually by a highly skilled team of three surgeons: Professor Dato Dr. Kwan, Professor Dr. Chris, and Associate Professor Dr. Chiu. The scoliosis surgeries were particularly refined, showcasing exceptional techniques in exposure, screw placement, correction, adjustment of balance, and wound closure. Every step of the procedure was purposeful, and I had the privilege of observing beautifully executed surgeries with no wasted effort.

Moreover, significant emphasis was placed on developing a highly efficient spinal surgery team (dedicated spine team). With only one operating room designated for spine surgeries each day, efficient use of the operating room was essential to achieve this high volume of cases. Processes such as patient admission, anesthesia induction, intraoperative management, anesthesia recovery, and patient turnover were all remarkably smooth, thanks to a highly dedicated spine team.

Notably, Prof. Shahnaz from the anesthesia department was outstanding, ensuring perfect intraoperative anesthesia management that facilitated the surgeons' work. The radiology technicians were equally impressive, offering immediate feedback if they suspected screw malposition under fluoroscopy. Additionally, the scrub nurses had a deep understanding of surgical procedures and made significant contributions to the operations. The entire dedicated spine team worked cohesively to deliver efficient and high-quality care, resulting in excellent surgical outcomes.

They were also highly committed to education. The institution also hosted observational surgical courses, attracting visitors from numerous countries. These visitors were greatly impressed by the meticulously prepared preoperative plans and surgical techniques that the team generously shared.

I feel incredibly fortunate to have spent three months studying scoliosis treatment in such an outstanding environment.

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Dedicated spine team

Weekly Schedule

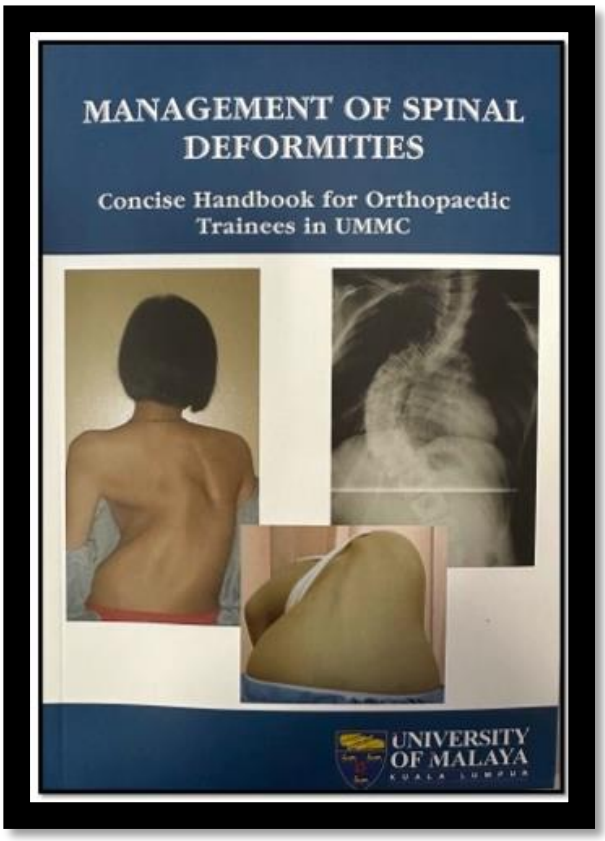
Spine Team Weekly Roster 2024						
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
0700-0800	Ward round	Spine Teaching + Preop Presentation	Preop teaching	Spine Teaching + Preop Presentation	Ward round	
					Research meeting	
0800-0900	Spine clinic	Long case teaching	OT		Long case teaching	OT
0900-1300		OT		OT	Scoliosis clinic	
1300-1700	Research				Research	
1700-2200					OT	

Spine and Scoliosis Clinics

Mondays and Fridays were designated outpatient clinic days. In particular, on Friday, Scoliosis Clinic exclusively catered to scoliosis patients, including those with severe scoliosis exceeding a Cobb angle of 150 degrees. The University of Malaya follows a unified treatment approach for scoliosis, guided by their evidence-based handbook, which they have independently published. This handbook ensures that all staff, including junior orthopedic surgeons, adhere to consistent treatment strategies.

