

Date:16/6/21

From
Dr.Vijayakumar,
Professor ,
Orthopaedics,
SLIMS,
Pondicherry.

To
The Dean,
SLIMS,
Pondicherry.

Sub: Permission to conduct value-added course: Damage control in orthopaedics

Respected Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **_Damage control in orthopaedics** on 14/7/21 We solicit your kind permission for the same.

Kind Regards



PROFESSOR & HOD
Department of Orthopaedics
Sri Lalitha Narayana Institute of Medical Sciences
Pondicherry - 605 002.

Dr.Vijayakumar

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr.Jayalakshmi

The HOD: Dr.Vijayakumar

The Expert :Dr.Boblee James

The committee has discussed about the course and is approved.



Dean

Dr. G. JAYALAKSHMI, MCh, MChS, DNB (C)
DEAN
Sri Lakhshmi Narayana Institute of Medical Sciences
Choa, Adyar, Madhavaram, Post,
Vandur, Chennai-600 026



Subject Expert

Department of Orthopaedics
Sri Lakhshmi Narayana Institute of Medical Sciences
Pondicherry - 605 002.



HOD

PROFESSOR & HOD
Department of Orthopaedics
Sri Lakhshmi Narayana Institute of Medical Sciences
Pondicherry - 605 002.

Circular

07.06.2021

Sub: Organising Value-added Course: DAMAGE CONTROL IN ORTHOPAEDICS

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **DAMAGE CONTROL IN ORTHOPAEDICS . 30 hrs JULY 2021 -JAN 2022**

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before JULY 2021- JAN 2022. Applications received after the mentioned date shall not be entertained under any circumstances.



Dean

Dr. C. JAYA LAKSHMI, BSc, MSc, DFCO, M.D.,
CMBM
Sri Lakshmi Narayana Institute of Medical Sciences
Campus, Bharath Institute of Higher Education and Research,
V. Narayana Pillai Road, Pondicherry-605 002

Encl: Copy of Course content

Course Proposal

Course Title: Damage control in orthopaedics

Course Objective: Management of DCO

Course Outcome: Evaluation and management skills in DCO

Course Audience: 20

Course Coordinator: Dr. Jayalakshmi

Course Faculties with Qualification and Designation:

1. Dr. Vijayakumar Ms Ortho .

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1	14/7/21	HISTORICAL PERSPECTIVES	4.30 to5	1/2
2	21/7/21	DAMAGE CONTROL	5 to 6	1
3	28/7/21	INDICATIONS	4.30 TO 5:30	1
4	2/8/21	DEFINITION	6 to 7	1
5	9/8/21	PATHOPHYSIOLOGY	4.30 to 5.30	1
6	16/8/21	MODS	6.30 to8	11/2
7	8/9/21	BORDER LINE PATIENTS	4.30 to 5.30	1
8	15/9/21	MANAGEMENT	4.30 to 5:30	1
9	22/9/21	STAGED TREATMENT	4.30 to5:30	1
10	6/10/21	CONCLUSION	6 to 7	1
11	13/10/21	PRACTICAL SESSION	4 to 8	4
12	10/11/21	PRACTICAL SESSION	3 to 7	4
13	24/11/21	PRACTICAL SESSION	4 to 8	4
14	20/12/21	PRACTICAL SESSION	4 to 8	4
15	11/1/22	PRACTICAL SESSION	3 to 7	4
			Total Hours	30

REFERENCE BOOKS:

1) DAMAGE CONTROL IN TRAUMA CARE - DUCHESNE,JUAN

VALUE ADDED COURSE

1. Name of the programme & Code

DAMAGE CONROL IN ORTHOPAEDICS – OR03

2. Duration & Period

30 hrs JULY 2021-JAN 2022

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Short notes- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 JULY 2021-JAN 2022

8. Year of discontinuation:

9. Summary report of each program year-wise

Value Added Course- july 2021 - jan 2022					
Sl. No	Course Code	Course Name	Resource Persons	Target Students	Strength & Year
1	OR03	DAMAGE CONROL IN ORTHOPAEDICS	Dr. Vijayakumar	THIRD YEAR MBBS	18 (JULY 2021-JAN 2022)

10. Course Feed Back *Enclosed as Annexure- V*



RESOURCE PERSON
DR.VIJAYA KUMAR

PROFESSOR & HOD
Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 002



COORDINATOR
DR..JAYALAKSHMI

Dr. G. JAYALAKSHMI, M.B.B.S, D.M.C.C, M.D.
DIPLOMA
Sri Lakshmi Narayana Institute of Medical Sciences
Department of Orthopaedics, Pondicherry
Vidyanagar, Coimbatore, Pondicherry-605 002

