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FELLOWSHIP PROGRAMME 2024

# 2024 APSS Medtronic Fellowship Report

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**Host: Prof. Yukihiro Matsuyama**

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Hamamatsu University Hospital, Hamamatsu, Japan



**Fellowship Center –**

Hamamatsu University Hospital, Japan

**Fellowship period: 1, July, 2024 to 30, September, 2024 (92 days)**



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## Introduction

During this training experience, I am sincerely grateful to the Asia Pacific Spine Society (APSS) and Hamamatsu University School of Medicine for their invaluable assistance, which enabled me to complete this learning journey successfully. APSS played an essential bridging role in facilitating my connection with Professor Yukihiro Matsuyama at Hamamatsu University School of Medicine, making this meaningful opportunity possible. This overseas training was not just a chance to advance my skills; it also provided a unique opportunity to gain insights into the forefront of international spinal surgery advancements, greatly broadening my professional and academic perspectives.

Under the leadership of Professor Yukihiro Matsuyama, the Orthopedic Department at Hamamatsu University School of Medicine has earned a strong international reputation for excellence in spinal deformity correction and other spinal surgeries. The team's high surgical volume and impactful research publications further underscore their global influence. Training with this distinguished team offered me a deep understanding of how clinical practice and academic research intertwine. Beyond technical skills, I learned the importance of a meticulous, high-standard approach to clinical practice, which is characteristic of such a high-quality team. Before each surgery, the team held thorough preoperative discussions where each surgeon shared insights and recommendations on the surgical plan, providing a comprehensive understanding of each patient's case. Postoperative case reviews focused on challenges encountered, strategies for overcoming difficulties, and ways to prevent or minimize complications in the future. These reflective discussions not only deepened my understanding of surgical processes but also solidified my mastery of various techniques, laying a strong foundation for my future clinical practice.

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**Training Schedule**

	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
<b>0700-0900</b>	Morning Meeting (All-surgical patients)	Morning Meeting (Preoperative surgical plan)	Branch Hospital Surgery Day (Dr. Yoshida at Aoyama Hospital)	Morning Meeting (Postoperative results)	Branch Hospital Surgery Day (Dr. Oe at Haibara General Hospital)
<b>0900-1200</b>	Outpatient Clinic	Surgery		Surgery	
<b>1300-1800</b>					
<b>1800-2100</b>	Night Meeting (Potential surgeries or complex cases)	Night Meeting (Postoperative imaging)	Branch Hospital Surgery Day (Dr. Hasegawa at Hamamatsu Red Cross Hospital)	Night Meeting (Postoperative imaging)	





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Every Monday is a clinic day. From 7 AM to 9 AM, a morning meeting is held to discuss the scheduled surgeries for patients across all departments. Following this, there is a full day of clinic hours. After the clinic ends, the team holds a meeting to discuss patients from the clinic who may require surgery or have more complex conditions.

Tuesday is a surgery day. From 7 AM to 9 AM, there is a morning meeting to discuss the surgical methods and preoperative examination results for spinal surgery patients. This is followed by a full day of surgeries. After the surgeries, the team conducts a meeting to review the day's surgeries, examine postoperative images, and discuss the surgical processes.

Wednesday is designated as a branch hospital surgery day. In the morning, Dr. Yoshida performs surgeries at Aoyama Hospital, and in the afternoon, Dr. Hasegawa performs surgeries at Hamamatsu Red Cross Hospital. The two doctors take turns bringing us to different hospitals to learn and participate in surgeries, depending on the cases and their complexity.

Thursday is another surgery day. From 7 AM to 9 AM, a morning meeting is held to review the surgical methods and postoperative examination results for spinal surgery patients. Afterward, there is a full day of surgeries, and the team meets again to review the day's surgeries and examine postoperative images.

Finally, Friday is another branch hospital surgery day, where we follow Dr. Oe to Haibara General Hospital to perform spinal surgeries.



