



AO-Symposium: Aktuelle Behandlungskonzepte knienaher Frakturen: Patella

Prof. Dr. P.M. Rommens

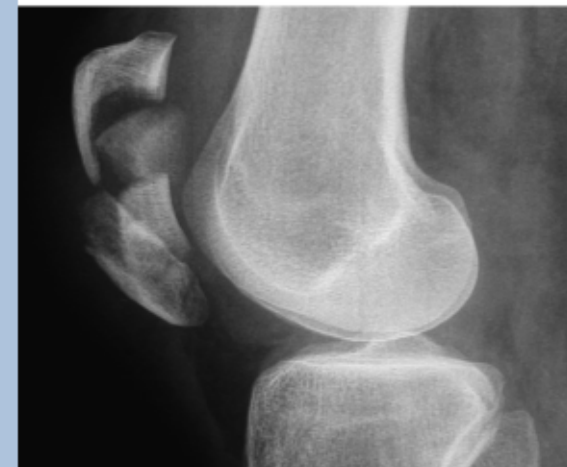
Priv.-Doz. Dr. S.-O. Dietz

Zentrum für Orthopädie und Unfallchirurgie

Universitätsmedizin Mainz

Epidemiologie/Ätiologie

- 1% aller Frakturen
- Männer : Frauen 2:1
- Altersgipfel 2.-5. Lebensjahrzehnt
- 6-7% offene Frakturen
- 78,3% Verkehrsunfälle
- Inzidenz bei Knie-TEP 0,68 – 21%
- Inzidenz bei VKB-Plastik (BTB) 1%



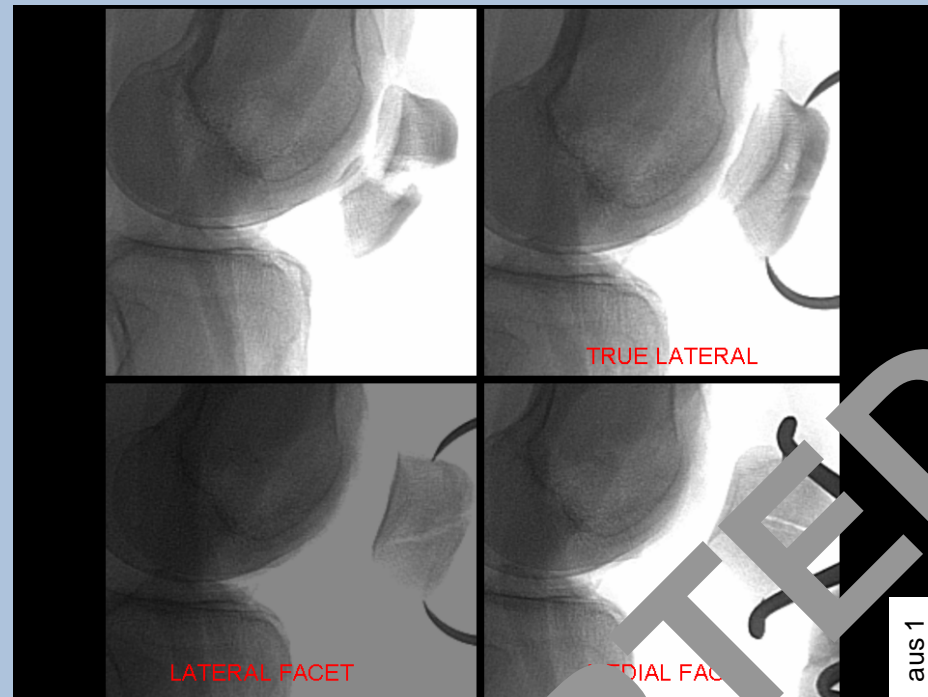
Diagnostik

■ Klinik

- Schwellung
- Tastbare Delle
- Streckschwäche

■ Radiologie

- Knie a.p. und seitlich
- zusätzlich seitlich in 20° Außen- und 30° Innenrotation¹
- CT, insbesondere bei Frakturen des distalen Pols²