For brace treatment, great emphasis was placed on patient education to improve brace compliance, including the distribution of informational pamphlets to patients. Additionally, they used braces created with 3D printing technology. I had the opportunity to observe the entire process, from measurements to the production of these braces, which provided valuable insight into the latest advancements in brace therapy.

Treatment plans for follow-up cases and those undergoing brace therapy were meticulously managed, and comprehensive longitudinal data on scoliosis patients were systematically collected. I look forward to future reports from this university on the natural history of scoliosis and the efficacy of brace treatment.



Scoliosis

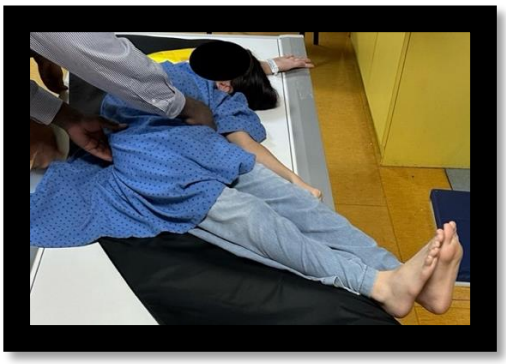
The preoperative planning for surgeries was incredibly logical and detailed. One of the most impressive aspects was their practice of obtaining whole-spine bending X-rays under the direct supervision of physicians for every case. This approach ensures high reliability and reproducibility, addressing the common issue of variability when patients are left to perform the bending on their own. Using these reliable whole-spine bending X-rays, they preoperatively planned the UIV tilt and LIV tilt to be achieved during surgery.

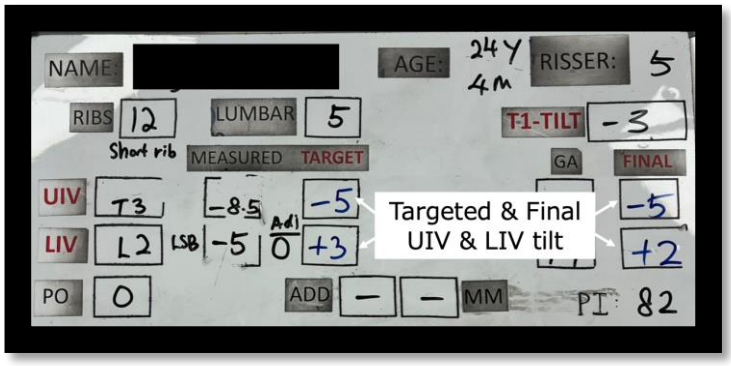
Additionally, full-length lower limb X-rays were obtained for every patient to evaluate leg length discrepancies, pelvic hypoplasia, and lower limb alignment. Based on this evaluation, the amount of pelvic tilt correction needed during surgery was also pre-planned.

Intraoperatively, they used a crossbar system for every case to adjust the alignment precisely, ensuring that the UIV tilt and LIV tilt matched the preoperative plan. They had a clear standard: once a good spinal balance was achieved, the scoliosis correction was considered complete. This meticulous planning eliminated any uncertainty about alignment adjustments during surgery.

Postoperative whole-spine X-rays consistently showed that the planned UIV and LIV tilts were maintained, and the T1 tilt was successfully leveled, resulting in excellent medial shoulder balance and neck tilt. This demonstrated the effectiveness of their preoperative planning.