DAMAGE CONTROL ORTHOPAEDICS

14/7/2021

DAMAGE CONTROL ORTHOPAEDICS(DCO)

Particulars	Description
Course Title	DAMAGE CONTROL ORTHOPAEDICS
Course Code	OR03
Objective	1. historical perspectives 2.what is damage control 3.indications 4.definition

	5.pathophysiology 6.mods 7.borderline patients 8.management 9.staged treatment 10.conclusion
Further learning opportunities	DAMAGE CONTROL ORTHOPAEDICS
Key Competencies	On successful completion of the course the students will have skill in damage control in orthopaedics
Target Student	Pre final year
Duration	30hrs JULY 2021 – January 2022
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Short notes

HISTORICAL PERSPECTIVES

In 1960s

The philosophy prevailed that the polytrauma patient was *'too sick to operate on'*

- The development of fat embolism syndrome and pulmonary dysfunction was feared (Bradford DS ET AL., 1970)
- Definitive surgical stabilization was often delayed to *10-14 days*
- Cast and skeletal tractions* preferred

In 1970s

Pioneering studies showed that *early* stabilization of femoral fractures *reduces* dramatically the incidence of Fat Emb.Syndrome, pulmonary failure (ARDS) and postoperative complications

In 1980s

“ There is a beneficial effect of early Stabilization of fractures on both mortality and morbidity and length of hospital stay.”

- This new philosophy was named

Early Total Care (ETC). *“The patient is too sick not to be treated surgically”*

- Surgeries were done within **24 hrs** of admission

In 1990s

A variety of unexpected complications related to the early stabilization of fractures of long bones was described. These complications mainly developed in patients with severe chest injuries, severe hemodynamic shock post reamed intramedullary nailing without thoracic trauma. This led to the conclusion that the method of stabilization and the timing of surgery may have played a major role in the development of such complications.

An approach to achieve **rapid skeletal stabilization** of major orthopedic injuries to **stop the cycle** of ongoing musculo - skeletal injury and **to control** hemorrhage

- Its purpose is to avoid worsening of the patient's condition by the "second hit" of a major orthopedic procedures

WHAT IS DAMAGE CONTROL ?

Damage control is a Navy term defined as “the capacity of a ship to absorb damage and maintain mission integrity

DAMAGE CONTROL IS A NAVAL TERM:-

- SAVE THE SHIP**
- LIMIT THE DAMAGE**
- EMERGENCY REPAIR**
- FINISH THE MISSION** DAMAGE CONTROL ORTHOPAEDICS (DCO)

Relatively recent concept in Orthopaedic practice Early rapid Containment & Stabilization of Orthopedic injuries without worsening the patient general condition

Indications

- **Critically ill polytrauma patient**
- **Unfavorable surgical environment**
- **Battlefield limb injuries & mass Casualties**

Damage Control Orthopedics

Definition

An approach that

1- Contains & Stabilizes Orthopaedic Injuries so that the Patient's Overall Physiology can improve

2- Avoid worsening of the patient's condition by a major Orthopaedic Procedure

3- Delay Definitive Fracture Repair in borderline or unstable patient till condition is optimized

Damage Control Orthopedics:

Its priorities are:

- Control of hemorrhage
- Provisional stabilization of major skeletal fractures
- Management of soft-tissue injuries
- Minimizing the degree of surgical insult to the patient.

1. Recognize who needs damage control.

2. Salvage operations.

3. Keep the patient alive.

4. Accept morbidity of the salvage procedures.

5. Definitive repair later

PATHOPHYSIOLOGY

HYPOTHERMIA

COAGULOPATHY

BLOOD TRANSFUSION

BLEEDING

THE BLOODY VICIOUS CIRCLE TRAUMA TRIAD OF DEATH TRAUMA MORTALITY

Early death

– Blood loss

– Brain injury

Late death

– Secondary brain injury

– Host defense failure -sepsis **TWO-HITS THEORY**

First Hit (Trauma)

– Hypoxia

– Hypotension

– organ & soft tissue injury

– fractures

Second Hit (operation)

– ischemia/reperfusion injury

– compartment syndrome

– operative intervention

– infection **Physiological response to injury**

Inflammatory immune response

Innate immune response

Adaptive immune response

Systemic Inflammatory Response Syndrome (SIRS)

Compensatory Anti-inflammatory Response Syndrome (CARS)

Multi Organ Dysfunction Syndrome (MODS) **Inflammatory immune response**

EARLY innate immune response

DELAYED adaptive immune response

Innate = Hyperinflammation = SIRS

Adaptive = Immunosuppression = CARS **Early innate immune response**

Activation of PMN, monocytes, macrophages, and endothelial cells

Release of pro-inflammatory mediators (cytokines and molecular mediators)