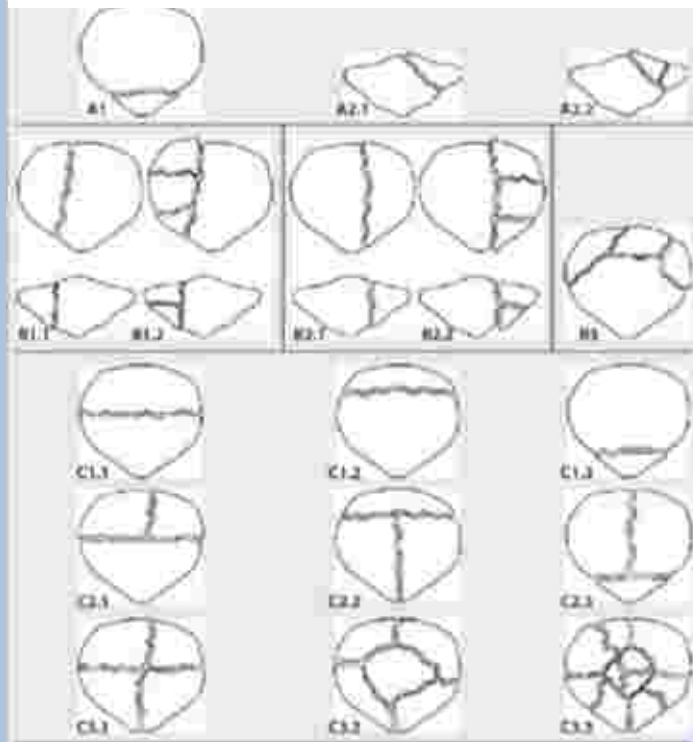
¹ Berkes MB et al.: J Orthop Trauma 2013, Publish ahead of print

² Lazaro LE et al.: J Orthop Trauma 2013; 27: 336-344

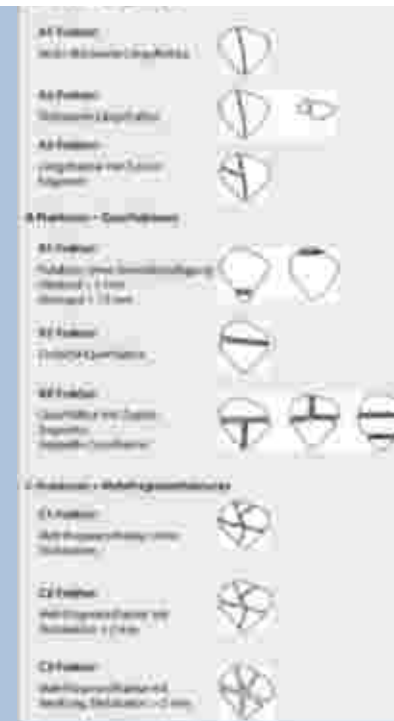
Klassifikation

- diverse Klassifikationen, von denen sich keine als Standard etablieren konnte (geringe inter-observer Reliabilität)

AO-Klassifikation (AO 45-



AO-Klassifikation modifiziert nach Speck und Regazzoni 1994



Zugang

<p>Lateraler (parapatallar) Zugang</p>	<ul style="list-style-type: none"> + Erweiterung nach proximal und distal + Schonung des R. infrapatellaris N. saphenus + Schonung der Blutversorgung + Inversion der Patella einfach
<p>Longitudinal (Mittellinie)</p>	<ul style="list-style-type: none"> + Erweiterung nach proximal und distal + ermöglicht Knie TEP (wenn erforderlich)
<p>Trans</p>	<p>+ kosmetisch günstig</p> <p style="text-align: center;"><i>NICHT EMPFEHLENSWERT</i></p> <p style="text-align: right;">S</p> <p style="text-align: center;">gefährdet</p>

Zugang

Lionel E. Lazaro, MD1; David S. Wellman, MD1; Craig E. Klinger, BS1; Jonathan P. Dyke, PhD2; Nadine C. Pardee, BA1; Peter K. Sculco, MD1; Marschall B. Berkes, MD1; David L. Helfet, MD1; Dean G. Lorich, MD1
Quantitative and Qualitative Assessment of Bone Perfusion and Arterial Contributions in a Patellar Fracture Model Using Gadolinium-Enhanced Magnetic Resonance Imaging: A Cadaveric Study

Results:

Magnetic resonance imaging demonstrated that the largest arterial contribution to the patella entered at the inferior pole in 100% of the specimens; in 80% of these specimens, the artery entered inferomedially. It also revealed an overall decrease in contrast enhancement in both transverse osteotomy groups, with an average reduction in enhancement in the proximal fragment of 36%.