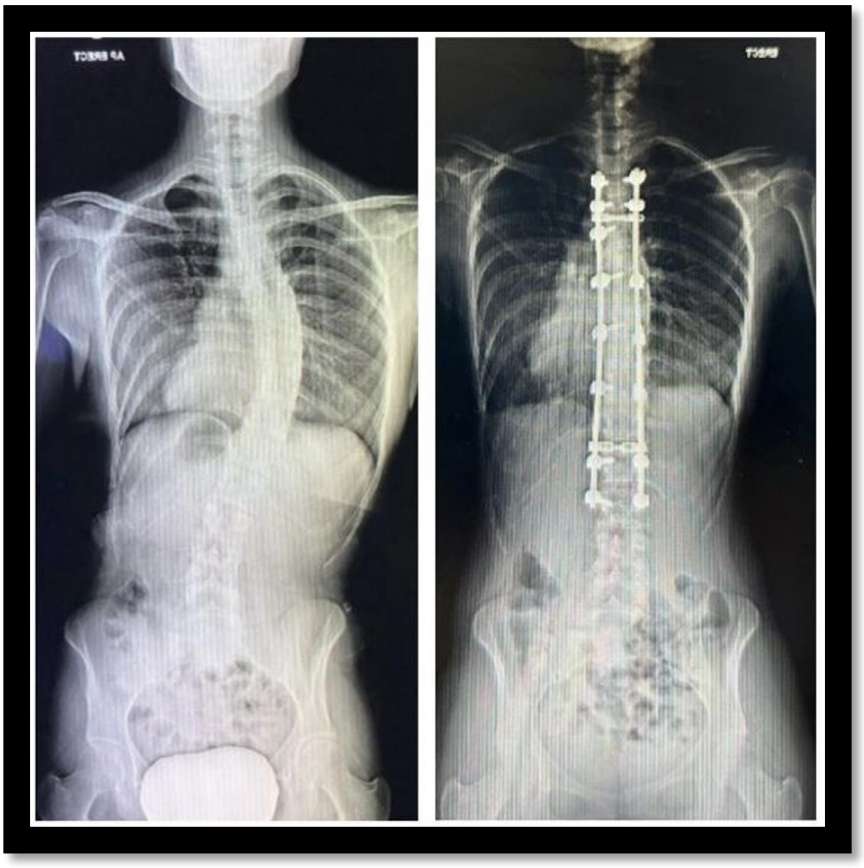
The key to this process lies in the reliability of the whole-spine bending X-rays. I had the chance to guide a patient during the bending X-ray process, and I found it surprisingly simple and efficient. I hope to implement this technique in my own institution in the future.





(left) Active bending film under direct surpervision of phisicians

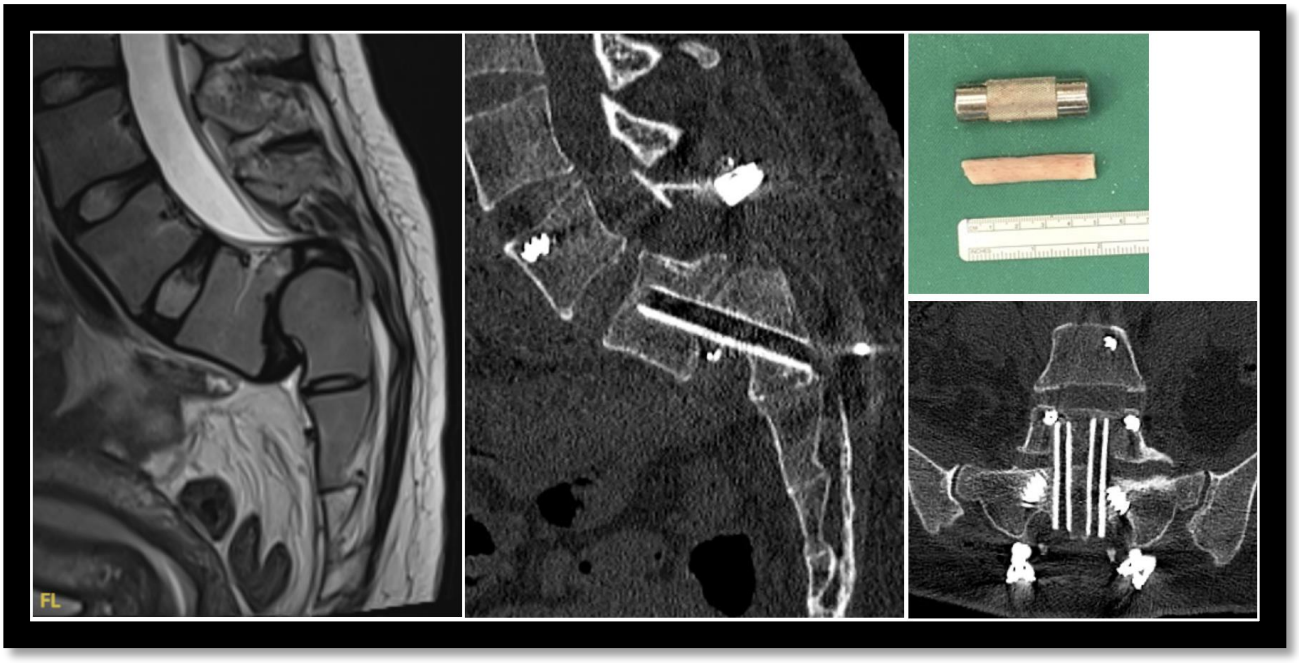
(right) Intraoperative targeted and final UIV and LIV tilts



