Frakturen des distalen Femurs

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Helios

Einleitung dist. Femur

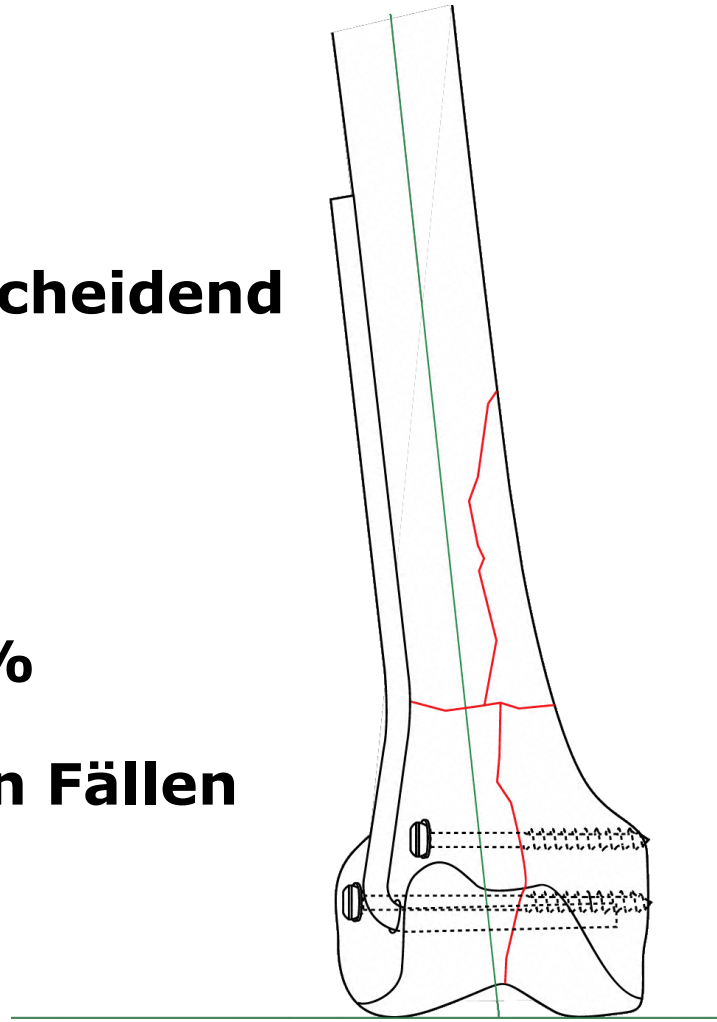
- **6-7% der Femur#**
- **OP-Prinzipien (Winkelplatte) haben Behandlung entscheidend verbessert:**

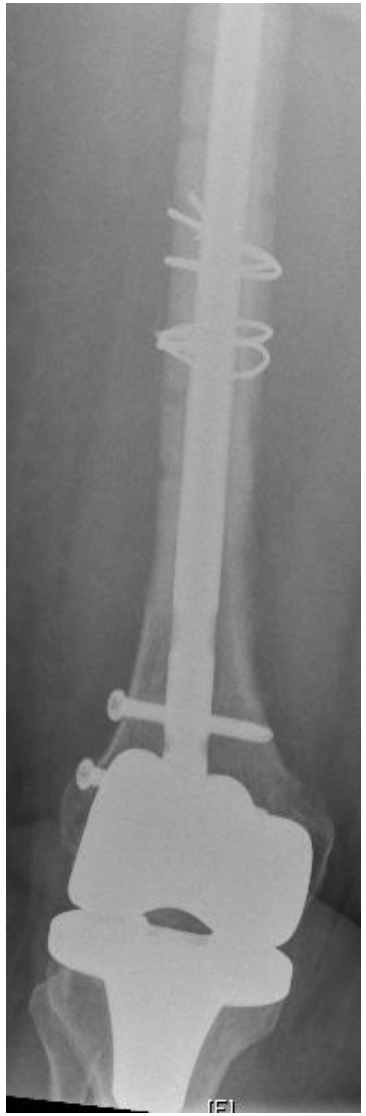
1960 Neer	**50% gut**
1970 AO	**75% gut**
1980	**80%**

- **Komplikationsraten: PA bis 20%, Infektionen bis 16%**
- **Trotz aller Fortschritte bleibt die Behandlung in vielen Fällen eine Herausforderung**

Henderson et al. JOT 2011

- **AWMF S2e-Leitlinie**





Implantatversagen, Pseudarthrose, Infekt …

Epidemiologie

6-7% der Femur#

Gruppe 1:

- jüngere Patienten (m) high energy trauma
- 12/100.000 pro Jahr
- C-#Typ = 58%
- Begleitverletzungen (>30% Polytrauma)

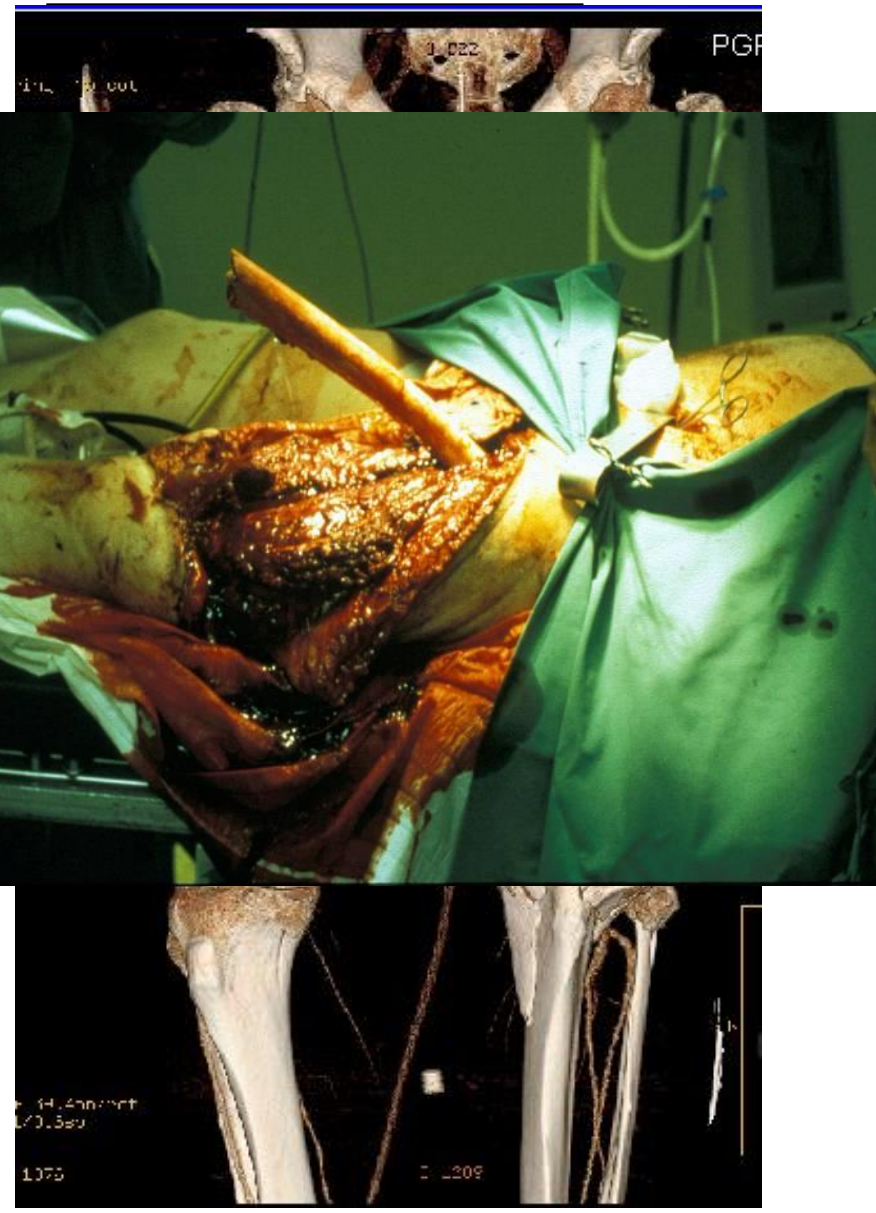
Gruppe 2:

- **ältere Patienten low energy trauma**
- **170/100.000 >85 Jahre**
- **Osteoporose!**
- **periprothetische Frakturen**
- **selten Begleitverletzungen**

Begleitverletzungen:

- u.a. dashboard injury
- 24-40% offene Frakturen
- 10-15% Patella#
- 5% floating knee
- <5% Nerven- und Gefäßverletzungen

Arneson TJ et al. 1988 Clin Orthop



Epidemiologie

6-7% der Femur#

Gruppe 1:

- **jüngere Patienten (m) high energy trauma**
- **12/100.000 pro Jahr**
- **C-Typ = 58%**
- **Begleitverletzungen (>30% Polytrauma)**

Gruppe 2:

- Alterstraumapatient, low energy trauma
- 170/100.000 >85 Jahre
- Osteoporose
- periprothetische Frakturen
- selten Begleitverletzungen, aber Komorbiditäten

Management

Gruppe 1:

- DCO (Fixateur externe)
- sekundäre (anspruchsvolle) Rekonstruktion

Gruppe 2:

- Cast/Orthesen-Anlage
- Verbesserung des Zustands in 24-48h möglich?
- Geriatrisches Co-Management
- Definitive interne Osteosynthese

Komorbiditäten
Narkoserisiko
Prävention Delir
Malnutrition
Weichteilverhältnisse, Kontrakturen
Keine Entlastung möglich

Diagnostik / Klassifikation

Klinische Untersuchung

Rö: angrenzende Gelenke

Patella, Becken

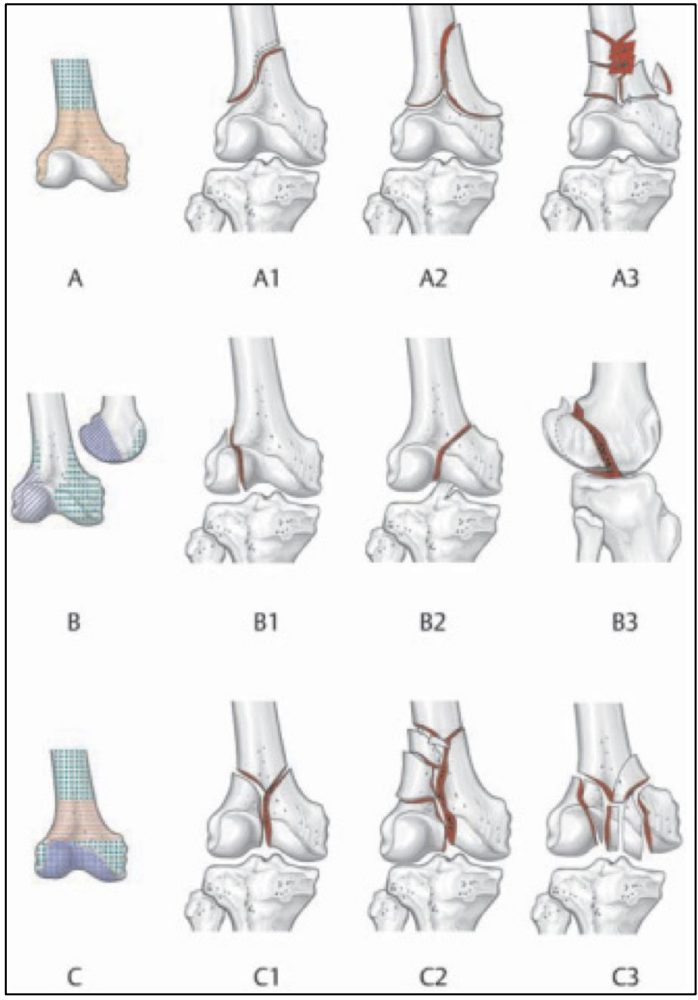
<u>CT (obligat):</u> #-Ausmaß, KG, Gefäße …

Ausschluss Gefäßverletzung (Doppler/CT)

AO Klassifikation (Strategie – Zugänge)

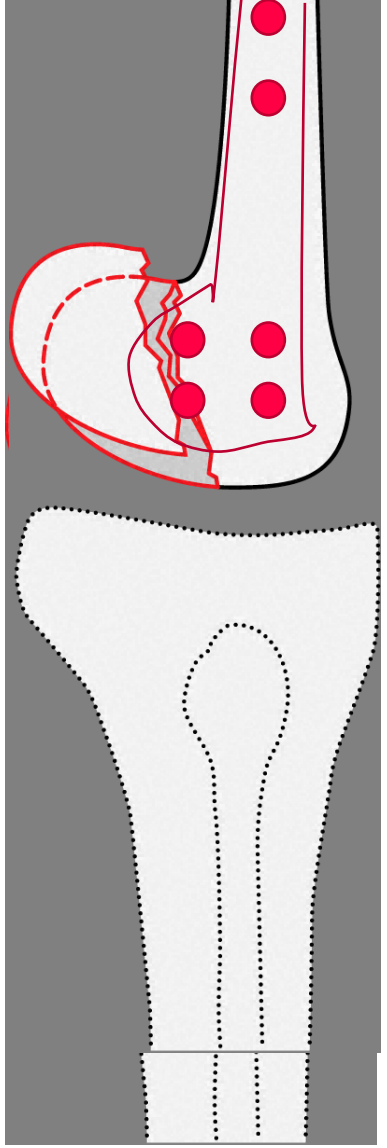
Klassifikation für Weichteilschaden/offene#

