



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]  
[ Affiliated to Bharath University, Chennai - TN ]

Date : 18/1/22

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

To  
The Dean,  
SLIMS,  
Pondicherry.

## Sub: Permission to conduct value-added course: FRACTURE MANAGEMENT

Respected Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **FRACTURE MANAGEMENT** on 16/2/22. We solicit your kind permission for the same.

Kind Regards

Dr. Vijayakumar

Department of Orthopaedics  
Sri Lakshmi Narayana Institute of Medical Sciences  
Pondicherry - 605 502.

---

### FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi

The profesor: Dr. Vijayakumar

The Expert: Dr. Boble James

The committee has discussed about the course and is approved.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]  
[ Affiliated to Bharath University, Chennai - TN ]

Dean

Dr. G. JAYALAKSHMI, BSC, MBBS, DTCO, M.D.,  
DEAN  
Sri Lakshmi Narayana Institute of Medical Sciences  
Osudu, Agaram Kudapakkam, Post,  
Villanur Commune Puducherry-605 502.

Subject Expert

Department of Orthopaedics  
Sri Lakshmi Narayana Institute of Medical Sciences  
Pondicherry - 605 502.

HOD

PROFESSOR & HOD  
Department of Orthopaedics  
Sri Lakshmi Narayana Institute of Medical Sciences  
Pondicherry - 605 502.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]  
[ Affiliated to Bharath University, Chennai - TN ]

## Circular

07.04.2022

**Sub: Organising Value-added Course: FRACTURE MANAGEMENT**

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 **FRACTURE MANAGEMENT** 30 hrs February 22 – MAY 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 FEB 2022- MAY 2022. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC, MBBS, DTCD, M.D.,  
DEAN  
Sri Lakshmi Narayana Institute of Medical Sciences  
Osudu, Ageram Kudapakam, Post,  
Villanur Commune Puducherry-605 502.



OFFICE OF THE DEAN

# **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## **VALUE ADDED COURSE**

### **1. Name of the programme & Code**

Principle of Fracture Management –OR04

### **2. Duration & Period**

30 hrs February 27 – MAY 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 February – MAY 2022



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

8. Year of discontinuation: 2022

9. Summary report of each program year-wise

Value Added Course- FEB- MAY 2022					
Sl. No	Course Code	Course Name	Resource Persons	Target Students	Strength & Year
1	OR04	Principle of Fracture Management	Dr. Vijayakumar	THIRD YEAR MBBS	20 (FEB -MAY 2022)

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

**RESOURCE PERSON**  
**DR. VIJAYA KUMAR**

Department of Orthopaedics  
Sri Lakshmi Narayana Institute of Medical Sciences  
Pondicherry - 605 502.

**COORDINATOR**  
**DR. JAYALAKSHMI**

**Dr. G. JAYALAKSHMI, BSC., MBBS., DTCO., M.D.,**  
DEAN  
Sri Lakshmi Narayana Institute of Medical Sciences  
Osudu, Ageram Kudapakkam, Post,  
Villanur Commune Puducherry-605 502.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## FRACTURE MANAGMENT

16/2/2022



## PRINCIPLE OF FRACTURE MANAGMENT

Particulars	Description
Course Title	Principle of Fracture Management



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Course Code	OR04
Objective	<ol style="list-style-type: none"><li>1. Introduction</li><li>2. Basic biomechanics of bone</li><li>3. Classification of fractures</li><li>4. Stress fracture</li><li>5. Mechanism of injury</li><li>6. Reduction</li><li>7. Splints</li><li>8. Bracing</li><li>9. Internal fixator</li><li>10. External fixator</li></ol>
Further learning opportunities	Principle of Fracture Management
Key Competencies	On successful completion of the course the students will have skill in fracture management
Target Student	Pre final year Students
Duration	30hrs FEB – MAY 2022
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Short notes

## Introduction

□ **Defintion** :A fracture is a break in the structural continuity of bone.

- It may be no more than a crack, a crumpling or a splintering of the cortex; more often the break is complete and the bone fragments are displaced.

