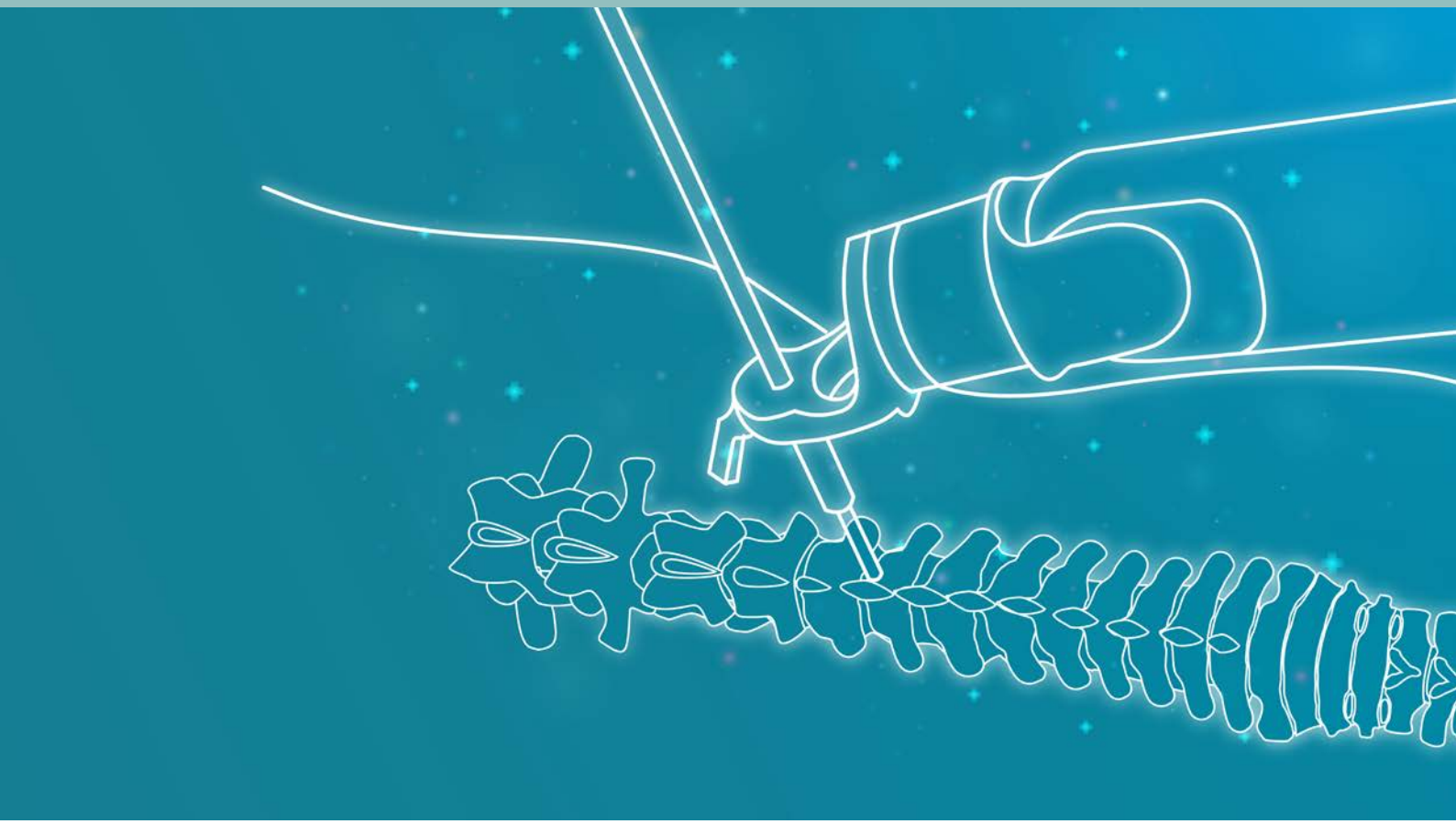
HKSH SPINE CENTRE SYMPOSIUM 2026

ROBOTICS IN SPINAL SURGERY AND REHABILITATION

10 November 2026, Tuesday



Organiser:

養和脊椎中心
HKSH Spine Centre

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HKU Med School of Clinical Medicine
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HKSH SPINE CENTRE SYMPOSIUM

Jointly organised by the HKSH Spine Centre of HKSH Medical Group and the Department of Orthopaedics and Traumatology of The University of Hong Kong, the Symposium aims to provide a forum for the advancement of knowledge in spinal surgery, innovative treatment methodologies, and practical clinical applications.