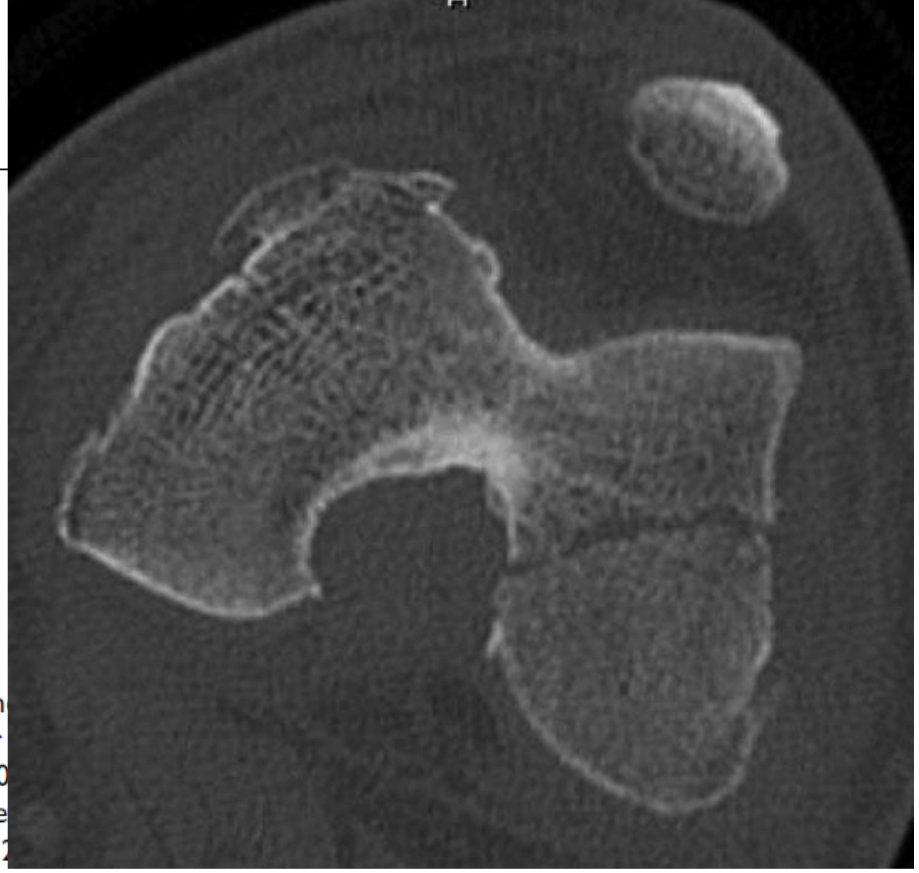
Klassifikationen periproth. Frakturen



Aspekt Bildgebung

90 jähriger Patient





Article

Hoffa Fragments in the Geriatric Distal Femur Fracture: Myth or Reality?

Brian W. Hill, MD[1] and Lisa K. Cannada, MD[1]

Abstract

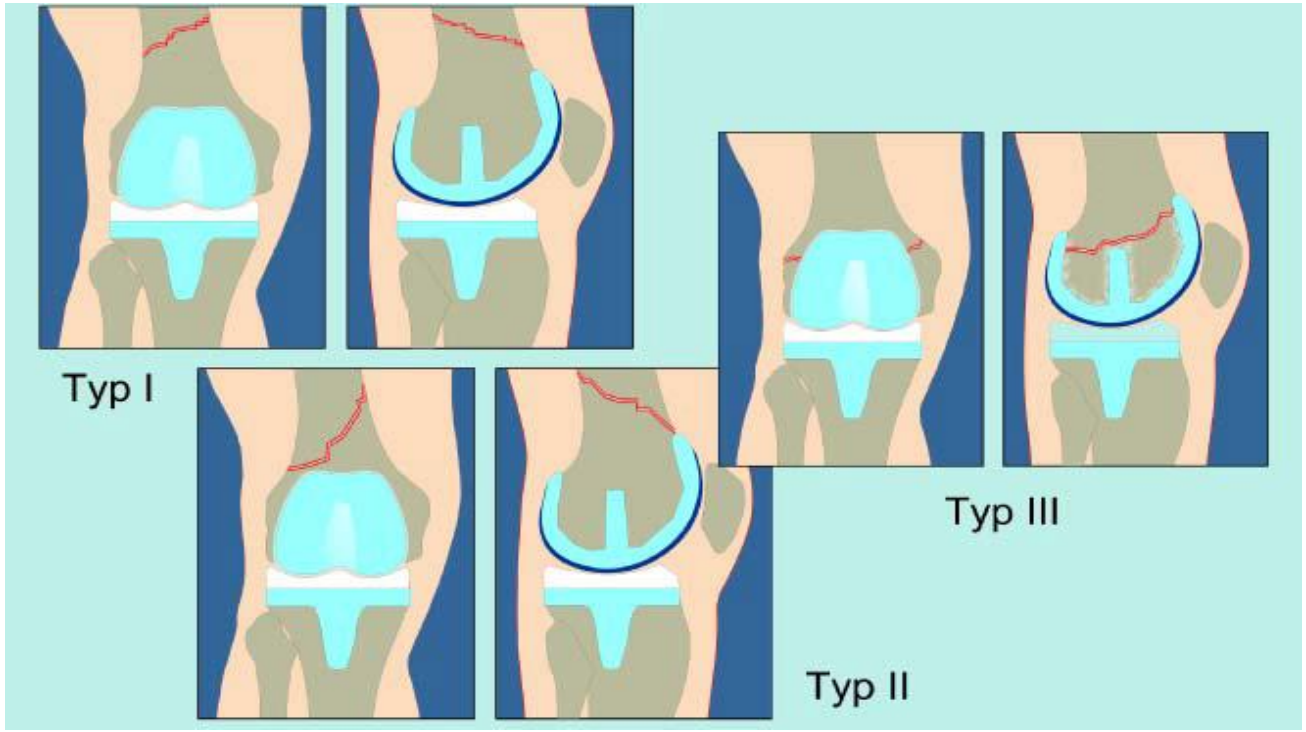
Background: Previous research reported the frequency of coronal plane (Hoffa) fractures fractures in a relatively young population. It is the purpose of this study to identify the frequen elderly patients. **Methods:** All patients over the age of 18 years treated for supracondylar centers were reviewed over a 4-year period. The patients were stratified (≥60 years and <60 differences in injury characteristics and fracture patterns with special attention to the pre **Results:** One hundred ten patients were identified with supracondylar femur fractures (1 [OTA] 33A; 2 OTA 33B; 96 OTA 33C). Thirty-two of the 96 intercondylar fractures were in patients >60 years of age. The elderly group included a higher percentage of females (81% vs 36%, $P = .0001$) and was more likely to sustain their injury due to a fall (59% vs 19%, $P = .0001$). Coronal plane fractures were visualized on computed tomography scans in 56 (58%) of the 96 33C femur fractures. Forty-four percent of elderly patients sustained a coronal plane fracture compared with 66% of the younger cohort ($P = .04$). The percentage of open fractures (30% elderly vs 46%) was not significantly different between the 2 groups ($P = .17$). **Conclusions:** The occurrence rate of 44% in this study was higher than expected and is the first to provide this information in the elderly patients on this fracture. It is important that a high index of suspicion be maintained for the Hoffa fracture in all distal femur fractures, regardless of age or mechanism of injury.

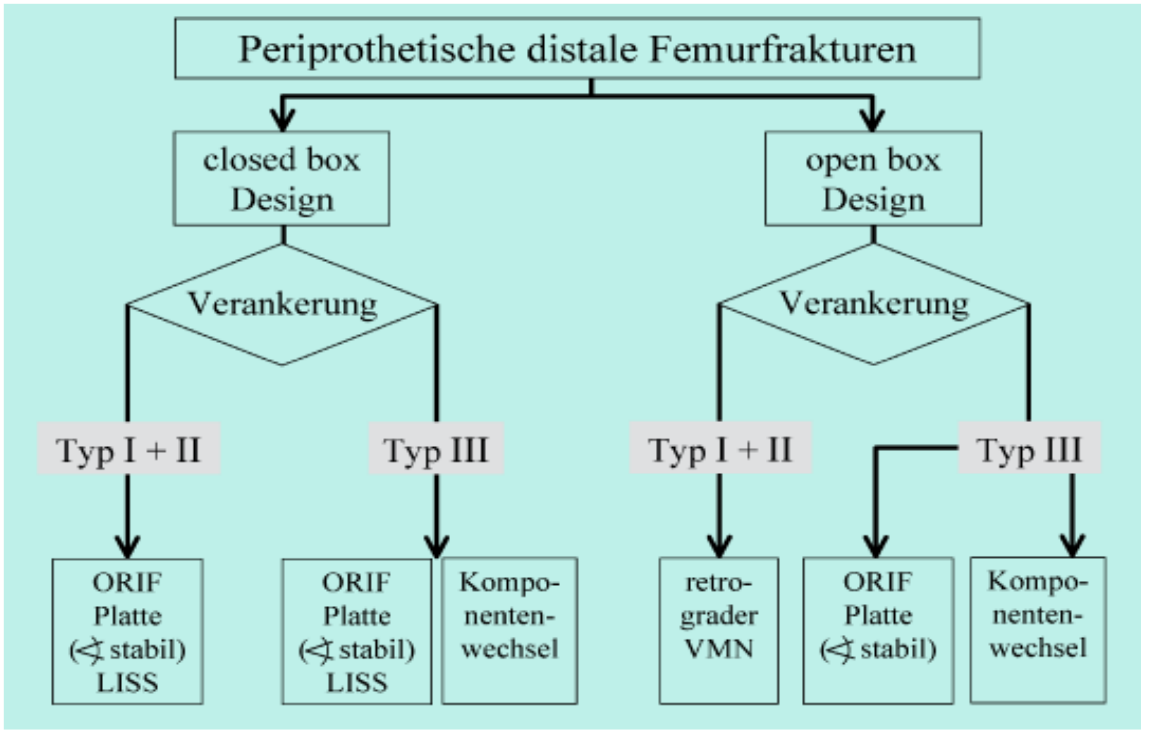
Keywords

femur, fracture, elderly, Hoffa, supracondylar

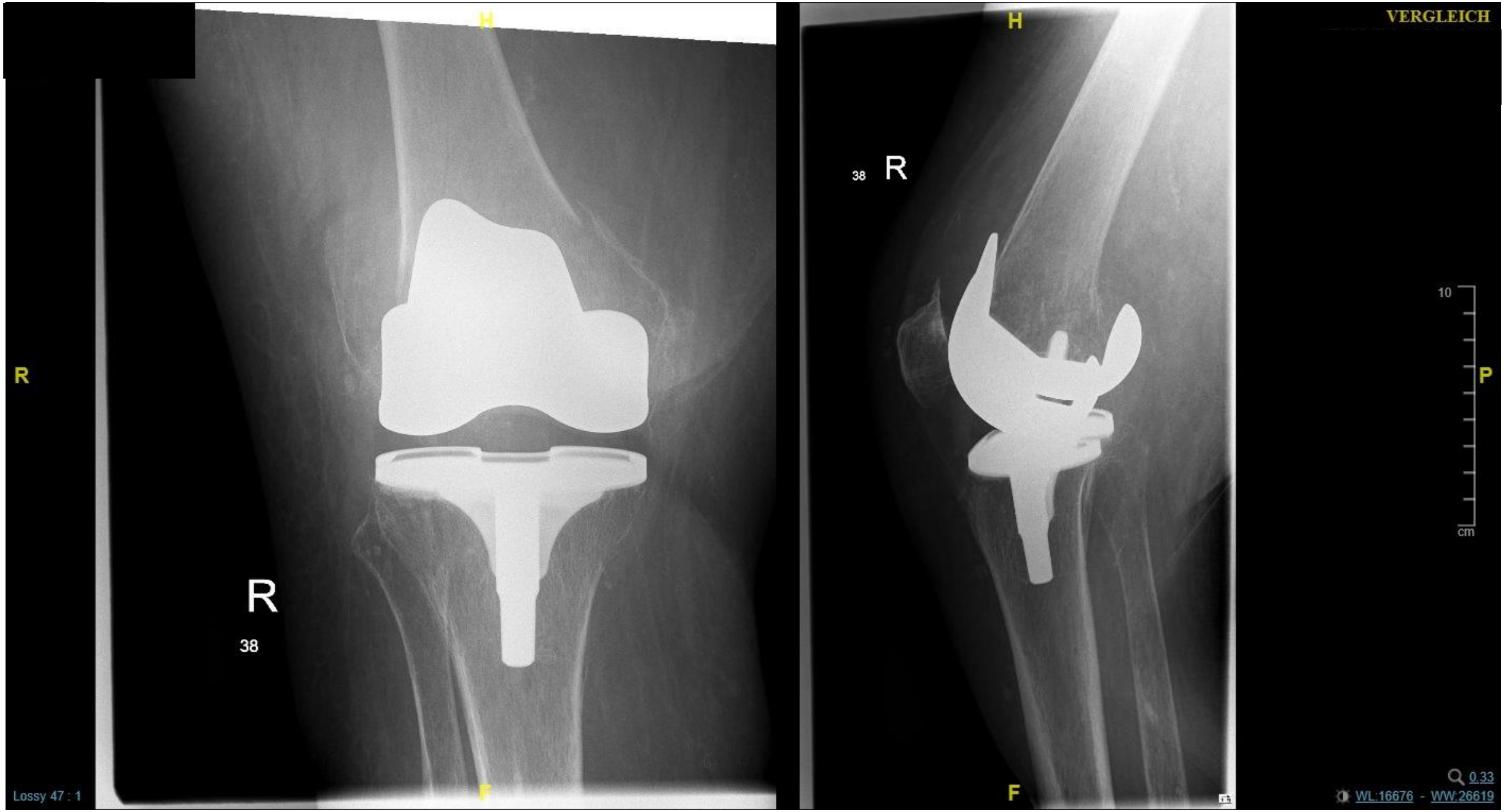
Submitted July 30, 2017. Revised September 27, 2017. Accepted September 28, 2017.

CT für Klassifikation nach Su





Frage 1: Prothese fest ja/nein?
Frage 2: falls ja: offene Box?