### Branch Hospital

Aoyama Hospital (top left)

Haibara General Hospital (top right)

Hamamatsu Red Cross Hospital (bottom)

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## Operation theatre Equipment and Surgeries

The operating room was fully equipped with modern technology, including Medtronic's O-arm Stealth Station navigation system, intraoperative neuromonitoring (IONM), a high-quality C-arm, and a Zeiss Pentero microscope, all to ensure the highest level of surgical safety. What was most impressive was that a technician was available in the operating room to perform real-time scanography after corrections, allowing us to immediately assess the quality of the correction and determine if further adjustments were necessary. Additionally, due to the high volume of surgeries, every nurse and technician was thoroughly familiar with the surgical procedures, each actively fulfilling their role. The surgeries proceeded very smoothly as a result.

Each surgery day involved 4-6 operations, amounting to 40-50 cases per month. Among these, adult spinal deformity correction surgeries were the primary focus, accounting for around 25-30 cases. Correction techniques included PLIF, XLIF, LLIF, and various grades of osteotomy from Grade 1 to Grade 6. Additionally, there were surgeries for cervical OPLL, where some cases involved open-door laminoplasty and others required ACDF. Beyond these, the center also addressed a wide range of rare spinal tumors, including primary and metastatic bone tumors, as well as extradural, intradural, and intramedullary spinal tumors.

At the branch hospital, I observed some relatively straightforward surgeries, such as PLIF for decompression in cases of spinal stenosis or HIVD. Additionally, I had the opportunity to see collagenase injections, a treatment currently more popular in Japan. Follow-up on patients post-injection revealed quite favorable outcomes, with a low percentage needing subsequent surgery. The injection itself was also very straightforward.



### Operation room equipment for scoliosis

O-arm, real time video for education, operation plan (on the wall) (left)  
Intraoperative Neurophysiological Monitoring (IONM), cell saver (middle)  
IONM sensor



**Adult spinal deformity surgery**

O-arm scanning (left), neuromonitoring (middle top)  
intra-operative post correction scannography (middle bottom and right)

**1. Adult spinal deformity**

The surgical plan was divided into two approaches. For cases of spinal stenosis with mild scoliosis primarily located at the disc level without rotational deformity, the first stage involved using LLIF or XLIF. In this stage, the cage was inserted to initiate correction, followed by a reassessment of the scanography to minimize the need for extensive fusion. If it was determined that interbody fusion was unnecessary, the surgery would then proceed from the posterior approach. Prof. would use the O-arm to precisely guide and rapidly insert pedicle screws, which accelerated the procedure.

In cases with very narrow pedicles, identified through preoperative CT measurements, non-absorbable sutures or laminar hooks were considered as alternative fixation methods, both yielding excellent outcomes. After securing the screws, the team would decide on osteotomy based on the preoperative plan. Although the team had extensive experience and efficiency with osteotomy procedures, Prof. remained committed to minimizing large-scale osteotomies and would double-check throughout the procedure to ensure sufficient correction.