PROGRAMME

SYMPOSIUM 1 - SPINAL REHABILITATION USING ROBOTICS

MODERATORS: Dr. Alex CHOW | Ms. Sammi TSUI

17:00-17:20	**Robotics in Spinal Rehabilitation**	**Dr. Paul Aarne KOLJONEN** Consultant & Deputy Chief of Service Department of Orthopaedics and Traumatology, Queen Mary Hospital Deputy Hospital Chief Executive, Maclehose Medical Rehabilitation Centre Honorary Clinical Associate Professor Department of Orthopaedics and Traumatology, The University of Hong Kong
17:20-17:40	**Use of Robotics: MMRC Experience**	**Mr. WONG Fong Yee, Admond** Department Manager (Physiotherapy) MacLehose Medical Rehabilitation Centre
17:40-18:00	**Use of Robotics: HKSH Experience**	**Mr. MA Kin Ting** Physiotherapist, Hong Kong Sanatorium & Hospital
18:00-18:10	**Discussion**	

18:20-19:00	**Vendor Demonstration of Cutting Edge Robotics in Spinal Surgery**
	Refreshments and Registration for Symposium

SYMPOSIUM 2 - ROBOTICS IN SPINAL SURGERY

19:00-19:05	**Welcome Speech**	**Dr. Walton LI** Chief Executive Officer, HKSH Medical Group Medical Superintendent, Hong Kong Sanatorium & Hospital
19:05-19:10	**Opening Remarks**	**Dr. WONG Yat Wa** Honorary Consultant in Orthopaedic Surgery Specialist in Orthopaedics and Traumatology Hong Kong Sanatorium & Hospital

MODERATORS: Dr. WONG Yat Wa | Dr. Kenny KWAN

19:10-19:25	**Applications and Prospects of Robotics In Spine Surgery**	**Prof. HE Da** Director of Spine Surgery Department Beijing Jishuitan Hospital, Capital Medical University
19:25-19:40	**Robot-Assisted Surgery for Spinal Fracture: A Safer and Less Invasive Maneuver**	**Prof. SHEN Hong Xing** Chief Physician & Doctoral Supervisor, Shanghai Jiao Tong University Director of Orthopedics & Spine Surgery Renji Hospital, Shanghai Jiao Tong University School of Medicine
19:40-19:50	**Panel Discussion**	
19:50-20:05	**Applications of Robotics in MIS Spinal Surgery**	**Prof. HE Da**
20:05-20:20	**Robot-Assisted Percutaneous Internal Fixation Revision for Cervical Pseudarthrosis After ACDF**	**Prof. SHEN Hong Xing**
20:20-20:30	**Panel Discussion**	
20:30-20:35	**Closing Remarks**	**Dr. Keith LUK** Honorary Consultant in Orthopaedic Surgery Specialist in Orthopaedics and Traumatology Hong Kong Sanatorium & Hospital



WELCOME MESSAGE

On behalf of HKSH Medical Group, it is my great pleasure to welcome you to HKSH Spine Centre Symposium 2026, themed "Robotics in Spinal Surgery and Rehabilitation".

This year's Symposium focuses on the role of robotics in spinal surgery and rehabilitation, bringing together two complementary aspects of spine care. It offers an opportunity to examine how robotic technologies may support surgical treatment and rehabilitation, and to consider their applications across the patient's journey towards recovery. Through shared expertise and clinical perspectives, we aim to deepen our understanding of robotics and its potential to support patient-centred care.