## Basic Biomechanics of bone

Anisotropic



OFFICE OF THE DEAN

## **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

- Mechanical properties dependent upon direction of loading
- Bone is weakest in shear, then tension, then compression.
- Viscoelastic – Sensitive to the speed at which the load is applied
- Wolff's law – The ability to adapt, by changing its size, shape, and its structure, to the mechanical demands placed on it

### **CLASSIFICATION OF FRACTURES :**

Classifying fractures into those with similar features advantages:

- it allows treatment or prognosis and
- it facilitates a common dialogue between surgeons and others

Classification of fracture Based on the cause

- (1) injury;
- (2) repetitive stress
- (3) abnormal weakening of the bone (pathological' fracture).

### **Fracture due to trauma**

fracture can happen after injuries like MVA, guns, fall down....

High vs low energy trauma

### **Stress fracture**

- When exposure to stress and deformation is repeated and prolonged, resorption occurs faster than replacement and leaves the area liable to fracture
- patients with chronic inflammatory diseases who are on treatment with steroids or methotrexate.





OFFICE OF THE DEAN

## Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

- most often seen in the tibia , fibula or metatarsal

### Pathological

- Fractures may occur even with normal stresses if the bone has been weakened by a change in its structure
- the causes are,
  - \* local bone diseases –osteomyelitis ,cysts , tumours
  - \*generalized bone diseases-osteoporosis,hyperthyroidism,osteitis deformans

### Mechanism of injury

- Direct
  - Tapping
  - Crushing
  - Penetrating
- Indirect
  - Traction or Tension
  - Angulation
  - Rotational
  - Compression

### AO/OTA system

Müller and colleagues ;An alphanumeric classification based on anatomy “A classification is useful only if it considers the severity of the bone lesion and serves as a basis for treatment and for evaluation of the results.” Maurice E Müller



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

CONT....

In this system, the first digit specifies the bone

(1 = humerus, 2 = radius/ulna, 3 = femur, 4 = tibia/fibula) and the second the segment

(1 = proximal, 2 = diaphyseal, 3 = distal, 4 = malleolar).

A letter specifies the fracture pattern (for the diaphysis:

A = simple, B = wedge, C = complex; for the metaphysis: A = extra-articular, B = partial articular,

C = complete articular).

Two further numbers specify the detailed morphology of the fracture

## Diaphyseal Fractures

• Type A

– Simple fractures with two

fragments

• Type B

– Wedge fractures

• Type C

– Complex fractures with no contact between main fragments

## Simple

1. Spiral

2. Oblique

3. Transverse

## Wedge



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

1. Spiral wedge
2. Bending wedge
3. Fragmented wedge

## Complex

1. Spiral multi-fragmentary
2. Segmental
3. Irregular

## Fracture displacement

- Displacement of fracture fragments caused by force of injury, gravity or muscle pull
- Described by translation, alignment, rotation and altered length
- Always describe distal fragment in relation to proximal fragment

*Translation (shift)* – The fragments may be shifted sideways, backward or forward in relation to each other

## Angulation

Extent to which Fx fragments are not anatomically aligned

- In an *angular* fashion

**Convention:** describe angulation as the direction the *apex* is pointing relative to anatomical long axis of the bone (e.g. apex medial, apex valgus) or direction of distal fragment

*Rotation (twist)* – One of the fragments may be twisted on its longitudinal axis; the bone looks straight but the limb ends up with a rotational deformity.

*Length* – The fragments may be distracted and separated, or they may overlap, due to muscle spasm, causing shortening of the bone

Excessive shortening is a hallmark of more severe soft tissue injury

## Management



OFFICE OF THE DEAN

## **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

- The Advanced Trauma Life Support (ATLS) guidelines with attention to **Airway, Breathing and Circulation on presentation**
- The patient should be optimally resuscitated before any fracture treatment is considered
- The treatment of fractures may be divided into three phases:
  - emergency care, definitive treatment, and rehabilitation.

