

AO Trauma Course— Basic Principles of Fracture Management

December 1–6, 2024
Davos, Switzerland

Lecture room:
Aspen 1
Practical exercise room:
Foyer C2

PRELIMINARY PROGRAM

Course description

This AO Trauma Course—Basic Principles of Fracture Management is part of AO Trauma's educational program for residents and based on a specific framework of competencies and learning objectives. They feature a balanced mix of educational methods with a strong focus on interactive sessions.

Online pre-course self-assessment prepares participants for the course and allows the faculty to tailor the course to the needs of the participants.

The course will consist of several evidence-based lectures which will cover the key information required. In practical exercises, participants will be trained in the application of various techniques.

The AO Skills Lab consists of ten stations where participants will learn about the principles of fractures and test fracture management options. Discussing cases in small groups will help participants to understand decision-making processes and further develop management skills.

After the course, an online post-course self-assessment will provide participants with important feedback on how much they have learned.

Goal of the course

The AO Trauma Course—Basic Principles of Fracture Management is part of the educational program teaching fundamental principles and current concepts in the treatment of injuries, incorporating the latest techniques in operative fracture management. The AO Trauma Basic Principles course is the initial step along the path of lifelong learning in operative fracture management. The focus of this course is on teaching the basic principles of fracture management.

Target participants

The AO Trauma Course—Basic Principles of Fracture Management is targeted at surgical trainees and is also open to certified orthopedic and trauma surgeons who are interested in furthering their knowledge and skills in operative fracture management.

Learning objectives

Upon completion of this course, participants will be able to:

- Plan a treatment based on assessment, classification, imaging, and decision-making
- Describe how to apply reduction techniques in fracture management with attention to the importance of the soft tissues
- Discuss the concepts of stability, their influence on bone healing, and how to apply implants to achieve appropriate stability
- Use appropriate fixation techniques to treat diaphyseal and simple (peri)articular fractures
- Identify and discuss the special problems related to:
 - Plan the initial treatment of the polytrauma patient
 - Fractures in the immature skeleton and osteoporotic fractures
 - Delayed union and/or nonunion
 - Pelvic injuries
 - Postoperative infection

Chairpersons



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Faculty

Jaber	Alkhyeli	Tawam Hospital, Alain	UAE
Tressa	Amirthanayagam	West Hertfordshire Hospitals NHS Trust, Watford	UK
Stefan	Benedikt	University Hospital Innsbruck, Innsbruck	Austria
Dhaval	Desai	Desai Orthopedic Centre, Surat	India
Mehmet Ali	Deveci	Koç University School of Medicine, Istanbul	Turkey
Marta	Gomes	Hospital da Luz, Porto, Lisboa e Arrabida	Portugal
Vincent	Groen	Zaans Medisch Centrum, Groningen	Netherlands
ElZaher	Hassan	Ain Shams University, Cairo	Egypt
Tina	Histing	BG Hospital Tübingen, Tübingen	Germany
Michael	Kushner	Hospital Doctor Arnulfo Arias Madrid, Panama	Panama
Lia	Marliana	Mitra Keluarga Bekasi Timur Hospital, Jakarta	Indonesia
Ananda	Nanu	Sunderland Royal Hospitals, Newcastle	UK
Kanu	Okike	Hawaii Permanente Medical Group, Honolulu	USA
Nathaniel	Orillaza	University of the Philippines Manila PGH, Manila	Philippines
Chetan	Pradhan	Sancheti Institute for Orthopaedics & Rehabilitation	India
BiYu	Rui	Shanghai Sixth People's Hospital, Shanghai	China
Muhammad Ather	Siddiqi	Nuffield Orthopaedic Centre, Oxford	UK
Carla	Smith	St Luke's Health System, Boise	USA
Gillian	Soles	University of California Davis Medical Center, Sacramento	USA
Muhammad	Usman Sarwar	Shalamar Medical & Dental College, Lahore	Pakistan
Rahul	Vaidya	Detroit Medical Center, Detroit	USA
Linda	Vallejo Vargas	Unidad Ortopédica de Colombia, Bogota	Colombia

Guest Lecturer

Simon	Lambert	The Princess Grace Hospital, London	UK
Peter	Varga	AO Research Institute, Davos	Switzerland

Sunday

December 1, 2024

15:00	Opening of the Davos Congress Centre
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15:00–17:00	Registration of participants
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17:00–19:00	Opening Ceremony and Founders' Reception
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Monday