Through scientific discussions, we will explore emerging robotic technologies and exchange clinical experiences in spinal surgery and rehabilitation. We hope these exchanges will encourage dialogue between surgical and rehabilitation teams, foster collaboration across disciplines, and advance our shared commitment to the care of patients with spinal disorders.

We are honoured to welcome an outstanding group of experts and are grateful to all participants, presenters, sponsors and colleagues for their contributions to the Symposium. Your dedication to clinical excellence, the exploration of robotic technologies, and collaborative innovation is central to our shared efforts to advance spinal surgery and rehabilitation.

As we consider the future of robotics in spinal surgery and rehabilitation, I encourage you to share your insights, connect with colleagues across disciplines, and embrace the spirit of innovation that has defined the Symposium since its inauguration last year.

Thank you for joining us. I wish you a productive, inspiring, and rewarding symposium.

Dr. Walton LI

Chief Executive Officer, HKSH Medical Group
Medical Superintendent
Hong Kong Sanatorium & Hospital



WELCOME MESSAGE

It is my great pleasure to welcome you all to the HKSH Spine Centre Symposium 2026, as we gather to explore the remarkable advancements in "Robotics in Spinal Surgery and Rehabilitation."

This gathering offers a valuable opportunity to share knowledge and practical experience in a field that is reshaping spine care. With respected speakers joining us from Hong Kong, Beijing, and Shanghai, I am confident that the discussions will leave us better equipped to apply these technologies to enhance precision, safety, and patient outcomes. Staying current with such innovations is essential for all of us in the profession, and today's programme is designed to support that goal.

The HKSH Spine Centre has long been dedicated to delivering compassionate, dependable, and forward-looking care. Bringing robotics into both surgical and rehabilitation settings marks an important step in that ongoing effort. This symposium reflects our commitment to continuous improvement and to building collaborations that move the field ahead.

I hope this Symposium provides you with valuable insights and meaningful connections. Wishing you all an enjoyable and rewarding evening.

Prof. Jason CHEUNG

Department Chairperson
Li Shu Fan Medical Foundation Professorship
in Orthopaedic Surgery

Clinical Professor and Honorary Consultant
Department of Orthopaedics and Traumatology
The University of Hong Kong



Dr. Paul Aarne KOLJONEN

Consultant & Deputy Chief of Service
Department of Orthopaedics and Traumatology, Queen Mary Hospital
Deputy Hospital Chief Executive, Maclehose Medical Rehabilitation Centre
Honorary Clinical Associate Professor
Department of Orthopaedics and Traumatology, The University of Hong Kong

Robotics in Spinal Rehabilitation

BIOGRAPHY

Dr. Koljonen is a Consultant in the Division of Spine Surgery, and Deputy Chief of Service of the Department of Orthopaedics and Traumatology at Queen Mary Hospital. He also holds the title of Honorary Clinical Associate Professor at The University of Hong Kong, and is actively engaged in clinical practice, research and education within the field of spinal surgery and spinal rehabilitation.

Dr. Koljonen's clinical interests span a wide range of spinal conditions, including adult and paediatric spinal deformities, cervical pathologies, degenerative spine disorders, spinal tumours, spinal trauma and spasticity management. Dr. Koljonen's research endeavours focus on various aspects of spine care such as degenerative cervical myelopathy, paediatric cervical disorders, and neurological rehabilitation.

ABSTRACT

Robotic exoskeletons are rapidly emerging as valuable adjuncts in spinal cord injury (SCI) rehabilitation, offering intensive, repetitive, and task-specific gait training that conventional therapy struggles to deliver consistently. Current systems — including overground devices like ReWalk, Ekso, and Indego, alongside stationary platforms — enable safe, weight-bearing practice and improve walking independence, balance and lower-limb strength. Meta-analytic evidence indicates that exoskeleton training yields significantly greater gains in walking stability and functional scores compared with conventional gait training, though advantages in walking speed and distance remain modest. These technologies bridge the gap by reducing the physical burden on therapists, enabling higher training volumes and providing measurable, repeatable locomotor practice that may enhance neuroplasticity. While exoskeletons are not a standalone cure, they represent a promising tool to complement conventional rehabilitation, particularly for improving balance and functional independence in individuals with incomplete SCI.



