Intraoperative Imaging with Cios Select FD

Clinical Cases – Ortho Trauma

BG Trauma Center Ludwigshafen, Germany
Clinical Cases

- Acetabulum
- Clavicula
- Femur
- Humerus distal
- Tibia
- Tibia plateau

- Conclusion
Clinical Case

Acetabulum
Intraoperative imaging with Cios Select FD
Clinical case – Acetabulum

- Background pathology
- Background therapy
- Patient history
- Preoperative findings
- Surgical procedure

AP view
Alar/oblique view
Background pathology

AO Classification
Acetabular fractures

Types:
Pelvis, acetabulum, partial articular, isolated column and/or wall fracture 62A
Pelvis, acetabulum, partial articular, transverse type fracture 62B
Pelvis, acetabulum, complete articular, associated both column fracture 62C

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ORIF
Fixation of the iliac wing and plate fixation of the anterior column
Patient history

Classification:
Complex acetabular fracture with central hip protrusion and pelvic fracture

Remarks:
• Skiing accident
• Initial extension treatment
• Pain in right pelvic region
• No peripheral motorical or neurological deficits

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<tr>
<th>Gender</th>
<th>male</th>
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<tr>
<td>Age</td>
<td>46 - 60</td>
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Preoperative findings

Preoperative CT
Axial, sagittal and coronal view of pelvis

• Complex acetabular fracture with central hip protrusion and pelvic fracture on the right
Surgical procedure
AP view

Intraoperative imaging
Pelvis and right hip in AP view

• Regular articulation of the hip joint
• Symphysis and right ISG joint are in anatomically regular position
Surgical procedure
AP view

Intraoperative imaging
Pelvis and right hip in AP view

- Correct implant positioning
- Good bony contrast in spite of metal objects
- No intra-articular fragments or screw penetration
Surgical procedure
Alar/oblique view

Intraoperative imaging
Pelvis and right hip in alar/oblique view

- Correct implant positioning
- Regular articulation of the hip joint
Surgical procedure
Alar view

Intraoperative imaging
Pelvis and right hip in alar/oblique view

• Correct implant positioning
• No intra-articular fragments or screw penetration
Clinical Case

Clavicula
Intraoperative imaging with Cios Select FD
Clinical case – Clavicula

- Background pathology
- Background therapy
- Patient history
- Preoperative findings
- Surgical procedure

AP view
Axial view
Background pathology

AO Classification
Types of distal (lateral) end segment fractures of the clavicle

Location: Clavicle, distal (lateral) end segment  15.3

Types:
- Clavicle, distal (lateral) end segment, extraarticular fracture 15.3A*
- Clavicle, distal (lateral) end segment, partial articular fracture 15.3B*
- Clavicle, distal (lateral) end segment, complete articular fracture 15.3C*

*Qualifications:
- a CC ligament complex intact
- b CC ligament complex, partial disruption
- c CC ligament complex, complete disruption
Background therapy

ORIF – Hook plate
Open reduction, temporary fixation with K-wire, plate application and ligament repair
Patient history

Classification:
Lateral fracture of the left clavicle of type 15.3 C1 (AO)

Remarks:
• Fell off a horse
• Gilchrist-bandage
• Hematoma, swelling and pain in AC joint region
• No peripheral motorical or neurological deficits

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Preoperative findings

Preoperative X-ray images
AP and tangential view of left clavicle

• Lateral clavicle fracture
• Fracture dislocation of more than one shaft width in AP view
Surgical procedure
AP view

Intraoperative imaging
AP view of left clavicle

• Correct anatomic reduction of AC joint
• Correct position of the hook plate
• No vertical dislocation
• Good bony contrast in spite of metal objects
• Good field of view
Surgical procedure
Axial view

Intraoperative imaging
Axial view of left clavicle

- Correct anatomic reduction of AC joint
- Correct position of the hook plate
- No sagittal dislocation
Clinical Case

Femur
Intraoperative imaging with Cios Select FD
Clinical case – Femur

- Background pathology
- Background therapy
- Patient history
- Preoperative findings
- Surgical procedure

Anterior view
Lateral view
Background pathology

AO Classification
Diaphyseal and distal femur fractures

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Background therapy

ORIF – Compression plating
Dynamic compression and plate fixation
Patient history

Classification:
Complex multi-segmental dislocated femur fracture

Remarks:
• Motorcycle accident, hit by car
• Analgosedation, no neurological status
• Initial reduction via external fixator

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Preoperative findings

Preoperative X-ray images
AP view of left upper leg

- Fracture of the left femur with dislocated proximal femoral shaft fracture and comminuted fracture of the distal femur
Surgical procedure
AP view

Intraoperative imaging
AP view of left upper leg

- Anatomical reduction via plating
- Correct implant position
Surgical procedure
AP view

Intraoperative imaging
AP view of left upper leg

- Good bony contrast in spite of metal objects
- Good field of view
Surgical procedure
AP view

Intraoperative imaging
AP view of left upper leg

- No intra-articular screw penetration
- Plate not completely shown
Surgical procedure
Lateral view

Intraoperative imaging
Lateral view of left upper leg

- Small dorsal fracture gap of the proximal femur
Surgical procedure
Lateral view

Intraoperative imaging
Lateral view of left upper leg

• Correct plate position
• No intra-articular screw penetration
Clinical Case

Humerus distal
Intraoperative imaging with Cios Select FD
Clinical case – Humerus distal

