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Long Bone Osteosynthesis Failure

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Cambodia
Everything You Need to Know

Angkor Watt

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INTRODUCTION

• Hardware failure is rare. It is one complication of operating treatment of fracture

• The incidence of nails and plates broken depend on many factors
INTRODUCTION

Many situations are involved in the failure of long bone osteosynthesis.
INTRODUCTION

- Excessive or repetitive force activity can gradually damage these metals.
INTRODUCTION

- New accidents can break the nail or plate or can cause another fracture of the bone
INTRODUCTION

- Our study is to determine the factors that cause these failures despite modern fixation technique.
MATERIALS AND METHODS

- Study examine on 26 patients came by injury or by follow up to our hospital during 10 years from 2003 to 2013 in trauma ward.
MATERIALS AND METHODS

- All these patients have their histories of long bone fracture and osteosynthesis by plate or by nail.
RESULTS
### AGE DISTRIBUTION

<table>
<thead>
<tr>
<th>Age</th>
<th>16-25</th>
<th>26--35</th>
<th>36-45</th>
<th>46-55</th>
<th>56-65</th>
<th>&gt;66</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Age between 16 to 70, mean 26
Higher proportion of patients are between 16 to 25 years old : 40%
SEX DISTRIBUTION

<table>
<thead>
<tr>
<th>M</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>11</td>
</tr>
</tbody>
</table>

Men 58% and women 42%
Phnom Penh has a higher proportion of patients than other provinces 54%
LONG BONE DISTRIBUTION

<table>
<thead>
<tr>
<th>Femur</th>
<th>Tibia</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

More implant failure in femur than in tibia
Femur 73%
## TYPE OF OSTEOSYNTHESIS FAILURE

<table>
<thead>
<tr>
<th>Nail broken</th>
<th>Plate broken</th>
<th>Bone fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>
STUDY ON PLATE

10 patients have their plate broken or bent

All 10 patients have their radiographs show non union of bone

1 patient has bone fracture at the tip of the plate and the bone healed very well
NON UNION BONE

- N C N 25 F
- Admission 21 07 06
NON UNION BONE

- S SP 27 M
- Admission 18 07 06
NON UNION BONE

- H H 53 M
- 21 12 06
NON UNION BONE

- Y Y 56 F
- Admission 25 06 07
NON UNION BONE

- Y Y 39 M
- Admission 26 06 07
NON UNION BONE

- P S P 31 M
- Admission 30 07 08
NON UNION BONE

SD 30 M
Admission 23, 07 10
NON UNION BONE

- T R S 24 F
- Admission 20 09 10
NON UNION BONE

C R D R 24 M

Admission 09 11 10
NON UNION BONE

S V R V 21 M

Admission 23 06 12
H S K 25 F

Admission 12 02 13

The bone healed and the fracture at proximal femur 1cm from lesser trochanter
STUDY ON NAILS

• 7 patients have their nail broken at the level of non union

• 3 patients have bone non union at its 1/3 distal and nails broken at the first distal holes

• 2 patients, the bone was healed but another fracture out of the nail on the 1/3 proximal of the femur
NAILS BROKEN

- E R C 18 Female
- Admission 19 07 09
NAILS BROKEN

- L C D 24 Female
- Admission 07 11 09
BROKEN AT 2nd SLOT

- H E 20 M
- Admission 05 10 07
NAILS BROKEN

- B S P 21 M
- Admission: 02 06 10
NAILS BROKEN

- C S D 20 M
- Admission 16 07 10
NAILS BROKEN

- O S P 29 M
- Admission 12 07 11
NAILS BROKEN

- M K S 28 M
- Admission 31 12 12
NAILS BROKEN

H R N 40 Female
Admission 12 04 12

[Image of X-ray]
BROKEN AT 2\textsuperscript{nd} SLOT

- S S 22 M
- Admission 08 06 2010
- Nail broken at the first distal hole
BROKEN AT 2\textsuperscript{nd} SLOT

- H E 20 M
- Admission 05 10 07
- Nail broken at the first distal hole
BROKEN AT 2\textsuperscript{nd} SLOT

- T S V 31 M
- Admission 14 01 13
- Nail broken at the first distal hole
BONE FRACTURE ON
OSTEOSYNTHESIS

S P S 24 Female
Admission 04 03 13
Bone fracture at proximal tip of the nail at 4cm from lesser trochanter
R C N 18 F

Admission 16 06 05

Bone fracture at proximal tip of the nail at 10 cm from lesser trochanter
STUDY ON SCREWS

- 1 plate had their screws broken
- 2 nail have their interlocking screws loosening and broken
SCREW BROKEN

- N C N 62 M
- Admission 02 05 13
SCREW BROKEN OR OUT OF HOLE

- P S 25 M
- Admission 10 06 13
SCREW BROKEN

- H R N 70 F
- Admission 14 02 13
STUDY ON PLATE AND NAIL

- 1 patient get nailing and plating had the nail break at the non union site
NAILS BROKEN

- N S N 22 F
- Admission 16 07 09
DISCUSSION AND ANALYSIS

- We study on 26 patients nailing and plating
- That came from the whole Province of CAMBODIA
- Male are higher proportion than the female
- The mean age is 26
Base on our result:

- 9 plates and 7 nails are broken at the non union site
- The instability of the bone, excessive activity can gradually damage the metal and cause fatigue fracture
• 3 patients with non union get breakage of the first distal hole.
• 2 cases got distal fracture of long bone
• 1 get fracture at distal tibial
• 1 get fracture at distal femur
1 case, the fracture is at the middle third of the bone, the tip of the nail is in the distal metaphyseal.

Instability by non union and large area of distal metaphyse will break the nail at its first locking hole where its received excessive load.
DISCUSSION AND ANALYSIS

BONE FRACTURE AFTER HEALING

1 osteosynthesis by plating, fracture at the tip of the plate in 1 cm below the lesser trochanter

1 patient fracture femur at the tip of retrograde nail 4 cm from the lessor trochanter

1 patient fracture 10 cm from lessor trochanter

After second accident even the impact on the nail

The fracture will go to the potential area
DISCUSSION AND ANALYSIS

- When instability happens, if the nail and plate are strong enough, the screw will loosen.
- Fracture of the screw or migration of the screw.
CONCLUSION

• Non union is principal cause of metal break. This is the biomechanical factor that leads to nail breakage.

• Fatigue fracture happen when the bone fail to heal. Location of the fracture depend on numerous factors including additional instability of the metaphyseal, the bolt of the nail (fracture of the distal bolt).

• Avoiding non union means preserve vascularisation improve density of bone, good compression.
CONCLUSION

The distal interlocking screw should be stable enough, long enough to keep stability

Avoided stress area

The tip of the nail or the plate should go above the lesser trochanter to prevent the fracture of the nail
THANK YOU FOR YOUR ATTENTION