AKERSHUS UNIVERSITY HOSPITAL

Annual Report 2022

Academic Activities

Department of Orthopedic Surgery

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Nonoperative or Surgical Treatment of Acute Achilles' Tendon Rupture

Ståle B. Myhrvold, M.D., Espen F. Brouwer, M.D., Tor K. M. Andresen, M.D., Karin Rydevik, P.T., M.Sc., Madeleine Amundsen, M.D., Wolfram Grün, M.D., Faisal Butt, M.D., Morten Valberg, Ph.D., Svend Ulstein, M.D., Ph.D., and Sigurd E. Hoelsbrekken, M.D., Ph.D.

ABSTRACT

BACKGROUND

Whether surgical repair of an acute Achilles' tendon rupture by an open-repair or minimally invasive approach is associated with better outcomes than nonsurgical treatment is not clear.

METHODS

We performed a multicenter, randomized, controlled trial that compared nonoperative treatment, open repair, and minimally invasive surgery in adults with acute Achilles' tendon rupture who presented to four trial centers. The primary outcome was the change from baseline in the Achilles' tendon Total Rupture Score (scores range from 0 to 100, with higher scores indicating better health status) at 12 months. Secondary outcomes included the incidence of tendon rerupture.

RESULTS

A total of 554 patients underwent randomization, and 526 patients were included in the final analysis. The mean changes in the Achilles' tendon Total Rupture Score were –17.0 points in the nonoperative group, –16.0 points in the open-repair group, and –14.7 points in the minimally invasive surgery group ($P=0.57$). Pairwise comparisons provided no evidence of differences betwe

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Content

Orthopedic Research Group

University employees

Asbjørn Årøen	Head of Research group, Prof II, consultant, 20 % university employee
Stein-Erik Utvåg	Associate Prof., consultant, 20 % university employee
Jakob V. Nordbø	PhD candidate, med. specialist, 100 % university employee
Guri R. Ekås	PhD, consultant, 20 % university employee
Per-Henrik Randsborg	Associate Prof., consultant, 20 % university employee

Research positions

Christian T. Pollmann	PhD candidate, consultant, 50 % research position
Max Temmesfeld	PhD candidate, resident, 50 % research position

Research Fellows

Truls M. Straume-Næsheim	Postdoc, consultant
Per-Henrik Randsborg	Postdoc, consultant
Aron Adelved	PhD, consultant
Christian Owesen	PhD, consultant
Hendrik S.F. Fuglesang	PhD, consultant
Inge Skråmm	PhD, Head of Department of Orthopedic Surgery
Oliver Grundnes	PhD, consultant
Rune B. Jakobsen	PhD, consultant
Svend Ulstein	PhD, consultant
Jan Harald M. Røtterud	PhD, consultant
Annette Wikerøy	PhD candidate, consultant
Ingi Thor Hauksson	PhD candidate, consultant
Jan Rune Mikaelsen	PhD candidate, consultant
Ola-Lars Hammer	PhD candidate, consultant
Stefan Bartels	PhD candidate, consultant
Stian Kjennvold	PhD candidate, consultant
Ståle Clementsen	PhD candidate, consultant
Ståle B. Myhrvold	PhD candidate, consultant
Axel S. Petterson	Consultant
Inni S. Figenschou	Resident
Monica Sailer	Consultant
Tor Kristian M. Andresen	Resident
Heidi A. Hanvold	Physiotherapist, research project coordinator
Torunn Hammer	Research nurse
Trine F. Myrvold	Research nurse

Editorial; Impossible is Nothing

Dear collegues, 2022 is in its final month and it is time to summarize what our research group has achieved. It has been a successful year with three PhD-defenses and several grant applications were awarded funding, reflecting the talented members of our group. In particular, our focus on innovations and new technologies as 3D printing and AI has paid off, building a base for the future.

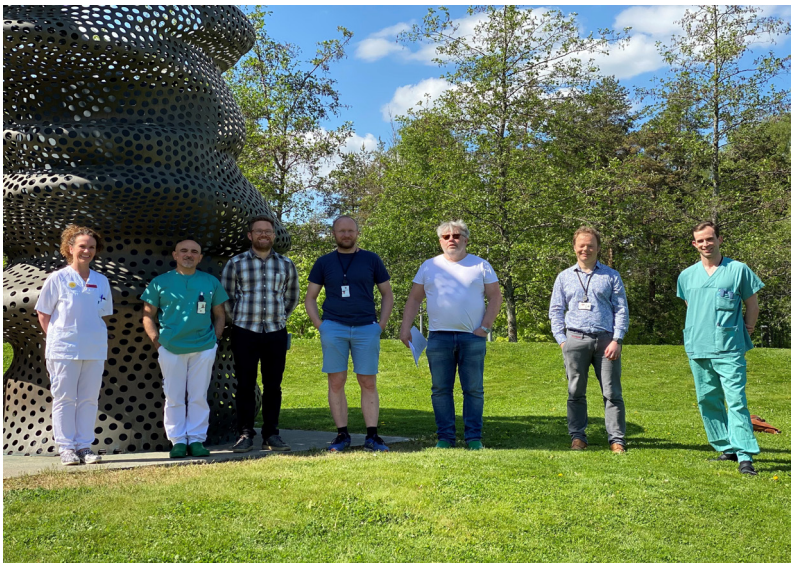
We are still struggling to increase the number of publications each year, but seeing that our manuscripts are accepted in the major journals in the field, outweighs that the numbers should be higher.

The fact that a manuscript written by members of our research group was accepted in the New England Journal of Medicine is the proof of the pudding that impossible is nothing. In this case it is the result of ten years of work and astonishing foreseeing of what was missing of evidence in our field. We will continue to celebrate this achievement, and have gathered an excellent team to our Orthopedic Symposium in 2023 about Achilles tendon rupture.

I am grateful to work with my excellent colleagues in our research group and I see a bright future ahead. Orthopedic disability represents a major burden on all health cares around the world, but the Nordic countries have a spot to fill through our knowledge on osteoporotic fractures and orthopedic registries. We will continue to work alongside the principles laid down in the last decade. Merry Christmas and a happy new year.

Regards, Orthopedic research group leader dr.med Asbjørn Årøen

Orthopedic Research Comittee



Members of the Orthopedic Research Committee

Asbjørn Årøen	Committee leader
Aron Adelved	Rep. supervisor for PhD-candidates (sub. for Randsborg)
Inni Figenschou	Rep. residents
Jakob V. Nordbø	Rep. PhD candidates
Per-Henrik Randsborg	Rep. supervisor for PhD-candidates (from Aug 1th.)
Rune B. Jakobsen	Rep. supervisor for PhD-candidates
Stefan Bartels	Rep. management of the department
Stein Erik Utvåg	Rep. university employees
Tor Kristian M. Andresen	Rep. residents (sub. for Figenschou)
Wenche B. Jacobsen	Rep. nurses
Inger Lene Brovold	Special adviser- research
Johanna A. Gjestland	Special adviser- research

The research committes main tasks:

- Develop the department´s research strategy.
- Promote research and research training for workers at the department.
- Contribute to developing the department´s research activity.
- Ensure high research quality and publication frequency within the research group.
- Improve the communication of orthopedic research and published results from the group.
- Ensure that research is maintained a high priority within the department.
- Assess all research projects before start-up and ensure that initiated projects are finalized.

Funding, prizes and awards

Randsborg PH, Mikaelsen JR. Total Knee Replacement in Obese Patients. 613 000 NOK x 6 years 2023-2028. Risks and benefits. South-Eastern Norway Regional Health Authority Research Funding.

Randsborg PH, Mikaelsen JR. Total Knee Replacement in Obese Patients. Risks and benefits. 500 000 NOK. Ahus strategic research funding for 2023.

Jakobsen RB, Wikerøy A. Fractures of the proximal humerus. Two Prospective Randomized Controlled Trials on the Treatment. 250 000 NOK. Ahus strategic research funding for 2023.

Straume-Næsheim T. Reconstruction of the medial patellofemoral ligament versus conservative treatment of recurrent patella dislocation. A Randomised Controlled Trial. 250 000 NOK. Ahus strategic research funding for 2023.

Gundersen M. Tibial Spine Fractures in Children at Akershus University Hospital – how are they doing? 130 000 NOK. Trygve Gythfeldt og frues forskningsfond.

Ekås G. Anterior cruciate ligament reconstructions in children and adolecents. 535 000 NOK. Sophies Minde Ortopedi.

Andresen TKM. Identification of factors of importance for treatment failure and patient satisfaction after Achilles tendon rupture: Minimum 5-year follow-up of patients randomized to non-surgical treatment, open surgery or mini-open surgery. 374 000 NOK. Sophies Minde Ortopedi.

Wikerøy A. Plate Fixation Versus Intramedullary Nailing of 3- and 4-part Promximal Humerus Fractures. A prospective Randomized Controlled Trial. 278 000 NOK Sophies Minde Ortopedi.

Fuglesang HF. Temmesfeld M. A solution to the knecap fracture problem. 1 400 000 NOK. Novo Nordisk Fonden.

Fuglesang HF. A superconstruct for osteoporotic femur fractures. 500 000 NOK. Forskningsrådet.

Myrvold S. FIFA og Norsk Idretssmedisinsk Forenings forskningspris 2022.

Pollmann C. Best publication 2021 at Department of Orthopedic Surgery, Ahus. Pollmann CT, Mellingsæter MR, Neerland BE, Straume-Næsheim T, Årøen A, Watne LO. Orthogeriatric co-management reduces incidence of delirium in hip fracture patients. Osteoporos Int. 2021.

Petterson A. The Bucket Handle Study. 40 000 NOK. Smith & Nephew arthoscopy scholarship.

Research seminar at the Department of Orthopedic Surgery

The Ortopedic Research Committee at the Department of Orthopedic Surgery arrange a yearly research seminar for all employers at the department. This year´s seminar was held on September 14th with the topic; *Industry and innovation.*

The following lectures were held:

- *Innovation - basics and experiences* by Max Temmesfeld.
- *Health innovation and industry* by Eirik Penne from Inventas.
- *How to realize an innovation idea* by Hendrik FS. Fuglesang, physician at the department.
- *Cooperation in industry and clinical studies* by Siri Kolle from Inven2.
- *Do´s and don´ts in research* by Data Protection Advisor June S. Østli.
- The regular feature *new projects in the department* where Jan Rune Mikaelsen presented his project; Total Knee Replacement in Obese Patients- Risk and Benefits led by associate professor Stein Erik Utvåg.

Our own surgeon Max Temmesfeld held a lecture about Innovation- basics and experiences.

Siri Kolle from Inven2 talked about cooperation in industry and clinical studies.

A great crowd from the department listening to Asbjørn Årøen in dialog with representant from Inven2; Siri Kolle.

Surgical Treatment of Distal Radius Fractures - Clinical Outcome And Health Economic

Cand.med **Ola-Lars Hammer** at Institute of Clinical Medicine defended the thesis "Surgical Treatment of Distal Radius Fractures- Clinical Outcome And Health Economics" for the degree of PhD (Philosophiae Doctor) on March 11, 2022 at Akershus University Hospital.

Principal supervisor: Associate prof. Per-Henrik Randsborg

Summary

Over the last two decades, volar locking plate (VLP) has become the most common surgical method to treat displaced radius fractures (DRFs) in adults, despite no clear evidence that VLP provides better functional or patient reported outcome- or is cost-effective- compared to external fixation (EF). The aim of the present study was therefore to meticulously compare the objective and subjective outcome of EF and VLP for displaced intraarticular DRFs, conduct an in-depth assessment of the responsiveness for widely used PROMs, and perform a detailed cost utility analysis, considering both direct (health service related) costs and societal costs, such as productivity loss due to work absenteeism.

After two years, there were no substantial differences in functional or patient reported outcome between patients treated with either VLP or EF. However, the VLP group had improved results the first year, and returned to work earlier that the patients in the EF group. When evaluating the responsiveness of EQ-5D and SF-6D to QuickDASH, we found that QuickDASH correlates well with EQ-5D on a group level, but with large individual variations. SF-6D was less responsive in the early postoperative period and did not provide additional information to EQ-5D. It can therefore be left out in future studies of outcome following surgical treatment of DRF. Finally, we found that the healthcare costs of VLP and EF are similar, but from a societal point of view VLP is cost-effective compared to EF, due to a higher degree of work absenteeism in the EF group.

In summary, this thesis supports the use of VLP as the method of choice when operating displaced DRFs due to quicker recovery for the patients and reduced cost for society. EQ-5D is an appropriate generic measure for quality of life and health economic analysis, while SF-6D can be omitted.