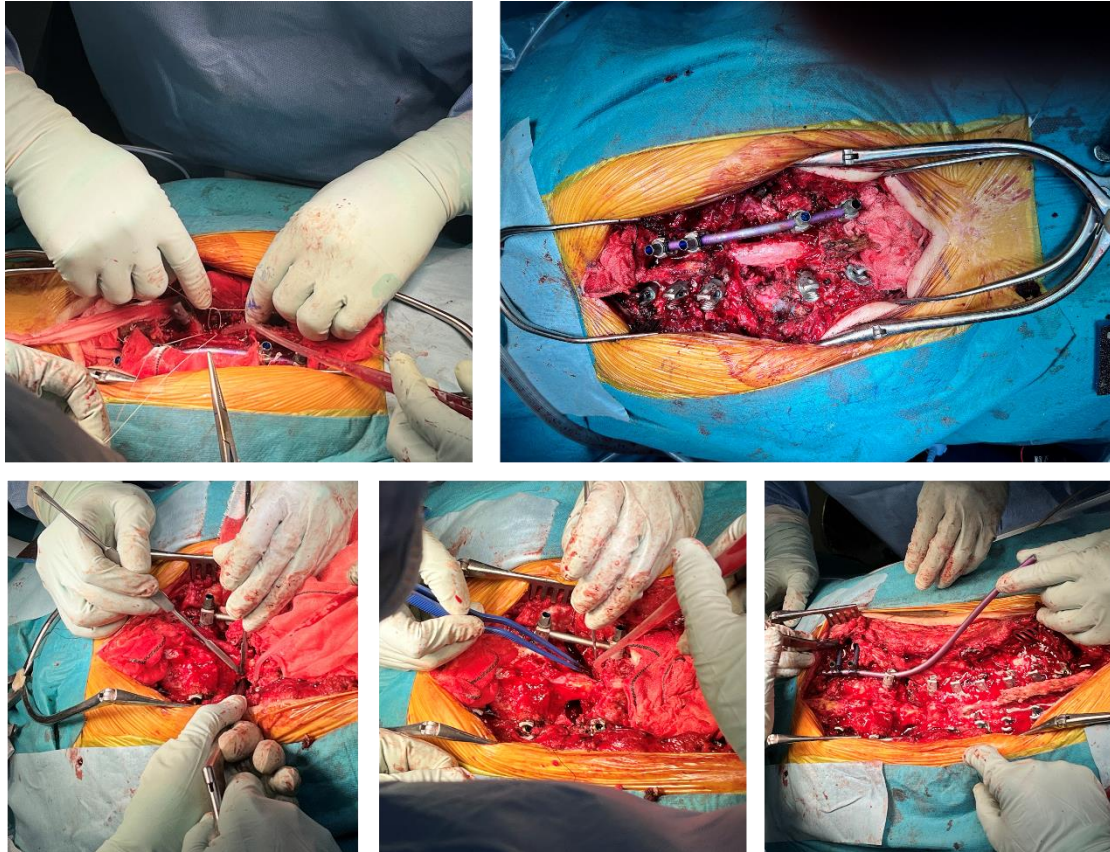
What impressed me the most during the surgical procedure was the blood loss. Based on my prior experience, osteotomy correction surgeries typically involve significant bleeding, often resulting in multiple bleeding sites where pinpointing the exact source of hemorrhage becomes challenging. In such situations, the only option is to proceed quickly, which sometimes compromises the outcome. However, the



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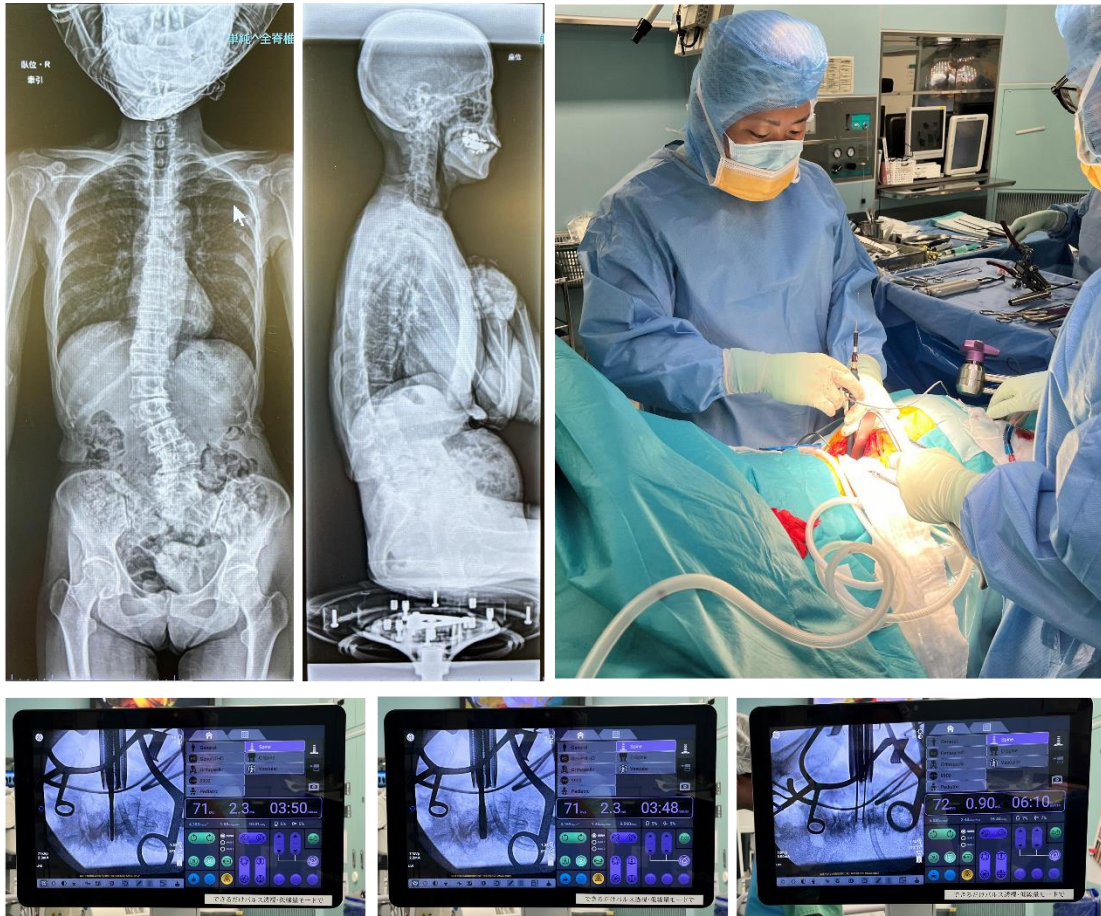
professor was exceptionally meticulous at every stage of the procedure, performing careful hemostasis to completely avoid the simultaneous bleeding from multiple sites that could complicate the hemostatic process. These explanations highlight why such complex surgeries can be performed on elderly patients.