December 2, 2024

LOCATION: Aspen 1

08:00–08:15 Welcome and introduction

I Hadisoebroto Dilogu, J Velarde

Module 1

Moderator: G Soles

Injury pattern (soft tissue and bone) and biology of bone healing

Upon completion of this module, participants will be able to:

- Describe how patient-related factors affect the management of fractures
 - Describe the importance of soft tissue in fracture healing
 - Use the AO/OTA Fracture and Dislocation Classification to describe a fracture
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08:15–08:30 The AO world—from history to lifelong learning

C Smith

08:30–08:40 Influence of the patient factors and the injury mechanism on fracture management

M Ali Deveci

08:40–08:55 The (soft-tissue) injury—a high-priority consideration

N Orillaza

08:55–09:05 The biology of bone healing

S Benedikt

09:05–09:20 AO/OTA Fracture and Dislocation Classification Compendium

J Alkhyeli

09:20–09:45 Coffee break and location change to AO Skills Lab

09:45–11:45 **AO Skills Lab**

Note: Participants spend 10 minutes at each station, then rotate.

Station A: Torque measurement of bone screws

J Velarde

B Rui, L Vallejo Vargas

Station B: Soft-tissue penetration during drilling

D Desai, M Usman Sarwar

Station C: Heat generation during drilling

L Marlana, MA Siddiqi

Station D: Mechanics of bone fractures

M Kushner, N Orillaza

Station E: Techniques of reduction, part 1

C Smith, M Gomes

Station F: Techniques of reduction, part 2

C Pradhan, J Alkhyeli

Station G: Mechanics of intramedullary fixation

T Amirthanayagam, V Groen

Station H: Mechanics of plate fixation	A Nanu, S Benedikt
Station J: Fracture healing and plate fixation	MA Deveci, K Okike
Station K: Damaged implant removal	T Histing, R Vaidya

11:45–11:50 Location change to lecture hall

Module 2

Moderator: T Amirthanayagam

Stability and biomechanics of bone healing

Upon completion of this module, participants will be able to:

- Explain the biology of fracture healing and how it is affected by fracture treatment
- Define absolute and relative stability, and describe their effects on fracture healing
- Describe the biomechanics of locking compression plates (LCP) and how to achieve different types of stability
- Explain the principles and steps of the lag screw technique

11:50–12:05	Absolute stability—biomechanics, techniques, and fracture healing	V Groen
12:05–12:20	Relative stability—biomechanics, techniques, and fracture healing	A Nanu
12:20–12:35	The use of plates in fracture fixation	J Alkhyeli
12:35–12:45	Principles of external fixation	V Groen
12:45–14:00	Lunch break	

LOCATION: Foyer C2

14:00–15:50	Practical exercise 1 Internal fixation with screws and plates—absolute stability	G Soles, M Kushner
	Table 1	D Desai, S Benedikt
	Table 2	T Histing, L Marlina
	Table 3	M Gomes, B Rui
	Table 4	N Orillaza, E Hassan
	Table 5	MA Siddiqi, R Vaidya
	Table 6	J Alkhyeli, K Okike

15:50–16:10 Coffee break and location change to discussion groups

16:10–17:25	Discussion group 1 General principles, classification, concepts of stability, their influence on bone healing, and how to apply implants to achieve appropriate stability	
	Group 1: Landwasser XX	S Benedikt, L Vallejo Vargas
	Group 2: Landwasser XX	M Kushner, T Amirthanayagam
	Group 3: Landwasser XX	M Gomes, B Rui
	Group 4: Landwasser XX	N Orillaza, M Usman Sarwar
	Group 5: Landwasser XX	MA Siddiqi, A Nanu
	Group 6: Landwasser XX	J Alkhyeli, K Okike
	Group 7: Landwasser XX	V Groen, D Desai

17:25–17:35	Evaluation	
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Tuesday

December 3, 2024

LOCATION: Foyer C2

08:00–09.15	Practical exercise 2 Principles of the internal fixator using the LCP	L Marlana, T Amirthanayagam
	Table 1	T Histing, L Vallejo Vargas
	Table 2	E Hassan, K Okike
	Table 3	M Kushner, M Usman Sarwar
	Table 4	A Nanu, C Pradhan
	Table 5	M Gomes, MA Siddiqi
	Table 6	R Vaidya, D Desai