Improving Outcomes in Hip Fracture Patients

MD **Christian Pollmann** at Institute of Clinical Medicine defended the thesis "Improving Outcomes in Hip Fracture Patients" for the degree of PhD (Philosophiae Doctor) on May 3, 2022 at Akershus University Hospital.

Principal supervisor: Prof. Asbjørn Årøen

Summary

Hip fractures typically occur in the frail and elderly. They result in considerable morbidity and in increased mortality comparable to acute myocardial infarction. Deep surgical site infection after hip fracture surgery can worsen the functional outcome and seems to be associated with a further increase in mortality. Approximately every other hip fracture patient develops delirium.

The aim of this thesis, which is based on four observational studies, was to investigate possibilities to improve mortality, the incidence of surgical site infection, the functional outcome after revision for deep surgical site infection, and delirium in hip fracture patients.

We found that 'fast-tracking' hip fracture patients to the orthopaedic ward is safe. However, in light of our study and other available evidence, the effect of fast track hip fracture care on mortality seems to be limited.

Deep surgical site infection after hip fracture surgery is an independent risk factor for mortality. The role of the duration of surgery as a risk factor for surgical site infection is unclear. Our data, in conjunction with other reports, may indicate that the elapsed time during surgery could be less important than the reason for a prolonged operation.

When a deep surgical site infection after total hip arthroplasty is treated with debridement, antibiotics, and implant retention, the use of the posterior surgical approach is associated with better function and increased patient satisfaction compared to the transgluteal approach. However, most patients in our study had other indications for their total hip arthroplasty than an acute hip fracture. Therefore, it is unclear if this result can be extrapolated to hip fracture patients.

Orthogeriatric co-management reduced the incidence of delirium in our cohort of hip fracture patients. In conjunction with previous evidence, a clinically relevant effect of orthogeriatric co-management on the incidence of delirium in hip fracture patients seems probable.

Outcomes, Physical Performance, and Complications Following Treatment of Acute Achilles´ Tendon Ruptures

Cand.med **Ståle Bergman Myhrvold** at Institute of Clinical Medicine defended the thesis "Outcomes, Physical Performance, and Complications Following Treatment of Ccute Achilles´ Tendon Ruptures" for the degree of PhD (Philosophiae Doctor) on September, 29 2022 at Akershus University Hospital.

Principal supervisor: Cand.med. PhD, Sigurd Erik Hoelsbrekken

Summary

The Achilles´ tendon is the strongest tendon in the human body. A rupture may lead to gait abnormalities caused by tendon elongation. Treatment options are non-operative and surgical including open, minimally invasive, and percutaneous techniques.

We performed the world's largest randomized controlled trial (RCT) comparing three treatments of acute Achilles´ tendon ruptures. 554 patients from four centers were randomly assigned to receive non-operative treatment, open repair, or minimally invasive surgery. 526 patients were included in the analyses. The main outcome was patient satisfaction measured by the only available injury specific patient reported outcome measure for acute Achilles´ tendon rupture – the acute Achilles´ tendon Total Rupture Score (ATRS). The validity and reliability of the Norwegian translation of the ATRS was found acceptable.

We also compared measurement methods for measuring the length of the Achilles´ tendon using ultrasound and found that the best agreement and most reliable measures were produced using measurements from the distal medial musculo-tendinous junction to the tendon´s insertion on the back of the heel using skin markings and a measuring tape.

In the RCT we found that despite a higher risk of re-rupture after non-operative treatment, patient satisfaction and physical performance were similar comparing the three treatment groups after 1 year.

Conservative versus Operative Treatment of 2-part Displaced Proximal Humerus Fractures. A Prospective Randomized Controlled Trial

Project group: Annette Wikerøy MD PhD candidate, Per-Henrik Randsborg MD PhD, Hendrik Fuglesang MD PhD, Rune Bruhn Jakobsen MD PhD

Background: Fractures of the proximal humerus (PHF) are increasingly common with an ageing population, being the third most frequent fracture in the elderly. 2-part fractures displaced more than 50 % are often considered for surgical treatment in Norway, a tradition that goes back to Neer´s publications in 1970. We wish to challenge this practice. Recent literature suggests a more conservative approach to displaced 2-part PHF. Despite this, surgical treatment trends increase in Norway. There is no consensus on which patients with PHFs that need surgery, the treatment differs and there are studies pointing to benefits of non-operative treatment options for some groups of patients. This project is a prospective randomized controlled trial on the treatment of PHFs that aims to challenge current clinical practice and provide definite answers to the question: Do patients fare better or worse after surgery in the case of a simple displaced 2-part fracture compared to non-operative treatment?

Aim: The aim of this RCT is to compare surgical with non-surgical management of displaced 2-part PHFs in light of radiological, economical and clinical outcome.

Material and methods: This is a prospective randomized controlled single center trial. All patients admitted to Ahus with a displaced 2-part PHF are considered for inclusion and followed at our outpatients clinic for one year after surgery. Primary outcome is the Quick-DASH score, a Patient Related Outcome Score (PROMS). The change of the score from baseline to end follow-up is registered. In addition to this, other PROMS, complications, radiological and functional outcome and costs are registered.

Calculations show that for a RCT with two arms and a significance level of 5% and power of 90%, a sample of 21 patients treated in each group is sufficient. We aim to include 50 patients, calculating a risk of losing 10% of patients within the two years follow-up.

Results: As a pilot project, we conducted a retrospective cohort/feasibility study of all PHFs operated from 2011 to 2014 to be able to plan the method selection and analysis for the RCT. The results were published in 2018 in Journal of Orthopaedic Surgery and Research. No other results are yet available.

Status: Inclusion of 14 patients, ongoing inclusion. The duration of follow-up is one year.

Plate Fixation Versus Intramedullary Nailing of 3- and 4-part Proximal Humerus Fractures. A Prospective Randomized Controlled Trial

Project group: Annette Wikerøy MD PhD candidate, Per-Henrik Randsborg MD PhD, Hendrik Fuglesang MD PhD, Rune Bruhn Jakobsen MD PhD

Background: Fractures of the proximal humerus (PHF) are increasingly common with an ageing population, being the third most frequent fracture in the elderly. In international publications, congresses and learning-courses discussing the treatment of complicated PHFs, systematic comparison of well-established methods are called for.

Aim: This project is a semi-blinded randomized controlled trial on the treatment of PHFs that aims to answer the question: Does intramedullary nailing or locked plating provide the best patient reported outcome in cases of displaced 3- and 4-part fractures? We will outline the differences in functional results, complications and the costs for society.

Nailing and plating complicated PHFs are two internationally well-established treatments that lacks systematic comparison. This project will fill in this knowledge-gap, strengthen the specialized treatment for PHFs and aims to result in a reduction of complications and costs.

Materials and methods: This is a prospective semi-blinded randomized controlled single center trial. All patients admitted to Ahus with a displaced 3- or 4-part PHF are considered for inclusion and followed at our outpatient clinic for two years after surgery. Primary outcome is the DASH score, a Patient Related Outcome Score (PROMS). The change of score from baseline to end follow-up is registered. In addition to this, other PROMS, complications, functional outcome and costs are registered.

For a RCT with two arms and a significance level of 5 % and power of 80 %, a sample of 36 patients treated in each group is sufficient. We aim to include 79 patients, calculating a risk of 10 % loss to follow-up within the two years follow-up.

Results: As a pilot project, we conducted a retrospective cohort/ feasibility study of all PHFs operated from 2011 to 2014 to be able to plan the method selection and analysis for the RCT, the results were published in 2018 in Journal of Orthopaedic Surgery and Research. No results other than this is available yet.

Status: Inclusion of 79 patients was completed in June 2021. The duration of follow-up is two years, so follow up is finished june 2023.

Dupytren's Disease Study: A Randomized Controlled Trial Comparing Clostridium Histolyticum with Needle Aponeurotomy

Project group: Ingi Thor Hauksson MD PhD candidate, Per-Henrik Randsborg MD PhD, Morten Havdal MD, Sigurd E Hoelsbrekken MD PhD

Background: Open surgery (fascieectomy) has traditionally been considered the gold standard of treatment for Dupytren´s disease (Dd) despite considerable risk of complications. The average recurrence rates are about 40% for fascieectomy and 60% for fasciotomy after four years. There is an increasing interest in Scandinavia in the treatment of Dd with Clostridium Histolyticum (Xiapex ®, Auxillium). The enzyme treatment may provide fewer complications and shorter sick leaves. However, the enzyme is expensive and long-term effects are not well documented. More studies are needed to analyze both short and long-term clinical outcome as well as cost-benefit analysis.

Another treatment of Dupuytren's contracture is aponeurotomy, a safe and inexpensive method by which the cord is severed with a needle. These two non-operative methods have not been compared in a properly designed RCT. This is of importance since both treatments may provide better and more cost effective treatment compared to open surgery. Moreover, serious complications rates may be lower. The two procedures leave little scar tissue reducing the challenges posed by the reoperations. Recurrence rate of contracture following different treatments of Dupuytren's disease differs widely in the literature, and the rate is influenced by multiple factors.

Aim: To conduct a clinical randomized controlled trail comparing functional results and recurrence rate following enzymatic treatment versus needle aponeurotomy.

Materials and methods: Patients with a contracture of 30° or more in only one metacarpophalangeal (MCP) joint contracture of one of the three ulnar digits and less than 20° for the adjacent proximal interphalangeal (PIP) joint and with primary disease of the hand will be asked to participate in the trial. Power calculations show that 80 patients are needed to detect a difference of 13.5°. Patients are randomized to receive either Needle aponeurotomy or Clostridium Histolyticum treatment. Clinical follow-ups at 1 week, 4 weeks, 16 weeks and 1 year, 2 years and 5 years. Functional outcome scores: URAM, QuickDASH, EQ5D, brief MHQ, VAS pain and VAS patient satisfaction. Total passive extension contracture reduction, recurrence rate and registration of complications.

Status: From the start of the study in October 2013 through November 2016, 80 patients have been included and treated in the study. The final 2-year follow-up has been completed. The data has been collected and analysis has begun with the aid of a biostatistician at the Health Services Reasearch Department at Ahus. Manuscript preparation started first quarter 2023.

Internal Fixation or Arthroplasty for Displaced Femoral Neck Fractures in Patients under 55 years? Functional Outcome and Complications from a Prospective Observational Study of 1047 Patients Reported to the Norwegian Hip Fracture Register

Project group: Stefan Bartels MD PhD candidate, Jan-Erik Gjertsen MD PhD (Department of Orthopedic Surgery, Haukeland University Hospital, Bergen, Department of Clinical Medicine, University of Bergen), Eva Dybvik PhD (Norwegian Hip Fracture Register, Bergen), Frede Frihagen MD PhD (Department of Orthopedic Surgery, Østfold Hospital), Cecilia Rogmark MD PhD (Department of Orthopaedics, Skåne University Hospital, Lund University, Malmö, Sweden), Stein Erik Utvåg MD PhD

Background: Treatment of displaced intracapsular femoral neck fractures (FNFs) in patients under 55 years remains controversial. We aimed to compare internal fixation (IF), bipolar hemiarthroplasty (HA) and total hip arthroplasty (THA) in terms of reoperations, patient survival, and patient-reported outcome measures (PROMs) by using data from the Norwegian Hip Fracture Register.

Material and methods: Data from 1047 patients treated between 2005 and 2017 were included. 764 patients were treated with IF (2 screws), 102 patients had HA, and 181 patients had THA. Reoperations, PROMs (patient satisfaction, pain, and health related quality of life (EQ-5D-3L) after 4 and 12 months and the 1, 3- and 5-year survival were investigated.

Results: Patients treated with HA had more comorbidities and were more frequently cognitively impaired compared to patients treated with IF and THA. Major reoperations occurred in 26% after IF, 7% after HA and 6% after THA. Patients treated with arthroplasties were more satisfied (p=0.012) and reported less pain (p=0.001) than patients treated with IF after 4 months but not at 12 months. Patients treated with THA and IF reported higher EQ5D index score before fracture but did not regain their original preoperative health status.

Status: Due to conflicts with other projects, this study still remains uncomplete and is not published. After finished PhD thesis and projects (assumed finished autumn 2023), there is still an intention to finish this study. We might discuss if new analyses with more patients are useful.