**ASD correction with osteotomy**  
T11 VCR with rootlet ligation  
L4 PSO with accessory rod fixation

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**2 stage deformity correction (1<sup>st</sup> stage XLIF)**

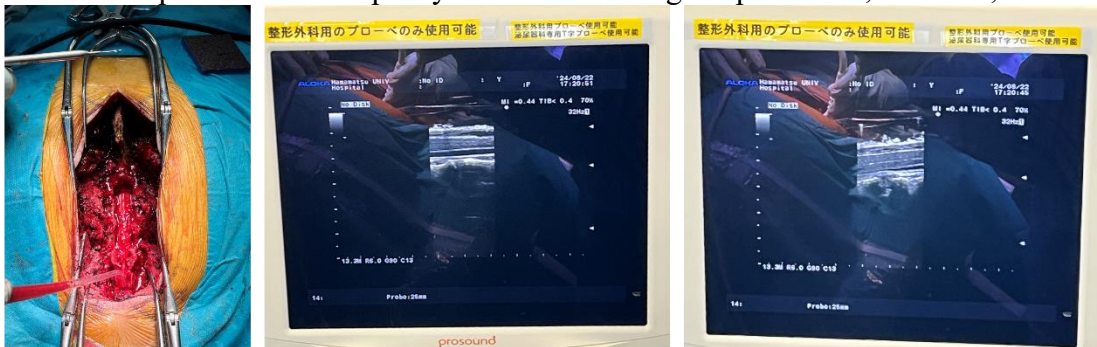
Traction view (left top) and sitting view (middle top) for flexibility exam

Intra-operative C-arm check (bottom)



## 2. Cervical open door laminoplasty with intra-operative echo exam

Cervical open-door laminoplasty is a common surgical procedure; however, some



### Intra-operative echo

Simple effective way to make sure complete decompression

patients may experience postoperative nerve root paresis, resulting in weakness or numbness. To prevent this complication, the surgical team not only employs routine intraoperative neuromonitoring (IONM) but also utilizes ultrasound during the surgery to verify whether the decompression of the spinal cord is adequate and to assess if there is any compression on the bilateral roots after opening. This technique is not difficult; by simply adding saline solution at the decompressed site and placing the ultrasound probe, the decompression status can be quickly determined. I find this method to be quite clever-simple yet very effective.