Considered the hyperinflammatory period **SIRS DEFINITION**

Heart rate: > 90 bpm

WBC: <4000/mm³ or >12000/mm³ or >10% immature PMNs

Respiratory rate: >20/min with PaCO₂<32mmHg

Core temperature: <36°C or >38°C

2 of 4 parameters = SIRS Delayed adaptive immune response

Non-apoptotic necrotic/dead cells produce alarmins plus Endogenous triggers (DAMPs = damage-associated molecular patterns) →

autoimmune tissue destruction

Considered the immunosuppression period or CARS

MODS

Cerebral -Cerebral edema

CVS -Hypotension and shock

Respiratory - Acute lung injury, ARDS

Liver - hepatocytes dysfunction

GI - Increased mucosal permeability

Bacterial translocation

Renal - Renal tubular necrosis, acute renal failure

Hematologic - DIC

PATIENT CLINICALLY ASSESSED ABOUT THEIR PHYSICAL STATUS AND CLASSIFIED AS:-

I. STABLE: GRADE 1

II. BORDERLINE: GRADE 2

III. UNSTABLE: GRADE 3

IV. EXTREMIS: GRADE 4

BORDERLINE PATIENTS (PAPE HC 2001):

- COAGULOPATHIC
- HYPOTHERMIA (T <32)

- ACIDOSIS
- SHOCK
- PRESUMED OPERATIVE TIME > 6H
- ARTERIAL INJURY AND HAEMODYNAMIC INSTABILITY
- EXAGGERATED INFLAMMATORY RESPONSE

MANAGEMENT □

ORTHOPAEDIC INJURY COMPLEX PROBLEMS

Femoral fractures in a multiply injured

- Pelvic ring injuries with shock
- Polytrauma in a geriatric patient
- Long bone fractures with chest or

head injuries

- Mangled extremities

APPLICATION OF DCO STRATEGY

- Multiply injured patient
- Physiologically unstable
- Severe chest injury
- Severe hemorrhage
- Mass casualty situation

STAGED TREATMENT

Stage 1: early temporary External Fixation

Stabilization of unstable fractures and the control of hemorrhage and, if indicated, decompression of intracranial lesion.

Stage 2: resuscitation of the patient in ICU and

optimization of his condition.

Stage 3: delayed definitive management of the fracture

Steps of Damage Control Orthopaedics

- Control Bleeding
- Manage Soft tissues
- Spanning Ex. Fixator
- Antibiotic Pouch
- Vacuum Dressings
- Control Bleeding
- Manage Soft tissues
- Spanning External Fixator
- Antibiotic Pouch
- Vacuum Dressings

CONCLUSION :

DAMAGE CONTROL ORTHOPAEDICS (DCO)

Is a Way of thinking

The aim is to Save lives not just fixing a fracture in a limb

Orthopedic team become a resuscitators & stabilizers not just a fixers

Early Skeletal fixation (DCO) is appropriate by external fixator

As Early Total Care may be very risky in

Hemodynamic instability

Pulmonary instability

Sever head injury

Lethal triad (Coagulopathy, Hypothermia & Acidosis)

Do not kill your Borderline patient by (ETC)

Help him to live by (DCO)

Give him the chance to fight another day
Ortho team must be resuscitators and stabilizers: not
FIXERS

VALUE ADDED COURSE

Annexure- II

DAMAGE CONTROL IN ORTHOPAEDICS OR03

4. List of Students Enrolled JULY 2021 – Jan- 2022

Pre final year students			
Sl no	Roll no	Name of the student	signature
1	U14MB201	AASHIK MUKESH. M. S	M.S. Mukesh
2	U14MB202	ABEETHA.M	Ubeetha
3	U14MB203	ABHINAV. S	Abinav
4	U14MB204	ABINAYA. M	M. Abinaya
5	U14MB205	ABISHEK. R	R. Abishek
6	U14MB206	ABIRAMI. S	S. Abirami
7	U14MB207	AGALYA. S	Agalya
8	U14MB208	AJAY PANDIAN. V	Aj
9	U14MB209	AJEETH. R	RA
10	U14MB210	AJITH KUMAR. M.K.	Ajith
11	U14MB211	AKSHAI. S	S. Akshay
12	U14MB212	ALLEN DANIEL. XAVIER.J	XDJ
13	U14MB213	ALTHAF AHMED	Ahmed
14	U14MB214	AMARA LOKESH	Amara
15	U14MB215	AMRESH. K	K. Amresh
16	U14MB216	ANANT SURYA. R	Anant
17	U14MB217	ANDREW MARIE XAVIER.V	XAV
18	U14MB218	APSARA. P	Apsara

VJK

RESOURCE PERSON
DR.VIJAYA KUMAR

PROFESSOR & HOD
Department of Orthopaedics
St. Lalitha Marys Institute of Medical Sciences
Pondicherry - 605 002

J Jayalakshmi

COORDINATOR
DR.JAYALAKSHMI

Dr. G. JAYALAKSHMI, MCh, MChS, DFFO, M.D.
DEAN
St. Lalitha Marys Institute of Medical Sciences
Group: Agetam, Pondicherry, P.O.,
V.M.N.R. Government Pondicherry-605 002.