H
R
38
F
H
38
R
F
VERGLEICH
10
P
cm
R
Lossy 47 : 1
0.33
WL:16676 - WW:26619

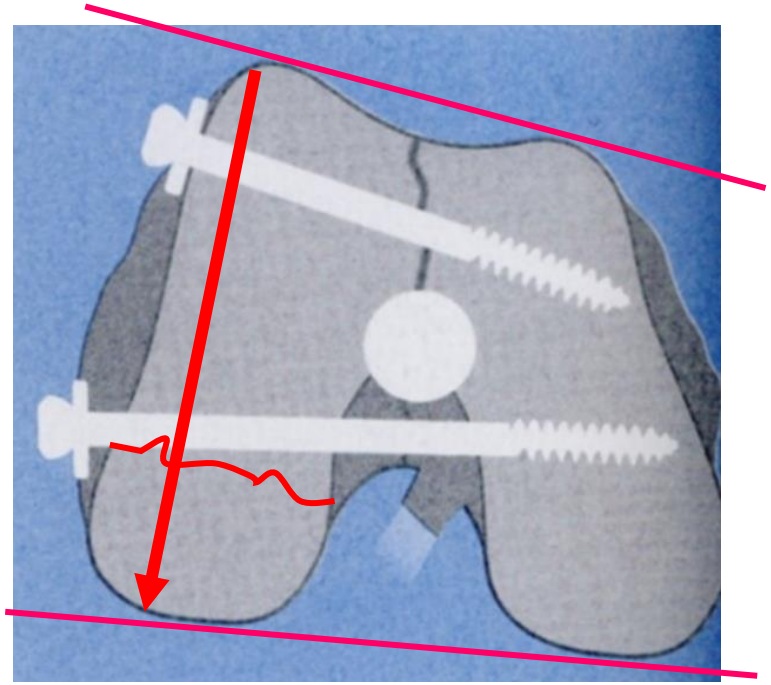
Es bleiben öfters Fragen offen!
Ggf. für Prothesenwechsel vorbereitet sein

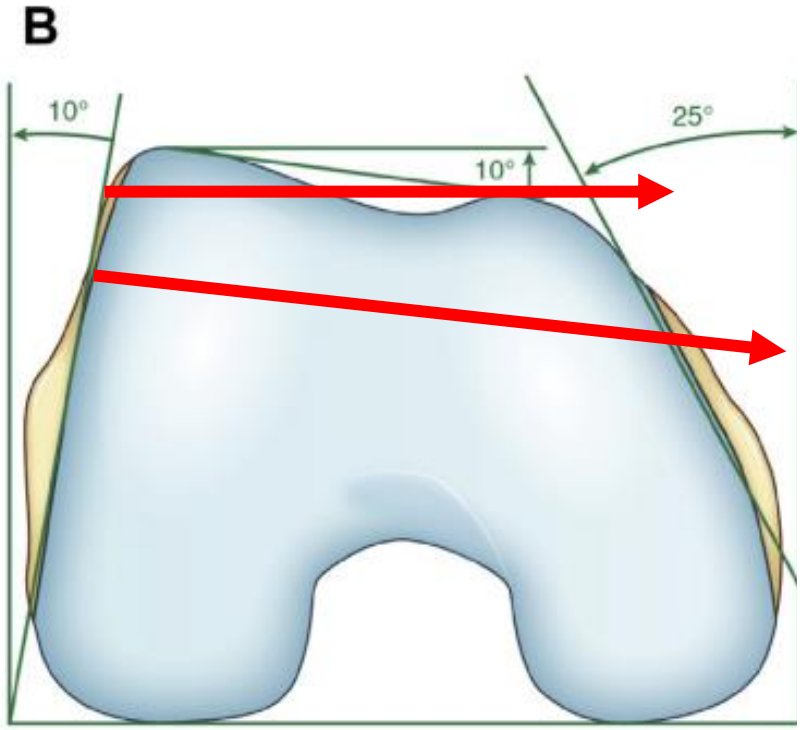
Anatomische Eckdaten

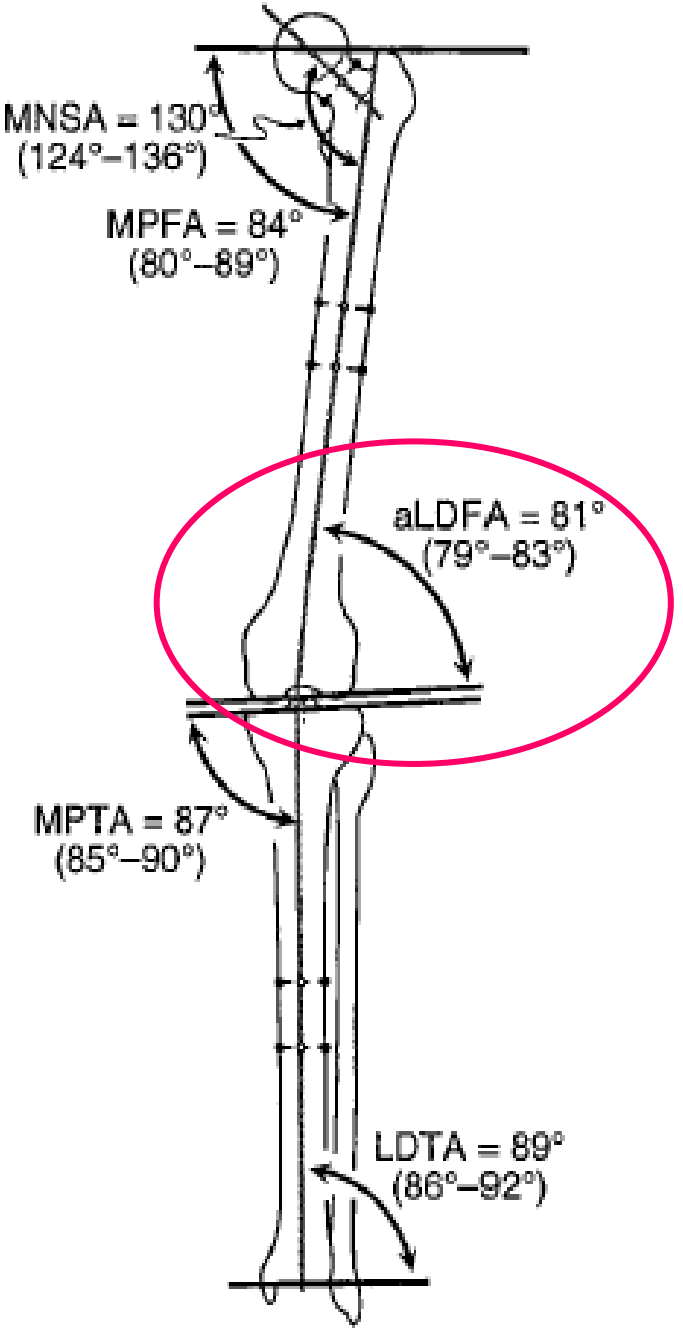
Anatomische Achsen

Trapezoide Form des dist. Femurs

Korridor für zusätzliche Schrauben







Definitive Therapie dist. Femur#

Fast immer operativ!

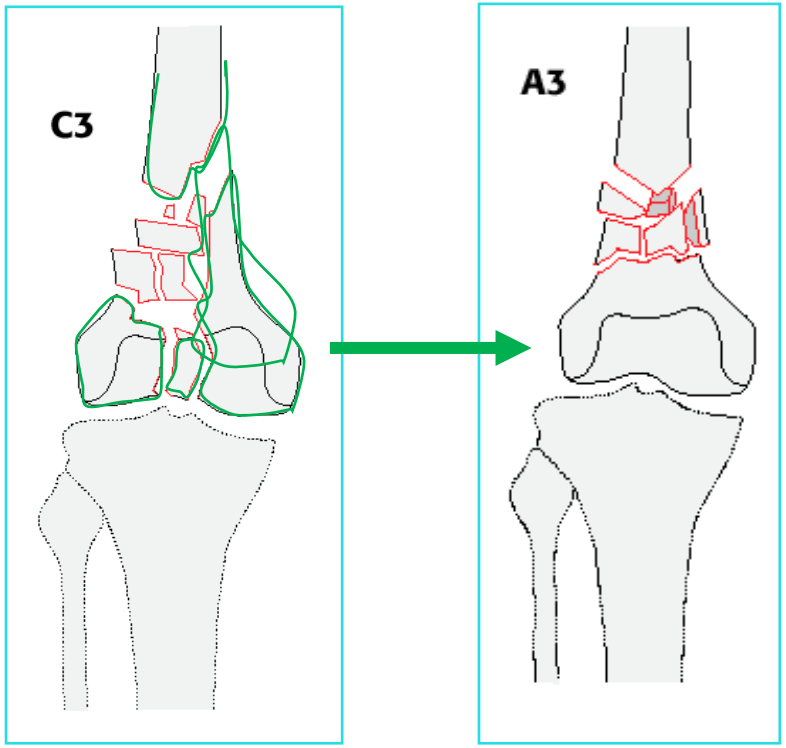
Konservativ:

- bei Kontraindikationen für OP/Narkose
- inkomplette#, stabile#
- Ermüdungs#

Großes Spektrum von Implantaten:

- Platten
- retrograder Nagel
- Fix. ext. (temporär, Pins sollen spätere Plattenlage möglichst nicht kompromittieren)

Definitive Therapie dist. Femur#



Extraartikuläre Frakturkomponente soll indirekt reponiert u. gedeckt stabilisiert werden

Dislozierte Gelenkfragmente müssen durch offene Zugänge reponiert werden:

<u>2 Strategien</u>

- Transfer C-Typ ⇒ B-Typ #
- Transfer C-Typ # ⇒ A-Typ #

  Osteosynthese Gelenkblock an Schaft

Aktuell verwendete Implantate

Retrograde Nägel:

- extraartikuläre Frakturen
- einfache intraartikuläre#
- periprothetische# (offene Box)

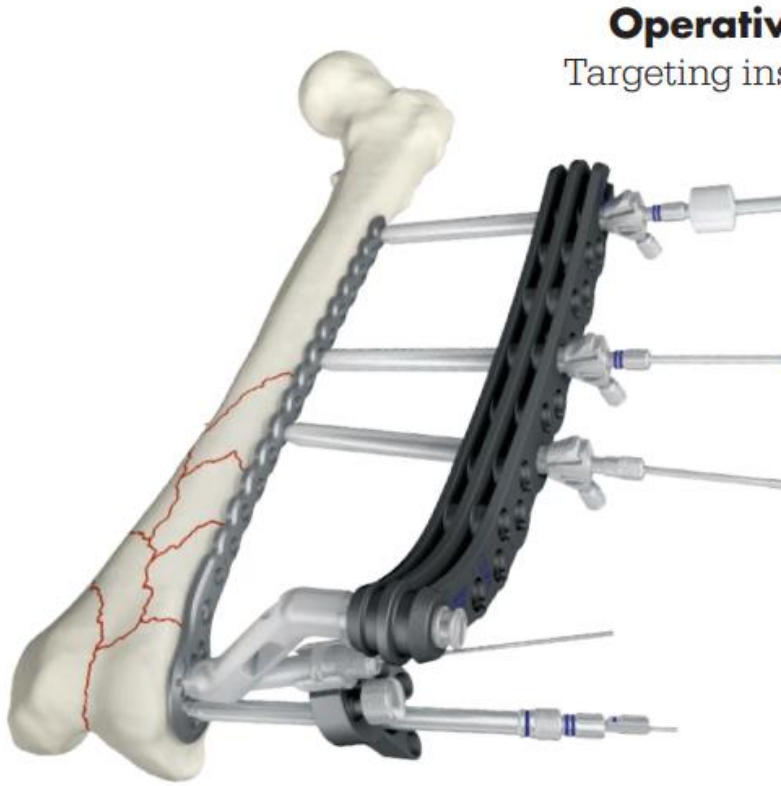
Winkelstabile Platten mit Zielgeräten:

- intraartikuläre#
- periprothetische#
- Schonung der Knochen-Durchblutung

  überbrückende „biologische“ Technik

Schrauben isoliert: bei Hoffa#

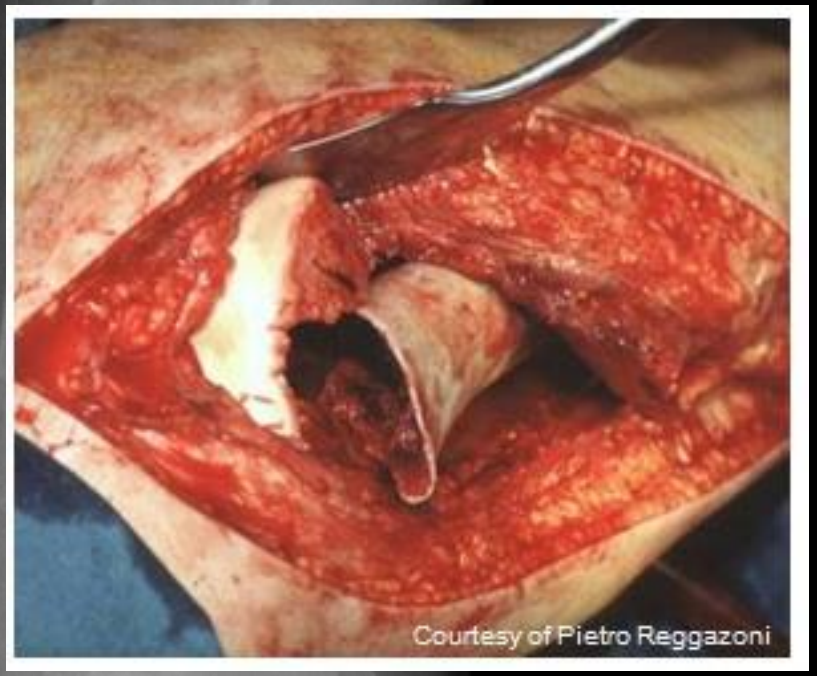
Knie-Prothesen/dist. Femurersatz



Auswirkungen Osteoporose auf Osteosynthese?