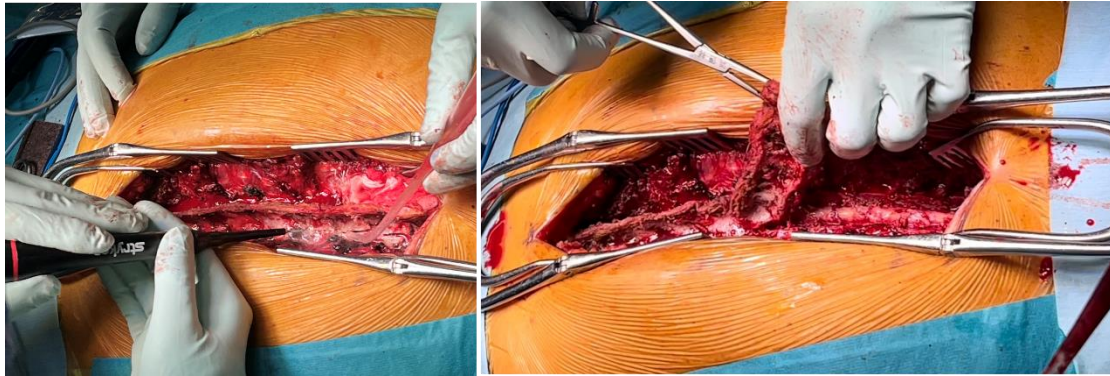
## 3. Special Case Memo

### 1. Resection of Thoracic Extramedullary Intradural Tumor with laminoplasty with miniplates fixation

The patient was positioned prone, and after ensuring proper alignment, we began the procedure by dissecting the soft tissues to expose the lamina. We then used an ultrasonic bone scalpel to cut along both sides of the lamina, ensuring that we penetrated both layers of the cortex to the appropriate depth. The width of the cut was measured preoperatively based on the width of the dura sac, making sure it was wider than the dura. The interspinal alignment was preserved completely to allow us to lift an entire row of laminae together from the head side.

Next, we wrapped the entire row of laminae in moist gauze and secured it to the skin with cotton sutures to prevent it from falling during the procedure. Special care was taken to avoid adhesions to the yellow ligament while lifting the laminae. The surgeon repeatedly used a mucosal elevator to gently detach any adhesions, minimizing unnecessary tearing.

After preparing the surgical area, we packed cotton at the bone junction to prevent any bleeding from obscuring the surgical field. A small incision was made in the dura, and a mucosal elevator was inserted to protect the spinal cord from potential injury during the cutting. After making a longitudinal incision in the dura, we proceeded with tumor resection. Once the tumor was removed, we meticulously sutured the dura to ensure there were no leaks. The previously intact row of laminae was then replaced in its original position and secured with miniplates. A drain was placed postoperatively to prevent hematoma formation above the dura. The surgery was then completed.



## **2. Resection of cervical Intramedullary Intradural Tumor with open-door laminoplasty with miniplates fixation**

In a case similar to the previous one, this patient also had an intradural tumor; however, the approach was different. In the previous case, even though the spinal cord was compressed, it wasn't significantly swollen, and tumor resection created enough space to relieve pressure. For this patient, however, the tumor was located directly on the spinal cord, and we could only perform a biopsy without complete resection, leaving decompression incomplete. If we were to simply lift and replace the lamina, the spinal cord would remain swollen, potentially causing more severe neurological symptoms.

Therefore, we performed an open-door laminoplasty. After opening the dura mater, instead of closing it directly, we sutured a dura patch along the incision edges, expanding the internal space of the dura sac and reducing compression. This approach was crucial; while laminoplasty has been discussed in the literature, tailoring different surgical steps for these two distinct cases was quite unique and effective.

### 3. Cervical spondylosis with myelopathy in patient with ankylosing spondylitis (spine fused and bilateral hip fuse)

This case was particularly memorable due to the extensive preoperative discussion about the patient's severe osteoporosis. During the surgery, the greatest challenge was not in the fixation itself but rather in the initial positioning. The patient's fused hips, knees, and limited cervical spine mobility made it impossible to lie fully prone. Once the positioning was complete, we found that there was inadequate exposure of the cervical spine, making the surgery quite challenging. However, a slight extension of the cervical spine revealed significant changes in IONM, prompting us to adjust the operating table and positioning. The team patiently modified the setup by switching beds and adding several layers of padding to accommodate the patient's unique posture. Although this process took considerable time, the well-supported positioning ultimately contributed to a smooth and successful procedure.