Good spinal alignment, particularly in terms of T1 tilt, was achieved, leading to excellent medial shoulder and neck balance.

High-grade dysplastic spondylolisthesis

They provided exceptional treatment for cases of severe congenital spondylolisthesis, which I would like to introduce. A 24-year-old female was diagnosed with a high-grade L5/S1 dysplastic spondylolisthesis (*Meyerding classification grade* Ⅳ*).* Her radiographs showed high-grade spondylolisthesis of L5/S1 with dysplastic features of dome-shaped sacral promontory and anterior slippage of L5 vertebra on S1 upper endplate. A T2-weighted MRI revealed severe compression of the dural sac and nerve roots at L5/S1 levels. In the cases of high-grade dysplastic spondylolisthesis, the overcorrection of spondylolisthesis was reported to have a high incidence of neurological deficits due to the traction of L5 nerve root. Therefore, in situ spinal fusion was performed to avoid neurological deficits. Meanwhile, according to the previous reports, the incidence of pseudoarthrosis at the L5/S1 level was clinically higher in in-situ fusion cases compared to reduction cases. To prevent pseudoarthrosis, fibular strut grafts were harvested to be used to augment the interbody fusion at the L5/S1 level. A 9 mm diameter bone tunnel was created with a guidewire, and the fibula bone graft was trimmed to a 9 mm diameter prior to insertion. This technique is an innovative method, and it was a highly impressive case for me.