Zunahme innerer u. äußerer Durchmesser

Dünne, schwache Kortikalis



Metaphysär massiv ausgedünnte Spongiosa

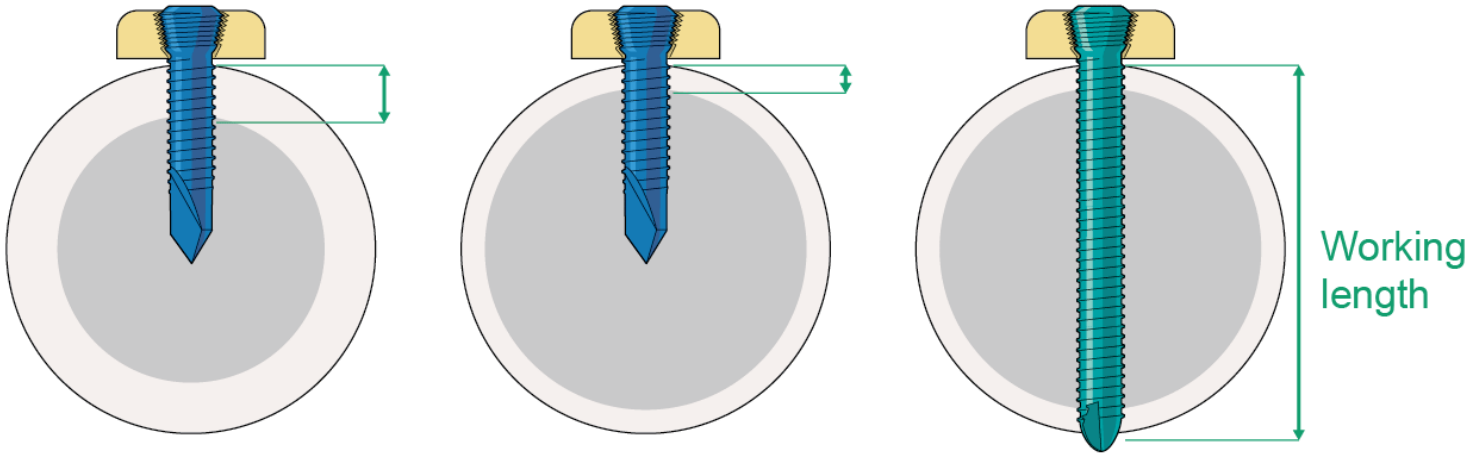
77 YO M

Auswirkungen Osteoporose auf Osteosynthese

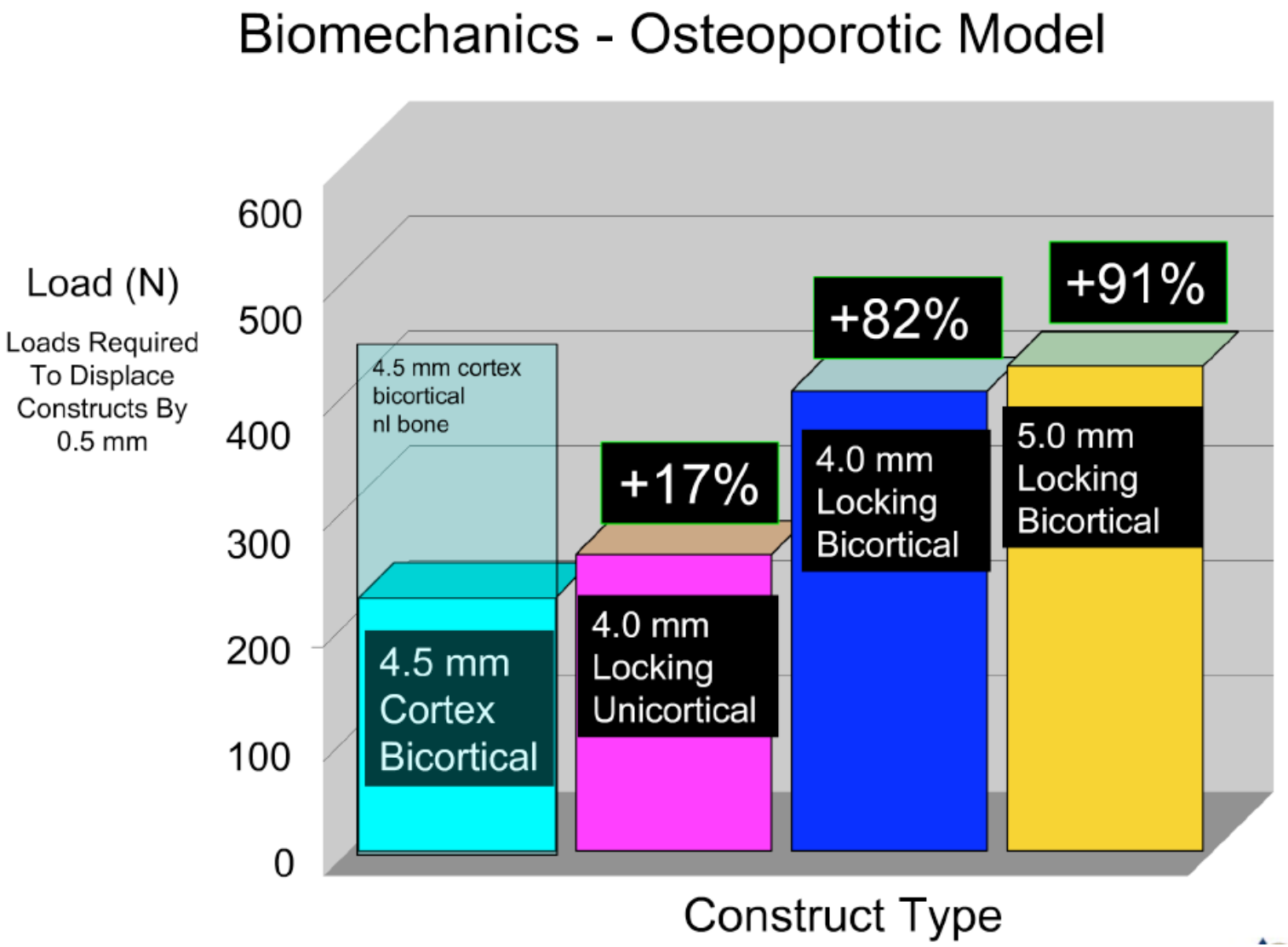
Abnahme der Kortikalisdicke

→ weniger Verankerungsstrecke der Implantate

“go long or go home”



Biomechanische Daten winkelstabile Platten



Supplemental Fixation of Supracondylar Distal Femur Fractures: A Biomechanical Comparison of Dual-Plate and Plate-Nail Constructs

David J. Wright, MD,[a] Donald J. DeSanto, MD,[a] Michelle H. McGarry, MS,[b] Thay Q. Lee, PhD,[b]

Objectives: This biomechanical study compares the effectiveness of dual-plate (DP) and plate-nail (PN) constructs for fixation of supracondylar distal femur fractures in synthetic and cadaveric specimens.

Methods: Twenty-four synthetic osteoporotic femurs were used to compare 4 constructs in an extra-articular, supracondylar fracture gap model (OTA/AO type 33-A3). Constructs included: (1) distal lateral femoral locking plate (DLFLP), (2) retrograde intramedullary nail (rIMN), (3) DLFLP + medial locking compression plate (DP construct), and (4) DLFLP + rIMN (PN construct). DP and PN constructs were then directly compared using 7 matched pairs of cadaveric femurs. Specimens underwent cyclic loading in torsion and compression. Biomechanical effectiveness was measured by quantifying the load-dependent stiffness of each construct.

Results: In synthetic osteoporotic femurs, the DP construct had the greatest torsional stiffness (1.76 ± 0.33 Nm/deg) followed by the rIMN (1.67 ± 0.14 Nm/deg), PN construct (1.44 ± 0.17 Nm/deg), and DLFLP (0.68 ± 0.10 Nm/deg) ($P < 0.01$). The DP construct also had the greatest axial stiffness (507.9 ± 83.1 N/mm) followed by the PN construct (371.4 ± 41.9 N/mm), DLFLP (255.0 ± 45.3 N/mm), and rIMN (109.2 ± 47.6 N/mm) ($P < 0.05$). In cadaveric specimens, the DP construct was nearly twice as stiff as the PN construct in torsion (8.41 ± 0.58 Nm/deg vs. 4.24 ± 0.41 Nm/deg, $P < 0.001$), and over one-and-a-half times stiffer in compression (2148.1 ± 820.4 vs. 1387.7 ± 467.9 N/mm, $P = 0.02$).

Conclusions: DP constructs provided stiffer fixation than PN constructs in this biomechanical study of extra-articular distal femur fractures. In the clinical setting, fracture morphology, desired healing mode, surgical approach, and implant cost should be considered when implementing these fixation strategies.

Key Words: distal femur fracture, supracondylar, dual plate, plate nail, biomechanics, cadaveric, supplemental fixation

(*J Orthop Trauma* 2020;34:434–440)

INTRODUCTION

Supracondylar distal femur fractures present several challenges for the treating orthopedic surgeon. Metaphyseal comminution, a short articular segment, poor-quality bone, and mismatch between the anatomic axis and mechanical axis of the femur can make stable, durable fixation difficult to achieve.

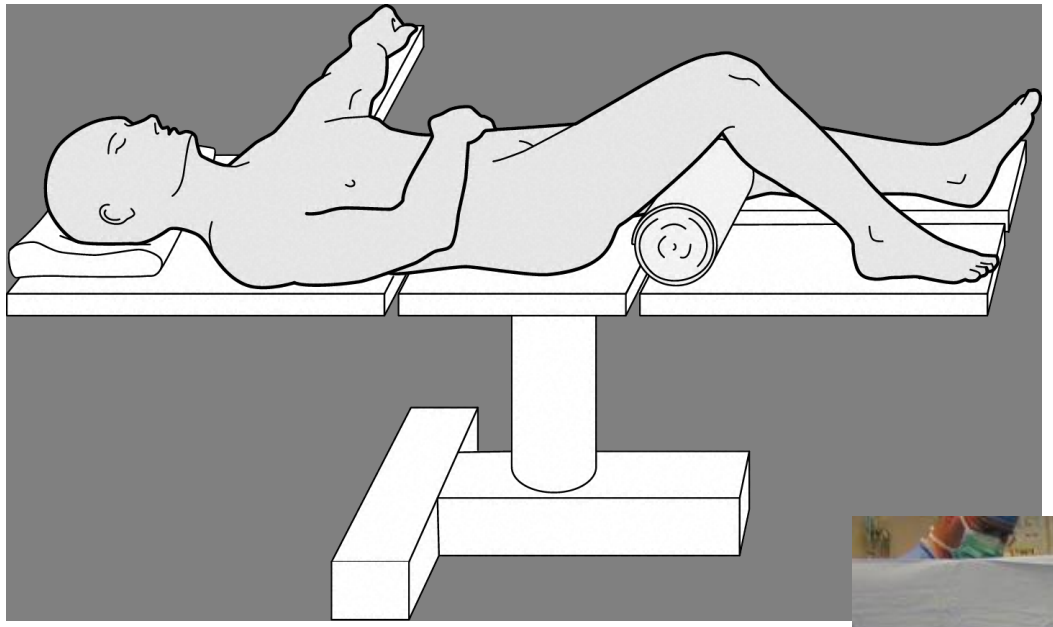
Historically, intramedullary cortical substitutes and supplemental medial plates were used with nonlocking implants to improve fixation in distal femur fractures.[1–3] The development of fixed-angle plates and locking screw technology allowed fixation with a single lateral implant.[4] Contemporaneously, the use of medial implants declined as improved healing was reported with fixed angle lateral implants and preservation of medial fracture biology.[5]

Currently, an isolated distal lateral femoral locking plate (DLFLP) or a retrograde intramedullary nail (rIMN) is often used to treat these fractures.[6] However, despite advances in implant technology and surgical technique, rates of fixation failure, malunion, and nonunion remain between 10% and 20%.[7–11] Although treatment failure can be multifactorial, stable fixation is critical to provide an adequate healing environment, allow immediate range of motion, and permit early/immediate weight bearing. As a result, there has been renewed interest in strategies to improve fixation in these fractures.

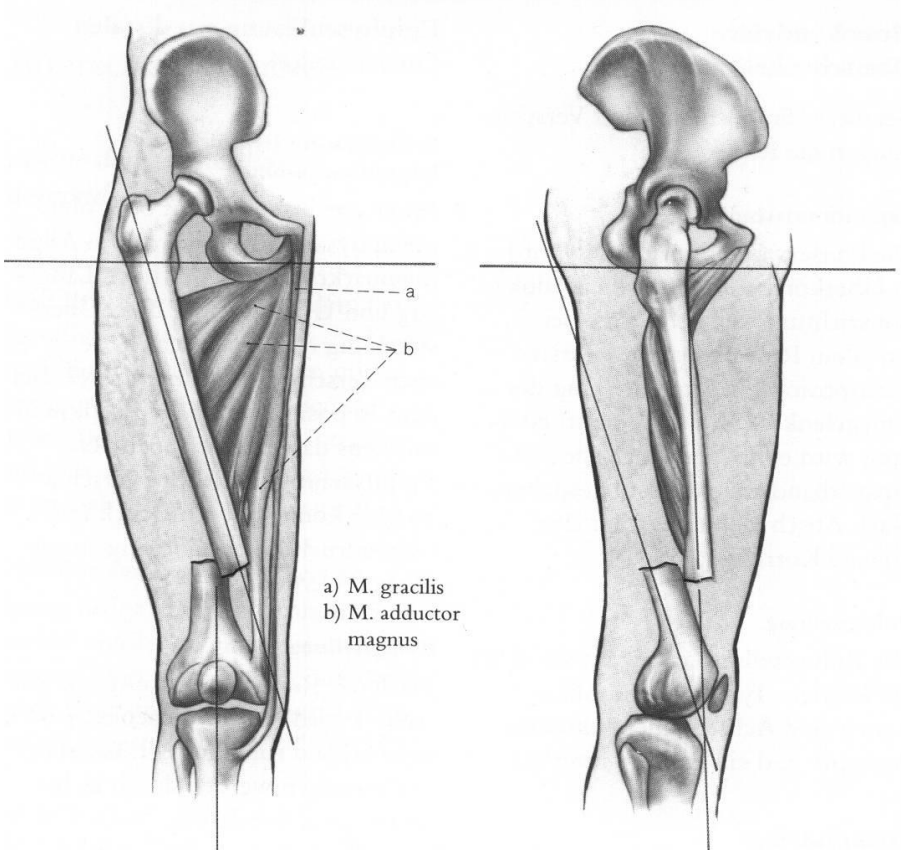
Dual-plate (DP) constructs, using a precontoured DLFLP combined with a medial small- or large-fragment plate, as well as plate-nail (PN) constructs, using a precon-