Treatment of Low-Energy Displaced Femoral Neck Fractures in Patients Between 55 and 70 years: A Randomized Controlled Multicenter Trial Comparing Internal Fixation and Total Hip Arthroplasty

Project group: Stefan Bartels MD PhD candidate, Torbjørn B. Kristensen MD PhD (Department of Orthopedic Surgery, Haukeland University Hospital, Bergen), Jan-Erik Gjertsen MD PhD (Department of Orthopedic Surgery, Haukeland University Hospital, Bergen, Norwegian Hip Fracture Register, Department of Orthopedic Surgery, Haukeland University Hospital, Bergen, Department of Clinical Medicine, University of Bergen, Bergen), Frede Frihagen MD PhD (Department of Orthopedic Surgery, Østfold Hospital), Cecilia Rogmark MD PhD (Department of Orthopedics, Skåne University Hospital, Lund University, Malmö, Sweden), Filip C. Dolatowski MD PhD (Department of Orthopedic Surgery, Oslo University Hospital), Wender Figved MD PhD (Department of Orthopedic Surgery, Bærum Hospital), Jūratė Šaltytė Benth PhD, Stein Erik Utvåg MD PhD

Background: The treatment of displaced femoral neck fractures (FNFs) in patients age 55-70 years remains controversial. We aimed to compare the effect of closed reduction and internal fixation with cannulated screws (IF) versus total hip arthroplasty (THA) on hip pain and function, as assessed by outcome measures, complications, and reoperations.

Methods: The study is conducted as a multicenter randomized controlled trial, including patients aged 55-70 years with a low-energy displaced FNF, randomized to IF or THA between December 2013 and December 2018. The primary outcome was Harris Hip Score (HHS) assessed 12 months postoperatively. Secondary outcomes were HHS at 4 and 24 months, Oxford Hip Score (OHS), Hip Disability and Osteoarthritis Outcome Score (HOOS), health-related quality of life (EQ-5D-3L index score and EQ-VAS), VAS pain, and VAS satisfaction at 4, 12, and 24 months. Complications and reoperations were monitored continuously.

The primary analyses were performed according to the intention to treat principle.

Results: 102 patients (mean age 63.7 years, SD 4.2) were allocated to IF (51) and THA (51). The mean difference in primary outcome HHS at 12 months (5.3, 95% CI (0.8;9.8): p=0.021) was below our predefined minimal clinically important difference (MCID) of 10 points. Patients treated with THA had significantly higher HHS at 4 and 12 months, better OHS at 4 and 12 months, and better HOOS at 4, 12, and 24 months. Patients treated with THA reported better health-related quality of life after 4 months, were more satisfied, and reported less pain after 4 and 12 months. Major reoperations occurred in 26 patients (51%) after IF and 2 (4%) after THA (RR=13.0, 95% CI (3.3;51.9): p<0.001).

Status: published

Factors that may impact the functional level of older patients following hip fracture surgery

Project group: Marit Kirkevold PhD, Linda Andresen study nurse, Torunn Hammer, study nurse Nina Michelsson Weldingh, research support, Jūratė Šaltytė Benth biostatistician PhD

Backgroud: Numbers from the hip fracture register indicate that one year after surgery, only approximately half of the patients who were independent in walking, personal hygiene and activities of daily living have regained the same level of functioning. Reduced functional level and high mortality are related to frailty and comorbidity but may additionally be associated with complications following hip fracture. Some of these complications may be prevented or limited by tailored treatment and follow-up. The literature review shows that a number of patient-related factors may explain the functional level both before and after a hip fracture in older patients. Several of these factors may be modified by nursing measures in the days prior to and following surgery. One essential goal for the treatment of patients following hip fracture is improved short-term and long-term functioning. Consequently, it is important to assess whether and to what degree these factors are present and impact the outcome. This knowledge will enable us to intervene early and target factors that may contribute to the negative development, thereby preventing at least some of the functional decline.

Aim: The main purpose of this project is to contribute knowledge that may improve the nursing care of patients with hip fracture. Specifically, the purpose is to explore which factors impact the level of functioning at discharge and after three months postdischarge.

Materials and methods: The study is exploratory and longitudinal. The patients are assessed at admission, every day during hospitalization and after three months. This study plans to utilize parts of the data already being collected for the CSF/delirium study. In addition, we will collect data on nutritional status at admission, daily mobilization status following the surgery, and functional level before admission, at discharge and at 3 months after discharge. Furthermore, pain and nausea are assessed daily, and grip strength is assessed pre- and postoperatively once during hospitalization. In addition, other data assumed to potentially influence the level of functioning at discharge and after three months will be collected.

Status: Published 2022.

”Better Before - Better After”: Prehabilitation Program for Older Patients Awaiting Total Hip Arthroplasty. A Randomized Controlled Trial

Project group: Jakob Vangen Nordbø MD PhD candidate, Asbjørn Årøen MD PhD, Odd-Einar Svinøy PT PhD student (OsloMet), Gunvor Hilde PT Associate professor (OsloMet)

Background: In the light of poor physical function before Total Hip Arthroplasty (THA) among older patients, and the likelihood of an added decrease during hospitalization and risk of poorer outcome after surgery, it is hypothesized that prehabilitation (preoperative exercise) would improve outcomes after surgery. However, evidence for its efficacy is still lacking. This study will add to the body of knowledge within community-based physiotherapy, and guide clinical practice in whether a research-based educational and exercise program tailored to meet individual needs, and the level of difficulty relevant for each patient, is an effective approach for older patients awaiting THA.

Aim: The primary objective of this study is to assess the effect of prehabilitation of older patients awaiting THA on physical function measured by walking speed within one week after the prehabilitation program is finished (end of intervention) as well as 6 weeks and 3, 6 and 12 months after THA surgery.

Secondary objectives are to assess physical performance measured by 30-second Chair Stand Test, 6 Minute Walk Test, Stair Climb Test, Timed Up & Go Test, self-reported outcomes such as pain, symptoms, activity of daily living (ADL), physical activity, and quality of life. Further, we will evaluate the cost-effectiveness of the intervention.

Materials and methods: The study will be conducted as a randomized controlled clinical trial. The participants, ≥ 70 years with Harris Hip Score ≤ 60, will be recruited mainly from Ahus and Martina Hansen’s Hospital, when they are scheduled for primary THA due to end-stage osteoarthritis. The intervention program will be carried out for 6-12 weeks with at least 3 training sessions weekly lasting 45-60 min. Supervised training with an experienced physiotherapist will be offered for 2 sessions, and for the other sessions, the participants will perform home training. The control group will be asked to do what they normally do. They will be told not to start a supervised prehabilitation program before surgery. In the primary objective, we want to assess the effect of prehabilitation on function measured by walking speed. Walking speed will be measured by the 40 m. (4x10 m.) Fast-paced Walk Test. The participants are asked to walk as quickly, but safely as possible along a 10 m. walkway. Timing will be recorded for each 10 m. (4x10 m.). The speed will be expressed as m/s. A regular walking aid is allowed and recorded. Sample size estimation requires 100 patients, 50 in each group.

Status: The inclusion is finished. Data acquisition will be finished by February 2023. The analysis will be performed in the first half of 2023 and the article written in the second half of 2023.

Physical Activity after Total Hip Arthroplasty

Project group: Jakob Vangen Nordbø MD PhD candidate, Truls Straume-Næsheim MD PhD, Einar Andreas Sivertsen MD PhD (Lovisenberg Diaconal Hospital), Geir Hallan MD PhD (The Norwegian Arthroplasty Register), Anne Marie Fenstad statistician (The Norwegian Arthroplasty Register), Stefan Bartels MD, Asbjørn Årøen MD Prof.

Background: With an increasing aging population and increasing expectations regarding physical activity (PA) among people going through total hip arthroplasty (THA), we want to investigate how physical activity interferes with modern hip arthroplasty defined by the introduction of highly cross-linked polyethylene (HXLPE) from 2005 and forward. The project consists of a cohort from the National Hip Arthroplasty Register and a cohort from The Trøndelag Health Study (The HUNT Study) – a longitudinal population health study in Norway.

Aim: The primary objective of this project is to compare the level of PA in a middle-aged population with THA with a matched normal population.

Materials and methods: A cohort of patients aged 40-75 years treated with THA containing HXLPE was identified in the national hip arthroplasty register from the period 2005-12 (n=856). With a median follow-up time after THA of 10 years, this cohort received a questionnaire. After two reminders, 429 (50.1%) patients replied.

The HUNT Study is one of the largest health studies ever performed. It is a unique database of questionnaire data, clinical measurements and samples from a county's inhabitants from 1984 onwards. Our cohort consists of participants from HUNT3 (2006-08). Questionnaires were sent to inhabitants aged 40-75 years (n=53441) and answered by 34518 (64.6%). Participants reported their PA levels by answering three questions about the frequency, intensity, and duration of exercise. The PA questionnaire has previously been validated. Participants also reported PA levels by the University of California, Los Angeles (UCLA) Physical Activity Scale.

We want to perform a regression analysis of the PA levels controlled by age, sex and BMI. We also want to present descriptive statistics on comorbidity and surgery-related variables.

Results: We have not published any results per 31.12.22.

Status: The data acquisition is completed and the project is in the analysis and writing phase. The project will be finished in 2023.

Physical Activity and the Risk of Aseptic Loosening after Total Hip Arthroplasty

Project group: Jakob Vangen Nordbø MD PhD candidate, Truls Straume-Næsheim MD PhD, Einar Andreas Sivertsen MD PhD (Lovisenberg Diaconal Hospital), Geir Hallan MD PhD (The Norwegian Arthroplasty Register), Anne Marie Fenstad statistician (The Norwegian Arthroplasty Register), Stefan Bartels MD, Asbjørn Årøen MD PhD

Background: With an increasing aging population and increasing expectations on physical activity (PA) among people going through total hip arthroplasty, we want to investigate how PA interferes with modern hip arthroplasty defined by the introduction of highly cross-linked polyethylene (HXLPE) from 2005 and forward. The wear and tear of the polyethylene is described as the main reason for the aseptic loosening of the cup. Aseptic loosening is one of the major reasons for the revision surgery of THAs. HXLPE shows a significantly reduced wear rate of the acetabular cup. There is an evident need to explore the level of PA among people after THA with HXLPE and if it still is associated with an increased risk of revision surgery.

Aim: The primary objective of this retrospective case-control study is to find out if people with THA in the age of 40-75 years, who have received revision surgery due to aseptic loosening were more physically active after the primary surgery than a matching control group that has not received revision surgery.

Materials and methods: Patients, aged 40-75 years, treated with THA containing HXLPE were identified in the National Hip Arthroplasty Register from the period 2005-2012. The cases (n=176), THAs reoperated due to aseptic loosening, were compared to controls (n=856), THAs without registered complications.

With a median follow-up time after primary THA of 8 years, both groups received a questionnaire. After two reminders 77 (43.8%) of the cases and 429 (50.1%) of the controls answered. Participants reported their PA levels by answering the University of California, Los Angeles (UCLA) Physical Activity Scale. Both groups were asked to answer the UCLA scale retrospectively at their best condition after the primary surgery. The sample size of the cohort is based on a meaningful difference in the UCLA activity scale. SooHoo defined the minimal clinically important difference in the UCLA activity scale to be 0.92 and Lubbeke the SD to be 2.0. This estimate requires 74 patients, 37 in each group, to obtain 80% statistical power with a 5% significance level for an independent samples t-test.

We want to perform a logistic regression analysis of the PA levels controlled by age, sex, BMI, ASA-score and surgery-related variables as surgical approach and type of prosthesis. Health-related and functional scores as EQ5D and HOOS are collected.

Results: We have not published any results per 31.12.22.

Status: The data acquisition is completed and the project is in the analysis and writing phase. The project will be finished in 2023.

Postoperative Mobilization Restrictions and the Risk of Dislocation after Total Hip Arthroplasty

Project group: Jakob Vangen Nordbø MD PhD candidate, Asbjørn Årøen MD PhD, Jakob de Lange medical student UiO, Christian Pollmann MD PhD, Örlygur Arnarson MD (Stavanger University Hospital), Aksel Paulsen MD PhD (Stavanger University Hospital)

Background: Postoperative mobilization restrictions are used in an attempt to reduce the risk of dislocation following primary total hip arthroplasty (THA). There has been a tendency towards less use of restrictions in the last years supported by the literature. Results published in 2019 among the Nordic countries showed that Norway is the most conservative country still using restrictions in 81% of the hospitals compared to 50% in Denmark. Akershus University Hospital (Ahus) is one of the hospitals still using postoperative mobilization restrictions after THA. In contrast, Stavanger University Hospital (SUH) does not have any postoperative restrictions and is a comparable hospital when it comes to volume of surgery, type of prosthesis, and use of the posterolateral approach to the hip. We wanted to conduct a historical cohort study between the hospitals to compare the early dislocation rate, the first 90 days, after THA surgery.