Mr. WONG Fong Yee, Admond

Department Manager (Physiotherapy)
MacLehose Medical Rehabilitation Centre

Use of Robotics: MMRC Experience

BIOGRAPHY

Mr. Wong is the Department Manager (Physiotherapy) at MacLehose Medical Rehabilitation Centre (MMRC) in Hong Kong, specialising in spinal cord injury rehabilitation and advanced neurological mobility recovery. He has served as a physiotherapist team head within the dedicated Spinal Cord Injury Rehabilitation Team at MMRC for more than two decades, working closely with major acute units from Queen Mary Hospital. His main role is to design and execute intensive recovery pathways tailored for individuals suffering from complete or partial neurological paralysis. As a strong advocate for bridging the gap between cutting-edge engineering and holistic patient care, Mr. Wong specialises in incorporating advanced medical technology into conventional therapy. He is a certified clinical trainer of latest robotic exoskeleton systems — including EksoNR, Ekso Indego, and Free Bionics — which he utilises to guide neurorehabilitation patients through robotic gait training, allowing them to stand upright and safely re-learn walking patterns. Throughout his career, the primary rehabilitation goal remains unchanged: to restore independence, push the boundaries of physical therapy, and maximise long-term mobility outcomes.

ABSTRACT

Achieving functional recovery in spinal cord injury (SCI) rehabilitation requires training protocols that strictly adhere to the core principles of motor learning: high repetition, task-specificity, and active patient engagement. While conventional physical therapy excels at building foundational strength, core stability, and pre-gait mechanics, manual gait training often falls short of the step volume needed to permanently encode new movement patterns. This presentation shares clinical insights on seamlessly blending conventional physical therapy with the EksoNR robotic exoskeleton. This integrated approach creates an ideal environment for motor skill re-education by combining hands-on therapeutic guidance with precision technology.

Drawing from clinical experience, this session examines how the exoskeleton's adaptive assistance allows patients to actively initiate steps, promoting error detection and motor control refinement. Clinical observations reveal that this dual protocol accelerates gait proficiency and reduces compensatory strategies far better than traditional methods alone. Rather than replacing traditional exercises, the robotics training enhances them by tracking objective performance data, allowing therapists to progressively challenge patients as their motor skills evolve. Ultimately, merging conventional therapy with EksoNR technology maximises motor learning principles, empowering physiotherapists to deliver highly effective care that restores long-term mobility.



Mr. MA Kin Ting

Physiotherapist, Hong Kong Sanatorium & Hospital

Use of Robotics: HKSH Experience

BIOGRAPHY

Mr. Ma is a physiotherapist of HKSH Physiotherapy Centre at Hong Kong Sanatorium & Hospital. He earned a Master of Science in Manipulative Physiotherapy from The Hong Kong Polytechnic University, Bachelor of Science in Physiotherapy from Curtin University and Diploma in Acupuncture and Moxibustion in Hong Kong.

Since graduating from Curtin University in 2007, Mr. Ma has practiced in both private clinics and hospital settings across Perth and Hong Kong. He has focused on spinal care and pain management since 2013 and is a certified ExoMotus user.

His innovative clinical projects include utilising real-time ultrasound for musculoskeletal assessment, rTMS pilot studies for chronic pain, oncology rehabilitation for prostate cancer, and exoskeleton-assisted post-surgical spinal rehabilitation.

ABSTRACT

Advanced rehabilitation robots are reshaping physiotherapy by helping patients rebuild motor skills and improve their quality of life. Mr. Ma will share how his department utilises these innovative tools, highlighting their impact on patient care and the hands-on realities of adopting robotic technology in clinical practice.



Prof. HE Da

Director of Spine Surgery Department
Beijing Jishuitan Hospital, Capital Medical University

BIOGRAPHY

Prof. He is a "Hundred-Level Talent" in the Beijing Health "10-100-1000" Talent Project and a recipient of the Beijing Hospitals Authority Ascent Plan.