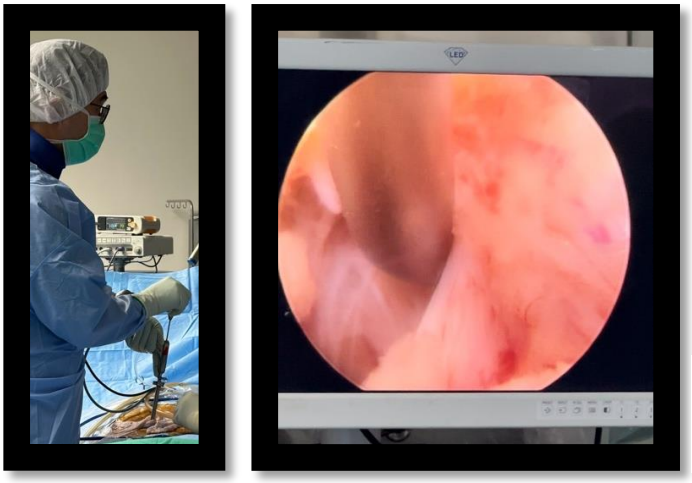


Minimally invasive surgery

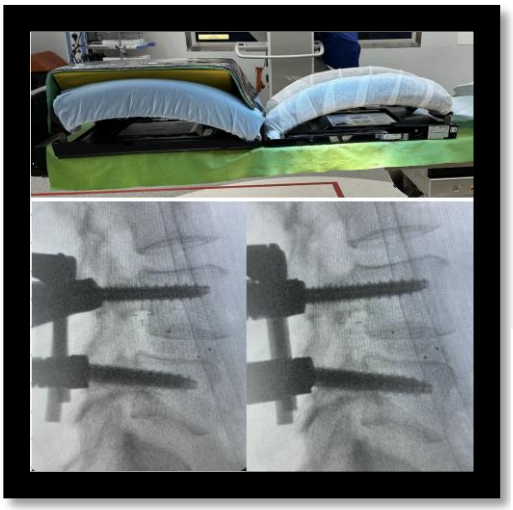
At this facility, minimally invasive surgical treatments were actively performed. In MIS-TLIF, they approached the disc through a small skin incision for percutaneous screw incision and removed the facet joint on one side. It is often said that obtaining sagittal alignment in MIS-TLIF is challenging, but by creatively utilizing the operating table, they were particularly focused on correcting the alignment of the lower lumbar spine (L4-S1 angle). Postoperative X-rays showed significant correction of the translation of the vertebral body and acquisition of lordosis.

For lumbar decompression and herniated disc discectomy, they introduced full-endoscopic spine surgery (FESS). Through the interlaminar approach, they performed minimal bone resection and preserved facet joint as much as possible while excising the ligamentum flavum and disc.

They were truly skilled surgeons, demonstrating various techniques that were highly educational for me. The surgeries prioritized safety above all, with each maneuver being precise and purposeful, resulting in shorter operative times.



Full-endoscopic spine surgery performed by Prof. Chris



Innovative use of the operating table and correction of transition of vertebral body and alignment acquisition with spinal implants.

Fellowship Experience

During this fellowship, there were many events. In the surgical observation course (17th and 18th Advanced Operative Course), I attended lectures filled with the professors' knowledge and experience over four days, and I had the opportunity to observe numerous scoliosis surgeries.

17th and 18th Advanced Operative Course

Additionally, as part of the JSSR Asia Traveling Fellow program, Dr. Yuki Taniguchi from the University of Tokyo, Dr. Hiroshi Takahashi from the University of Tsukuba, and Dr. Satoshi Maki from Chiba University visited and exchanged ideas. It was a great pleasure for me to have my knowledge organized and clarified during the lively discussions with these three esteemed professors.

JSSR Asia traveling fellowship

The APSS Basic Spine Course was also held, and Dr. Shinji Takahashi from our university visited the University of Malaya to give a lecture. Additionally, there was a workshop on surgical techniques using sawbones, which provided a great opportunity to learn surgical skills while visualizing actual procedures. Later, an event was organized to experience the nature of northern Malaysia, where we had the unforgettable experience of taking pictures with wild monkeys on our shoulders.

APSS Basic Spine Course

I had the opportunity to give a lecture on cervical degenerative diseases as part of the Spine Case-Based Educational Course for junior orthopedic surgeons at the University of Malaya. The orthopedic surgeons here are very diligent in their studies, and I have got memories of them occasionally taking photos of the lecture content and listening attentively.

During this period, I had countless memorable encounters. After surgeries, I was often taken to a curry restaurant (Nasi Kanda) by the professors, and on Sundays, despite their busy schedules, they took me to a famous Bak Kut Teh restaurant in the countryside. I also went out for meals with the secretaries, who totally supported me, and I spent fulfilling days. Another wonderful memory was enjoying dinner with Prof. Kwan, his family and Dr. Sin Ying, while experiencing the Christmas atmosphere in Malaysia. Everyone was so kind and generous, and I believe that the enriching experience of this fellowship was made possible thanks to all the professors, staffs, and friends.

What has changed? -My vision for the future-

Through this fellowship, I have gained so much.

First, regarding scoliosis, in our facility, we did not have a clear target value for surgical alignment in preoperative planning. However, at the University of Malaya, there was a clear target value, and when surgery was performed according to this predetermined target, a beautiful alignment was achieved and maintained postoperatively. Considering this, preoperative planning for postoperative alignment in the TKA and THA, is done thoroughly, so it seemed odd that there was no such approach in scoliosis surgery. I believe they have found the answer to that question here. The approach at the University of Malaya is fully documented in the articles, and I would like to implement this method at our university first. I was also taught the characteristics of cases where achieving a good alignment is difficult. Until now, I had simply thought that the difficulty of scoliosis surgery was dependent on the size of the Cobb angle, but that is significantly different. They shared their knowledge of pitfalls in scoliosis surgery, such as the size of the pedicle, the strength of the UIV anchor, flexibility, T1 tilt, and BMI, which greatly changed my perspective on scoliosis surgery.