Aim: This cohort study aims to find out if patients operated with THA by the posterolateral approach in two comparable Norwegian hospitals have the same low risk of postoperative dislocation the first 90 days despite that one of the hospitals does not have any postoperative mobilization restrictions.

Materials and methods: Patients with osteoarthritis treated with primary THA by the posterolateral approach at Ahus and SUH are identified in the National Hip Arthroplasty Register (NAR) from the period 2015-20. Dislocation of THA is reported by the repositioning procedure (NFH) in the Norwegian Patient Register (NPR). By using data from NPR, we hope to identify all reported dislocations from our cohort repositioned at any hospital in Norway. The sample size estimation of the cohort is based on a 1% dislocation rate with a 1% non-inferiority margin, power 80%, alpha 0.05, and requires a total sample of 2446 patients.

We want to perform a logistic regression analysis of the dislocation rate between the hospitals controlled by age, sex, ASA-score, head-size of the prosthesis, and surgical approach.

Status: The study protocol is approved by the Regional and local ethical committees (REK and PVO). An application was sent to the NPR in September 2021 and approved in November 2022. The data is expected to be delivered from the NPR in the first half of 2023 and will be matched with data from the NAR. We aim to analyze the data in the second half of 2023.

Incidence of pediatric Anterior Cruciate Ligament Reconstructions in Norway (2005-2021)

Project group: Caroline Kooy Tveiten MD PhD student, Anne Marie Fenstad (Norwegian Arthroplasty Register), Lars Engebretsen MD Prof. (Oslo University Hospital), Rune Jakobsen MD PhD, Andreas Persson, Håvard Visnes MD PhD (Haukeland University Hospital), Guri Ekås MD PhD

Background: ACL-injury is a severe injury to sustain as a child because of its impact on quality of life, both short and long-term, and especially regarding the risk of early development of osteoarthritis. Treatment is controversial regarding indication for surgery and what is considered the best treatment algorithm. In Norway, early ACL-reconstruction (ACL-r) is offered to patients with additional injuries, which warrants immediate repair. Patients without such injuries are initially treated non-operatively with rehabilitation. Delayed ACL-r is an option if a child sustains additional injuries, has recurrent instability or unacceptable activity limitations. During the last few decades, there has been an increase in ACL-r in the pediatric population both in Australia and in the United States. Even though not all patients seem to need surgery, ACL-r is still an important treatment alternative – but not without risk in skeletally immature children. The increasing trend in ACL-r internationally is therefore of great concern, also because it may imply an increase in ACL-injuries in the young population. Pediatric ACL-r has not been described in a population-based setting in Norway, and the national incidence is also unknown.

Aim: Our primary aim is to determine the incidence of pediatric ACL-r in Norway during the past 15 years. Secondly, we want to find out trends in surgical practice, patient characteristics, and to see how they cope.

Material and methods: Data was retrieved from the nationwide Norwegian Knee Ligament Register (NKLR), which collects data on all cases of ACL reconstructions in Norway. Included patients were girls aged 14 years or younger, and boys aged 16 years or younger, with primary ACL-r registered in the period Jan 2005 - Dec 2019. Main outcome measurement was annual incidence of pediatric ACL-r , stratified by age and sex, and calculated by using the corresponding annual population number (per 100.000) based on data from Statistics Norway (SSB). Descriptive statistics were analyzed regarding age, sex, height, weight, activity at injury, type and treatment of additional injury, and surgical details including “choice of graft” and “time from injury to surgery”. Patient reported outcome measures (PROMs) were assessed by “The Knee Injury and Osteoarthritis Outcome Score” (KOOS) preoperatively and after 2, 5, and 10 years. KOOS is a tool that measures five domains according to a scale of 0-100: Pain, Symptoms, Activities of Daily Living, Sports and Quality of Life. We will report mean scores for each domain/subscale and proportion of patients achieving patient acceptable symptom state, where a minimal important change and treatment failure is set at a KOOS sub score < 44.

Status: Data collection is completed. Final data-analysis is currently ongoing, and manuscript is in preparation.

Pediatric Anterior Cruciate Ligament Monitoring Initiative

Project group: Guri Ekås MD PhD, Håvard Moksnes PT PhD, Lars Engebretsen MD Prof. (Oslo University Hospital), Caroline Mouton MD PhD (Centre Hospitalier de Luxembourg), Romain Seil MD PhD (Centre Hospitalier de Luxembourg)

Background: Children are a special population, having immature bodies and minds. They have their life ahead of them. Anterior cruciate ligament (ACL) injuries are an increasing problem among this vulnerable population. An ACL injury is a knee injury with potentially detrimental long-term consequences, but we do not know to what extent. Currently, treatments with unknown efficacy are performed on these children. While there is moderately strong evidence to guide decision making on how to manage ACL injuries in adults, we cannot simply apply a "cookie-cutter approach" and expect that this evidence will apply to children. Children are not "miniature adults".
There are 2 main problems:

1. We have only preliminary evidence on how to approach ACL management in children – and the quality is low.
2. Because we have limited evidence, it is difficult for clinicians to guide patients and families when making shared decisions about managing ACL injuries.

Aim: The primary aim of Pediatric Anterior Cruciate Ligament Monitoring Initiative (PAMI) is to improve the knowledge base of pediatric ACL injuries. Secondary aim is to incorporate and utilize this newly ascertained knowledge to advance patient treatment. To reach the primary aim we have the following objectives:

1. Describe epidemiological aspects (i.e incidence, injury mechanisms) with regard to pediatric ACL injuries.
2. Evaluate short-and medium-term clinical outcomes following pediatric ACL injury.
3. To reach the secondary aim we have the following objectives:
4. Document current practice for pediatric ACL injuries (i.e treatment approach, surgical technique).
5. Identify prognostic factors for outcome based on current treatments including risk factors for poor outcomes (i.e new injuries).

Materials and Methods: PAMI is a novel pan-European multi-centre registry supported by the European Society of Sports Traumatology, Knee Surgery and Arthroscopy (ESSKA) established in 2017 with headquarters in Luxembourg. The PAMI registry began including children with ACL injuries from Luxembourg in 2018 and from Norway in January 2020 (Oslo and Akershus University Hospital). A secure data collection platform has been created using two-factor authentication with Short Message Service, SMS. Only de-identified patient information will be uploaded into the PAMI database, to ensure data protection and avoid legal issues related to data transfer between countries. The following three patient inclusion criteria must be present: a physical activity-related ACL injury, ACL injury diagnosed with MRI and a positive Lachman's test and skeletal age 8-14 in girls and 8-16 in boys. Exclusion criteria: tibial spine fractures, combined ACL and posterior cruciate ligament injuries, and knee dislocations.

S**tatus**: Data collection is ongoing.

Tibial Spine Fractures in Children at Akershus University Hospital – how are they doing?

Project group: Guri Ekås MD PhD, Maren Gundersen MD, Asbjørn Årøen MD Prof.

Background: A tibial spine fracture is an avulsion of the insertion of the anterior cruciate ligament (ACL) to the tibia in the knee. We suspect injury burden and patient outcomes are similar for children with tibial spine and ACL injuries, but regarding tibial spine fractures there has not been much development in treatment strategies the last 20 years. There are no high-quality epidemiological studies, very few prospective studies which report patient outcome over time and non-surgically treated patients are generally overlooked in research.

Aim: Primary aim is to detect and examine patients who have been treated for a tibial spine fracture in childhood at Akershus University Hospital (Ahus) the last 10 years. Secondary aim is to evaluate the structure of the ACL in conservatively managed patients who have sustained a tibial spine fracture in childhood using 7.0 Tesla MRI.
We hypothesize that:

- the main injury mechanism for tibial spine fractures are alpine skiing in 50 % of the cases or more
- the incidence of tibial spine fractures at Akershus University Hospital is higher than reported in Sweden (0.1 pr 1000 child age 9-14)
- more than 50% of children with a tibial spine fracture have not returned to preinjury activity level one year after injury
- the structure of the ACL is altered following a tibial spine fracture

Materials and Methods: This is a retrospective study including children (boys =<16 years, girls =<14 years with a tibial spine fracture from 2009-2019 treated at Ahus (surgically or non-surgically). We define tibial spine avulsion fracture as bony or cartilaginous avulsion of the ACL. Exclusion criteria are ACL injury and knee luxation. Patients will be identified in hospital records. Inclusion is based on informed consent. Study participants will be invited to a clinical follow-up visit which includes medical history, clinical examination and patient reported outcome measures. In addition, we will evaluate available radiological images and review relevant medical charts regarding treatment and complications. Primary outcome measures in this study are mean and individual scores of the following patient reported outcomes measures pedi-IKDC and Hospital for Special Surgery Pediatric Functional Activity Brief Scale. Secondary outcomes are injury mechanisms, rate of patients with additional intraarticular injuries at baseline, rate of patients who require surgical treatment for their tibial spine fracture, rate of patients with subsequent surgery since baseline, clinical examination of knee laxity (Lachman test, pivot shift/slocum test, KT-1000). The rational for this study is to plan a larger prospective multicenter study to evaluate treatment and radiological outcome of tibial spine fractures in children treated surgically or non-surgically.

Status: Patient inclusion and data collection is completed. Data analysis is ongoing.

Antibiotic Loaded Bone Cement in Prevention of Periprosthetic Joint Infections in Primary Total Knee Arthroplasty: A Register-based Multicenter Randomized Controlled Non-inferiority (ALBA Trial)

Project group: Tesfaye Leta PhD, Ove Furnes MD PhD (Haukeland University Hospital), Rune Jakobsen MD PhD, in addition local representatives from all including hospitals and Norwegian Arthroplasty Register

Background: The current evidence on the efficacy of ALBC in reducing the risk of periprosthetic joint infections (PJI) after primary joint reconstruction is insufficient. In several European countries, the use of ALBC is routine practice unlike in the US where ALBC use is not approved in low-risk patients. It has been claimed that the antibiotic in ALBC increase the risk of aseptic loosening, risk of systemic toxicity, allergic reaction, and /or bacterial resistance.

Aim: To investigate the effects of Antibiotic Loaded Bone Cement (ALBC) compared to plain bone cement in primary total knee arthroplasty (TKA).

Materials and methods: A single-blinded pragmatic multicenter register-based randomized controlled non-inferiority trial. The primary outcome will be risk of revision surgery due to PJI at 1 year of follow-up. Secondary outcomes will be:

- risk of revision due to any reason including aseptic loosening at 1-, 6-, 10-, and 20-years of follow-up;
- patient related outcome measures (PROMs) like function, pain, satisfaction, and health-related quality of life at 1-, 6-, and 10-years of follow-up;
- risk of changes in the microbial pattern and resistance profiles of organisms cultured in subsequent revisions at 1-, 6-, 10-, and 20-years of follow-up; and
- cost-effectiveness of routine ALBC vs plain bone cement use in primary TKA.

This trial will be conducted in Norwegian hospitals that routinely perform cemented primary TKA. All patients undergoing full-cemented primary TKA are eligible to participate in the study. A minimum of 11108 patients (5504 in each group) will be included. We will use 1:1 randomization with random permuted blocks and stratify by participating hospitals to randomize patients to receive ALBC or plain bone cement. Inclusion, randomization, and follow-up will be through the Norwegian Arthroplasty Register.

Results: None at present.

Status: Protocol published. Inclusion ongoing (at present 1st quarter 2023 >1500 patients included).

Improving the Treatment of Anterior Cruciate Ligament Tears in Norway with register-RCTs – who should have surgery and how should we do it?