Primary research of Prof. He focuses on the development and clinical translation of a precise, minimally invasive and intelligent spinal robot, as well as the pathogenesis of degenerative spine diseases. He co-developed China's first universal orthopaedic robotic system, with significant contributions spanning research and development, preclinical validation and clinical implementation. He spearheaded the development of China's first clinical practice guideline for robotic-assisted spine surgery, establishing national standards for regulated adoption and widespread promotion.

Prof. He performs approximately 500 spinal surgeries annually, encompassing a comprehensive spectrum of routine and complex procedures across the occipitocervical, subaxial cervical and thoracolumbar regions, as well as spinal oncology. He specialised in minimally invasive spinal techniques, including robotic-assisted spine surgery, minimally invasive tubular fixation and percutaneous transforaminal endoscopic surgery.

Professional Appointments:

- Member of Spine Surgery Group, Chinese Orthopaedic Association (COA)
- Member, Trauma Society, Chinese Medical Association
- Chairman, Spine Health Branch, National Health Industry Enterprise Management Association
- Vice Chairman and Chairman-Elect, Medical Robot Engineering and Clinical Application Branch, Chinese Society of Biomedical Engineering

Applications and Prospects of Robotics in Spine Surgery

ABSTRACT

Traditional spine surgery is associated with considerable variability in surgical precision due to the complex anatomy of the operative site, the proximity of neurovascular structures and the restricted visual field of the surgeon. Robotic technology has the potential to improve the accuracy and safety of spine surgery by providing image-guided navigation and robotic arm positioning. This review summarises the evolution of robotic systems in spine surgery, their current applications in thoracolumbar and cervical spine surgery, and future developments, including deeper integration with artificial intelligence and the creation of new robotic platforms. It also considers how these technologies may transform the diagnostic and therapeutic approaches to spine surgery. Robot-assisted thoracolumbar surgery substantially improves the accuracy of screw placement and reduces the incidence of surgical complications. In patients with osteoporosis, scoliosis or prior instrumentation requiring revision, it demonstrates excellent screw placement and puncture accuracy, as well as valuable preoperative planning capabilities. It has also facilitated the development of minimally invasive and remote surgery. Although robot-assisted cervical surgery has improved the accuracy of cervical screw placement, several technical and anatomical challenges remain, particularly given the smaller pedicle dimensions and critical neurovascular relationships.

Applications of Robotics in MIS Spinal Surgery

ABSTRACT

The development of endoscopic and tubular retractor techniques, as well as unilateral biportal endoscopy, has made minimally invasive spine surgery an effective treatment for lumbar disc herniation and spinal stenosis. This approach offers the advantages of limited surgical trauma, a rapid postoperative recovery period and a low complication rate. Robotic assistance is increasingly being adopted in spine surgery, including for the placement of minimally invasive surgical corridors and screw insertion. This review summarises the current status of robot-assisted techniques in minimally invasive spine surgery, outlining future trends and providing a reference for clinical practice. The use of robots in minimally invasive spine surgery improves the accuracy of screw placement and endoscopic corridor creation, reduces the need for intraoperative fluoroscopy, enhances surgical efficiency and has a favourable learning curve. This promotes the wider adoption of minimally invasive techniques. The integration of multimodal information fusion supported by artificial intelligence and the refinement of master-slave control strategies are expected to further enhance the precision and efficiency of minimally invasive spine surgery.



Prof. SHEN Hong Xing

Chief Physician & Doctoral Supervisor, Shanghai Jiao Tong University
Director of Orthopedics & Spine Surgery
Renji Hospital, Shanghai Jiao Tong University School of Medicine

BIOGRAPHY

Dr. Shen is a Professor, Chief Physician and doctoral/postdoctoral supervisor at Renji Hospital, Shanghai Jiao Tong University School of Medicine, where he serves as Chairman of the Department of Orthopaedics and Director of Spine Surgery. He completed two years of advanced clinical training at the Cervical Spine Research Institute, University of Washington School of Medicine under the supervision of world-renowned cervical spine expert Prof. K. Daniel Riew.