Next, I learned the importance of education and knowledge sharing. This university organizes numerous lectures, seminars, and surgical observation courses, inviting lecturers and participants from various countries. In this environment, they not only share knowledge but also gain new ideas. I believe that an attractive person is always someone who is always curious, constantly exploring new things, and generously offering new knowledge and ideas. The professors here were truly admirable and inspiring. I also want to become a person who always seeks new things, alongside sharing education and knowledge.

Finally, I would like to express my sincere gratitude to the APSS committee for providing me with this incredible opportunity. I am deeply thankful to the professors and staffs at the University of Malaya for generously sharing their knowledge and skills with me. Based on this wonderful experience, I have made the decision to be involved in scoliosis treatment in the future. This traveling fellowship program has undeniably been a significant turning point in my life. Thank you so much.

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No	Date of operation	Diagnosis	Type of procedure
1	2024/9/18	AdIS	PSF
2	2024/9/18	Spondyloptosis	PSF
3	2024/9/19	Spondylolisthesis	TLIF
4	2024/9/20	AIS	PSF
5	2024/9/21	AIS	PSF
6	2024/9/21	AIS	PSF
7	2024/9/21	LSS	PD
8	2024/9/21	Spondylolisthesis	PLF + TLIF
9	2024/9/24	LSS	PD
10	2024/9/24	Spondylolisthesis	TLIF
11	2024/9/25	AIS	PSF
12	2024/9/25	AIS	PSF
13	2024/9/25	Spondylolisthesis	TLIF
14	2024/9/25	Metastatic tumor	Biopsy
15	2024/9/26	AIS	PSF
16	2024/9/27	AIS	PSF
17	2024/9/27	AIS	PSF
18	2024/9/27	LSS	PD
19	2024/10/1	Cervical spinal cord injury	Cervical PSF
20	2024/10/2	AIS	PSF
21	2024/10/2	AIS	PSF
22	2024/10/2	AIS	PSF
23	2024/10/2	AIS	PSF
24	2024/10/3	AIS	PSF
25	2024/10/3	AIS	PSF
26	2024/10/5	AIS	PSF
27	2024/10/5	AIS	PSF
28	2024/10/5	AIS	PSF
29	2024/10/5	AIS	PSF
30	2024/10/8	Neuromuscular scoliosis	PSF
31	2024/10/9	AIS	PSF

32	2024/10/9	Spondylolisthesis	MIS-TLIF
33	2024/10/9	LSS	PD
34	2024/10/9	LSS	PD
35	2024/10/10	Scoliosis with Syringomyelia	PSF
36	2024/10/10	LSS	PD
37	2024/10/11	AIS	PSF
38	2024/10/11	PID	FESS
39	2024/10/12	Spondylolisthesis	TLIF
40	2024/10/12	AdIS	PSF
41	2024/10/12	AIS	PSF
42	2024/10/15	AIS	PSF
43	2024/10/16	AdIS	PSF
44	2024/10/16	AIS	PSF
45	2024/10/16	PID	PD
46	2024/10/16	LSS	PD
47	2024/10/17	Spondylolisthesis	PLIF
48	2024/10/22	AIS	PSF
49	2024/10/22	Spondylolisthesis	TLIF
50	2024/10/22	CSM/LSS	PSF/PD
51	2024/10/23	OVF	VP, PSF
52	2024/10/23	LSS	PLF
53	2024/10/26	EOS	Growing rod
54	2024/10/26	AIS	PSF
55	2024/10/26	AIS	PSF
56	2024/10/26	PID	PD
57	2024/10/29	AIS	PSF
58	2024/10/29	Congenital Kyphoscoliosis	PSF
59	2024/10/30	AdIS	PSF
60	2024/10/30	AdIS	PSF
61	2024/10/30	AdIS	PSF
62	2024/10/30	AdIS	PSF
63	2024/11/2	LSS	PD
64	2024/11/2	AdIS	PSF
65	2024/11/5	Syndromic Scoliosis (NF1)	Growing rod insertion
66	2024/11/5	Spondylolisthesis	Nerve root injection
67	2024/11/6	AIS	PSF
68	2024/11/6	AdIS	PSF