Project group: Rune B. Jakobsen MD PhD, Ass. Prof., Asbjørn Årøen MD Prof., Lars Engebretsen, MD Prof. (Oslo University Hospital), Andreas Persson, MD PhD (Oslo University Hosptial), Guri Ekås MD PhD, Ann-Kristin Hansen MD Ass. Prof. (University of Tromsø), Jon Olav Drogset MD Prof. (St. Olavs Hospital), Håvard Visnes MD PhD (Haukeland University Hospital), Jostein Bildøy (patient representative, Norwegian Arthroplasty Register) Marianne Warholm (IT Haukeland University Hospital) Stein Håkon Lygre (biostatistician, Norwegian Arthroplasty Register) Anne Marie Fenstad cand.scient. (biostatistician, Norwegian Arthroplasty Register) John Petter Skjetne, Helse Midt IKT, Magnus Løberg, MD, PhD, Associate Professor, UiO, Caroline Kooy Tveiten, MD, PhD-student

Background: Every year 4000 people in Norway sustain a complete tear of their anterior cruciate ligament- a life-changing event leaving the patient with an unsatisfactory knee-function limiting everyday life and predisposing the patient to suffer from premature osteoarthritis. Physicians need to be able to offer patients precise, personalized advice on treatment and prognosis. Yet, at present, despite years of research on treating ACL injuries, it remains uncertain who should undergo reconstructive surgery and who should not. Neither do we know the optimal choice of graft for the reconstruction. In this project, we seek to exploit the infrastructure of the Norwegian National Knee Ligament Register (NNKLR), which uniquely include non-surgically treated ACL-tears and has almost complete coverage of surgical reconstructions, utilizing a pragmatic register-based RCT design.

Aim:

- Investigate the outcome of surgical and non-surgical treatment of ACL-injury through a multi-center register-based RCT with outcome collection of primary endpoints solely performed by NNKLR.
- Investigate the outcome of the three main graft choices when reconstructing ACLs through a multi-center register-based RCT with outcome collection of primary endpoints solely performed by the NNKLR.
- Provide the infrastructure of register-based RCTs to make this the norm for assessing effects of changes in the treatment of cruciate ligament injuries.
- Disseminate the knowledge of register-based RCTs in the orthopedic community and encourage implementation in other orthopedic registries.

Materials and methods: The study design is a register-based multi-center RCT. The project will develop and implement a randomization module within the electronic registration form for the NNKLR to conduct two large comparative effectiveness trials of standard treatments for ACL deficiency. Patients will be followed by registration of PROMS at 2, 5 and 10 years and by revision rates and/or reoperation for any cause in index or contralateral knee.

Status: Development phase of randomization module completed. Ethical approval obtained. Data Protection Impact Assessment completed and approved. Inclusion ongoing.

Mesenchymal Stem cells in the Treatment of Focal Cartilage Lesions of the Knee - a randomized clinical trial

Project group: Stian Kjennvold MD PhD student, Per-Henrik Randsborg MD PhD, Rune Bruhn Jakobsen MD PhD, Asbjorn Aroen, MD Prof.

Background: Focal chondral defects of the knee are common, especially in young and active adults. The hyaline cartilage of joints has limited potential for intrinsic healing and focal lesions have been shown to impair quality of life similar to patients scheduled for knee replacement. In addition, we know that cartilage lesions lead to early onset osteoarthritis. Researchers and clinicians have therefore tried to find a way to repair or regenerate knee cartilage in an effort to restore joint function and postpone the need for arthroplasty.

Several improvements in cartilage restoration techniques have been developed over the last decades, but none has so far proved to be superior to others in properly conducted RCTs. Current surgical strategies range from simple debridement or microfracture to the more advanced cell-based therapies such as Autologous Chondrocyte Implantation (ACI) and Mesenchymal Stem Cell therapy (MSC). However, all methods have their shortcomings, and no conclusion has been made on optimal treatment.

Aim: The aim of the study is to determine the clinical-, radiological- and patient reported outcome of Mesenchymal Stem Cells harvested from bone marrow to treat focal cartilage knee lesions.

Material and Methods: This is a randomized clinical trial comparing ACI to MSC in the treatment of symptomatic focal cartilage injuries in the knee. It utilizes a non-inferiority design with the alternative hypothesis that MSC yields clinical results non-inferior to ACI. Primary outcome measure is the Lysholm Knee Scoring Scale. Additional outcome measures include several other validated PROMs, a standardized one-leg hop test, weight bearing x-rays, MRI of the injured knee with T2 mapping, urine- and blood samples. Inclusion spanned from May 2009 to July 2011. 332 patients were referred and evaluated as possible study participants. Inclusion criteria were:

- Age 18-50, symptomatic, full thickness cart. lesion to either of the femoral condyles, lesion size > 2cm2, Lysholm score < 75

We excluded patients with osteoarthritis, malalignment, instability due to ligament injuries and patients with more than one focal cartilage lesion. 71 of the 332 patients were included. All knees underwent arthroscopy to estimate lesion size and to verify the presence of a single lesion.

To ensure the study reflected normal clinical practice the 71 patients were put through a standardized rehabilitation program for 3 months. 2/3 of the patients improved from training to such an extent that they declined or postponed surgery. The remaining 26 patients were randomized into the two treatment arms: The ACI group and the MSC group.

Status: We are currently conducting the 10-year follow-up of the operated patients.

Surgical Treatment of Meniscal Tears of the Knee - Long Term Clinical, Radiological and Patient Reported Outcome Following Treatment of Meniscal Tears of the Knee.

Project group: Henrik Rosenberg MD, Jan Harald Røtterud MD PhD, Per-Henrik Randsborg MD PhD

Background: Meniscal injuries are one of the most common conditions affecting the human knee. Treatment has included open total meniscectomy, open or endoscopic repair, endoscopic partial meniscectomy or conservative (non-operative) management.

In recent years, new research indicates that degenerative meniscal tears should be treated less aggressively, and conservative management with knee strengthening training programs should be first choice. At the same time, surgical repair of meniscal tissue has increased, and a variety of different techniques and implants have been developed. The new awareness of the meniscal root injuries has led to the development of new arthroscopic repair techniques, used either alone or in concert with other intraarticular repairs, such as ACL reconstruction. As a consequence of this recent development, the management of meniscal injuries has changed at our institution. Less endoscopic partial meniscectomies are performed, while more acute or subacute meniscal tears are repaired by a variety of surgical techniques (inside-out, outside-in or all inside meniscal sutures, or the use of endobutton and bone tunnel attachment of root lesions).

The purpose of this study is to retrospectively evaluate the long term clinical, radiological and patient reported outcome following treatment of meniscal tears of the knee performed at during 2015-2018 at Ahus.

Material and methods: This study is a retrospective cohort study that will be conducted at Ahus University Hospital. All patients older than 12 years treated surgically for a meniscal injury at our institution between 2015 and 2019 will be asked to participate in the trial. The patients will be identified from our medical record system and will be invited to a designated follow-up clinic at our institution. The only exclusion criterion is patients declining participation. A combination of clinical parameters, questionnaires and radiological examination will be used for follow-up. To assess clinical function the patients will perform a validated single-leg hop test and range of motion (ROM) will be measured with a goniometer. Patients will also provide information about return to physical activity and sports. Complications or reoperations will be registered. A standard visual analogue scale will be used to quantify pain.

Present status: There has been some delay in the project due to personnel change. The patient list has been extracted from the medical record system, and the data is currently being collected and transferred to a secure database at Akershus University Hospital.

Complication and Revision Rates after Total Knee Replacement in Obese Patients

Project group: Jan Rune Mikaelsen MD PhD student, Jan Harald M. Røtterud MD PhD, Per-Henrik Randsborg MD PhD associate prof., Rune Bruhn Jakobsen MD, PhD associate Prof.

Background: The prevalence of overweight, (Body Mass Index (BMI) 25 – 30 kg/m2) and obesity (BMI >30 kg/m2) has increased in the last decades and has become a serious public health concern. Obesity is a well-documented risk factor for development of osteoarthritis. BMI is the most common variable used to grade obesity. Rising levels of obesity are predicted to increase the demand and need for Total Knee Replacement (TKR). Estimates suggest that more than one third of all patients receiving total hip and knee replacements are obese.

The success, failure and outcome of TKR are potentially different in overweight or obese patients compared to non-obese patients. However, there are conflicting reports concerning the relationship between obesity and clinical and functional results following TKR.

Our objective is to identify revision rate risk factors after primary TKA while taking into account baseline differences of patient characteristics and comorbidities.

Aim: This project will investigate if there is a difference in self-reported outcome after TKR in patients with BMI > 30 kg/m2 at the time of surgery, compared to patients with BMI < 30 kg/m2. The risk of complications after TKR in obese patients will be evaluated. The present study will also determine whether obese patients lose weight after receiving a TKR and whether changes in BMI after TKR influence patient-reported outcomes.

This study may also provide guidelines for risk and benefit factors for obese patients in the choice of TKR procedures.

The overarching aim of this project is to evaluate the clinical outcome and health care services provided to obese patients receiving a TKR. More specifically, the project will investigate if obese patients are more exposed for complications than non-obese patient following TKR. Identifying risk factors may reduce revision rates in obese patients receiving a TKR.

Material and methods: A retrospective study comparing complication and revision rates after TKR between obese vs non-obese patients.

Status: Data is collected and analyzed. Writing article spring 2023.

Save the Meniscus – the Bucket Handle Study – RCT

Project group: Axel Száva Petterson MD, Asbjørn Årøen MD Prof., Truls Straume-Næsheim MD PhD, Jan Harald Røtterud MD PhD, Ove Talsnes MD PhD (Innlandet Hospital Trust), Buru Gilbert Moatshe MD PhD (Oslo University Hospital), Guri Ranum Ekås MD PhD, Johanna Austeen Gjestland MSc., Hilde Lurås PT PhD, Jonn-Terje Geitung MD Prof., Andreas Persson MD PhD (Oslo University Hospital)

Background: Meniscal injuries are severe injuries, which follows an individual for life. It commonly hits in adolescence, or young adulthood. A bucket handle rupture is a particular malign rupture pattern. Untreated it will inevitably lead to a meniscus resection, and subsequently, greatly increase the risk for developing early osteoarthritis of the knee, and eventually a total knee arthroplasty (TKA).

It is widely accepted that such a lesion should be surgically treated. Inside out suturing technique has long been regarded as the "gold standard", but to access the posterior parts of the meniscus, an open access has to be made, which is difficult, time consuming and potentially dangerous to neurovascular structures in the back of the knee. Therefore, most hospitals today use a combined technique, where the posterior horn is sutured with "all inside devices", and the corpus is sutured with "inside out" technique. These devices are more expensive than the traditional method, but are believed to reduce the time of surgery, and reduce the risk of complications. Although the "all inside method" is the "workhorse" in most clinics today, it has not yet been studied properly, and fear is that it does not live up to the traditional gold standard.

Aim: To evaluate the two methods investigated, namely "all inside" and "inside out" technique.

Materials and methods: We plan to conduct a multicenter randomized controlled trial (RCT) comparing the two methods, namely inside out, and the combined method. Patients will be included from Akershus University Hospital (AHUS), Oslo University Hospital (OUS), and Innlandet Hospital Trust. All patients with a bucket handle injury, detected on an MRI, or clinically suspected, will be asked to participate in the study. After arthroscopic verification of the injury, and indication for meniscal suture, the patient will be randomized to suture with either combined technique or inside out technique. Postoperative treatment will be the same for both groups.

The patients will fill in knee specific PROMs preoperatively, and at 3, 6, 12, 24 and 36 months. The primary endpoint will be failure of the meniscal repair verified by MRI and/or reoperation.

The secondary endpoints will be knee function assessed by the PROMs and a cost analysis of the two treatments. This study will provide fundamental information regarding the most cost effective and superior treatment of this common meniscal injury, which potentially could dictate the further handling of this large patient group both nationally and internationally.

Status: The study is currently in the planning phase. We have received approval from the Regional Committee for Medical and Health Research Ethics (REK), and are ready to start including when sufficient funding is secured.

Save the Meniscus – the Bucket Handle Study – Epidemiological register study

Project group: Axel Száva Petterson MD, Asbjørn Årøen MD Prof., Truls Straume-Næsheim MD PhD, Jan Harald Røtterud MD PhD, Ove Talsnes MD PhD (Innlandet Hospital Trust), Buru Gilbert Moatshe MD PhD (Oslo University Hospital), Guri Ranum Ekås MD PhD, Johanna Austeen Gjestland MSc., Hilde Lurås PT PhD, Jonn-Terje Geitung MD Prof., Andreas Persson MD PhD (Oslo University Hospital)

Background: One of the most common orthopedic surgeries is meniscal repair. Recent literature report of an incidence of acute meniscal injuries between 0,5 to 0,7 per 1000 per year (Kopf et al., 2020). Although there is level 1 evidence for a conservative approach to degenerative meniscus tears in patients older than 40 years (Sihvonen et al., 2013), it is commonly accepted that a bucket handle meniscus should be treated to restore normal knee kinematics as soon as possible. Removal of the meniscus implies an increased risk of degenerative changes in a 10-15 years horizon of the injured knee. As such, a repair of the meniscus is an essential preventive measure to avoid degeneration of the joint and save the knee. A variety of suture devices to repair the meniscus exists, with a considerable variation in the caregivers' costs. The two most common methods are "all inside suture" or "inside out suture" of the meniscus. Recent literature has reported a survival of sutured bucket handle meniscus of 78.4%, while prior studies have reported much poorer survival rates at three years with as low as 63% (Albrecht-Olsen & Bak, 1993; Saltzman et al., 2020). This demonstrates a considerable variation in the survival rate of the bucket handle meniscus. Knowing that a lost meniscus is a strong predictor for later arthrosis, this shows a substantial problem.