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DAMAGE CONTROL IN ORTHOPAEDICS

Direct Observation Of Procedural Skills

DOPS Score Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

CANDIDATE AND ASSESSOR INFORMATION

Course code: OR01

Candidate Name	ANANT SURYA.S	Assessor Name	
Date of Assessment		Assessor Position	

PATIENT INFORMATION

Age of patient	NA	Patient gender	NA	Setting	WPBA Work Place Based Assessment
Procedure	Damage control in orthopaedics		Discipline	ORTHOPAEDICS	

Please record a rating for each component of the procedure observed on the scale 0 (extremely poor) to 4 (extremely good). A score of 0- is not observed, 1- is considered below expected level, 2 –borderline 3– adequate performance 4 above expected level, for the **MBBS standard**. Support ratings of 1-2 with an explanation / example in the comments box. Please add other relevant comments about this doctor's strengths and weaknesses that support your ratings and guide future learning.

Annexure 4

Course: damage control in orthopaedics

Name: ANANT SURIYA.S

Reg NO.

Department:ORTHO

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

OPTIONAL Section: Name _____ Date _____
Signature _____

What is damage control. Principles of stage treatment.

1) Damage Control:

It is an approach that contains and stabilizes orthopaedic injuries so that the patient's overall physiology can improve. Its purpose is to avoid worsening of the patient's condition by the 'second hit' of a major orthopaedic procedure and to delay definitive fracture repair until a time when the overall condition of the patient is optimized.

Minimally invasive surgical techniques such as external fixation are used initially. Damage control focuses on control of hemorrhage, management of soft tissue injury, and achievement of provisional fracture stability, while avoiding additional insults to the patient.

2) STAGE treatment:

The STAGE principles refer to the principles of surgical intervention during wound treatment of DPU's and emphasize that "based on



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Indications that show degree of damage.

Triad of death.

Indications:

- Unstable Patients / Patients in extremis
- Bilateral Lung Contusion / Thoracic trauma
- Abdominal / Pelvic trauma & haemorrhagic shock.
- Bilateral femur fracture.

15
20

Parameters:

- Acidotic: pH < 7.24 , lactate > 2.5 mmol/l.
- Hypothermia: Temperature $< 35^\circ$
- Transfusion: > 10 units of blood.
- Coagulopathy: Platelets $< 90,000$
- Long operative time: > 90 minutes
- > 65 / pediatric Patient.

4

Exaggerated Inflammatory Response.

IL 6 > 800 ug/ml.

Injury Severity Score / ISS

- > 20 with chest trauma.

- > 40



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anatomical layers, the management focuses on blood supply and includes layer by layer incision to the infected area, maintenance of effective wound drainage, and step-by-step treatment of the wound.

During treatment, ~~microcirculation~~ microvascular angiogenesis (A) are essential for granulation tissue formation in the bone (skeletons) and tendons (T) and healing of the wound with epithelialization (E).

4



Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)



CERTIFICATE OF MERIT

This is to certify that ANANT SURYA.S has actively participated in the Value Added Course on *Damage control in Orthopaedics* held during JULY 2021 – Jan 2022 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. VIJAYA KUMAR
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Student Feedback Form

Course Name: DAMAGE CONTROL IN ORTHOPAEDICS

Subject Code: OR03

Name of Student: Abcetha M

Roll No.: V19 MB 202

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. No	Particulars	1	2	3	4	5
1	Objective of the course is clear					/
2	Course contents met with your expectations					/
3	Lecturer sequence was well planned					/
4	Lectures were clear and easy to understand					/
5	Teaching aids were effective					/
6	Instructors encourage interaction and were helpful					/
7	The level of the course					/
8	Overall rating of the course	1	2	3	4	5

* Rating: 5 - Outstanding; 4 - Excellent; 3 - Good; 2 - Satisfactory; 1 - Not-Satisfactory

Suggestions if any:


Signature

Date:30/1/22

From
Dr. Vijayakumaran
Department of orthopaedics,
Slims,
pondicherry

Through Proper Channel

To
The Dean,
Slims,
Pondicherry.

Sub: Completion of value-added course: damage control in orthopaedics

Respected Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **_damage control in orthopaedics_** on 11/1/22. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards



Dr.vijayakumar

PROFESSOR & HOD
Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 002

Encl: Certificates

Photographs