### **Emergency principles**

- Align the fracture
- Splint
- Analgesics

### **Splinting**

- One of the most highly taught and least frequently obeyed
- Adequate splinting is desirable for the following reasons:
  - Further soft-tissue injury (especially to nerves and vessels) may be averted and, most importantly, closed fractures are saved from becoming open.
  - Immobilization relieves pain.
  - Splinting may well lower the incidence of clinical fat embolism and shock.
  - Patient transportation and radiographic studies are facilitated.

### **Types of splints**

#### **Improvised Splints**

Excuse should never be used that no splints were available. Almost anything rigid can be pressed into service-walking sticks, umbrellas, slats of wood-padded by almost any material that is soft.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## Conventional Splints

- Basswood Splints
- Universal Splints
- Cramer Wire Splints
- Thomas Splints
- Inflatable Splints
- Structural Aluminum Malleable (SAM) Splints

## Definitive Management

□ The objectives of the treatment of a fracture are to have the bone heal in such a position that the **function** and **cosmesis** of the extremity are unimpaired and to return patients to their vocation and avocations in the shortest possible time with the least expense.

## Principles of fracture treatment

- Resuscitation
- Reduction
  - Open
  - Closed
- Manipulation
- Traction
- Gravity
- Retention
  - Traction /Gravity
  - External splints
  - Internal fixation



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

– External fixation

- Soft tissue management
- Rehabilitation

## **Reduction**

- The sooner the reduction of a fracture is attempted the better,
- Before embarking on the manipulative reduction, adequate x-ray films must be obtained to determine what the objectives of the manipulation are to be or if, indeed, a reduction is necessary.
- X ray \_rules of two

## **Reduction**

- Methods of reduction

1. Closed

1. Gravity

2. Manipulation

2. Open

Closed reduction

### **Indication**

1. all minimally displaced fractures,
2. most fractures in children
3. fractures that are not unstable after reduction and can be held in some form of splint or cast
4. Unstable fractures can also be reduced using closed methods prior to stabilization with internal or external fixation.



OFFICE OF THE DEAN

## **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

### **contraindicated**

1. There is no significant displacement.
2. The displacement is of little concern (eg, humeral shaft).
3. No reduction is possible (eg, comminuted fracture of the head and neck of humerus)
4. The reduction, if gained, cannot be held (eg, compression fracture of the vertebral body)
5. The fracture has been produced by a traction force (eg, displaced fracture of the patella).

• To achieve a reduction, the following steps usually are advised:

- apply traction in the long axis of the limb;
- reverse the mechanism that produced the fracture;

and

- align the fragment that can be controlled with the one that cannot.

• This is most effective when the periosteum and muscles on one side of the fracture remain intact; the soft-tissue strap prevents over-reduction

### **OPEN REDUCTION**

Operative reduction of the fracture under direct vision

First step in internal fixation indicated:

- 1) when closed reduction fails,
- 2) when there is a large articular fragment that needs accurate positioning or
- 3) for traction (avulsion) fractures in which the fragments are held apart.

### **Immobilization**



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## • Methods

### 1. Splint

- a. Body strapping
- b. External splint
- c. POP

### 2. Continuous mechanical traction

### 3. Fixation

- a. External
- b. Internal

## **Immobilization by POP**

### POP Casts

- Upper extremity Casts
- Lower extremity Casts
- Patellar tendon-bearing casts
- Cast braces
- Hip and Shoulder spica

### POP splints

- Slabs dorsal/volar
- Posterior gutters

### Fiberglass Casts

There are three principles that apply to the treatment of unstable fractures with a cast

Utilization of intact soft tissues

Three-point fixation





OFFICE OF THE DEAN

## **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Hydrostatic pressure

### **THREE-POINT FIXATION**

is achieved by molding the wet cast in a similar manner to the way the fracture was reduced initially. Two of these three points, therefore, are applied by the hands.

- Two forces acting alone cannot stabilize a fracture; a third force must be present. This third force is supplied by the portion of the cast over the proximal portion of the limb. With overreduction, the bridge is under the greatest tension and the reduction is even more stable.
- A straight cast will usually contain a crooked bone; a curved cast will generally contain a well-aligned bone.