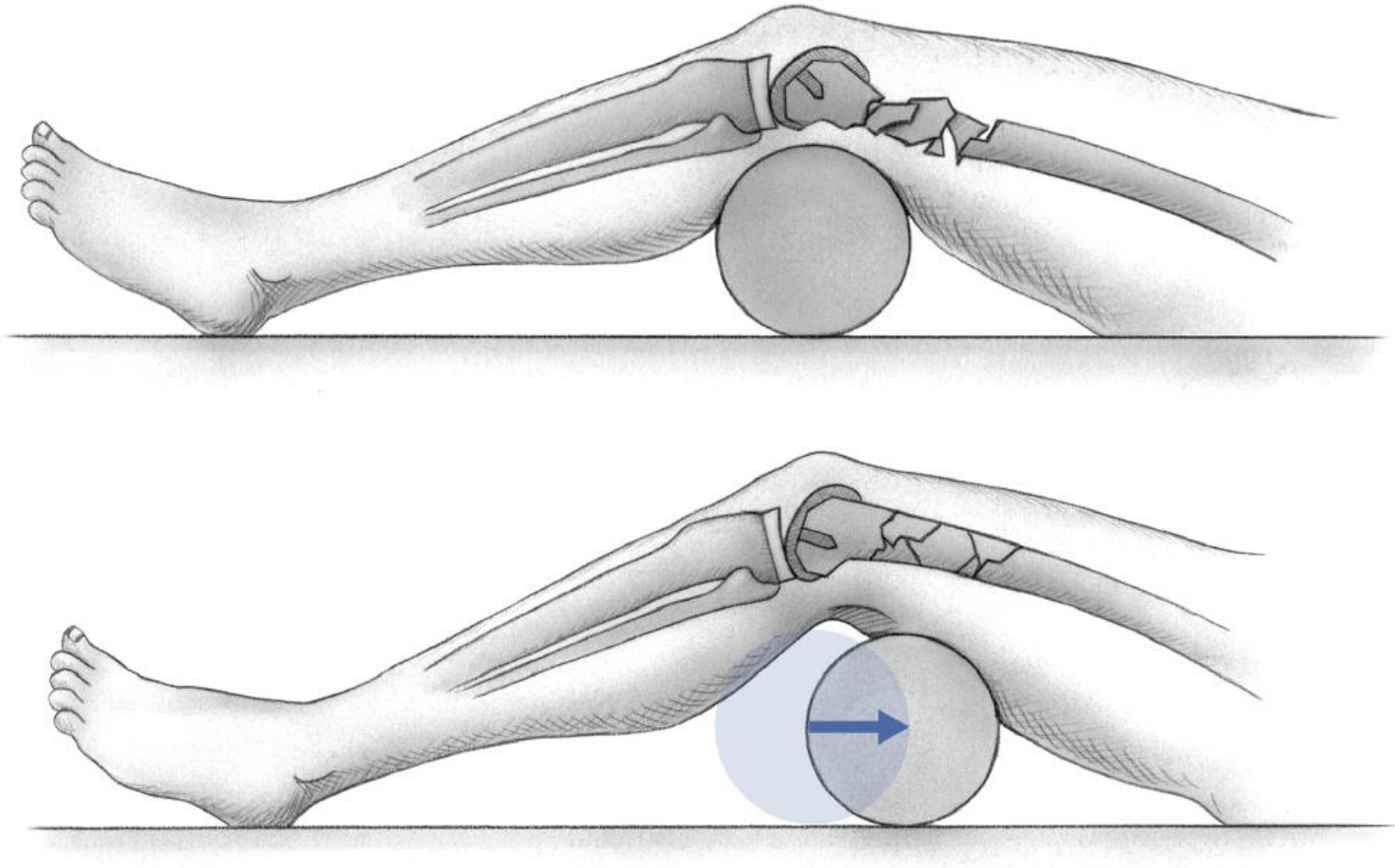
Augmentation (Evidenzgrad IIB)

Lagerung



Lagerung

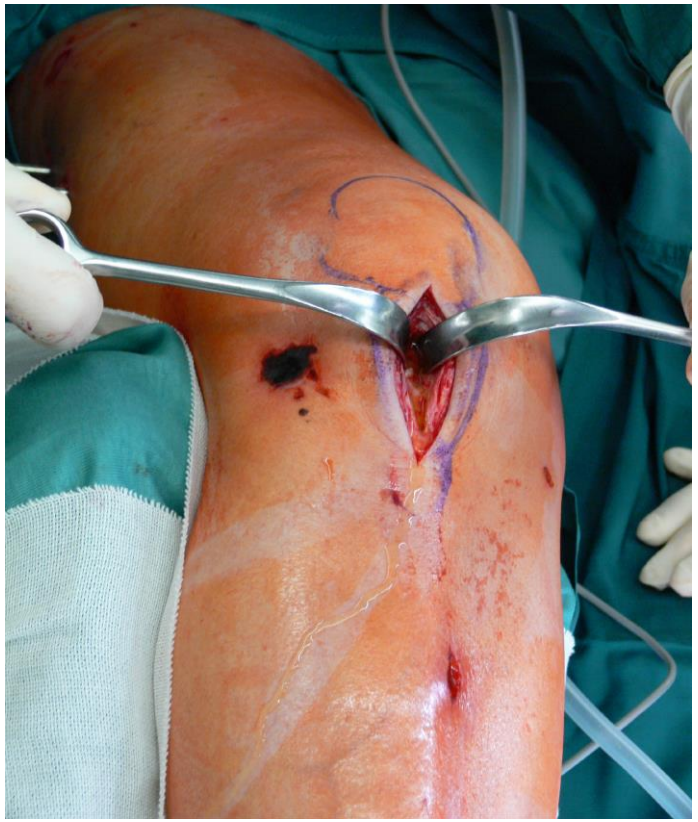




Zugang retrograde Nagelung

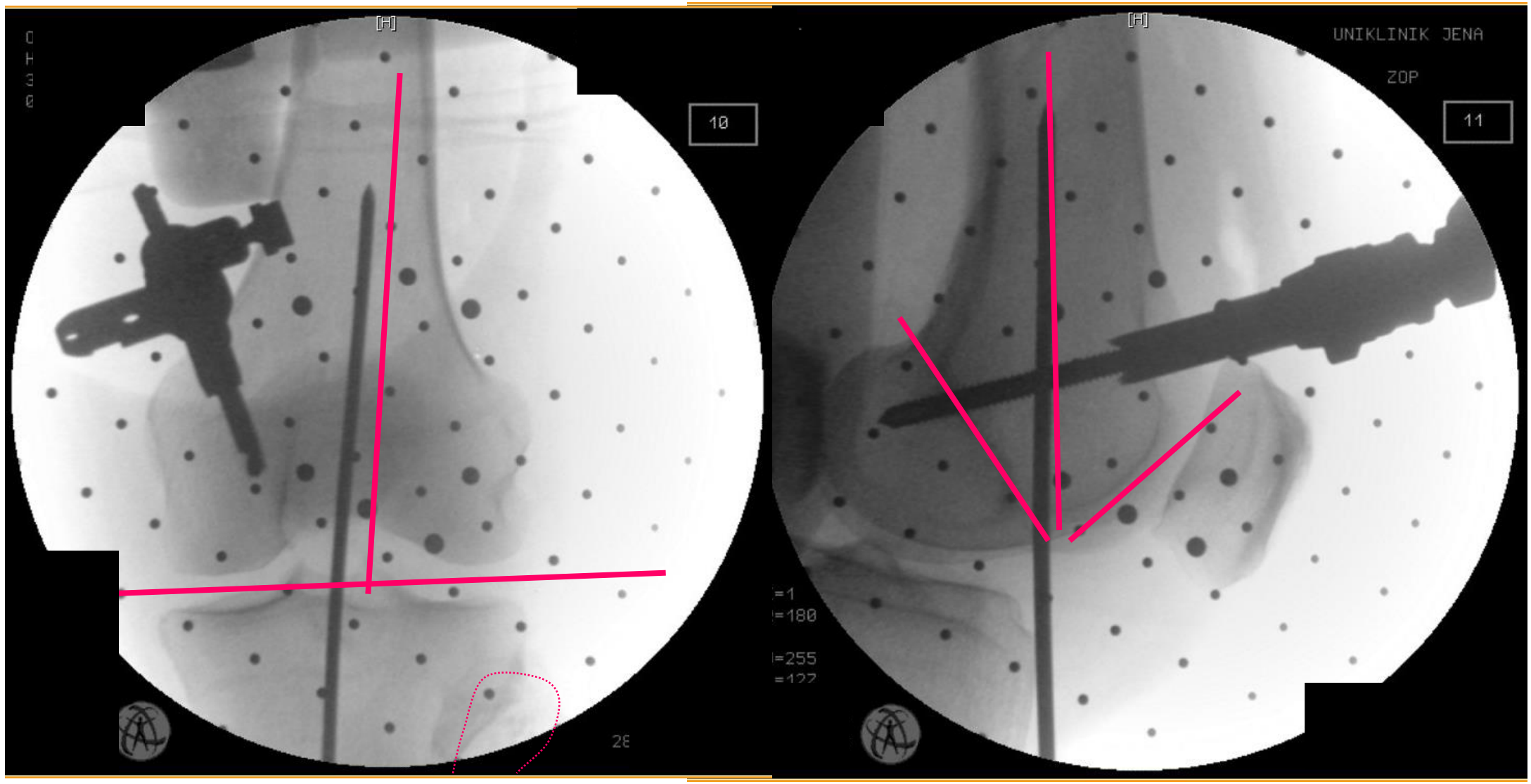
Falls Gelenkfläche undisloziert oder perkutan reponierbar

Patellarsehnen-Split (medial der Patellarsehne)

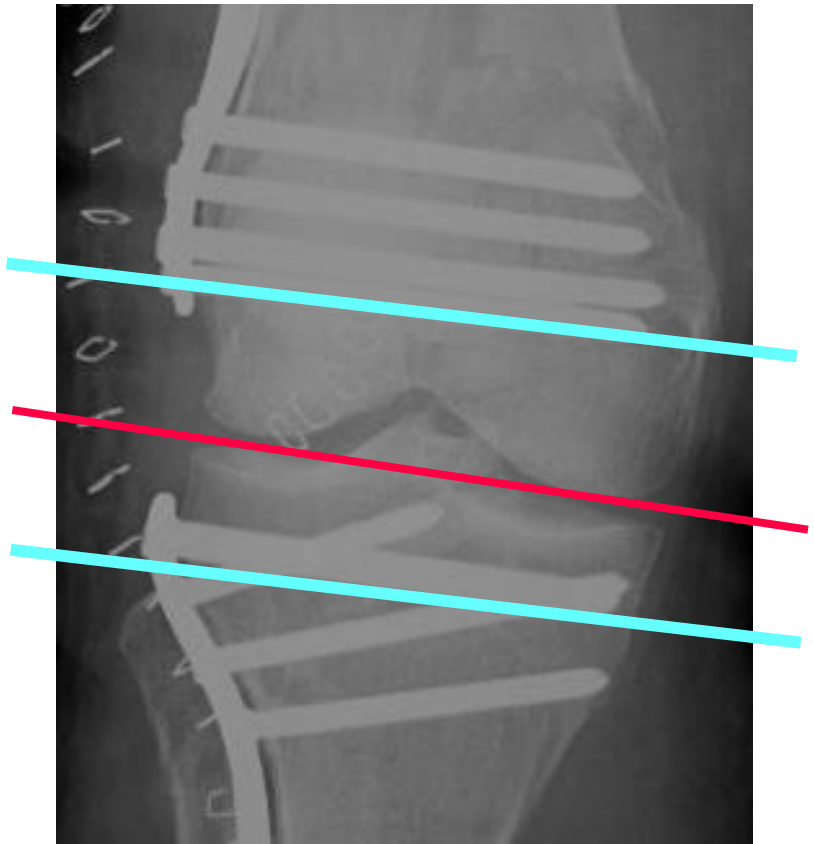


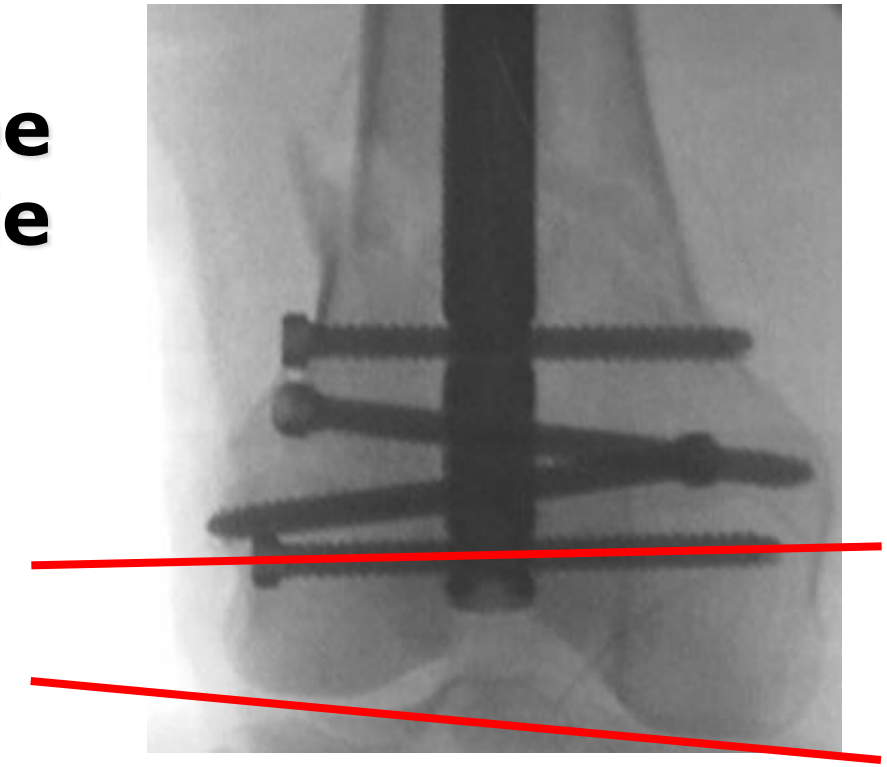
Ideal ca. 40° Beugung (check mit BV)
Zu viel Beugung ⇒ Patella blockiert
Zu viel Extension ⇒ ventraler Tibiakopf blockiert