With 30 years of clinical, academic and teaching experience, Dr. Shen is a pioneering expert in AI-driven robotic-assisted spine surgery. His core research focuses on basic and clinical investigations of cervical spine surgery. Since 2018, his team has performed over 1,620 robotic spinal operations.

He is Past President of CSRS-AP (Cervical Spine Research Society-Asia Pacific), Vice Chairman of the Orthopaedics Branch of Shanghai Medical Association, and Senior Instructor of AO Spine. As principal investigator, he leads five NSFC projects and one National Key R&D Program. He has published over 50 SCI papers as corresponding author, and was awarded the First Prize of Science and Technology Progress by the Ministry of Education of China, as well as the title of Shanghai Leading Talent.

Robot-Assisted Surgery for Spinal Fracture: A Safer and Less Invasive Maneuver

ABSTRACT

Spinal fractures account for approximately 5% of all traumatic injuries, with an annually increasing incidence. Thoracolumbar (T11–L2) fractures represent 75% to 90% of cases, and nearly 45% of patients require surgical intervention. Conventional open freehand surgery is constrained by limited screw placement precision, substantial radiation exposure to both patients and surgeons, extensive paravertebral muscle damage, and heavy operative workload.

This presentation shares clinical experience of robot-assisted spinal fracture surgery from Renji Hospital, based on the TiRobot robotic system. Through representative cases — lumbar burst fracture treated with percutaneous fixation and the Wiltse paraspinal approach, upper cervical (C1–C2) odontoid fracture, and multilevel cervicothoracolumbar fractures — the lecture demonstrates the complete workflow of 3D preoperative trajectory planning, robotic-guided guidewire insertion, and accurate pedicle screw placement.

Robotic assistance enables precise screw positioning, subfascial dissection with reduced bleeding and muscle injury, adequate fracture distraction and reduction via an intermuscular approach, and decreased fluoroscopy time. The technique is associated with lower revision rates, faster postoperative rehabilitation and shorter hospital stay. The integration of artificial intelligence and robotic systems will further advance the safety and efficacy of spinal fracture surgery.

Robot-Assisted Percutaneous Internal Fixation Revision for Cervical Pseudarthrosis After ACDF

ABSTRACT

Cervical pseudarthrosis (bone nonunion) is a challenging complication after anterior cervical decompression and fusion (ACDF), with an incidence of 4% to 20% for single-level procedures and 27% to 50% for multilevel surgeries. It often presents with refractory neck pain, radicular symptoms, myelopathy and functional impairment, and revision via the anterior approach carries high reoperation and complication rates.

This presentation introduces the clinical experience with robot-assisted posterior minimally invasive revision surgery for cervical pseudarthrosis at Renji Hospital. Based on a case series of patients with symptomatic ACDF nonunion, the lecture illustrates the standardised surgical workflow of TiRobot-guided pedicle screw placement via an intermuscular posterior approach, which maximally preserves posterior cervical musculature and ligamentous structures.

Compared with conventional revision methods, the robotic technique achieves higher accuracy and a higher one-time success rate of screw placement, reduces intraoperative fluoroscopy exposure and operative trauma, and delivers satisfactory mid-term outcomes including significant pain relief, neurological functional improvement and solid bony fusion. This minimally invasive robotic strategy provides a safe, precise and effective alternative for managing cervical pseudarthrosis, with advantages in tissue preservation and patient recovery.

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College / Institution	Points	Group-Category
The Hong Kong College of Orthopaedic Surgeon	2	Cat A-PP
	1	Rehabilitation CMECPD Points
The Hong Kong College of Anaesthesiologists	2.5	RC-NA
The College of Surgeons of Hong Kong	2.5	CME-PP
Hong Kong College of Radiologists	Pending	Pending
The Hong Kong College of Pathologists	2.5	CME-PP
Hong Kong College of Physicians	1	PP-PP
The Hong Kong College of Family Physicians	3	OEA-5.02
Hong Kong College of Emergency Medicine	2.5	CME-PP
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