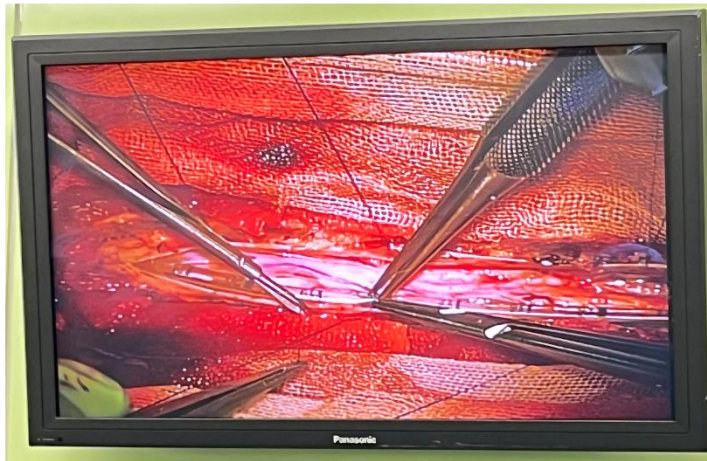
This was the situation after the initial positioning, where noticeable skin folds appeared at the back of the cervical spine, making the surgery difficult to proceed with and limiting the visibility significantly.



We used a flexible operating table along with multiple soft cushions to assist the patient in positioning according to their natural curvature, without applying pressure. This ensured that there was no impact on the nerves and that the cervical spine could bend appropriately, resulting in improved visibility for the surgery.

#### 4. Syringomyelia due to ventral subdural hematoma

A 56-year-old man presented with back pain and was unable to walk or sit. Because of severe back pain, and bilateral low limbs weakness he admitted to the operation. We planned to do laminectomy and then set drainage in the dura sac.





## Fellowship Experience

My experience at Hamamatsu University School of Medicine has been quite enjoyable. The team members have great rapport and are open to sharing their different perspectives on surgical techniques. There are many meetings, providing ample time for everyone to discuss the most ideal surgical approaches. Additionally, during weekends and outside of surgery hours, the attending physicians enthusiastically invited us to participate in social gatherings and sightseeing hikes, which deepened my understanding of Japanese culture, including sumo wrestling matches, baseball games, and Japanese professional wrestling events, among others.



We also encountered a major earthquake and a typhoon in Japan, with even some nearby areas experiencing flooding. We received continuous emergency alerts in the middle of the night, which was quite terrifying but also unforgettable. The hospital's international exchange center was very considerate, regularly sending reminders about typhoon safety and avoiding heatstroke. We had several international fellows, including Dr. Josiah Mutia from the Philippines and doctoral students from other countries (China and Vietnam), and everyone got along well. During this time, I have grown in clinical experience, surgical skills, and my approach to treating patients.





Caution is advised: Extreme Heat > 收件匣 x



国際化推進室 <kokusai@hama-med.ac.jp>  
寄給 国際化推進センター、国際化推進室

7月5日 週五 上午8:38 ☆ ☺ ↶ ⋮

Dear International Students and researchers,

According to the weather forecast, this scorching heat wave expected to continue until Sunday.  
Caution advised if outside for extended periods of time or even in a building or at home. Please be careful, avoid the heat and stay hydrated!

Please see the attached file, too.

Best regards,  
International Office

Typhoon approaching > 收件匣 x



国際化推進室 <kokusai@hama-med.ac.jp>  
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8月27日 週二 上午8:09 ☆ ☺ ↶ ⋮

Dear International Researchers and Students,

This is to inform you all about approaching typhoon.  
A typhoon is approaching Japan this week.  
For further information and updates, please refer to the following website of Japan Meteorological Agency.  
The website is available in English, Chinese, Vietnamese, and other languages.  
[Japan Meteorological Agency | Local Information \(Southern Hamamatsu City\) \(jma.go.jp\)](http://jma.go.jp)

For your safety, please take precautions below.