Ausrichtung Eintrittspunkt



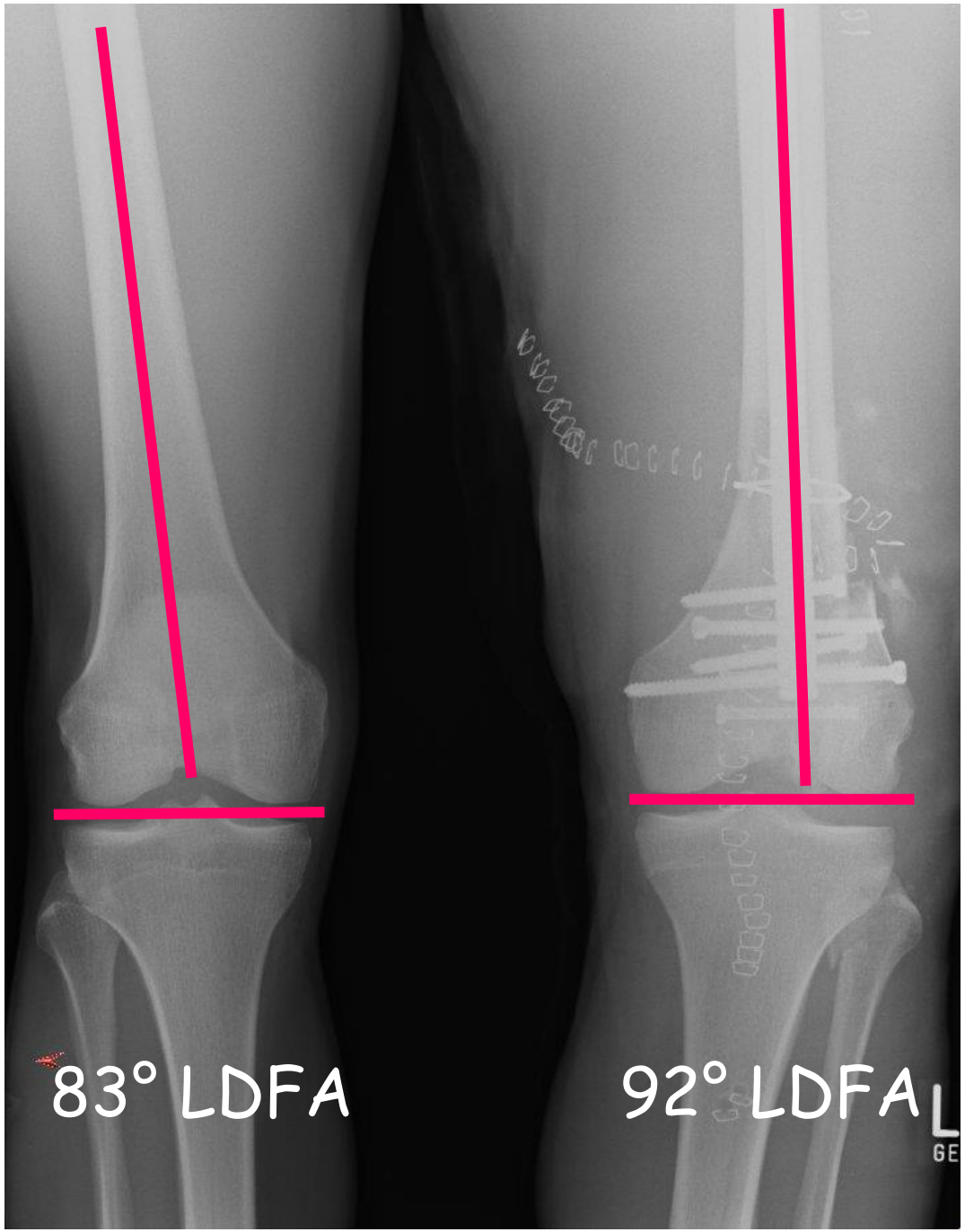
Verriegelungsschraube 5-9° zur Gelenklinie





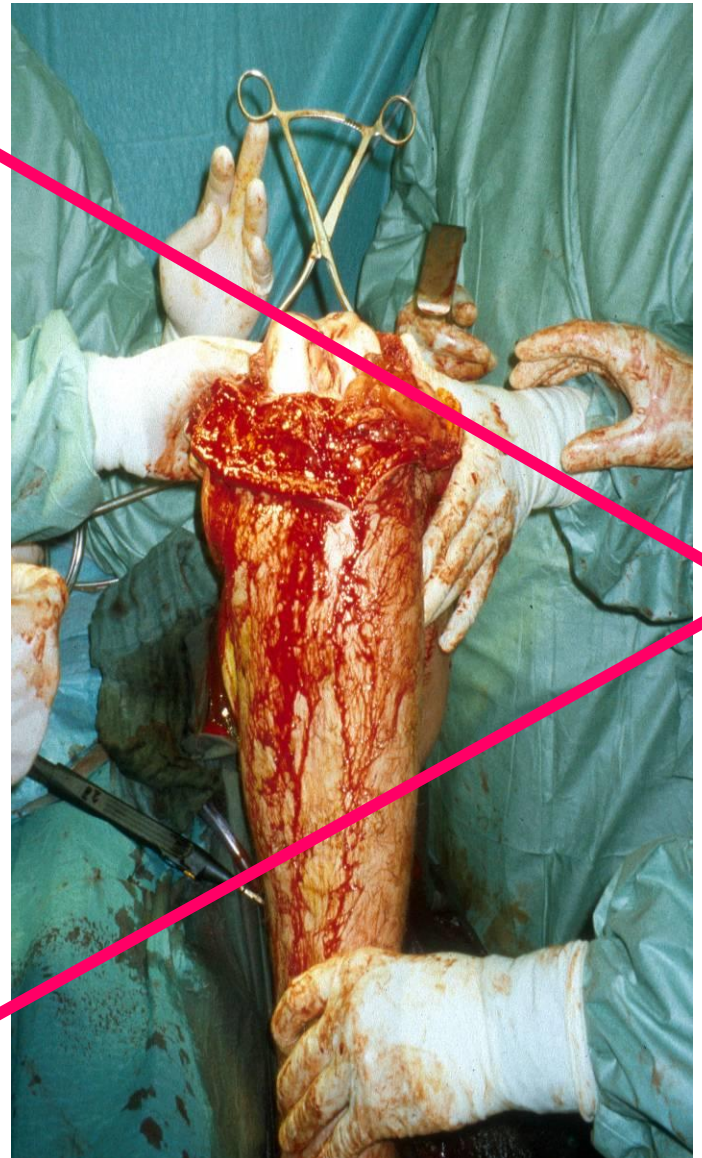
LISS-Schrauben parallel zur Gelenklinie

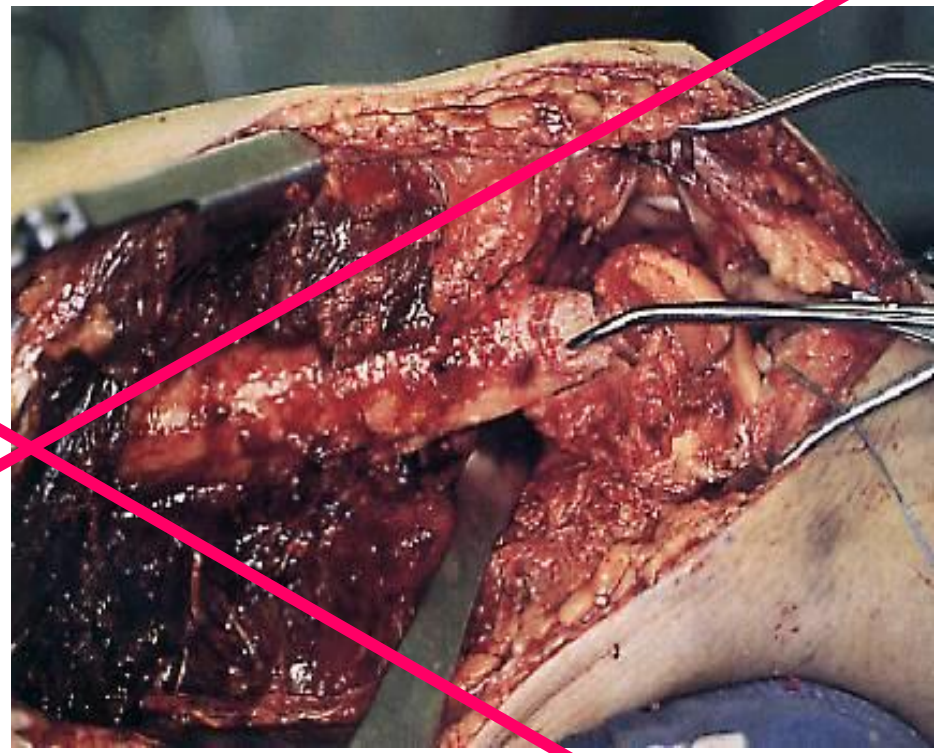
Grass R et al. Unfallchirurg 2002
Gregory P et al. JOT 1996



Nach Osteosynthese Achs- und Rotationskontrolle!!

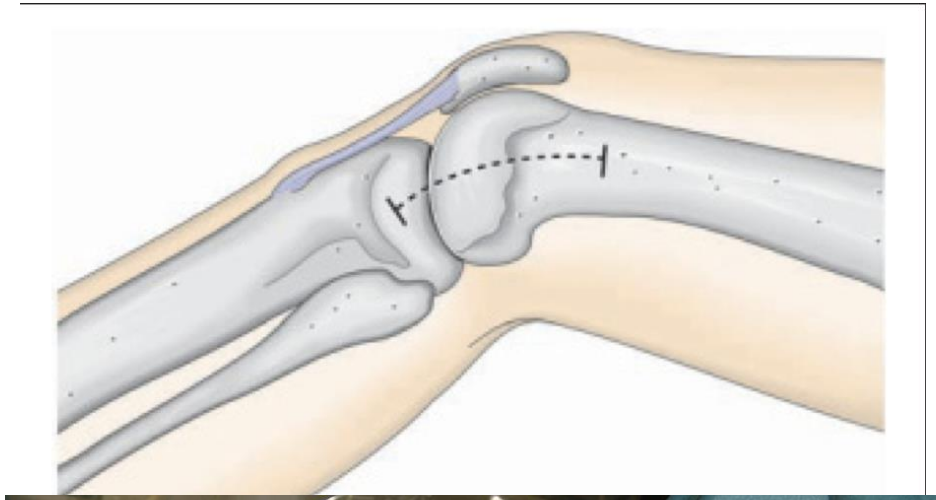
Extensive Zugänge für Platten sind nicht notwendig

