Update on periprosthetic fractures around the knee



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Ex-Mex Ljubiana 2015



Osteosynthesis of periprosthetic hip fractures

AO-Advanced Copenhagen 2018

Michael Brix

Objectives

- Introduction
 - Problem definition
 - Classification Vancouver
- Fixation options
- Evidence
- Pitfalls

Updated treatment strategy

Problem definition

- Increasing number
- Technically demanding
 - Osteoporosis
 Co-morbidity
- High failure rate
 - Non-union
 - Plate/screw breakage or pull-out



Massive reoperations

Distribution of
 periprostetic fx

• Distribution of reoperations



Vælg region for det planlagte reoperation



Classification

- Vancouver B1 near well fixed implant
 - Corten et al found 9/45 (20 %) radiological stable stems to be loose intra operatively (J.BoneJointSurg(Br) 2009;91-B:1424-30⁺
- All B1 are not the same
 - Osteoporosis
 - Fracture type
 - Healing potential
 - B2/B3- revision





Classification

- Vancouver C away from implant
 - Gray zone B1 C type
 - Osteoporosis
 - Simple fracture
 - With extension
 - Comminuted or segmental



Fixation options

- Plate and cable
- Locking plate
 - Locking screws
 - (Uni- bi cortical)
 - + cable
 - + conventional screws
 - + strut allograft
- Open or MIPO

Locking attachment plate

- Multiple 3,5 mm screws instead of one 5,5 mm uni cortical locking screw
- Alternative to cable
- Can be used limited open (no stripping of bone)
- Loosening not seen
- Weaken the bone by multiple drilling ?



Absolute stability

HORISON

VE







Bridge plating











HØ

0

0

0

Pittfalls

Eur Orthop Traumatol 2012

Treatment of Vancouver B1 fractures contemporary principles for the use of locking plates Morten Schultz Larsen & Michael Brix & Lonnie Froberg







Always Spann the prosthesis Minimum 2/3



More is not better

Locking Compression Plate Fixation of Vancouver Type-B1 Periprosthetic Femoral Fractures

By M.A. Buttaro, MD, G. Farfalli, MD, M. Paredes Núñez, MD, F. Comba, MD, and F. Piccaluga, MD

Investigation performed at the Hip Surgery Unit, Institute of Orthopedics "Carlos E. Ottolenghi," Italian Hospital of Buenos Aires, Buenos Aires, Argentina

- 14 patients LCP with locking screws
- 3 non-union => fracture of the plate
 - Many screws
 - Absolute or relative stability ?
- 3 pull-outs proximal
 - Only unicortical screws
 - Some cases only two screws
 - Include fracture through screw hole
- All revised with strut graft and new plate





Acta Orthop. Belg., 2009, 75, 776-783

ORIGINAL STUDY

Less is not more

- 18 all locking plate (bridge)
- 22% complication
 - 2 delayed union
 - 2 implant fracture (late)
- Bridging plate
 - Short spiral fracture
 - Comminution of medial cortex

Periprosthetic femoral fractures : outcome after treatment with LISS internal fixation or stem replacement in 36 patients

Michael Müller, Max Kääb, Stephan Tohtz, Norbert P. HAAS, Carsten PERKA

From the CHARITÉ – University Medicine, Berlin, Germany



Medial cortex

• A lateral plate is only strong enough if the medial cortex is stable (anatomically reduced and fixed)



Controversy

- Which construct is more stable ?
 - Stiffness vs. stability
- How long must the plate be ?
- How many screws above and below ?
 - More the merrier or less is more ?
- Can (should) we mix cables and different screws ?

Injury, Int. J. Care Injured 40 (2009) 1180-1186

Contents lists available at ScienceDirect

Injury



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

Isolated locked compression plating for Vancouver Type B1 periprosthetic femoral fractures *

Ginger K. Bryant, Saam Morshed^{*}, Julie Agel, M. Bradford Henley, David P. Barei, Lisa A. Taitsman, Sean E. Nork

Department of Orthopaedics and Sports Medicine, Harborview Medical Centre, University of Washington, Seattle, WA, United States



• 10 patients - ORIF

- 0 % complications
 - Anatomical reduction
 - Spanning the stem
 - Spanning the femur
 - Lag screws for inter fragmentary compression
 - Secure proximal fixation
 - Stress distribution
 - Restoring medial cortex

Minimally invasive

- Documentation from traditional fracture treatment
- Best suited for bridge plate
- Must be able to reduce anatomically in short fractures
 - Open reduction of fracture
 - MIPO technique for plate
- In open technique
 - Preserve periostium
 - Preserve soft tissue





Technique

Pictures, Mortens Schultz









Summary – Vancouver B1

- Anatomical reduction
 - Remove cement if necessary
 - Open if necessary
- Inter fragmentary compression
 - Screw, cable, plate
- Span the stem and fix secure
 - Uni cortical, cable, LAP
- Use long plates > 15 cm below frx or form hip to knee
- Pitfall: Medial cortex, loose stem



Summary – Vancouver C

- Short fracture (transverse, oblique or spiral)
 - Absolute stability as B1
 - Long fracture or comminuted
 - Bridge plate
 - Axial reduction
 - Span the stem
 - Medial cortex MUST be restored or supported

648 Acta Orthopaedica 2012; 83 (6): 648–652 Periprosthetic Vancouver type B1 and C fractures treated by locking-plate osteosynthesis Fracture union and reoperations in 60 consecutive fractures Lonnie Froberg1, Anders Troelsen2, and Michael Brix1



Set up for succes: Take Home

- Acces to experienced traumatologist and hipsurgeon
- Acces to advanced instruments, all sorts of plates, cables, screws, LAP device
- Stick to basic principles and use them on the right fracture and the right patient.
- Refer to specialist centre on low indication