- ◆ Close all windows and curtains
- ◆ Remove any stuff on your balcony or outside which could be blown away, otherwise please securely hold objects in place

<p><b>緊急警報</b> <span style="float: right;">現在</span></p> <p>警戒レベル3高齢者等避難発令 釣橋川が増水し氾濫するおそれがあるため、下記の地域に発令</p> <p><b>【地域名】</b> 浜名区 三ヶ日地区 (上神、下神、西天、東天、西町、宇志、御菌、岡本、只木、磯代、摩訶耶)</p> <p>避難に時間のかかる方は安全な場所に避難してください。屋外が危険な場合は2階などで身の安全を確保してください。 発令時刻：8時55分 浜松市 (浜松市(危機管理課))</p>	<p><b>緊急警報</b> <span style="float: right;">現在</span></p> <p>警戒レベル4避難指示発令 土砂災害が発生するおそれが高まったため、以下の地区に発令</p> <p><b>【地域名】</b> 浜名区 三ヶ日地区</p> <p>危険な場所にいる方は避難してください。屋外が危険な場合は崖から離れた場所などで身の安全を確保してください。 発令時刻：9時00分 浜松市 (浜松市(危機管理課))</p>
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## Reflection and Gratitude

This training, spanning from June 30 to September 29, 2024, lasted three months. I trained alongside one physician from Taiwan and another from the Philippines, who attended three-month and six-month training programs, respectively. We stayed in a hospital-provided dormitory located near the campus. This convenient, well-equipped, and comfortable accommodation met all our basic needs and saved us a considerable amount of commuting time. This arrangement greatly enhanced both the efficiency of our studies and the quality of our daily lives, allowing us to rest quickly after intensive surgeries and meetings, preserving energy for continued learning. The dormitory also served as a platform for exchange among international physicians, allowing us to share academic insights and promote a diverse absorption of knowledge.

My primary techniques in clinical practice have been minimally invasive endoscopic and computer-navigated minimally invasive surgeries; however, I had limited experience with scoliosis correction surgeries, an area that presented a gap in my clinical work. In reality, there are many patients who require this type of surgery, and not all spinal deformities can be resolved through endoscopic or simple fusion surgeries. Therefore, this training allowed me to address this gap by learning essential techniques in scoliosis correction surgery. These techniques require not only precise execution but also attention to many intricate details in clinical application. By observing these surgeries repeatedly, I gradually mastered these nuanced aspects, which have significantly boosted my confidence in scoliosis correction and enhanced the overall quality and precision of my minimally invasive surgeries.

The spinal surgery team at Hamamatsu University also demonstrated exceptional kindness and dedication to teaching. I am especially grateful to Dr. Hasegawa, Dr. Yoshida, Dr. Oe, Dr. Yamato, and Dr. Yamada, who provided technical guidance during surgeries and actively shared their experiences and clinical insights post-surgery. Their enthusiasm for teaching encouraged me to participate in a wide variety of surgeries, allowing me to acquire new knowledge in each procedure, whether it involved surgical techniques or postoperative recovery management. This training experience has brought notable improvements to my technical skills, clinical experience, and academic perspective, while deepening my understanding of the diverse demands within spinal surgery.

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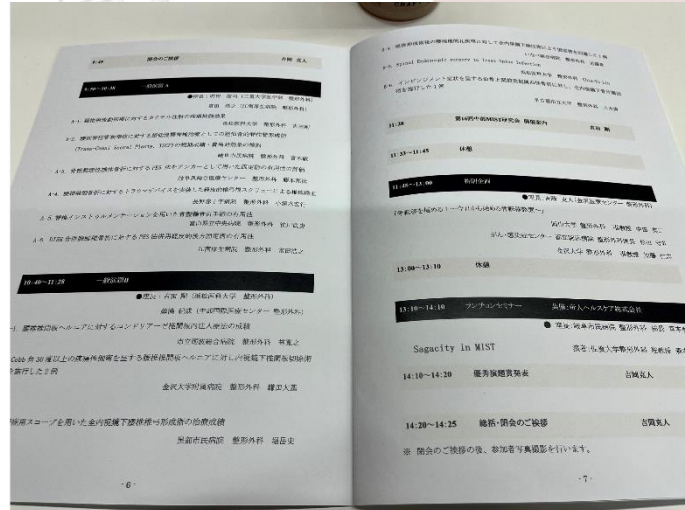
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I am grateful to Dr. Yoshida for knowing my interest in minimally invasive techniques and for taking me to Kanazawa to participate in the Minimally Invasive Surgery Training (MIST) symposium. It was a great opportunity for me to share my presentation and engage in meaningful exchanges with everyone, making it a very interesting and rewarding experience.

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Professor Yukihiro Matsuyama and his outstanding spine team

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