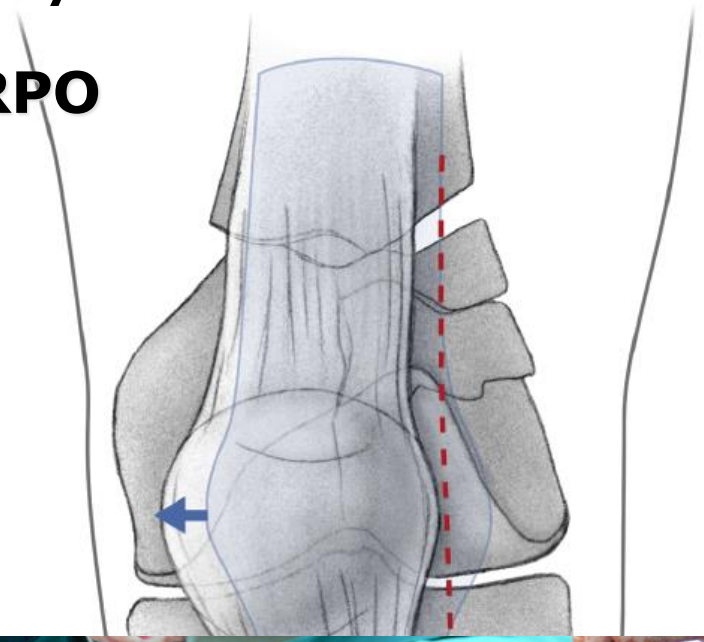


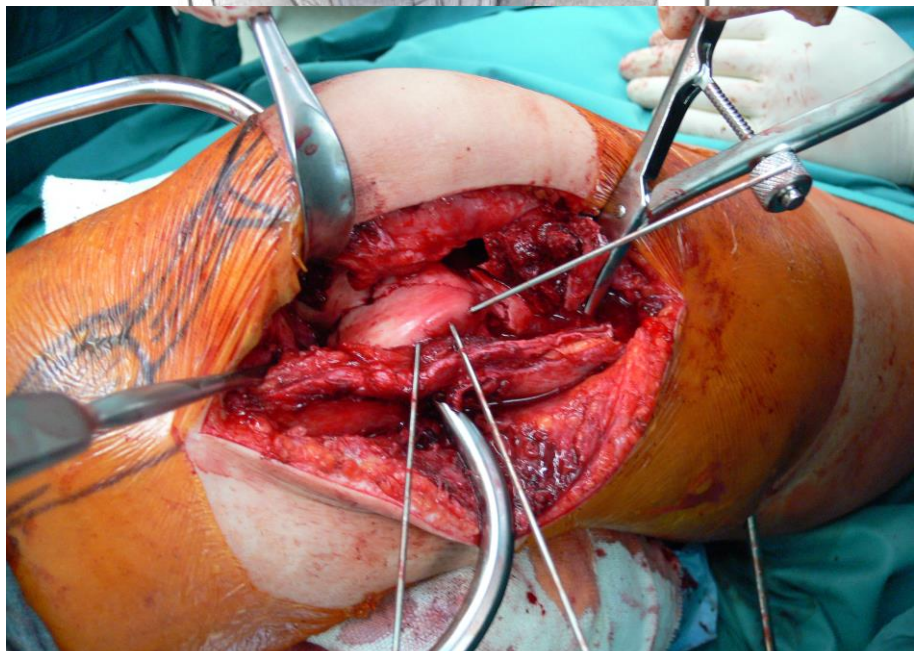


Zugänge Plattenosteosynthese

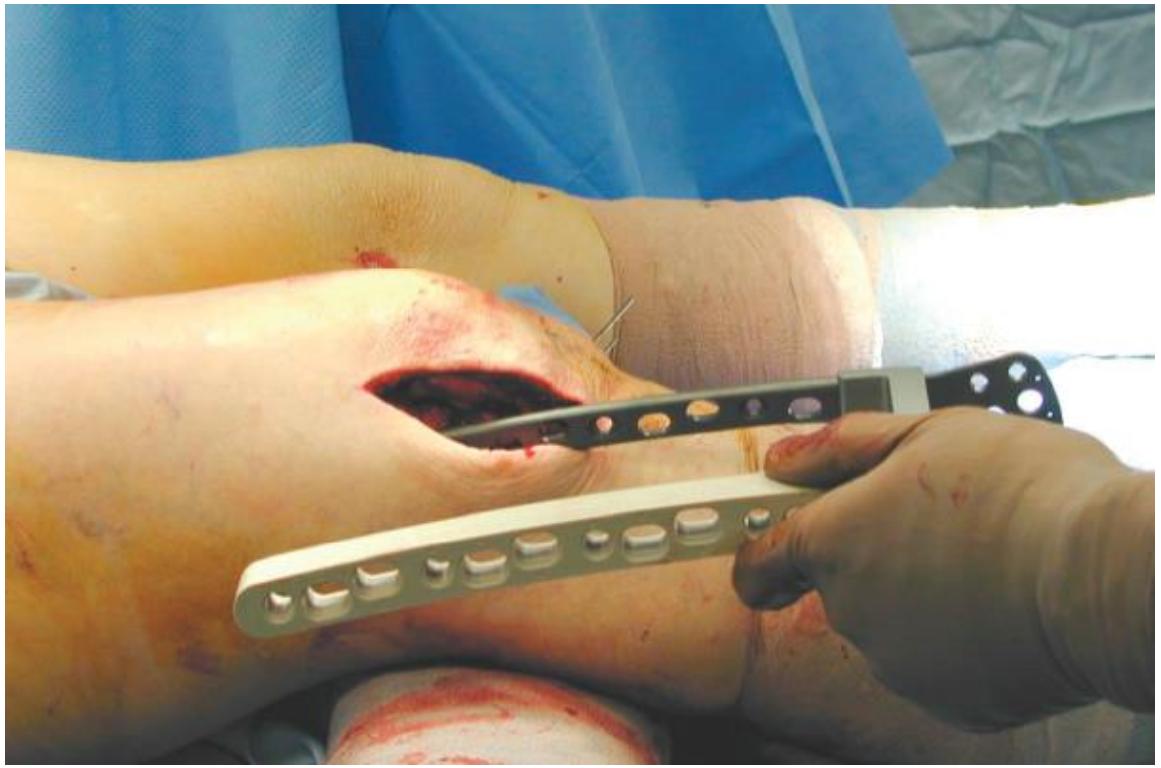
MIPO, TARPO

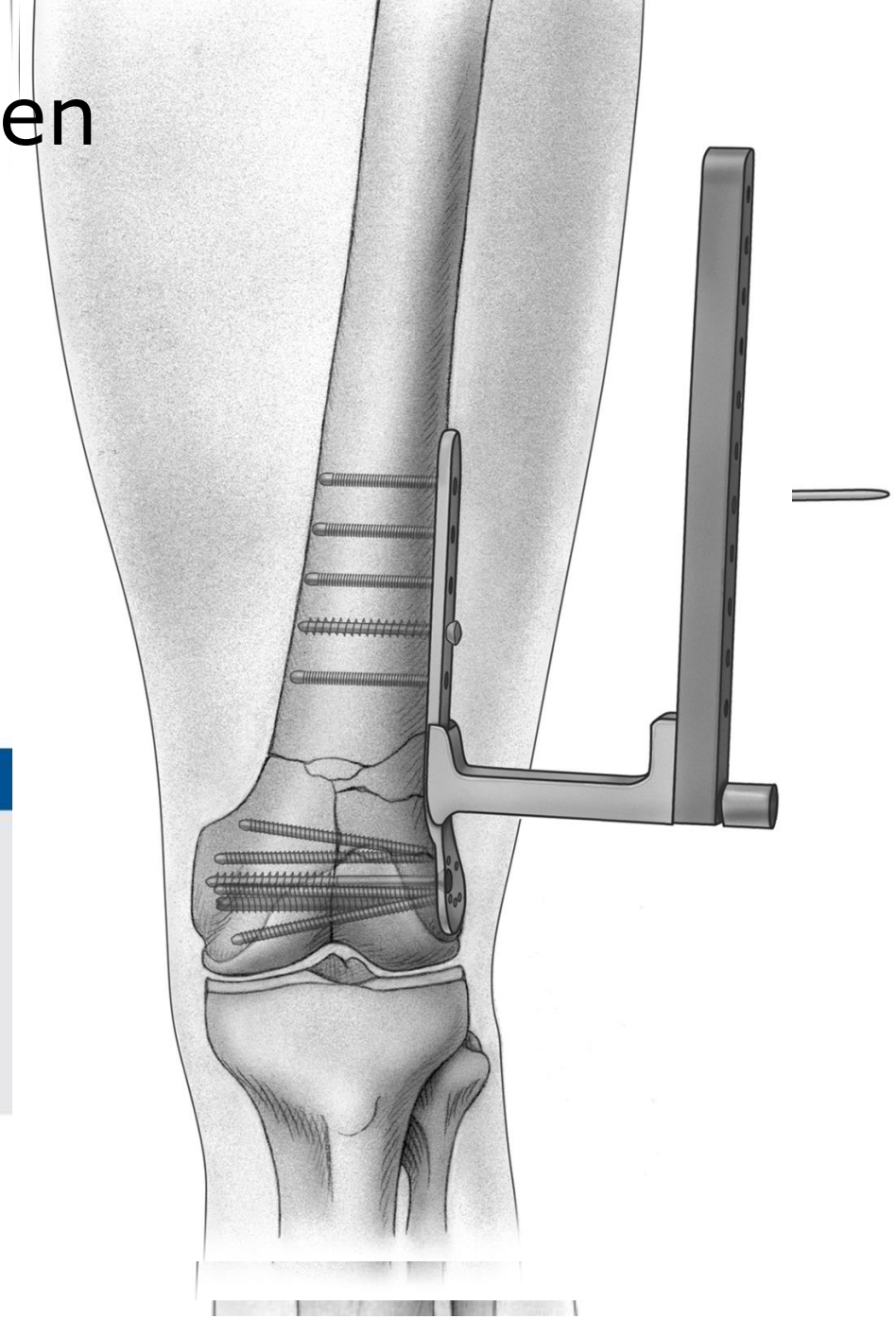


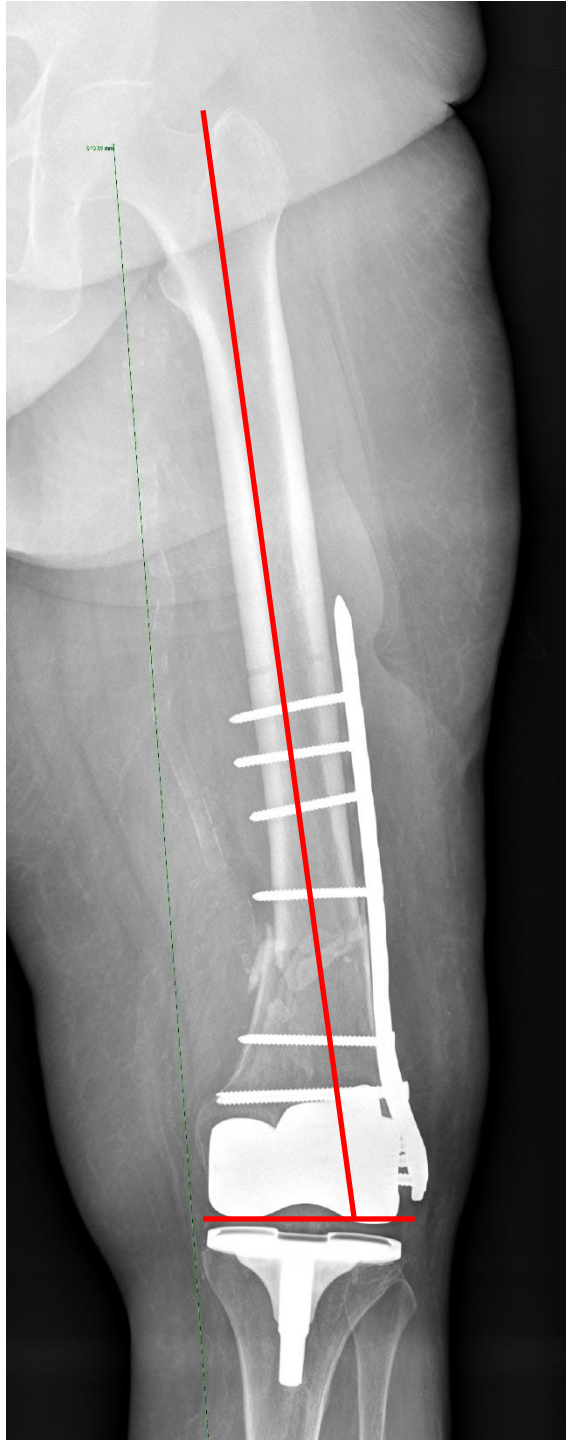


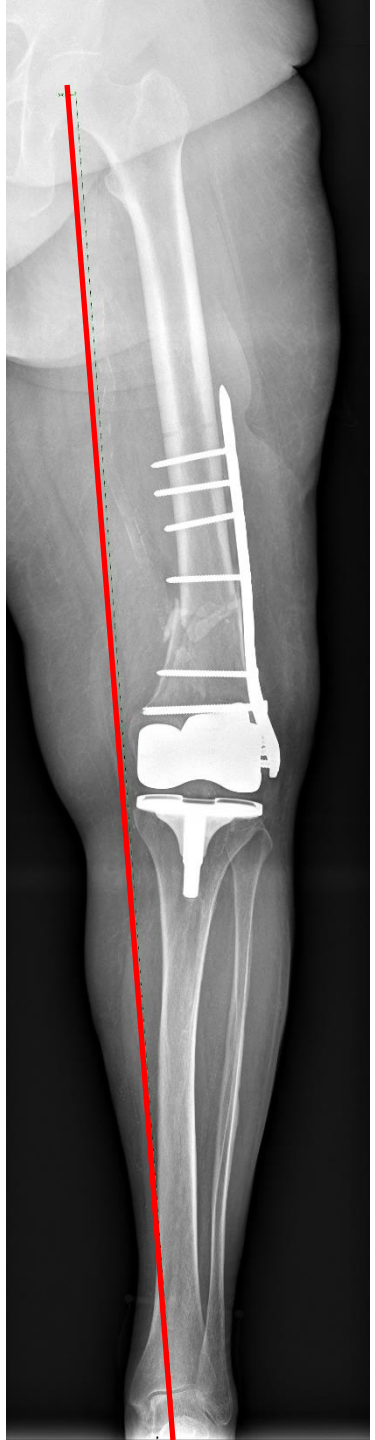


Platte ausrichten









Hier Schaftausrichtung nicht geglückt!

Varus:

Gefahr des Implantatversagens

Man braucht ein individuelles Patienten-Konzept

Werner 81J

geriatrische Fraktur!

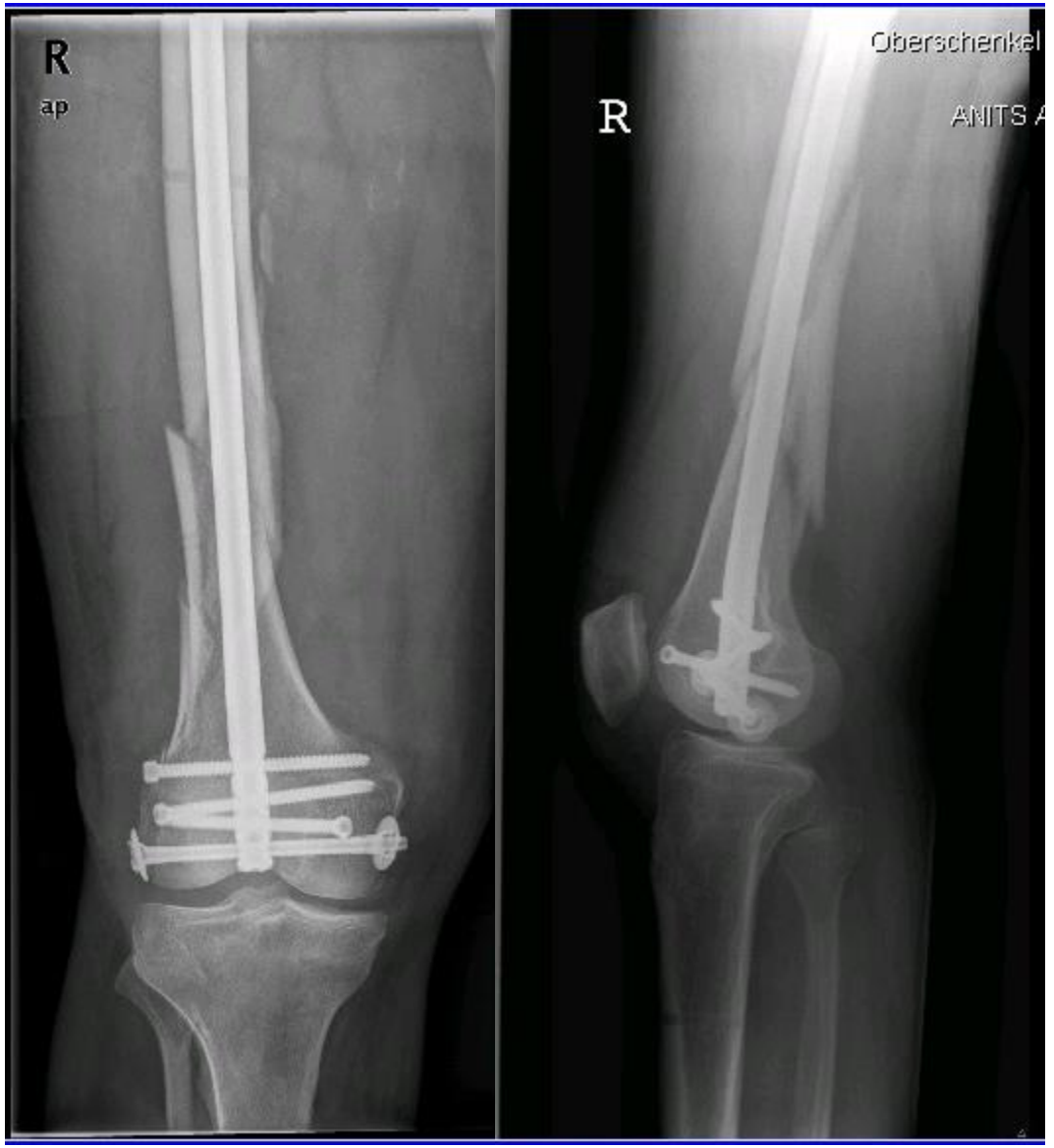
dist. Schaftfraktur

Fissur ins Gelenk ziehend

primär im Dienst Fix. ext.