69	2024/11/7	AIS	PSF
70	2024/11/7	AIS	PSF
71	2024/11/8	AIS	PSF
72	2024/11/8	AIS	PSF
73	2024/11/9	AIS	PSF
74	2024/11/9	AIS	PSF
75	2024/11/9	AIS	PSF
76	2024/11/9	LSS	PD
77	2024/11/12	LSS	FESS
78	2024/11/12	LSS	FESS
79	2024/11/12	PID	PD
80	2024/11/18	LSS	PD
81	2024/11/18	LSS	PD
82	2024/11/19	PID	PD
83	2024/11/20	AIS	PSF
84	2024/11/20	AdIS	PSF
85	2024/11/20	AIS	PSF
86	2024/11/20	Spondylolisthesis	MIS-TLIF
87	2024/11/21	PID	PD
88	2024/11/21	Rod brackage of postop Congenital kyophoscoliosis	rod connection and growing rod distraction
89	2024/11/21	PID	PD
90	2024/11/22	LSS	PD
91	2024/11/22	Spondylolisthesis	MIS-TLIF
92	2024/11/23	Spondyloptosis	PSF
93	2024/11/23	Spondylolisthesis	MIS-TLIF
94	2024/11/23	OPLL & LSS	Laminectomy with fusion & PD
95	2024/11/25	Spondylolisthesis	TLIF
96	2024/11/26	AIS	PSF
97	2024/11/27	AIS	PSF
98	2024/11/27	AIS	PSF
99	2024/11/27	AIS	PSF
100	2024/11/27	Spondylolisthesis	MIS-TLIF
101	2024/11/28	Congenital scoliosis	PSF
102	2024/11/28	AIS	PSF
103	2024/11/30	AIS	PSF
104	2024/11/30	AIS	PSF

105	2024/11/30	AIS	PSF
106	2024/12/3	Non idiopathic scoliosis	PSF
107	2024/12/3	PID	PD
108	2024/12/4	AIS	PSF
109	2024/12/4	LSS	MIS-TLIF
110	2024/12/4	PID	PD
111	2024/12/4	Spondylolisthesis	MIS-TLIF (L3/4/5)
112	2024/12/5	Metastatic cancer	PD (T7-T9)
113	2024/12/6	AIS	PSF
114	2024/12/7	AdIS	PSF
115	2024/12/7	AIS	PSF
116	2024/12/7	AIS	PSF
117	2024/12/7	OYL	PLF+PD
118	2024/12/9	LSS	PLF
119	2024/12/10	AIS	PSF
120	2024/12/10	EOS	Growing rod distraction
121	2024/12/10	Chance fracture	PSF
122	2024/12/11	AIS	PSF
123	2024/12/11	AIS	PSF
124	2024/12/11	AIS	PSF
125	2024/12/11	AdIS	PSF
126	2024/12/11	AIS	PSF
127	2024/12/12	AIS	PSF
128	2024/12/13	AdIS	PSF
129	2024/12/13	Neurofibromatosis	Tumor resection
130	2024/12/13	EOS	Growing rod distraction
131	2024/12/14	LSS	PD
132	2024/12/14	PID	PD
133	2024/12/14	PID	PD
134	2024/12/14	PID	PD

Abbreviations; AIS, adolescent idiopathic scoliosis; PID, prolapsed intervertebral disc; LSS, lumbar spinal stenosis; OYL, ossification of ligament flavum; OPLL, ossification of posterior longitudinal ligament; TLIF, trans-foraminal lumbar interbody fusion; PSF, posterior spinal fusion; MIS, minimum invasive surgery; PD, posterior decompression; PLF; posterior lateral fusion.