### **Immobilization by POP**

- Complication of cast

1. Plaster sore
2. Compartment syndrome
3. Burn
4. Thrombophlebitis
5. Redisplacement
6. Joint stiffness
7. Allergic rxn

### **FUNCTIONAL BRACING**

- using either plaster of Paris or one of the lighter thermoplastic materials,
- prevents joint stiffness while still permitting fracture splintage and loading
- Segments of a cast are applied only over the shafts of the bones, leaving the joints free; the cast segments are connected by metal or plastic hinges that allow movement in one plane.



OFFICE OF THE DEAN

## Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

□ The splints are 'functional' in that joint movements are much less restricted than with conventional casts

- used most widely for fractures of the femur or tibia, but
- since the brace is not very rigid, it is usually applied only when the fracture is beginning to unite, i.e. after 3–6 weeks of traction or conventional plaster.

### Immobilization by traction

- Some fractures are so unstable that maintenance of a reduction by plaster-of-Paris casts is impossible, or casts may be, for one reason or another, impractical. In these circumstances the bone can be reduced and held to length by means of continuous traction, provided a soft-tissue linkage still exists.
- Traction is applied to the limb distal to the fracture, so as to exert a continuous pull in the long axis of the bone, with a counterforce in the opposite direction
- This is particularly useful for shaft fractures that are oblique or spiral and easily displaced by muscle contraction.
- which reduces fracture fragments through *ligamentotaxis* (*ligament pull*)

### Immobilization by traction

□ Methods

#### 1. Skin traction

- Used
- for children
- for adults temporarily
- Weight more than 5Kg result in skin slough

2. Traction by gravity – This applies only to upper limb injuries.

e.g a U-slab with wrist sling for humeral shaft fracture

3. *Skeletal traction* – A stiff wire or pin is inserted



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

- Sites
- Distal femur – may result tethering of quadriceps
- proximal tibial – safest site
- Distal tibia
- Calcaneus - difficult to eradicate calcaneal infection
- Olecranon
- cranium

## Indications

1. Vertically **unstable fractures of the pelvic ring** where external fixation cannot maintain vertical stability,
2. Fractures of **the acetabulum with minimal displacement** where internal fixation is not indicated, Unstable fractures of the acetabulum
3. Fractures of the **hip (basilar neck, intertrochanteric, or subtrochanteric)** where local soft-tissue or bone conditions or systemic conditions contraindicate surgery **the shaft and supracondylar area**
4. Fractures of of the femur for which internal or external fixation is contraindicated
5. Comminuted fractures of **the tibial plateaus** where traction is necessary to maintain alignment and facilitate early motion, and where internal or external fixation is not possible or feasible.
6. Fractures of the shaft of **the tibia and fibula** where delay in initial treatment or unacceptable shortening in a plaster cast requires correction.
6. Comminuted **pylon fractures**

## Complication

1. Pressure ulcer
2. Equines contracture
3. Pin tract infection



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

4. Damage growth plate
5. Neurovascular injury
6. Incorrect placement
7. Distraction
8. Redisplacement
9. Scar on the skin

## **external fixator**

- Stabilize a fracture at a distance from fracture site with out further soft tissue damage

## **Indication**

1. # with extensive soft tissue injury
2. Comminuted & unstable #
3. Segmental defect
4. Infected #
5. Emergency use in pelvic #
6. Fixation of Polytrauma patients

## **Technique**

- the bone is transfixed above and below the fracture with screws or tensioned wires and these are then connected to each other by rigid bars.
- permit adjustment of length and alignment after application on the limb.
- Knowledge of 'safe corridors' is essential so as to avoid injuring nerves or vessels;
- the entry sites should be irrigated to prevent burning of the bone
- The fracture is then reduced by connecting the various groups of pins and wires by rods.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## Complication

1. Pin tract infection
2. Pin loosening
3. Neurovascular damage
4. Epiphyseal injury
5. Scar

## INTERNAL FIXATION

- Types
- screws*
- Plates*
- Wires (transfixing, cerclage and tension-band)*
- Intramedullary nails

## Biology and biomechanics

- Mechanical stability: absolute vs relative
- Absolute stability; is defined as rigid fixation that does not allow any micromotion between the fractured fragments under physiologic loading
- Relative stability; allows limited motion at the fracture site under functional loading (locked intramedullary nail, bridge plate, or external fixator)

## INDICATIONS

1. Fractures that cannot be reduced except by operation.
2. Fractures that are **inherently unstable and prone to re-displace** after reduction (e.g. mid-shaft fractures of the forearm and some displaced ankle fractures).