09:15–09:20 Location change to lecture hall

09:20–09:50	Biomechanical challenge with OSapp	S Lambert, P Varga
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09.50-10.15	Panel discussion Cases, questions, and conclusions—injury pattern, biology of bone healing, and stability	Moderator: T Amirthanayagam Panelists: MA Deveci, S Benedikt, V Groen, J Alkhyeli, A Nanu
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10:15–10:35 Coffee break

Module 3

Moderator: C Smith

Surgical treatment of diaphyseal fractures

Upon completion of this module, participants will be able to:

- Describe the treatment goals for diaphyseal fractures
 - Describe the treatment principles for diaphyseal fractures in the upper and lower extremities
 - Determine the type of reduction and stability needed for diaphyseal fractures
 - Explain the rationale behind preoperative planning and the importance of careful decision-making with regard to reduction technique, implant requirements, and fixation techniques
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10:35–10:50	Principles of diaphyseal fracture management—what is important in treating these fractures?	L Marlana
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10:50–11:05	Reduction techniques for diaphyseal fractures—principles and methods	B Rui
11:05–11:20	Fractures of the femoral diaphysis (including subtrochanteric)—management principles	K Okike
11:20–11:35	Fractures of the humeral diaphysis—management principles	M Kushner
11:35–11:55	Panel discussion Cases, questions, and conclusions—diaphyseal fractures	Moderator: C Smith Panelists: L Marliana, B Rui, K Okike, M Kushner
11:55–12:50	Lunch break	
LOCATION: Landwasser		
12:50–14:00	Discussion group 2 Management principles for the treatment of diaphyseal fractures	
	Group 1: Landwasser XX	G Soles, K Okike
	Group 2: Landwasser XX	T Amirthanayagam, C Pradhan
	Group 3: Landwasser XX	T Histing, V Groen
	Group 4: Landwasser XX	A Nanu, M Usman Sarwar
	Group 5: Landwasser XX	MA Siddiqi, M Kushner
	Group 6: Landwasser XX	R Vaidya, S Benedikt
	Group 7: Landwasser XX	L Vallejo Vargas, B Rui
14:00–14:10	Location change to practical exercise room	

Module 4

Moderator: A Nanu

Patient positioning

Upon completion of this module, participants will be able to:

- Describe different patient positions (setup of the operating room) used in fracture surgery (upper extremity, lower extremity, pelvis)

14:10–14:15	Introduction to the correct patient positioning	D Desai
14:15–15:30	Practical exercise 3 Demonstration of different patient positions using the digitally enhanced hands-on surgical training system (DEHST)	

	Group 1	C Smith, E Hassan
	Group 2	V Groen, L Vallejo Vargas
	Group 3	C Pradhan, MA Deveci
	Group 4	G Soles, K Okike
	Group 5	N Orillaza, M Usman Sarwar
	Group 6	T Amirthanayagam, MA Siddiqi
	Group 7	L Marliana, S Benedikt
	Group 8	T Histing, J Alkhyeli
	Group 9	M Gomes, B Rui
	Group 10	M Kushner, R Vaidya
15:30–15:32	Location change to lecture room	
15:33–15:45	Summary and take-home messages	A Nanu
15:45–16:05	Coffee break	
16:05–17:15	Practical exercise 4 <ul style="list-style-type: none"> Reamed intramedullary (IM) nailing Tibial shaft fractures—IM nailing using the expert tibia nail (ETN) with reaming and extractor Training of freehand distal interlocking of intramedullary nails with Digitally Enhanced Hands-on Surgical Training (DEHST) 	MA Siddiqi, L Vallejo Vargas
	Table 1	M Gomes, K Okike
	Table 2	M Usman Sarwar, D Desai
	Table 3	MA Deveci, L Marliana
	Table 4	M Kushner, T Amirthanayagam
	Table 5	E Hassan, B Rui
	Table 6	G Soles, V Groen
17:15–17:25	Evaluation	
17:45–20:30	AO Davos Courses Night Davos Congress Centre	

Wednesday

December 4, 2024

LOCATION: Aspen 1

08:00–08:15	Summary of days 1 and 2	I Hadisoebroto Dilogo, J Velarde
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Module 5

Moderator: K Okike

Treatment of articular fractures

Upon completion of this module, participants will be able to:

- Describe the treatment goals for articular fractures
 - Define the key surgical principles for the management of articular fractures
 - Determine the type of reduction and stability needed for articular fractures
 - Outline the function and clinical indications for the tension band technique
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08:15–08:30	Management principles for articular fractures—how do they differ from diaphyseal fractures?	T Amirthanayagam
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08:30–08:45	Reduction techniques for articular fractures—principles and methods	MA Siddiqi
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08:45–09:00	Distal radial fractures—which to fix, how to fix?	M Usman Sarwar
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09:00–09:15	Tension band principle and cerclage wiring	M Kushner
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09:15–09:30	Ankle fractures—a systematic approach for their fixation	T Histing
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09:30–09:35	Location change to practical exercise room	
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09:35–10:15	Practical exercise 5 Cerclage compression wiring of the olecranon	M Kushner, N Orillaza
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Table 1	E Hassan, MA Deveci
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Table 2	M Usman Sarwar, T Histing
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Table 3	J Alkhyeli, G Soles
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Table 4	A Nanu, C Pradhan
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Table 5	C Smith, S Benedikt
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Table 6	R Vaidya, L Marliana
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10:15–10:30	Coffee break	
10:30–11:45	Practical exercise 6 Management of a type 44C malleolar fracture	T Histing, R Vaidya
	Table 1	B Rui, L Vallejo Vargas
	Table 2	M Gomes, C Smith
	Table 3	T Amirthanayagam, C Pradhan
	Table 4	MA Siddiqi, S Benedikt
	Table 5	V Groen, N Orillaza
	Table 6	M Kushner, MA Deveci
11:45–11:50	Location change to lecture hall	
11:50–12:10	Forearm fractures—understanding the principles for diaphyseal and articular fractures	N Orillaza
12:10–12:30	Preoperative planning—rationale and how to do it	C Pradhan
12:30–12:55	Panel discussion Cases, questions, and conclusions—preoperative planning	Moderator: K Okike Panelists: T Amirthanayagam, T Histing, N Orillaza, C Pradhan
12:55–13:55	Lunch break	
LOCATION: Foyer C2		
13:55–15:55	Practical exercise 7 (part 1) Preoperative planning—plan your forearm operation	C Smith, C Pradhan
	Table 1	N Orillaza, T Amirthanayagam
	Table 2	L Vallejo Vargas, J Alkhyeli
	Table 3	MA Deveci, M Gomes
	Table 4	V Groen, A Nanu
	Table 5	R Vaidya, T Histing
	Table 6	M Kushner, D Desai

15:55–16:15 Coffee break

16:15–17:25	Practical exercise 7 (part 2) Operate your plan—fixation of 2R2A and 2U2C forearm fractures using the LCP 3.5 (8 and 11 holes)	C Smith, C Pradhan
	Table 1	N Orillaza, T Amirthanayagam
	Table 2	L Vallejo Vargas, J Alkhyeli
	Table 3	MA Deveci, M Gomes
	Table 4	V Groen, A Nanu
	Table 5	R Vaidya, T Histing
	Table 6	M Kushner, D Desai

17:25–17:35 Evaluation

Thursday

December 5, 2024

LOCATION: Aspen 1		
08:00–08:15	Femoral neck fractures	K Okike
08:15–08:30	Trochanteric fractures	R Vaidya
08:30–08:45	Distal femoral fractures—management principles	D Desai
08:45–09:00	Tibial plateau fractures	B Rui
09:00–09:15	Distal tibial fractures	C Smith
09:15–09:40	Panel discussion Cases, questions, and conclusions—articular fractures	Moderator: M Usman Sarwar Panelists: K Okike, R Vaidya, D Desai, B Rui, C Smith
09:40–10:00	Coffee break	
10:00–11:10	Discussion group 3 Management principles for the treatment of articular fractures Group 1: Landwasser XX Group 2: Landwasser XX Group 3: Landwasser XX Group 4: Landwasser XX Group 5: Landwasser XX Group 6: Landwasser XX Group 7: Landwasser XX	N Orillaza, S Benedikt C Smith, M Gomes D Desai, T Histing L Marlana, R Vaidya E Hassan, MA Deveci MA Siddiqi, J Alkhyeli A Nanu, C Pradhan
11:10–11:20	Location change to practical exercise room	
11:20–12:45	Practical exercise 8 Intramedullary nailing of a proximal femur using a trochanteric femoral nail antirotation (TFNA) Table 1 Table 2 Table 3	J Alkhyeli, A Nanu R Vaidya, B Rui C Smith, M Usman Sarwar E Hassan, G Soles