Fraktur retrograd Nagel zugängig

Weichteile?


R
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Oberschenkel

Ergebnisse Mortalität - Frailty

Clin Orthop Relat Res (2011) 469:1188–1196
DOI 10.1007/s11999-010-1530-2

CLINICAL RESEARCH

Mortality After Distal Femur Fractures in Elderly Patients

Philipp N. Streubel MD, William M. Ricci MD, Ambrose Wong BS, Michael J. Gardner MD

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Distal femoral fractures
The need to review the standard of care

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Mortality	Distal femoral fractures	Proximal femoral fractures
30 days	6-7%	
6 month	16-18%	11-23%
1 year	18-30%	22-29%
5 years	48%	

Vergleichbar mit prox. Femur#

Ergebnisse Mortalität in Bezug OP-Zeitpunkt

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CLINICAL RESEARCH

Mortality After Distal Femur Fractures in Elderly Patients

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- Vergleichbar prox. Femur
- **Osteosynthese >4 Tage ➔ Mortalität↑**
- 25% Mortalität im 1. Jahr

Dist. Femurersatz (in Erwägung bei hochgradige Arthrose, patholog.#,nicht rekonstruierbarer#, EG IIb)

Distal femoral fractures treated by hinged total knee replacement in elderly patients

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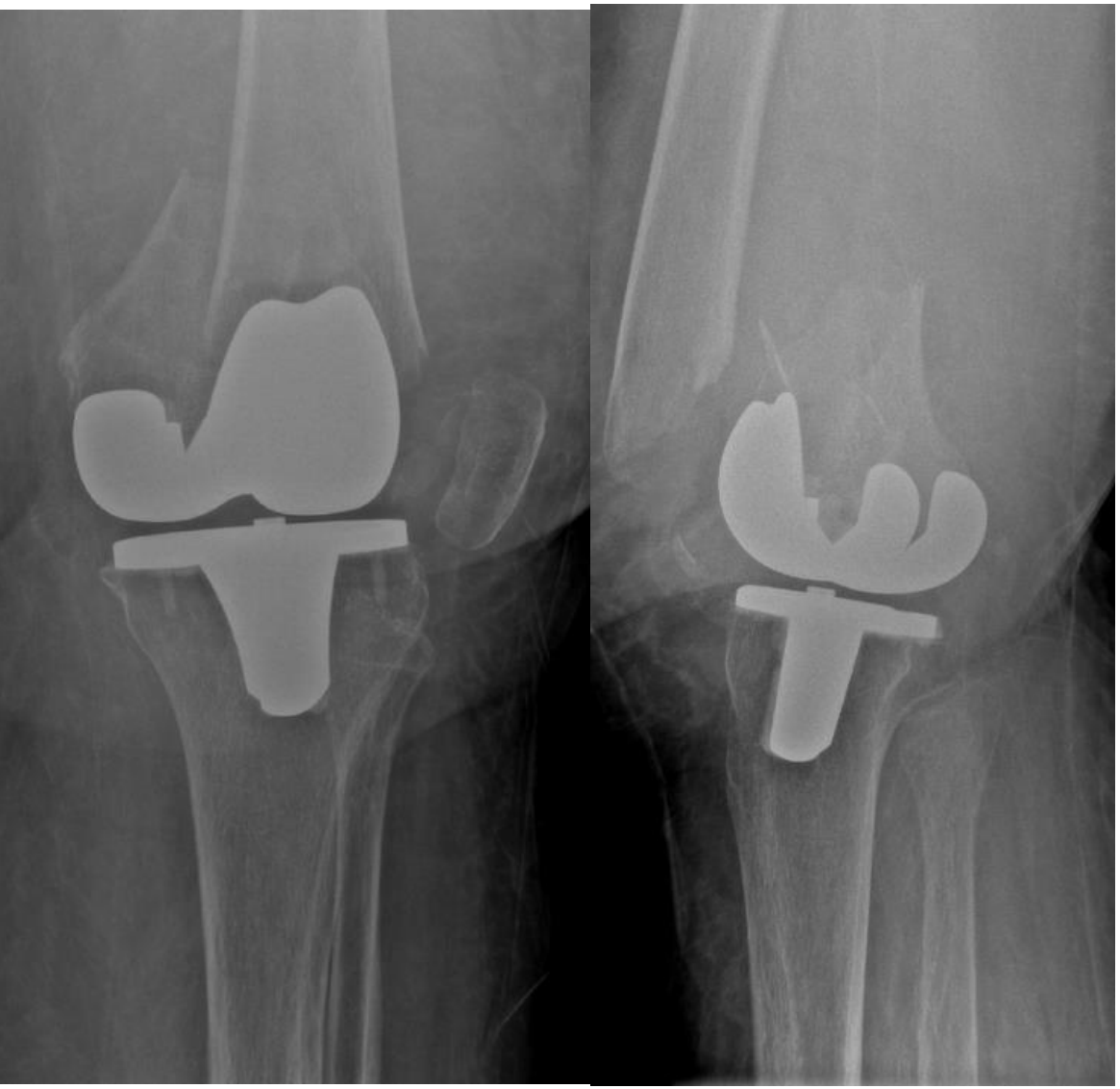
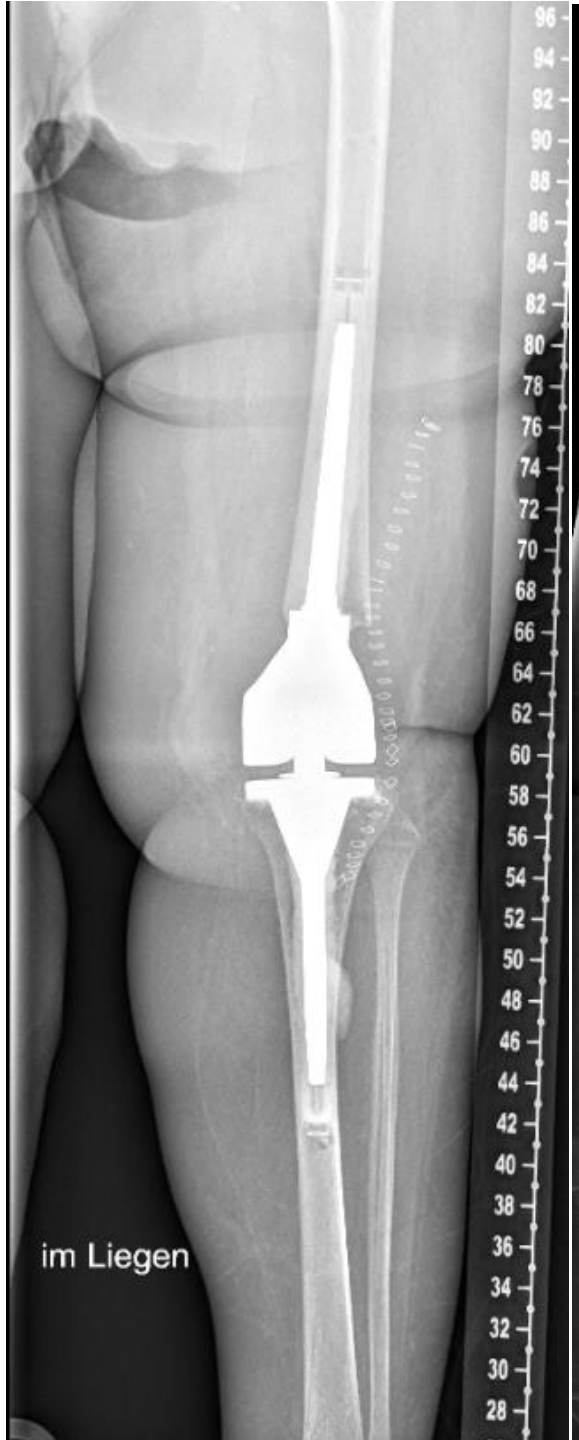
Although the use of constrained cemented arthroplasty to treat distal femoral fractures in elderly patients has some practical advantages over the use of techniques of fixation, concerns as to a high rate of loosening after implantation of these prostheses has raised doubts about their use. We evaluated the results of hinged total knee replacement in the treatment of 54 fractures in 52 patients with a mean age of 82 years (55 to 98), who were socially dependent and poorly mobile.

Within the first year after implantation 22 of the 54 patients had died, six had undergone a further operation and two required a revision of the prosthesis. The subsequent rate of further surgery and revision was low.

A constrained knee prosthesis offers a useful alternative treatment to internal fixation in selected elderly patients with these fractures, and has a high probability of surviving as long as the patient into whom it has been implanted.

40,7%
14,8%

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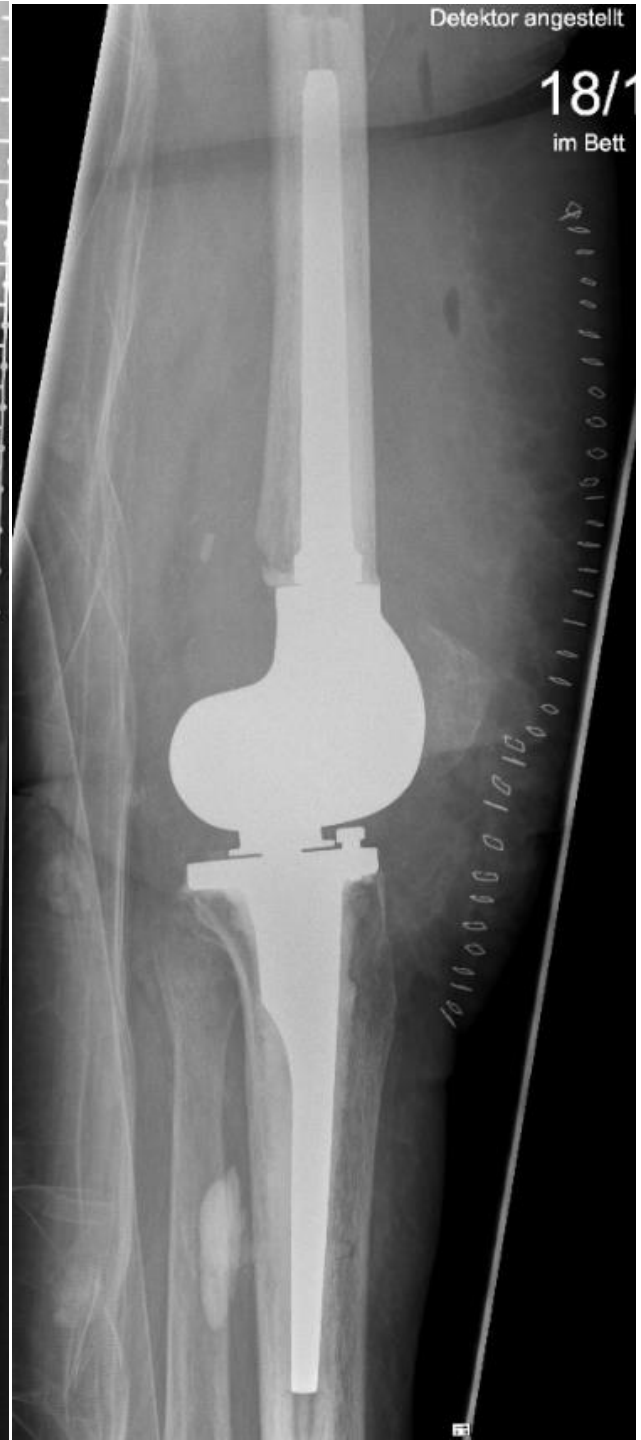
Detektor angestellt
im Bett

Zusammenfassung

Distale Femur# als osteoporot. Alters# nimmt zu

CT-Diagnostik erforderlich

Zeitnahe OP (Ziel innerhalb 48h)

Primärversorgung anstreben (Leitlinie)

Möglichst stabile Osteosynthese (Compliance)

Retrogr. Nagel u. winkelstabile Platte (Doppelplatte/Kombinationen bei geriatr. Patienten)

Einzelfälle Prothesen (dist. Femurersatz)

„Surgeons with increased experience may significantly reduce the risk of revision surgery“

Zlowodzki M et al. JOT 2006

Vielen Dank für Ihre Aufmerksamkeit

Helios