OFFICE OF THE DEAN

## Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

3. fracture liable to **be pulled apart** by muscle action (e.g.transversefracture of the patella or olecranon).
4. Fractures that **unite poorly and slowly**, principally fractures of the femoral neck.
5. **Pathological fractures** in which bone disease may prevent healing
6. **Multiple** fractures where early fixation
7. Fractures in patients who present **nursing difficulties** (paraplegics, those with multiple injuries and the very elderly)

### Screws

- Screws are the basic and most efficient tool for internal fixation, especially in combination with plates.
- A screw is a powerful element that converts rotation into linear motion.
- some common design features
- A central core that provides strength
- A thread that engages the bone and is responsible for the function and purchase
- A tip that may be blunt or sharp, selfcutting or self-drilling and -cutting
- A head that engages in bone or a plate
- A recess in the head to attach the screwdriver

### CLASSIFICATION

- They are typically named according to their design, function, or way of application.
- Design (partial or fully threaded, cannulated, self tapping, etc.)
- Dimension of major thread diameter (most commonly used: 1.5-mm, 2.0-mm, 2.7-mm, 3.5-mm, 4.5-mm, 6.5- mm, 7.3-mm, etc.)
- Area of typical application (cortex, cancellous bone, bicortical or monocortical)



OFFICE OF THE DEAN

## **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Function (lag screw, locking head screw, position screw, Interlocking screw, Anchor screw, Poller screw etc.)

### **PLATE**

Function

1. Neutralization – when used to bridge a fracture and supplement the effect of interfragmentary lag screws; the plate is to resist torque and shortening.

2. Compression – Axial compression of a transverse fracture of a forearm bone is best obtained by a compression plate

3. Buttressing (anti glide)– any secondary displacement of an oblique fracture in the metaphysis of bones (e.g. in treating fractures of the proximal tibial plateau)

4. Bridging : comminuted diaphyseal or metaphyseal fractures that are not suited for intramedullary nailing

5. Tension band: in fracture around proximal femur where there are compressive force in lateral aspect and tensile ones on medial aspect

### **Immobilization - internal fixation**

• Complication

1. Soft tissue damage

2. Infection

3. Scar

4. Delay healing

5. Failure of fixations Soft tissue management

• Every fracture is associated to a certain extent with injury to the tissues surrounding the bone



OFFICE OF THE DEAN

## **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

- “every fracture is a soft tissue injury where the bone happens to be broken,”
- As a rule, it is much safer to temporarily immobilize the zone of injury by traction or more adequately by an external fixator, postponing definitive fixation until the soft tissues have recovered.

### **Rehabilitation**

- Start immediately
- Phase of rehabilitation
  - Resting
  - Proprioceptive training
  - Strengthening exercise
  - Work related training references





OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## VALUE ADDED COURSE

Annexure- II

Principle of Fracture Management OR04

### 4. List of Students Enrolled FEB – MAY 2022

Pre final year students			
Sl.no	Roll no	Name of the student	signature
1	U14MB221	ARUNRAJ. T	
2	U14MB222	ARVIND. M	
3	U14MB223	ASHOK. V.S.I	
4	U14MB224	ASPIN NIVYA. M	
5	U14MB225	ASWINI @ LAKSHMI.B	
6	U14MB226	AYYANAN. R	
7	U14MB227	AZHARUDDIN. R	
8	U14MB228	BALAJI. K	
9	U14MB229	BARATHGANESH. A	
10	U14MB230	BARATH N.S.	
11	U14MB231	BEAULAH JEBAKUMARI. S	
12	U14MB232	BENIL.V	
13	U14MB233	BHUVANESWARI.G	
14	U14MB234	CHINTHAMANI. A.L.	
15	U14MB235	DEVI.D	
16	U14MB236	DARSHANA.M.L	
17	U14MB237	DHARSHINI .B	
18	U14MB238	DHIVYA DHARSHINI. N	
19	U14MB239	DHIVYA PRABHAVADHY. M	
20	U14MB240	DHULIPUDI NAGA RAMYA	

RESOURCE PERSON

DR.VIJAYA KUMAR

Department of Orthopaedics  
Sri Lakshmi Narayana Institute of Medical Sciences  
Pondicherry - 605 502.

