

2024 APSS Fellowship Report

Fellow: Dr. Sheng-Chieh Tseng

Department of Orthopedic Surgery

Taichung Veterans General Hospital, Taichung, Taiwan

Host:

I. Dr. Brian Hsu

Norwest Private Hospital

New South Wales, Australia



II. Dr. Bhisham Singh

Norwest Private Hospital

New South Wales, Australia



Fellowship period: June 1, 2024 – September 1, 2024

Location: New South Wales, Australia

Introduction

First, I would like to express my deep gratitude to APSS for giving me the opportunity to participate in this three-month spinal surgery fellowship. This is my first experience as a spine fellow overseas, and as a young spine surgeon, it has been an invaluable opportunity to expand my knowledge and clinical experience.

Dr. Hsu is a highly experienced adult and pediatric spine surgeon. He is actively involved in numerous international spine societies, including AAOS, SRS, and NASS. Before beginning this fellowship, I had the chance to meet him at the Global Spine Congress in Bangkok earlier this year. We also reconnected at an AO Spine Advanced Seminar in Taiwan just a week after GSC. These events allowed me to become more familiar with Dr. Hsu and prepared me well for the upcoming fellowship.

During the fellowship, Dr. Hsu scheduled a variety of cases over the three months, most of which involved adult degenerative conditions and spinal deformities. Additionally, he arranged for me to visit the Children's Hospital at Westmead to observe pediatric spinal deformity cases, which are quite rare in my country.

Dr. Singh has been an exceptionally kind and supportive mentor. He consistently welcomed me into his surgeries and took the time to thoroughly explain surgical techniques. He also introduced me to new interventions for spinal conditions, such as facet and epidural injections and radiofrequency ablation, which are used before definitive spinal surgery. These procedures are helpful not only in relieving symptoms but also in accurately identifying the location of lesions.

Weekly schedule

Upon my arrival, Ms. Deborah, the secretary of New South Wales Spine Specialists, gave me an orientation about the facility and my schedule. The weekly schedule is as follows:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
North Shore Private Hospital	Westmead Private Hospital	Children's Hospital at Westmead	Norwest Clinic	Norwest Private Hospital	Macquarie University Hospital
Surgery	Surgery	Surgery & Clinic	Clinic	Surgery	Surgery
		Case Conference at 4:30 pm			

All the surgeries were scheduled at four different hospitals, so the schedule was subject to change. On average, there were 7–8 operations each week. Additionally, pediatric deformity surgeries were arranged at the Children's Hospital at Westmead every two weeks.

The main clinic at Norwest was open on Thursdays, while other clinics were located at Macquarie University Hospital, Chatswood, and Sydney Olympic Park. Each clinic session had about 15 patients, all referred by general practitioners for spinal disorders.

Every Wednesday afternoon, there was an online conference. One fellow would present a topic, and others would present cases. The discussions focused on the thought process involved in patient evaluation and surgical decision-making. I found these sessions very beneficial for fellows in enhancing their clinical practice.

Learning in Operation Theater

I. Cervical spine surgery

Most of the cervical spine cases here are degenerative. During the pre-operative evaluation, imaging studies such as EOS, CT, and MRI were reviewed. A bone scan with SPECT/CT was arranged if facet joint arthropathy was suspected.

Injection therapy, including facet joint and foraminal injections, was commonly performed before surgery. The primary purpose of these

procedures was to accurately localize the target lesion. If symptoms improved after the injection, the surgeon had greater confidence in addressing the main lesion surgically.

Lateral mass screw techniques were frequently used in various types of cervical spine surgeries. Dr. Hsu also encouraged me to review the surgical techniques for posterior screw fixation in the subaxial cervical spine.