J Bone Joint Surg Am, 2013 Oct 02;95(19):e140 1-7.



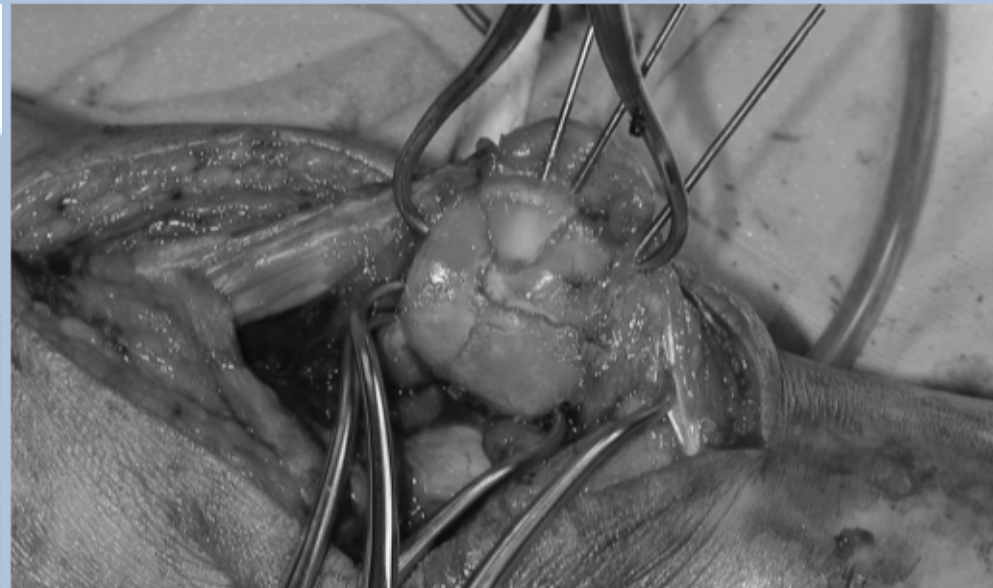
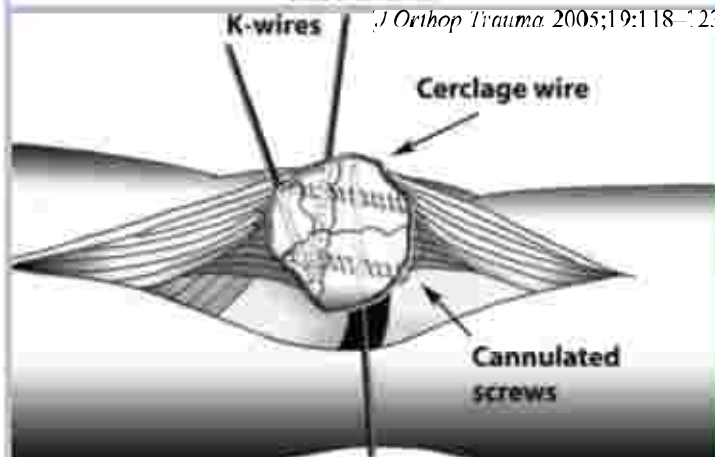
- Schonung der infero-medialen Blutversorgung
- Refixation des inferioren Fragmentes
- Abschälen der anterioren fibrösen Bedeckung vermeiden
- Cave bei zirkumferenter Retention

Reposition

Complete Exposure of the Articular Surface for Fixation of Patellar Fractures

Michael J. Gardner, MD, Matthew H. Griffith, MD, Brandon D. Lawrence, MD, and Leon G. Loric, MD

J Orthop Trauma 2005;19:118-123



Inversion/Umkappen der Patella:

- bei mehrfragmentären und/oder komplexen Frakturen
- visuelle Kontrolle des Osteosynthesematerials
- verbesserte Darstellung der Gelenkfläche
- lateraler Zugang, proximal und distal um 1cm erweitert

Osteosynthese

- **Behandlungsziel:**
 - **stabile Fixierung**

- **Zuggurtung:**
 - alleine
 - mit Kirschner-Drähten
 - mit kanülierten Schrauben

Biomechanical Evaluation of Current Patella Fracture Fixation Techniques

Carpenter, James E.; Kasman, Roberta A.; Patel, Niraj; Lee, Michael L.; Goldstein, Steven A.