COORDINATOR  
DR.JAYALAKSHMI

Dr. G. JAYALAKSHMI, BSc, MBBS, DFCO, M.D.,  
DEAN  
Sri Lakshmi Narayana Institute of Medical Sciences  
Osudu, Agaram Kudapakkam Post,  
Villanur Commune Pondicherry-605 502.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## Annexure 4

### Course/Training Feedback Form

Course: fracture management

Date: 24/5/22

Name: arvind . m

Reg NO.

Department: ORTHO

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

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 \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Definition of fracture.  
b) Various types of fracture.

a) A fracture is a break in the continuity of a bone.

b) Various types of fracture :-

i) On the basis of aetiology -

Traumatic fracture : Fracture sustained due to trauma.

Pathological fracture : A fracture through a bone which has been made weak by some underlying disease.

Stress fracture : This is a special type of fracture sustained due to chronic repetitive injury (stress) causing a break in bony trabeculae.

ii) On the basis of displacements -

Undisplaced fracture : These fractures are easy to identify by the absence of significant displacement.

Displaced fracture : A fracture may be displaced by -  
fracturing force, muscle pull on the fracture fragments, gravity.

iii) On the basis of relationship with external environment -

Closed fracture : A fracture not communicating with external environment.

Open fracture : A fracture with break in the overlying skin and soft tissues, leading to the fracture communicating with external environment.

iv) On the basis of complexity of treatment -

Simple fracture : A fracture in two pieces usually easy to treat.

Complex fracture : A fracture in multiple pieces, usually difficult to treat.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Numbness and tingling .

- Limited mobility or inability to move a limb.
- Compartment Syndrome .

Signs and symptoms of open fracture :

- Pain .
- Swelling .
- Angulation : the affected area may be bent at an unusual angle .
- Puffiness .
- Discoloured skin around the affected area .
- Numbness and tingling .
- Bleeding .
- Broken skin with bone protruding .
- Limited mobility or inability to move a limb .
- Inflammation .
- Infection .
- Fever .
- The patient is unable to put weight on the injured area .
- The affected bone or joint may have a grating sensation .





OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Management of open fracture.

Fracture that communicates with external environment

↓

Hematoma communicates with the outside

↓

Introduction of bacterial agents

M/c: *Organic Staphylococcus aureus*

↓

Delayed fracture healing.

It is an emergency

Antibiotic coverage

Wound management

→ Debridement with sterile NS, povidone iodine or Hydrogen peroxide

↓

Primary closure.

→ If wound is contaminated

> the golden period of wound or associated nerve injury

↓

Serial debridement

↓

Delayed closure (48-72hrs)

↓

Heals by 3<sup>rd</sup> intention

Fracture mgt

→ External fixator

→ Nail fixator / LRS (Limb Reconstruction system)

→ Ilizarov Ring fixator

→ Amputation.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Assessment of Fracture

- Swelling or bruise over a time
- Deformity of any part of the body
- Pain in the injured area that get worse when the area is moved or pressure is applied
- An inability to bear weight on the affected foot or lower leg
- Loss of function of the injured area.
- An open fracture bone protrudes from the area

→ Evaluation of types of fracture

the most common way to evaluate a fracture with X-ray which provides clear image in X-ray

For multiple fractures we use Bone Scan

② Management of Various types of fracture

Fracture management can be divided into:

- Non operative fracture
  - closed reduction
  - period of immobilisation with cast/splint
- operative fracture
  - open reduction
  - Management

Decisions Needed: Fractures significantly displaced or angulated.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

Displaced fractures  
A fracture may be displaced due to factors responsible  
1) Fracture force 2) the muscle pull on the fracture  
3) the gravity.