The study group is planning to conduct a large randomized controlled trial later on. This study will provide essential information to assess the incidence and the current standard of treatment for this injury, and is crucial for the design of the planned RCT.

Aim: To evaluate the current treatment and epidemiology of bucket handle tears.

Materials and methods: Using the Norwegian Knee Ligament Register (NKLR), we will evaluate to which extent, the different treatment methods are used in Norway in the treatment of bucket handle lesions, accompanying an ACL injury in Norway in the period 2019-2021. We will include all patients registered in the NKLR between 01.01.19 and 31.12.21 with a concomitant meniscus tear. Time from injury to operation will also be of interest. The register started thorough registration of the concurrent meniscus injuries in January 2019.

Further on we will identify risk factors, the population (age, gender e.g.) and cause of injury. A more thorough understanding will provide knowledge for preventing future injuries, and identifying the individuals at risk.

Further questions to be answered are: Is the treatment the same for those treated acutely, and those receiving late surgery? Do the different institutions use the same methods?

Status: Data analysis phase.

Save the Meniscus – the Bucket Handle Study – a prospective register study

Project group: Axel Száva Petterson MD, Asbjørn Årøen MD Prof., Truls Straume-Næsheim MD PhD, Jan Harald Røtterud MD PhD, Ove Talsnes MD PhD (Innlandet Hospital Trust), Buru Gilbert Moatshe MD PhD (Oslo University Hospital), Guri Ranum Ekås MD PhD, Johanna Austeen Gjestland MSc., Hilde Lurås PT PhD, John-Terje Geitung MD Prof., Andreas Persson MD PhD (Oslo University Hospital)

Background: Meniscal injuries are severe injuries, which follows an individual for life. It commonly hits in adolescence, or young adulthood, and a bucket handle rupture is a particular malign rupture pattern. Untreated it will inevitably lead to a meniscus resection, and subsequently, greatly increase the risk for developing early osteoarthritis of the knee, and eventually a total knee arthroplasty (TKA).

One of the most common orthopedic surgeries is meniscal repair. Recent literature reports of an incidence of acute meniscal injuries between 0,5 to 0,7 per 1000 per year (Kopf et al., 2020). Although there is level 1 evidence for a conservative approach to degenerative meniscus tears in patients older than 40 years (Sihvonen et al., 2013), it is commonly accepted that a bucket handle meniscus should be treated to restore normal knee kinematics as soon as possible. Removal of the meniscus implies an increased risk of degenerative changes in a 10-15 years horizon of the injured knee. As such, a repair of the meniscus is an essential preventive measure to avoid degeneration of the joint and save the knee. A variety of suture devices to repair the meniscus exists, with a considerable variation in the caregivers' costs. The two most common methods are ”all inside suture” or ”inside out suture” of the meniscus. Recent literature has reported a survival of sutured bucket handle meniscus of 78.4%, while prior studies have reported much poorer survival rates at three years with as low as 63% (Albrecht-Olsen & Bak, 1993; Saltzman et al., 2020). This demonstrates a considerable variation in the survival rate of the bucket handle meniscus. Knowing that a lost meniscus is a strong predictor for later arthrosis, this shows a substantial problem.

Aim: To evaluate the current treatment of bucket handle tears treated in combination with ACL-reconstruction.

Materials and methods: We will use existing data from the Norwegian Knee Ligament Register (NKLR) to evaluate the results on the current treatment of patients going through ACL reconstruction with concurrent suturing of a bucket handle meniscus. This will be done with existing data in the register, using Knee Injury and Osteoarthritis Outcome Score (KOOS), prior to operation, and 2 years after treatment. We will use values for “patient acceptable symptom state” (PASS) verified for KOOS Quality of Life (QoL) 62,5, and sport and recreation (sport/rec) 75,0 (Muller et al., 2016).

Status: The project is awaiting data, expected in 2024.

Reconstruction of the Medial Patellofemoral Ligament versus Conservative Treatment of Chronic Patellar Instability. A RCT.

Project group: Truls M. Straume-Næsheim MD PhD Postdoc project, Asbjørn Årøen MD Prof., Per-Henrik Randsborg MD PhD, Jan Rune Mikaelsen MD, Tina Løkken Nilsgård master candidate (OsloMET)

Background: Patella dislocation is a serious knee injury whose peak incidence occurs in patients aged 10–17 years and is associated with a high rate of re-dislocation. Knee injuries frequently cause long-term disability and reduced physical activity among adolescents and young persons. Surgery in this patient group requires a low tolerance for complications, meaning that physical therapy might offer more successful outcomes in many knee injury cases. The proposed project studies a particular patient cohort subjected to recurrent dislocation of the patella.

Aim: The principal objective of this clinical, randomized controlled trial is to evaluate and compare knee function and symptoms in patients with recurrent patella dislocation randomized into treatment with surgical reconstruction of the medial patellofemoral ligament (MPFL) with those of patients in a standardized physiotherapy program designed to stabilize the patella and improve patient function.

Materials and methods: Patients aged 12–30 years who have experienced two or more patella dislocations are randomized into groups receiving either MPFL reconstruction or physical therapy only. Follow-ups at 3, 6, 12, and 36 months involve functional tests, validated knee scores, arthroscopic examination, and cartilage-specific MRI protocols for the knee.

Results: The first paper assessing the baseline was published in 2019 where we found that recurrent lateral patella dislocation affects knee function as much as ACL deficiency; however these patients wait five times longer for treatment.

Data from the one-year follow-up was published this year in the Journal of Knee surgery, Sports Traumatology and Arthroscopy (KSSTA) and the corresponding abstract of this paper was nominated for best abstract at the ESSKA conference in Paris in April 2022. We found that patients with recurrent patellar dislocations have a six-fold increased risk of persistent patellar instability if treated with active rehabilitation alone, compared to MPFL-R in combination with active rehabilitation, even in the absence of significant anatomical risk factors.

In 2020, we initiated a collaboration with Oslo Metropolitan University, and physiotherapist Tina Løkken Nygård was included in the research group. She finished her master's thesis in June 2022. In the thesis she looked into the association between single leg hop tests self-reported knee function in patients with recurrent patellar dislocations. She found no association between this functional test and persistent patella instability and concluded that this functional test had limited value in the assessment of patellar instability.

Status: The recruitment of patients has been finalized. Follow-up period is 3 years. Planned finished all follow-up by January 2023.

Norwegian Cartilage Project NCP – Autologous Chondrocyte Implantation Study (ACI study)

Project group: Asbjørn Årøen MD Prof., Per-Henrik Randsborg MD PhD, Christian Owesen MD PhD, Heidi Hanvold PT, Jan Brinchmann MD PhD (Rikshospitalet), Lars Engebretsen MD PhD (Oslo University Hospital)

Introduction: The Norwegian Cartilage Project (NCP) is a national multicenter research group headed by Professor Asbjørn Årøen and assisted by post doc Per-Henrik Randsborg at Akershus University Hospital (Ahus). It includes eight different hospitals in all four Norwegian health regions. The project includes two RCTs, a register study and a basic science project.

Focal cartilage injuries in the knee might have devastating effect with pain, swelling and inability to work/partake in sport. It also increases the risk of early onset osteoarthritis. Various surgical treatment options are available, however no statistically significant differences have been found between the different surgical treatments. This supports the suggestion that the improvement might be a result of the post-operative rehabilitation rather than the surgery itself. Autologous chondrocyte implantation (ACI) has become a recognized treatment option for larger cartilage lesions in the knee. Although ACI has been compared to other surgical treatment such as microfracture and mosaicplasty, it has never been directly compared to simple arthroscopic debridement (AD) and rehabilitation alone.

Aim: In this study, we want to increase clinical and economic knowledge about ACI compared to AD and physical rehabilitation in the short and long run.

Materials and methods: Patients aged 18-50 with isolated grade III or IV cartilage lesions larger than 2 cm2 located on the femoral condyles or trochlea are prospectively randomized to either ACI or AD, followed by a standardized rehabilitation protocol. The lesion must be symptomatic with a Lysholm score below 75. Inclusion and treatment takes place at Ahus or Oslo University Hospital, with follow-ups at 3, 6, 12 and 24 months. The primary outcome is the difference in the KOOS knee-related quality of life (QoL) subscore in the ACI group compared to the AD group at 2 years. A combination of self-explanatory questionnaires, clinical parameters, clinical hop test and radiographs and cartilage-specific MRI are used as secondary endpoints. Additionally there will be late follow-ups at 5 and 10 years to monitor the potential onset of osteoarthritis. The power analysis suggested a sample size of 82, but due to slow inclusion and financial and time-specific restrictions, inclusion have been stopped before this number has been reached.

Status: 28 patients are included, all of them at Ahus except for one. The recruitment of patients was terminated in September 2022, due to a long inclusion period over seven years. Data collection is complete after the last 24 month follow-up in January 2023. Data will be analyzed during 2023, followed by publication in an international, peer-reviewed orthopedic journal.

NCP - Microfracture Study (MFX study)

Project group: Asbjørn Årøen MD PhD, Tommy Aae MD PhD (Kristiansund Hospital), Per-Henrik Randsborg MD PhD, Christian Owesen MD PhD, Heidi Hanvold PT

Background: The Norwegian Cartilage Project (NCP) is a national multicenter research group headed by Professor Asbjørn Årøen and assisted by post doc Per-Henrik Randsborg at Akershus University Hospital (Ahus). It includes eight different hospitals in all four Norwegian health regions. The project includes two RCTs, a register study and a basic science.

Focal cartilage injuries in the knee might cause pain, swelling and inability to work or partake in sport, as well as have devastating effect due to the predisposition of early onset osteoarthritis. Various surgical treatment options are available, however no statistically significant differences have been found between the different surgical treatments. This supports the suggestion that the improvement might be a result of the post-operative rehabilitation rather than the surgery itself. Arthroscopic microfracture (AM) has gained popularity, and has become the treatment of choice for smaller cartilage lesions globally.

Aim: In this study, we want to increase clinical and economic knowledge about AM compared to arthroscopic debridement (AD) and physical rehabilitation in the short and long run.

Material and methods: This study is a prospective, randomized, double-blinded, multicenter study with two treatment arms. Patients aged 18-50 with isolated grade III or IV cartilage lesions less than 2 cm2 of the femoral condyles or trochlea are prospectively randomized to either AM or AD, followed by a standardized rehabilitation protocol. The lesion must be symptomatic with a Lysholm score below 75. Inclusion and treatment will take place at the hospitals involved with the NCP, with follow-ups at 3, 6, 12 and 24 months. The follow up at 24 months will be performed at Ahus by a blinded assessor to secure double blinding. The primary outcome measure will be the difference in the KOOS knee-related quality of life (QoL) subscore in the MF group compared to the AD group at 2 years. A combination of self-explanatory questionnaires, clinical parameters, clinical hop test and radiographs and cartilage-specific MRI will be used as secondary endpoints. Additionally there will be late follow-ups at 5 and 10 years to monitor the potential onset of osteoarthritis. The study will include a total of 114 patients.

Status: 65 patients are included, mainly at Ahus. The recruitment of patients was terminated in September 2022, due to a long inclusion period over seven years. Data collection continues until the last 24 month follow-up in September 2024, followed by data analyzes and publication in a peer-reviewed, international recognized orthopedic journal. Although the aimed inclusion number was not reached, the cohort is unique and that should enable us to publish this manuscript in a highly ranked journal in the field.