Table 4	D Desai, M Kushner
Table 5	L Marlana, S Benedikt
Table 6	T Amirthanayagam, L Vallejo Vargas

12:45–14:00 Lunch break

LOCATION: Aspen 1

Module 6

Moderator: R Vaidya

Emergency management, minimally invasive surgery, and special fractures

Upon completion of this module, participants will be able to:

- Identify indications for minimally invasive osteosynthesis (MIO) and when to use it
- Outline differences of fracture treatment in children compared to those in adults
- Outline differences of fracture treatment in the elderly compared to those in adults
- Understand the danger of radiation in the operating room and how to avoid it
- Outline the algorithm for polytrauma management and discuss the roles of the team members
- Recognize the pathology of severe pelvic trauma and identify the reasoning behind emergency pelvic stabilization
- Outline the treatment plan and priorities for open fractures
- List the causes and factors that lead to postoperative infection
- Name factors leading to delayed union and/or malunion

14:00–14:15	Minimally invasive osteosynthesis —when to use it?	T Histing
14:15–14:30	Radiation hazards in the operating room—how to minimize them?	G Soles
14:30–14:45	Fractures in the growing skeleton—how are they different?	V Groen
14:45–15:00	Fixation principles in osteoporotic bone—the geriatric patient	C Pradhan
15:00–15:15	Implant removal—why, when, and how?	E Hassan
15:15–15:35	Coffee break	
15:35–15:50	Treatment algorithms for the polytrauma patient	MA Deveci
15:50–16:05	Indications and techniques for external fixation for damage control in orthopedic and open fractures	G Soles
16:05–16:20	Emergency management of pelvic fractures—a critical skill can save lives	M Kushner

16:20–16:35 Management of open fractures

M Gomes

16:35–16:45 Evaluation

Friday

December 6, 2024

LOCATION: Foyer C2		
08:00–09:00	Practical exercise 9 Fixation of a tibial shaft fracture using a large external fixator (modular frame construct)	B Rui, E Hassan
	Table 1	C Smith, L Vallejo Vargas
	Table 2	J Alkhyeli, V Groen
	Table 3	M Usman Sarwar, G Soles
	Table 4	MA Siddiqi, T Histing
	Table 5	L Marlana, D Desai
	Table 6	M Kushner, K Okike
09:00–09:05	Location change to lecture hall	
09:05–09:20	Infection after osteosynthesis—how to diagnose and manage	L Vallejo Vargas
09:20–09:35	Delayed healing—causes and treatment principles	E Hassan
09:35–09:45	Research and development of smart systems to help the surgeon advance patient care	R Vaidya
09:45–10:05	Coffee break	
10:05–11:15	Practical exercise 10 Stabilization of the pelvic ring using a large external fixator	M Gomes, M Usman Sarwar
	Table 1	L Vallejo Vargas, B Rui
	Table 2	J Alkhyeli, E Hassan
	Table 3	MA Deveci, C Pradhan
	Table 4	A Nanu, V Groen
	Table 5	MA Siddiqi, S Benedikt
	Table 6	G Soles, N Orillaza
11:15–11:25	Location change to discussion groups	

11:25–12:35	Discussion group 4 Final case discussion on selected topics: <ul style="list-style-type: none"> • Polytrauma • Complications 	
	Group 1: Landwasser XX	N Orillaza, M Kushner
	Group 2: Landwasser XX	S Benedikt, Lia Marliana
	Group 3: Landwasser XX	C Smith, R Vaidya
	Group 4: Landwasser XX	T Amirthanayagam, K Okike
	Group 5: Landwasser XX	MA Deveci, B Rui
	Group 6: Landwasser XX	A Nanu, V Groen
	Group 7: Landwasser XX	E Hassan, G Soles
12:35–12:45	Location change to lecture hall	
12:45–13:00	Violation of AO principles—when it goes wrong	A Nanu
13:00–13:30	Panel discussion Cases, questions, and conclusions—infection, malunion, and nonunion	Moderator: D Desai Panelists: L Vallejo Vargas, E Hassan, R Vaidya, A Nanu
13:30–13:45	Course wrap-up	I Hadisoebroto Dilogo, J Velarde
13:45–13:55	Evaluation	
13:55–14:15	Sandwich lunch	