We found that combining lag screw and tension band principles provided more secure fixation of transverse patellar fractures than either method alone, with less displacement at the fracture site as the knee is extended and a higher load to failure.

Journal of Orthopaedic Trauma

Ausgabe: Volume 11(5), July 1997, pp 351-356



Osteosynthese

■ winkelstabile Plattenosteosynthese

Variable angle-stable patella plate, Fa. Königsee

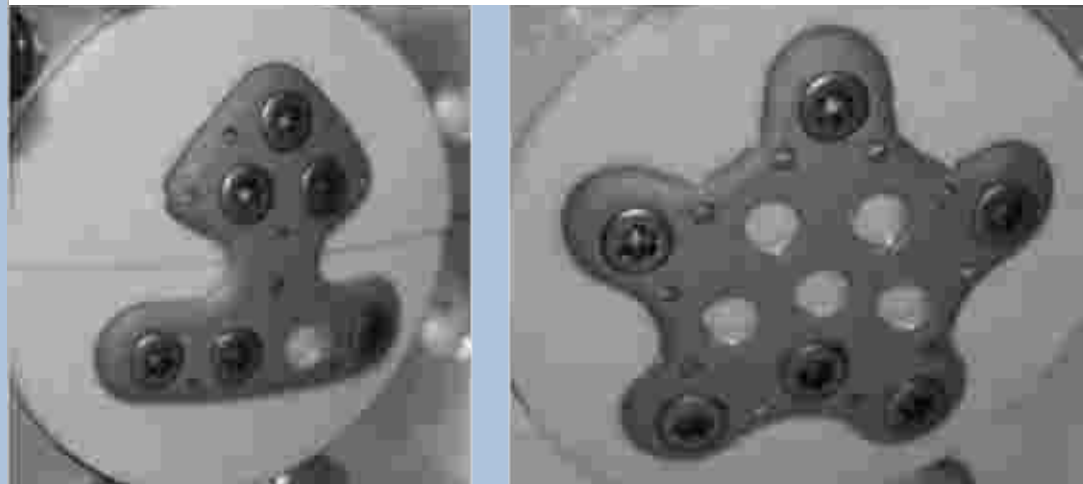


aus: Wild, M et al. Clin Biomechanics 2010

Wild et al 2010:

*signifikant stabiler und
signifikant weniger Dislokation
als Zuggurtung mit K-Drähten
bzw. kanülierten Schrauben*

Patella SuturePlate, Fa. Arthrex



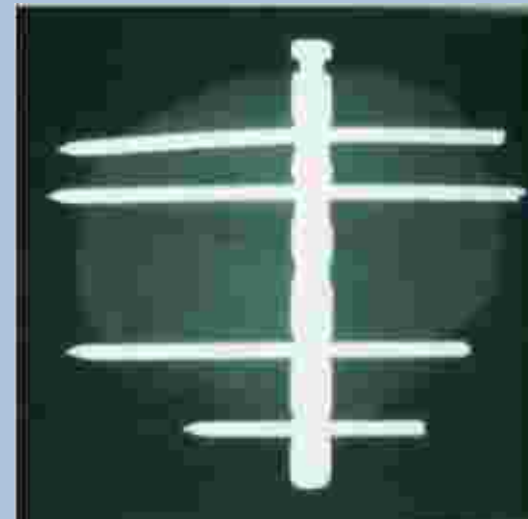
aus: Wurm, S et al.: Trauma Berufskrankh 2012

Wurm et al 2012:

Zuggurtung: Zugbelastung von 350 N Öffnung des
Frakturspalts von 2,4 mm > Versagen der Osteosynthese
Plattenosteosynthese: Frakturspalt auch bei Maximalkraft von
1052 N nicht über 1,8 mm

Osteosynthese

- Nagelosteosynthese:



Aus: J.Gehr und W.Friedl: Probleme der Zuggurtungsosteosynthese von Patellafrakturen und deren Konsequenzen für weitere Implantatentwicklungen Der XS-Nagel. Chirurg 2001 72: 1309-1318

- trotz vieler theoretischer Vorteile kein Standardverfahren
- aktuell kein patella-spezifisches Implantat verfügbar

Patella Teilresektion

- Patella Teilresektion:
 - i.d.R. bei distaler Trümmerfraktur und intaktem proximalem Fragment
 - Gefahr der Patella baja (Patellatiefstand):
 - retropatellarer Schmerz
 - limitierte ROM
 - Krepitationen



➤ möglichst Erhalt des distalen Fragments

Patellektomie

- Indikation:
 - nicht rekonstruierbare Frakturen
 - postoperativer Infekt

- klinische Ergebnisse in der Regel schlecht¹

- Frühpatellektomie > Spätpatellektomie²



¹Pandey AK, Pandey S, Pandey P (1991) Results of partial patellectomy. Arch Orthop Trauma Surg 110:246–249

²Müller EJ, Wick M, Muhr G (2003) Patellectomy after trauma: is there a correlation between the timing and the clinical outcome. Unfallchirurg 106:1016–1019

Komplikationen

- Implantatbedingte Komplikationen

Factors predicting failure of patella fixation

Micah A. Miller, BS, Wanjun Liu, MD, David Zurakowski, PhD, Raymond Malcolm Smith, MD, Mitchel B. Harris, MD, and Mark S. Vrahas, MD, Boston, Massachusetts

BACKGROUND: Surgical fixation of patella fractures is frequently indicated due to disruption of the quadriceps mechanism. Operative technique varies; however, failure rates can be high. The purpose of this study was to compare the effectiveness of various techniques for the fixation of patella fractures and the etiology of fixation failure.

METHODS: We retrospectively reviewed 173 patella fractures treated operatively at two Level I trauma centers. Patients with less than 90 days of follow-up, inadequate radiographic studies, and partial or total excision were excluded. Failure was defined as hardware breakage, nonunion, or displacement of fragments from their initial reduced position. Twelve factors were examined independently for predictive value using both univariate and multivariate analyses. A comparison between groups based on reoperation and hardware removal was also performed.

RESULTS: One hundred nine patients met the inclusion criteria, and 13 were found to have failed (12%). Both older patient age ($p < 0.02$) and use of K-wires, with or without tension-band wires ($p < 0.04$), were found to be significant predictors of failure. Increasing follow-up time was the only significant predictor of reoperation ($p < 0.001$) and hardware removal ($p < 0.001$).

CONCLUSIONS: As anticipated, increasing age was found to correlate with higher failure rates. Use of K-wires with or without tension-band wires correlated with higher failure rates, compared with the use of screws, both K-wires and screws, or other fixation. Increasing follow-up time predicted both reoperation and hardware removal, with patients having asymptomatic hardware and other complications naturally returning to clinic for evaluation and treatment. (*J Trauma*, 2012;72: 1051-1055. Copyright © 2012 by Lippincott Williams & Wilkins)



Spitze nicht Zuggurtung zerschneidet

Komplikationen

Meta-analysis of re-operation, nonunion, and infection after open reduction and internal fixation of patella fractures

Christopher J. Dy, MD, MSPH, Milton T. M. Little, MD, Marschall B. Berkes, MD, Yan Ma, PhD, Timothy R. Roberts, MLS, David L. Helfet, MD, and Dean G. Lorich, MD, New York, New York

The frequency of re-operation was 33.6% in a meta-analysis of 24 studies (737 patella fractures). The frequency of infection was 3.2% in a meta-analysis of 18 studies (522 patella fractures). The frequency of nonunion was 1.3% in a meta-analysis of 15 studies (464 patella fractures). There were no significant predictors for re-operation, nonunion, or infection in any of the regression analyses.

Although our data show that patella fractures heal with low nonunion rates, approximately one-third of the patients undergo re-operation. These findings suggest that further investigation is needed to use treatment strategies that maintain these high union rates but decrease the frequency of re-operation.

Vielen Dank für Ihre Aufmerksamkeit