Compensation Claims after Treatment for Achilles´ Tendon Ruptures in Norway from 2010 to 2019, and Its Correlation between the Different Hospital`s Patient Volume

Project group: Tor Kristian Molstad Andresen MD, Ståle Myhrvold MD PhD, Svend Ulstein MD PhD, Sigurd Erik Hoelsbrekken MD PhD (LHL), Per-Henrik Randsborg MD PhD, Ida Rashida Khan Bukholm MD PhD (Norwegian System of Patient Injury Compensation)

Introduction: Ruptures of the Achilles´ tendon (ATR) typically occur during sports activity in both women and men in their working part of life with a mean age around 40 years. The incidence has been increasing over time and in larger materials shown to be approximately 47 per 100.000 persons per year for men and approximately 15 per 100.000 person per year for women. ATR may lead to a severe disability, not only in the short term, but also over time. ATR can be treated non-operatively (NO) with cast and orthosis or operatively with suture of the tendon. The surgical techniques can be further divided into open repair (OR) and minimally invasive surgery (MIS). There is no consensus on which type of treatment for ATR is best. Since 1988, claims for compensation after medical treated injuries in Norway are handled through the Norwegian System of Patient Injury Compensation (NPE). Patients file their claim for compensation by submitting an electronic, online form, at no cost for the patient and generally without legal aid. The claim is subsequently processed and either granted compensation, dismissed or rejected. All claims are archived and available for analysis in anonymized form. Sveen and co-workers described 324 acute ATR registered in the Danish Patient Compensation System (PEBL) over an 18-year long period and discovered a 3.8 times higher compensation rate after surgical treatment compared to non-surgical treatment. 34.5% of the recognized compensation claims were due to an overlooked primary diagnosis.

Aim: The aim of our study is to investigate the epidemiology of compensation claims following treatment for ATR as reported to the Norwegian System of Patient Injury Compensation (NPE), correlations between treatment type and compensation claims and the association of compensation claims and hospital catchment area volume.

Material and methods: In this retrospective registry study, we will identify all the compensation claims for treatment injuries after ATR registered in the NPE database from 2010 to 2019. The data will be systematically analyzed to assess how the claims were processed. The following data will be extracted; age (at the time of intervention), gender, time from injury to diagnosis, open or subcutaneous rupture, the treatment provided, the cause for complaints, cause for granted/rejected claim and the content of the compensations. Possible areas of improvement of the healthcare provided for this injury will be targeted.

Status: Data including all patients filing claims for ATR to the NPE between 2010 and 2019 has been collected and are being analyzed by the study group.

Treatment of Zone Three Fractures in the Proximal Part of the Fifth Metatarsal Bone – a randomized controlled trial

Project group: Petter Morten Pettersen MD (Østfold Hospital), Tor Kristian Molstad Andresen MD, Wolfgram Grün MD (Østfold Hospital), Kjetil Hvaal MD PhD (Oslo University), Marius Molund MD PhD (Østfold Hospital)

Background: The lower extremity is put through a great amount of load through life. Stress fractures occur in certain bones, the fifth metatarsal is one of these. Stress fractures are fractures of sudden onset in otherwise healthy bone due to a summation of mechanical stresses, whom singularly would be harmless. Anatomical, mechanical, and systemic factors may contribute to the development of stress fractures. Fractures of the proximal part of the fifth metatarsal are divided into three zones after the Lawrence and Bottes classification where fractures in the third zone are stress fractures. Many of the patients suffering a zone three fracture are having a lifestyle with high level of physical activity, but also a cavovarus foot and a metatarsus quintus varus leaves the foot susceptible. Anatomical studies have argued that the marginal local blood supply might compromise fracture healing in zone three. The available evidence regarding the treatment of these fractures is based on mainly retrospective studies with small patient materials. With current knowledge both non-operatively and surgical treatment are accepted modalities. The argument for surgical treatment with intramedullary compression screw is the innate poor fracture healing potential. In the already published retrospective study by our group we found no difference between patients who followed a weight bearing as tolerated or non-weight bearing treatment strategy.

Our understanding is that the choice of treatment is in large, based on local traditions and physicians' preference. The professional environment therefore longs after a new prospective study.

Aim: To investigate if surgical treatment leads to faster fracture healing and earlier return to work compared to non-operative treatment.

Material and methods: Multi-centre randomized controlled clinical trial, led by Østfold hospital with participating centers; Oslo University Hospital and Akershus University Hospital. Inclusion of 80-100 adult patients with zone three fractures, digitally randomized (WebCRF by NTNU). Surgical treatment by minimal invasive technique is performed in the outpatient clinic within two weeks. Both the groups follows a weight bearing as tolerated rehabilitation strategy and are seen at the outpatient clinic every sixth week until fracture healing. In addition, every second week by telephone. The main outcome measure is time from injury to clinical fracture healing, with the minimal clinically relevant difference set at four weeks. Secondary outcomes are return to work, physical activity, palpable and radiological fracture healing, complications, and MOXFQ-score.

Status: Ongoing inclusion of patients at all three centers started spring 2021. In the beginning of January 2023 39 patients were included.

STOP Leg Clots (SLC) – Swedish-International Multi-Center Trial of Outpatient Prevention of Leg Clots.

Prevention of thromboembolism and failed healing during lower limb immobilization- a multi-center study with adjuvant intermittent pneumatic compression therapy

Project group: Paul Ackerman MD (PI, Karolinska University Hospital), Bengt Eriksson (University of Gothenburg), Lasse Lapidus (Karolinska University Hospital), Tor Kristian Molstad Andresen MD, Ståle Bergman Myhrvold MD PhD

Background: Venous thromboembolism is common in lower limb immobilization. Traditional pharmacological anticoagulants have limited effect on reducing VTE-incidence in the immobilized patients, probably due to reduced blood circulation, and pose a risk of bleeding.

Aim: Our hypothesis is that leg immobilization calls for promoted blood circulation using adjuvant mechanical compression. This intervention, in form of intermittent pneumatic compression (IPC) therapy, targets the primary cause of impaired neuro-vascular flow. IPC is a safe and established method of preventing VTE in bedridden patients but has not yet been investigated in patients with lower leg immobilization in the outpatient setting. We wish to investigate whether the addition of mechanical anticoagulation, IPC, to lower leg immobilization in outpatient care reduce the risk of VTE and at the same time stimulate healing?

Materials and methods: A multicentre RCT initiated by Karolinska Institute, with participating hospitals in Sweden, Italy, Switzerland, and Norway. Men and women between 18 and 75 years of age with an acute achilles tendon rupture that requires lower leg immobilization for at least 5 weeks and can be treated with an orthosis. The inclusion goal is 1000 ankle fractures and 400 achilles tendon ruptures. Current status is 650 included patients in total. At the Department of Orthopedic Surgery at Ahus we include patients with acute achilles tendon ruptures for participation in the trial. Information and consent is recorded by the treating clinician. The randomisation and treatment must be initiated within 10 days after injury. The patient follows the local guidelines for treatment and follow-up. If randomized to treatment with IPC the patient will receive both the pump equipment and walker-orthosis immediately. In addition to digital registration of patient characteristics, diary and PROMs, the patient will at the end of mobilization be screened for DVTs by compression duplex ultrasound. The long-term effect of IPC on VTE and healing will be confirmed by the secondary patient reported outcome measures. Final analysis will be according to intention to treat.

Status: Ongoing inclusion of patients.

Claims for Compensation after Surgery for Hallux Valgus in Norway from 2010 to 2020

– Possible areas of improvement to the quality of care

Project group: Per-Henrik Randsborg MD PhD, Tommy Frøseth Aae (Kristiansund Hospital), Ida Rashida Khan Bukholm (Norwegian System of Patient Injury Compensation), Rune Bruhn Jakobsen MD PhD

Background: Claims for compensation after medical treatment in Norway are handled through the Norwegian System of Patient Injury Compensation (NPE). This way of handling patient injury and compensation has been in place since 1988.

Patients report their claim for compensation by submitting a standard form, generally without legal aid. The claim is subsequently processed and either entitled a compensation or dismissed. All claims are archived and available for analysis in anonymized form.

Hallux valgus (bunions) is a very widespread misalignment of the big toes. The big toe noticeably drifts to the outer edge of the foot, where it also crowds the smaller toes. Hallux valgus leads to the metatarsophalangeal joint is overstrained and as a result, painful osteoarthritis of the big toe (hallux rigidus) can develop. The protruding bunion at the metatarsophalangeal joint becomes inflamed and painful and can swell.

Surgical correction of hallux valgus is a very common procedure, performed at most orthopedic departments in Norway.

Material and methods: We will obtain all complaints after surgery for hallux valgus in Norway in the period from 2010 to 2020, by searching the NPE database for the relevant ICD-10 codes and procedure codes.

The data will be systematically analyzed to assess how the claims were processed. The following data will be extracted: age (at the time of intervention), gender, diagnosis, the treatment provided, the cause for complaints, consequences for the patients, and to what extent compensation was awarded to the patient. Possible areas of improvement will be identified.

Status: The project was delayed because of a change in personnel in the study group in 2022. However, the project is now back on track. The data has been categorized, and analysis will commence Q1 2023.

Implementation of a Clinical Pathway for Treatment of Diabetic Foot Ulcer Leads to Reduction of Major Lower Extremity Amputations

Project group: Monica Sailer MD, Per-Henrik Randsborg MD PhD

Background: Diabetic foot ulcer (DFU) is the leading cause of non-traumatic amputation in the lower extremity in western countries. The five-year mortality rate after major lower extremity amputation (LEA) caused by a DFU is 52-82% which is comparable to cancer.

Despite following recommended procedures including frequent use of Vacuum Assisted Closure (VAC) or Negative Pressure Wound Therapy (NPWT), we found that patients with DFU had long hospital stays, underwent serial surgical revisions and still required major LEA.

Unlike cancer patients, who are enrolled in a clinical pathway, which secures fast diagnosis and treatment, patients suffering from DFU are not offered the same prioritized care, despite comparable mortality rates. We therefore decided to create a clinical pathway for patients with DFU.

Aim: The purpose of this study was to evaluate the outcome measured in rates of LEAs and length of hospital stay (LHS) in patients with DFU before and after the implementation of the clinical pathway.

Materials and methods: We created a clinical pathway in close collaboration with the vascular surgeons, run by a dedicated foot and ankle surgeon and a specialized nurse. We based our pathway on the guidelines suggested by The International Working Group on the Diabetic Foot, with some alterations to adjust for local resource availability.

On January 1th, 2019 we introduced several changes:

- A common referral trunk for the out-patient clinic was created.
- Patients referred to our institution with a DFU would be evaluated in a designated DFU-clinic run by a foot-and- ankle surgeon in close collaboration with the vascular surgeons, supported by a specialized nurse and an orthopedic engineer.

A total of 50 patients were included.

Results: N.A.

Status: All data is collected and analysed. The writing of the article is almost finished.

Spine surgery - Individual criteria for success

Project group: Ole Kristian Alhaug MD PhD student, Ingrid Grundnes medical student, Rune Bruhn Jakobsen MD PhD

Background: All surgery for pain have challenges regarding reporting effect of surgery. Different patient reported outcome measures (PROMs) can be used before and after surgery, and one can calculate the change. Furthermore, one can use transition scales where the patients grade their exerpienced improvement (or worsening). However, changes in PROM scores or grading of clinical change raises questions about clinical relevance.

In spine surgery, the most used PROM is Oswestry Disability Index (ODI). ODI score is between 0 (no disability) and 100 (bed bound). To grade back and leg pain a VAS scale or numeric rating scales are most often used. All patient operated for spine disorders in Norway are offered inclusion in the Norwegian Registry for Spine Surgery (NORspine). NORspine include clinical evaluation before surgery, and at three and twelve months after surgery using ODI, NRS back pain and leg pain and Global Perceived Effect Scale (1 (worse than ever)-7 (completely recovered).

Different definitions of acceptable symptom states based on calculations on variables collected after surgery are reported. Austevoll et al. found a limit for success of 24 (or less) ODI points, van Hooff found an acceptable symptom state of 22 points ODI (1, 2). Furthermore, studies on normal populations have found mean ODI score of 9 and “optimal” ODI without disability of 12 (3).

These definitions and limits can be used to calculate the proportions of patients achieving an acceptable clinical result. The limitations are that the limits are based on variables after surgery and they do not account for patients expectations prior to surgery. The limits reported are equal to all patients. We think that the cut offs may differ between patients.

Aim: We plan to record each patient`s expectation regarding clinical result before surgery, and measure these expectations in the same PROM tools normally used (ODI + NRS pain). This will allow us to see if the expectations match with previous reported cut-offs for success, and if the cut-off vary between patients. We will also calculate the proportions of patients achieving their individual success criteria and see if this proportion match the one given by using the previous defined general cut-offs.

Materials/ methods: All patients planned for spinal surgery at Ahus are invited to this study, disc herniations, spinal stenosis and back pain/degenerative disc disease. Inclusion criteria is sufficient knowledge of the Norwegian language and consent to register in the NORspine registry. Exclusion criteria is age under 18 years.

