Göteborg, 2023

Distal femur fracture in the elderly patient

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i R-aulan, Sahlgrenska universitetssjukhuset, Mölndal

Fredagen den 16 juni, klockan 09.00

av Martin Paulsson legitimerad läkare

Fakultetsopponent:
Professor Jan Erik Madsen
Universitet i Oslo, Norge

Avhandlingen baseras på följande delarbeten

I. Paulsson M, Ekholm C, Jonsson E, Geijer M and Rolfson O, 2021, ***Immediate Full Weight-Bearing Versus Partial Weight-Bearing After Plate Fixation of Distal Femur Fractures in Elderly Patients. A Randomized Controlled Trial,*** *Geriatric Orthopaedic Surgery & Rehabilitation, Volume 12: 1–14: 2021*

II. Paulsson M, Ekholm C, Rolfson O, Tranberg R and Geijer M, ***Using a traction table for fracture reduction during minimally invasive plate osteosynthesis (MIPO) of distal femoral fractures provides anatomical alignment,*** *Manuscript submitted*

III. Paulsson M, Ekholm C, Rolfson O, Tranberg R and Geijer M, ***Secondary displacement was common in healing distal femur fractures in a cohort of elderly patients,*** *Manuscript submitted*

IV. Paulsson M, Ekholm C, Rolfson O, Geijer M and Tranberg R, ***Temporary partial weight-bearing restriction in elderly patients treated with a plate fixation after a distal femur fracture had a negative long-term impact on gait recovery,*** *Manuscript submitted*

V. Paulsson M, Geijer M, Rolfson O, Pekkari T, Tranberg R and Ekholm C, ***New classification of geriatric distal femur fractures. A proposal,*** *In manuscript*

SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR KLINISKA VETENSKAPER

GÖTEBORGS UNIVERSITET

Göteborg, 2023

Distal femur fracture in the elderly patient

Martin Paulsson

Department of Orthopaedics, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Sweden, 2023.

Abstract

Studies on the epidemiology of distal femur fractures show a vast increase in low-energy trauma-associated fractures in older ages. Age-related changes in bones lead to loss of bone matrix and increased porosity, which entails an increased risk for fractures and different fracture patterns than in younger individuals. Corresponding age-related changes also occur in muscles, resulting in decreased muscle mass and strength, which impairs the ability to recuperate after a fracture. To reduce the risk of surgical complications, it is common practice to limit weight-bearing on the fractured leg after surgical fixation of distal femur fractures. Typically, patients are restricted to bear no more than 30% of their body weight on the affected leg. There is, however, a lack of knowledge on how a period of restricted weight-bearing affects the long-term outcome in elderly patients with distal femur fractures. This thesis aimed to evaluate how the patient's everyday function, surgical fixation and ability to recover were affected by eight weeks of restricted weight-bearing. The thesis also aimed to assess fracture demographics and design a new fracture classification adapted to the characteristics of distal femur fracture in elderly patients.

A randomised controlled trial compared restricted weight-bearing for eight weeks after surgery with full immediate weight-bearing. The primary outcome was patient-reported everyday living function. Secondary outcomes were postoperative fracture alignment, secondary displacement of the fractures during healing, weight-bearing ability, and gait recovery assessed during a one-year follow-up. There was no difference in patient-reported function between groups. The use of a traction table facilitated an excellent postoperative fracture alignment. All fractures were fixated with a long plate applied with a minimally-invasive technique, and there was no non-union or plate breakage within the one-year follow-up. However, there was a significant fracture subsidence of 4.9 ± 4.2 mm in mean of the femur. The restricted weight-bearing group showed a small but significant increase in secondary displacement. Five of six major secondary displacements and mechanical adverse events also occurred in this group. Only one-third of the patients in the restricted weight-bearing group managed to comply with the recommended loading of 30% of the body weight. Despite this, the restricted group had a significantly lower gait speed at 16 weeks and one year. A survey of fracture demographics of 342 patients 65 years or older showed a dominance of spiral fractures of the distal shaft, which increased with advancing age. Two-thirds of patients had peri-implant fractures associated with knee and hip replacements or previous fracture fixation devices. A new fracture classification for distal femur fractures in elderly patients was developed. Reliability tests of the new classification showed substantial agreement.

Concluding the results of the thesis, the morphology of the distal femur alters with advancing age, affecting the fracture demographics. The prosed new classification adapted to the characteristics of distal femur fractures in elderly patients is promising and could improve classification compared with today's used classification systems. Restricted weight-bearing for eight weeks after surgery had a negative effect on fracture fixation and a persistent negative impact on gait recovery, indicating worse function and increased mortality. Restricted weight-bearing should therefore be avoided in elderly patients with distal femur fractures.

Keywords: Distal femur fracture, Geriatric patients, Weight-bearing, Recovery, Secondary displacement, Minimally invasive plate osteosynthesis (MIPO), Fracture alignment, Fracture classification

ISBN: 978-91-8069-291-5 (TRYCK) http://hdl.handle.net/2077/75902
ISBN: 978-91-8069-292-2 (PDF)