On the Basis of Relationship with external Environment  
Closed fracture A fracture not communicating with the external environment  
the overlying skin and other soft tissues are intact is called a closed fracture.  
Open fracture A fracture with break in continuity skin and soft tissue leading to fracture  
communicate with external environment.

On the Basis of Complexity of Treatment  
Simple fracture A fracture in two pieces, usually easy to treat is  
called simple fracture. eg. a transverse fracture of humerus.  
Complex fracture A fracture in multiple pieces, usually difficult to treat is  
called complex fracture.  
eg. comminuted fracture of tibia.

On the Basis of Mechanism of Force Causing Fracture  
High velocity injury: these are fractures sustained as a result of  
sudden trauma force, as in traffic accident.

On the Basis of Pattern

Transverse fracture -	Comminuted
Oblique fracture	Segment
Spiral	



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## Orthopaedics Test

- ① How to assess and evaluate various type of fracture
- ② Management of various type of fracture

### ① - Various types of fracture

- ① on the Basis of etiology
- ② on the Basis of displacement.
- ③ on the Basis of relationship with external environment
- ④ on the Basis of complexity of treatment
- ⑤ on the Basis of Quantities of force causing fracture
- ⑥ on the Basis of pattern.

16  
20

### ①. on the Basis of etiology

→ Traumatic fracture: A fracture sustained due to trauma is called a traumatic fracture.  
Eg. fracture caused by a fall, road traffic accident, fight etc

→ pathological fracture: A fracture through a bone which has been made weak by some underlying disease is called pathological fracture.

→ Stress fracture: This is a special type of fracture sustained due to chronic, repetitive injury. Stress causing a break in bony trabecula. These often present as subperiosteal and may not be visible on

### ② On the Basis of Displacement

X-rays.  
undisplaced fracture. These fractures are easy to identify by the absence of significant displacement.





OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

- v) On the basis of quantum of force causing fracture -
- High velocity fracture: Fractures sustained as a result of severe trauma force (in RTA).
  - Low velocity fracture: These fractures are sustained as a result of mild trauma force, as in a fall.
- vi) On the basis of pattern -
- Transverse fracture: Fracture line is perpendicular to long axis of bone.
  - Oblique fracture: Fracture line is oblique, caused by bending force.
  - Spiral fracture: Fracture line runs spirally in more than one plane.
  - Comminuted fracture: Fracture with multiple fragments.
  - Segmental fracture: There are two fractures in one bone but at different levels.

2. Signs and symptoms of closed fracture and Open fracture.

Ans) Signs and symptoms of closed fracture :

→ Pain.

→ Swelling.

→ Bruising.

→ Discoloured skin around the affected area.

→ Angulation: the affected area may be bent at an unusual angle.

→ The patient is unable to put weight on the injured area.

→ The affected bone or joint may have a grating sensation.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]



## 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 \_ARVIND.M\_ has actively participated in the Value Added Course on *Principle of Fracture Management* held during FEB 2022 – MAY 2022 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. VIJAYA KUMAR  
RESOURCE PERSON

Dr. Jayalakshmi  
COORDINATOR



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P - II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

## Student Feedback Form

Course Name: PRINCIPLE OF FRACTURE MANAGEMENT

Subject Code: OR04

Name of Student: Altaf Ahmed Roll No.: V14 MBd13

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:

Date: 24/5/22

Altaf Ahmed  
Signature



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]  
[ Affiliated to Bharath University, Chennai - TN ]

Date:24/5/22

From  
Dr. Vijayakumar  
orthopaedics,  
Slims,  
pondicherry.

Through Proper Channel

To  
The Dean,  
Slims,  
pondicherry.

**Sub: Completion of value-added course: fracture management**

Respected Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **fracture management** on 24/5/22. 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

Department of Orthopaedics  
Sri Lakshmi Narayana Institute of Medical Sciences  
Pondicherry - 605 502.



OFFICE OF THE DEAN

# Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY - 605 502.

[ Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME ( P -II ) dt. 11/07/2011 ]

[ Affiliated to Bharath University, Chennai - TN ]