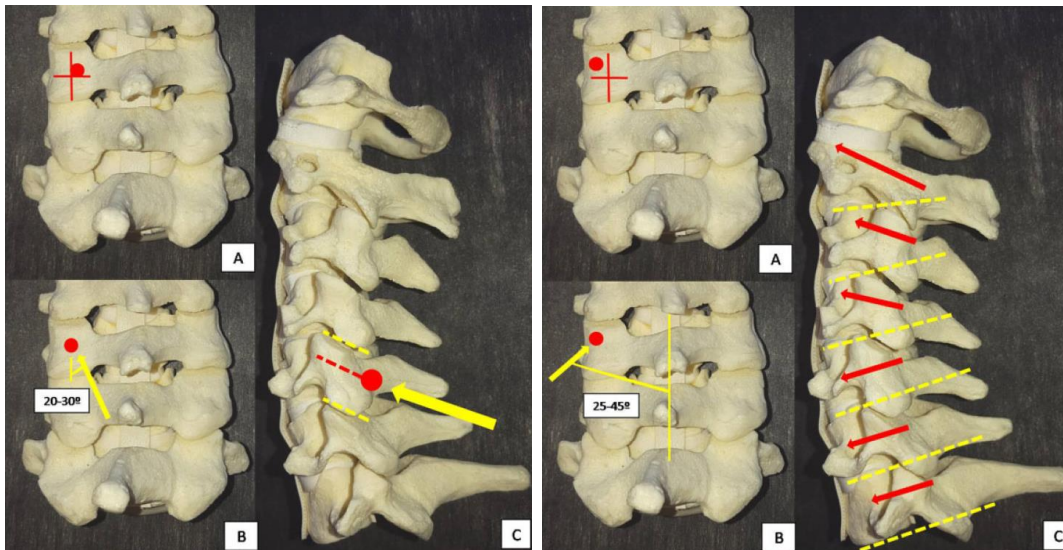
Review Article



Posterior Subaxial Cervical Spine Screw Fixation: A Review of Techniques

Global Spine Journal
1-10
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journals.sagepub.com/home/gsj
SAGE

Andrei Fernandes Joaquim, MD, PhD¹, Marcelo Luis Mudo, MD, MSc²,
Lee A. Tan, MD³, and K. Daniel Riew, MD⁴



There are several lateral mass screw techniques, and Dr. Hsu emphasized the importance of being familiar with more than one. If the Magerl technique cannot be used, for example, the Roy-Camille technique can be applied using a different trajectory. In addition, pedicle screw fixation is widely used in deformity correction procedures as it offers superior mechanical support for spinal stability, although it is more technically demanding.

I previously learned the cervical pedicle screw technique in a cadaveric course, but I lack practical experience. I believe gaining more hands-on experience with cervical pedicle screw fixation is crucial.

In multi-level anterior cervical fusion surgeries, posterior spinal fixation and fusion are often added to enhance stability and improve fusion rates. Dr. Hsu continues to use a single transverse incision for three-level ACDF (anterior cervical discectomy and fusion). To facilitate soft tissue retraction, he performs additional releases of both the superficial and deep fascia. He also inserts cages from both the cranial and caudal levels, creating a mobile window to minimize soft tissue injury.



II. Lumbar spine surgery

Dr. Hsu has extensive experience in anterior, lateral, and posterior spinal fusion surgeries. Several factors must be considered when selecting the most appropriate surgical approach. Patient-specific factors such as medical history, prior surgeries, BMI, and other health conditions play a critical role in decision-making.

When planning deformity correction, it is essential to assess how much correction is required to achieve optimal alignment and stability.

CURRENT CONCEPTS REVIEW

Sagittal Alignment in the Degenerative Lumbar Spine

Surgical Planning

Bassel G. Diebo, MD, Mariah Balmaceno-Criss, BS, Renaud Lafage, MS, Christopher L. McDonald, MD, Daniel Alsoof, MBBS, Sereen Halayqeh, MD, Kevin J. DiSilvestro, MD, Eren O. Kuris, MD, Virginie Lafage, PhD, and Alan H. Daniels, MD

Investigation performed at Brown Spine Research Laboratory, Department of Orthopaedic Surgery, Warren Alpert Medical School, Brown University, Providence, Rhode Island

TABLE I Mean Segmental Sagittal Alignment Values for the Lumbar and Thoracolumbar Spinal Regions*						
PI Category	T10-L2	L1-L2	L2-L3	L3-L4	L4-L5	L5-S1
40°	-6.9°	1.7°	4.4°	9.5°	15°	17.5°
50°	-4.3°	1.7°	6.2°	10.1°	15°	20°
60°	-4.3°	3.1°	7.9°	11.2°	15°	20°
70°	2.1°	4.9°	9.2°	15.4°	15°	20°
80°	2.1°	5.5°	11.9°	17°	19°	20°
90°	2.1°	7.3°	14.6°	12.9°	22°	20°

*These data should be interpreted with caution, as the values are means and thus may not be prescriptive for every patient.

According to the reviewed article, the distribution of caudal lordosis (L4-S1) and cranial lordosis (L1-L4) as percentages of global lordosis varies depending on pelvic incidence (PI). These values guide the sagittal alignment that needs to be restored during surgery. If spinal fusion is performed without careful consideration of the magnitude and location of lordosis in the lumbar spine, it can lead to iatrogenic deformity.

Dr. Hsu placed significant emphasis on restoring caudal lordosis to 35 degrees. He tailored his surgical planning based on the degree of correction required. For instance, if a patient needed to gain 15 degrees at a single level, anterior lumbar interbody fusion (ALIF) was a preferred option.