- Background pathology
- Background therapy
- Patient history
- Preoperative findings
- Surgical procedure

Anterior view
Lateral view
Background pathology

AO Classification
Fractures of the distal humerus
Background therapy

**ORIF – Screw fixation**
Open reduction and K-Wire navigated screw fixation

Medial epicondyle
Patient history

Classification:
Type 13-C3 (AO)

Remarks:
• Stumbling fall
• Initial immobilization via upper arm plaster cast
• Pain and bony crepitation of the left elbow joint
• No peripheral motorical or neurological deficits

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Preoperative findings

Preoperative X-ray picture
Left elbow

1. AP in extension
2. Lateral in flexion
Preoperative findings

Preoperative CT
Left elbow

• Plaster cast
Preoperative findings

Preoperative CT
Left elbow

• Fracture of the distal humerus with multi-fragmentary trochlea and capitulum fracture
Surgical procedure
AP view

Intraoperative imaging
AP view of left elbow

• Anatomical reduction
• Fixation of ulnar and radial ligaments via 2 FASTak- Anchors
• Good bony contrast in spite of metal objects
Surgical procedure
Lateral view

Intraoperative imaging
Lateral view of left elbow

• Anatomical reduction
• No intra-articular screw penetration
Clinical Case

Tibia
Intraoperative imaging with Cios Select FD
Clinical case – Tibia

- Background pathology
- Background therapy
- Patient history
- Preoperative findings
- Surgical procedure

Anterior view
Lateral view
Background pathology

**AO Classification**
Diaphyseal fractures of the lower leg

![Diaphyseal fractures diagram](https://www.aosurgery.org)
Background therapy

MIO – Compression plating
Approaches and Reduction (plate + interfragmentary lag screw)
Patient history

Classification:
Type 42 A1 (AO)

Remarks:
• Skating accident
• Closed fracture of right lower leg
• Closed reduction by emergency doctor
• Pain and deformity of lower leg
• No peripheral neurological and motorical deficits

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<td>13 - 17</td>
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Preoperative findings

Preoperative X-ray images
Right lower leg in AP and Lateral view

- Simple spiral fracture of the lower leg
- Minimally displaced
Surgical procedure

AP view

Intraoperative imaging
AP view of lower leg

• Anatomical reduction
• Correct implant position
• Good bony contrast in spite of metal objects
• Sufficient field of view
Surgical procedure
Lateral view

Intraoperative imaging
Lateral view of lower leg

• Anatomical reduction
• Correct implant placement
• Plates not completely displayed
Clinical Case

Tibia plateau
Intraoperative imaging with Cios Select FD
Clinical case – Tibia plateau

• Background pathology
• Background therapy
• Patient history
• Preoperative findings
• Surgical procedure

Anterior view
Lateral view
Background pathology

AO Classification
Tibia plateau fractures

Group: Tibia, proximal end segment, partial articular, split-depression fracture 41B3

Subgroups:
- Lateral plateau fracture 41B3.1*
- Medial plateau fracture 41B3.2*
- Involving the tibial spines and 1 of the tibial plateaus 41B3.3*

*Qualifications:
- t Anterolateral (AL)
- u Posterolateral (PL)
- w Posteromedial (PM)
- x Central
- v Anteromedial (AM)
- f Lateral
- h Medial
Background therapy

ORIF – Plates with angular stability
Reduction of articular surface, filling of defect or adjustment osteotomy, plate fixation
Patient history

**Classification:**
Lateral fracture of the left tibia plateau type 41-B3 (AO)

**Remarks:**
- Direct impact trauma of the left knee during handball
- Persistent pain symptoms and joint effusion despite relief by forearm crutches
- MR diagnostics
- Pressure pain in lateral joint segment and restricted range of motion (Ex/Flex 0-20-50°)
- No peripheral motorical and neurological deficits

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Preoperative findings

Preoperative CT
Axial and coronal view of left knee joint

- Ventrolateral impression fracture of the tibia plateau with lateral articular depression of 8 mm
Surgical procedure
AP view

Intraoperative imaging
AP view of left knee joint

- Anatomical reduction of tibia plateau alignment
- No fragment dislocation after adjustment osteotomy
- Correct plate position
- No intra-articular screw penetration
- Good bony contrast in spite of metal objects
Surgical procedure
Lateral view

Intraoperative imaging
Lateral view of left knee joint

- Correct plate position
- No sagittal fragment dislocation
- No intra-articular fragments or screw penetration
Cios Select FD

Conclusion
“In my opinion, Cios Select FD can be used for every procedure in orthopedic trauma. This C-arm is easy to handle and with a few minutes of introduction the improved user interface can be operated by everyone. But most important for me: Cios Select FD provides a new level of two-dimensional intraoperative imaging in terms of image quality!”

Dr. med. Jochen Franke,
Head – Division of Trauma
Department for Orthopedic and Trauma Surgery
BG Trauma Center Ludwigshafen at Heidelberg University Hospital Germany

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Cios Select FD
Select smart surgical imaging

See more anatomical details with **Retina FD technology**

The right dose in each individual case thanks to **CARE technology**

Easy patient and system positioning thanks to **large C-arm geometry**

Smart power management for the right power wherever and whenever you need it

**Wireless footswitch** for cableless freedom in the OR

Flexible and consistent system control via **smart touch user interface**

Display of live and reference images in high detail thanks to **high bright color monitors**

Advanced connectivity thanks to **wireless DICOM**

* Option
Thank you for your enthusiasm!

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