In anterior and lateral spinal surgeries, Dr. Mayo Theivendran, an experienced vascular surgeon in Sydney, performed the ALIF and OLIF approaches in the first stage. In the ALIF approach, understanding abdominal anatomy is crucial. After incising the anterior rectus sheath and retracting the rectus abdominis, the posterior sheath is exposed above the arcuate line, while the transversalis fascia is visible below it. During peritoneal mobilization, the arcuate ligament must be carefully released with scissors to avoid injuring the peritoneum.

For proper cage insertion, adequate release of the posterior elements is essential to restore lumbar lordosis. Dr. Hsu used a smaller cage trial to extend the posterior elements before inserting the appropriate cage to fit the disc space. He also used a Kerrison rongeur to remove spurs and residual disc material from the borders of the disc space. In the second stage, he typically removed the bilateral facet joints and compressed the pedicle screws on rods to achieve additional lumbar lordosis. In cases of severe

spinal stenosis, a total laminectomy was performed to ensure sufficient nerve decompression.



III. Pediatric spine surgery

I participated in several pediatric spinal deformity surgeries at the Children's Hospital at Westmead, most of which involved early-onset scoliosis (EOS). The diagnoses in these cases included congenital scoliosis, syndromic scoliosis, and neuromuscular scoliosis. Treatment strategies for EOS must take into account both the patient's age at diagnosis and the future growth potential of the spine.

Definitive surgical correction often involves spinal fusion combined with techniques to improve spinal alignment and balance. Before surgery, Dr. Hsu assesses the flexibility of the spine through physical examination. In cases of a stiff spine, multi-level posterior column osteotomies (PCO) and concave rib osteotomies may be necessary to achieve adequate correction.



Intraoperative neuromonitoring is crucial in spinal deformity surgery. If there is a decrease in somatosensory evoked potentials (SSEP) or motor evoked potentials (MEP) during spinal correction, the spine must be released immediately to prevent neural compromise.



MEP of right lower limb decreased

recovered



International conference

During my fellowship, I attended two international conferences: the APSS Annual Meeting 2024 and the Deformity Down Under 2024. Both conferences offered excellent presentations and discussions, and I had the opportunity to meet renowned spine surgeons from around the world, making it a memorable experience.

The APSS Annual Meeting is the largest spine conference in the Asia-Pacific region, covering a wide range of topics across the field. With the rise of artificial intelligence, the application of AI in spine surgery has become increasingly popular. One particularly impressive presentation was on a deep learning model for screening and monitoring adolescent idiopathic scoliosis. The authors used a smartphone photograph of the patient's back to generate a masked image via an open-platform app, which was then tested against the original image. The model demonstrated high sensitivity in recognizing curve severities and types, showing potential for out-of-hospital scoliosis assessments in children.



Original Investigation | Pediatrics

Deep Learning Model to Classify and Monitor Idiopathic Scoliosis in Adolescents Using a Single Smartphone Photograph

Teng Zhang, PhD, MBME; Chuang Zhu, PhD; Yongkang Zhao, MEng; Moxin Zhao, MEng; Zhihao Wang, MEng; Ruoning Song, MEng; Nan Meng, PhD; Alisha Sial, MD; Ashish Diwan, PhD, MD; Jun Liu, PhD, MEng; Jason P. Y. Cheung, MBBS, MS, MD



The Deformity Down Under is an international conference held annually in Australia. This year's meeting focused on procedural excellence and surgical innovations in spine surgery. Many international experts were invited, providing a great opportunity for me to connect with spine specialists from around the world.

Before the main conference, a small seminar was held with Dr. Ibrahim Obeid, a renowned spine deformity surgeon from France with numerous publications on spinal disorders. It was a privilege to engage in small group discussions with Dr. Obeid about complex cases. Additionally, he presented his classification system for coronal malalignment of the spine, which provides a valuable framework for treating spinal malalignment and helps spine surgeons better understand the full spinal alignment in adult spinal deformity patients.

European Spine Journal (2019) 28:94–113
<https://doi.org/10.1007/s00586-018-5826-3>

ORIGINAL ARTICLE



Classification of coronal imbalance in adult scoliosis and spine deformity: a treatment-oriented guideline

Ibrahim Obeid¹ · Pedro Berjano² · Claudio Lamartina² · Daniel Chopin³ · Louis Boissière¹ · Anouar Bourghli⁴



Conclusion

This was my first experience as an overseas fellow, joining a medical team in a different country. I am grateful for the opportunity to meet fellow spine surgeons and colleagues from around the world. This has been a truly enriching journey, enhancing both my surgical techniques and my approach to clinical decision-making. I am deeply appreciative of my host and everyone who supported me along the way. I believe that, someday, our paths will cross again.