We will use already known and validated questionnaires; a slightly modified ODI form to measure expectations, and the ODI and NRS pain. This results in three variables: expected ODI score, expected NRS back pain and expected NRS leg pain.

Mean values for expected PROM scores will be compared with previous cut-offs. For each patient their expected PROM score will be used as definition for success, and compared with their transition score (GPE). We will calculate proportions of patients with success, using simple descriptive statistics. Comparison of the different methods for defining success will be calculated using kappa statistics.

We plan to include 100 patients during one year, which is realistic based on the activity at the spine section at Ahus hospital.

Status: We started the data acquisition in October 2022 and plan to include patients until summer 2023. We plan to analyze the data autumn 2023 and publish the results in 2024.

Claims for Compensation after Spine Surgery in Norway from 2009 to 2019 – possible areas of improvement to the quality of care

Project group: Joao Reis MD, Filip Dolatowski MD (Oslo University Hospital), PhD Per-Henrik Randsborg MD PhD, Ida Rashida Khan Bukholm MD PhD, Rune Jakobsen MD PhD

Background: Claims for compensation after medical treatment in Norway are handled through the Norwegian System of Patient Injury Compensation (Norsk pasientskadeerstatning).

This way of handling patient injury and compensation was established in 1988. Patients report their claim for compensation by submitting a standard form, generally without legal aid. The claim is subsequently processed and either entitled a compensation or dismissed. All claims are archived and available for analysis in anonymised form. Orthopedic surgery is one of the specialties with most compensation claims.

Aim: This project aims to describe the claims processed relating to spine surgery and identify areas of improvement in orthopedic surgery.

Materials and methods: We have obtained all complaints after spine surgery in Norway in the period from 2009 to 2019.

The data will be systematically analyzed to assess how the claims were processed, the treatment provided, the cause for complaints, consequences for the patients, and to what extent compensation was awarded to the patient. Possible areas of improvement will be identified.

For elective procedures reported to the Norwegian Registry for Spine Surgery we will assess the incidence of complaints relative to the number of surgeries per year.

Status: Data acquistion phase.

The potential of 3D printing in fracture management and customized surgical tools

Project group: Max Temmesfeld MD; Hendrik F.S. Fuglesang MD PhD; Andreas Øslebye, MD; Nicolas F. Stedding MD; Asbjørn Årøen MD Prof; Rune B. Jakobsen MD PhD

Background: Complex fracture surgeries and corrective osteotomies are demanding and require advanced visuo-spatial skills. Full-scale three-dimensional (3D) models of an individual patient's injury may help to facilitate the optimum surgical treatment, and custom-made surgical tools (CMST) are invaluable in complex corrective osteotomies and arthroplasty cases. The cost of manufacturing models and CMST is estimated to several million NOK annually, which are transferred from the Norwegian public health care system to foreign commercial providers. Hard- and software have recently become inexpensive and user-friendly to the extent that hospitals can reasonably establish in-house production at a low cost.

Aim: The project aims to investigate the versatile benefits and opportunities for this technology in the field of orthopedic surgery and innovation.

The project is divided into four parts with the following aims:

Part 1: Establish a functioning workflow for the in-house production of 3D printed fractured bone models.

Part 2: Study the opportunities and the impact of fractured bone models on:

a) fracture surgery, its indications, surgical approach, and the choice of implant.

b) the patient's understanding of the injury.

Part 3: Map the potential of in-house production of CMST, by collecting and treating as many cases as possible, and publish results.

Part 4: Facilitate rapid prototyping of innovative ideas and products at the department.

Materials and methods:

Part 1:

- Identification, realization and funding of suitable premises close to operation theatres and patient floors
- Funding and procurement of necessary hard- and software

Establishment of a functional workflow for:

- Image extraction
- Segmentation
- Additive manufacturing
- Return to clinician
- Sterilization and logistics

Formal approvals and implementation into the hospitals organization of all of the above

Part 2:

a) Observational trial, which includes 200 patients with a selection of challenging fracture injuries. The surgeon will note the treatment plan, including, but not limited to conservative/surgical, choice of approach and implant prior inspecting the model and after inspecting the 3D model of the fracture. Any change in plan as a result of the 3D model

will be recorded in questionnaires. Data will be analyzed with descriptive statistics.

b) Randomized controlled trial including the same patient group as mentioned in a). Patients will be randomized to receive preoperative information with and without the help of a 3D printed fracture model. Questionaires will record the patient's understanding and their expectations in both groups. Data will be analyzed with descriptive statistics and the cumulative score of the questionnaires in both groups will be tested for statically significant differences by the mean of Student's T-testing.

Part 3:

- Identification of patients with suitable problems, which can be solved / facilitated by 3D-printed CMST. Then, design and additive manufacturing of CMST and application of CMST during surgery.
- Recording of functional patient-reported outcome measures (PROM) and objective range of motion (ROM) recordings.
- Data will reported case-wise.

Part 4:

- Disseminate the possibilities for rapid prototyping and innovation at the department.
- Process requests for rapid manufacturing of innovative ideas.
- Provide help to channel innovative ideas into the formal pathways of the hospital.

Status:

Part 1: this part has consumed considerable time and resources this year. In March 2021 the construction works for the new 3D lab's premises at the hospital's lobby were finalized. In a time-consuming effort, lab personnel, mostly Max Temmesfeld, accomplished moving all equipment, established an IT infrastructure at the lab, got hold of furniture and other basic non-academic work to render the lab operational. Furthermore, the water-soluble support washing station was finalized. Two more machines have been procured, rented, installed, calibrated and maintained. In collaboration with the Division of Surgery, Department of Surgical Research Prof. Juha Silvola, technician Mikael Omlid from Oslo Met was engaged in a 40% position. He was taught by Max Temmesfeld on how to operate the lab, consuming additional FTE time.

A customized cloud-based computer software was complied (3dsurgery.no) to facilitate the intrahospital workflow between surgeons, the 3D lab and the Department of Sterile Supplies. In the context of this, several tablet computers were installed in various key areas, including the department of sterile supplies by Max Temmesfeld. He also provided instruction to all employees of the Department of Sterile Supplies concerning the handling and sterilization of 3D printed models. In collaboration with Lars Kanten, the hospital's tracing system for medical devices (T-Doc) was adopted to 3D models. Furthermore, Max Temmesfeld organized a 3D course for six participants from different departments, three of which are included in this research group, for the segmentation of CT images in collaboration with the company Materialise (Leuven, Belgium).

Finally, Max Temmesfeld was engaged by the department's management to participate in the formal implementation of the 3D lab within the hospital's organizational structure. Numerous meetings and the editing of

a comprehensive strategic plan for the hospital's vision for the lab's organization and aims for the upcoming years also consumed some time.

Part 2: this year's activity in part 2 comprised the preparations of two mentioned investigations in form of study material, editing of all 4 questionnaires and implementation of those into the logistics program "3Dsurgery.no". Nevertheless, studies cannot commence prior a reliable plan for intra-hospital handling and logistics for 3D printed models had been accomplished. By 01/20222 this is finally the case now and no more technical and/ or organizational obstacles can prevent the inclusion of patients in project 2, which is ultimately planned 02/2022.

Part 3: CMST for two more patients were designed, manufactured and patients were operated successfully, including a complex forearm deformity. In collaboration with Martina Hansen's hospital the research group filed a research proposal and grant application to the South-Eastern Health Authority for the development of a novel jig for high tibial osteotomies.

Part 4: two DOFIs were sent to the hospital's TTO Inven2 of the signatory. Additionally, the 3D lab provided help for very various problems, spanning a range from the design and production of "ear relievers" for facemasks after a request form the nursing management of the department to other departments to the segmentation and 3D printing of a renal tumor. Requests were registered from the department of orthopedics, pediatrics, urology, thoracic surgery and otorhinolaryngology. To date, the lab has registered and mostly processed 11 of such requests.

Finally, the innovation project will be included in the PhD was published in the American Journal of Infection Control. With this part 4 is accomplished.

Collaboration to Improve Bone Health

Project group: Lene Gjelseth Dalbak MD PhD, Jakob Vangen Nordbø MD, Hans Inge Johannessen MD, Hanne Christine Huse Brubakken, Renate Magnussen

Background: Previous fractures may well be the most important risk factor for subsequent fractures because many of these patients suffer from osteoporosis. In 2015, a network of orthopedic surgeons took the initiative to create a guide for the treatment of osteoporosis in men and women over the age of 50, who have suffered a low-energy fracture. Norwegian orthopedic departments that have introduced this guide aim to ensure that anyone over the age of 50, who is presented with a low-energy fracture, will be offered a check-up for osteoporosis followed by treatment, if required. For patients with hip fractures, the first-line treatment is an infusion of zoledronic acid 5 mg annually for 3 years combined with vitamin D and calcium supplements. In our opinion, it is expedient, safe, and sensible for parts of the subsequent treatment to be provided by general practitioners (GPs). If hospitals take responsibility for initiating the treatment, we believe that most of the subsequent monitoring and continuance of treatment can be conducted by the primary healthcare service. Despite this, we suspect that many patients do not get their annual infusions of zoledronic acid after discharge from the hospital.

Aim: This quality assurance study aims to test a new system where ambulant nurses from the hospital support the GP in treating osteoporosis with the administration of zoledronic acid in the following 3 years after femoral neck fractures.

Through the project, we will create procedures for the administration and follow-up of zoledronic acid fitted in the setting of the GP office.

Materials and methods: The design is a cluster randomized controlled study (RCT) where the regions are prospectively randomized to either intervention or control regions. Patients ≥ 75 years, which suffer a femoral neck fracture, are identified at the Department of Orthopedic Surgery, Ahus where they are provided the first infusion of zoledronic acid 5 mg and proposed participation in the study. Patients from intervention regions will be followed by the protocol of ambulant nurse-assisted administration of zoledronic acid. Both patients from control and intervention regions are asked to fill out a questionnaire after 1 year. The questionnaire will ask if the patient has got zoledronic acid as encouraged in the medical journal after discharge from the hospital.

Sample size calculation estimates a total sample of 65 patients based on a minimal clinically important difference of 20% between the groups. Because of high mortality, we estimate the need for 100 patients.

Status: The study protocol is approved by the Regional ethical committee (REK) and by the local ethical committee (PVO). The data acquisition phase is 2023-2024. The analysis is planned for the second half of 2024 and publication in the first half of 2025.

Innovation - A solution to the kneecap fracture problem

Project team: Hendrik F S Fuglesang MD PhD, Max J Temmesfeld MD PhD Student, Stein E Utvåg MD PhD

Partners: UiO Lifesciences: SPARK program

Mentor: Wenche Grønnvold, Project Coordinator: Bjarte Reve

Introduction: Fractures of the patella (kneecap) are only about 1% of all fractures, but there are 178 million fractures worldwide every year. There is a bimodal distribution in young men due to high energy trauma and elderly women due to osteoporosis. If your patella fracture is displaced, you cannot extend your knee and surgery is mandated. The gold standard of care has been tension band wiring (TBW) with two pins and a wire but this does not secure the bone ends in up to 44% of the cases, and the average strength loss is reported to be 31% seven years after surgery. TBW also has a reported partial failure rate of 22 to 30% and catastrophic failure rate of 5-14% requiring revision surgery. Newer implants are commercially available, but their use is limited to simple fracture patterns and the documentation on complex fractures are scarce.

Aim: This project aims to develop and commercialise a novel plate fixation that:

1. covers all fracture patterns

2. decreases the risk of implant failure, and

3. permits a faster recovery.

The overall aim is to secure young men´s return to work and sports and maintain the physical independence of the elderly.

Status: The plate is designed and we are currently planning the first prototype production for biomechanical testing.

The project is financially supported by UiO Lifesciences: SPARK program, UiO Growth House and the Novo Nordisk Foundation.

Innovation – Supercontruct for distal femur fractures

Project team: Hendrik F S Fuglesang MD PhD

Partners: Inven2

Introduction: Fractures of the femur (thighbone) in the elderly are increasing due to an increasing life span and osteoporosis. In addition, the number of implants like hip and knee prosthesis is increasing. A stiff implant in a soft bone leads to stress risers around the implant that increase the risk of a fracture. These fractures are complex to solve, but should be surgically managed within 48 hours due to increased mortality with time. The goal of the operation is to secure the bony ends good enough so that the patient can be mobilised and weight bear fully. This can be challenging with complex fractures in osteoporotic bone, with or without adjacent implants (so-called periprosthetic fractures), so often the patients are confined to a wheel chair until the bone heals at 3-4 months and the 30 – day complication rate is reported to be 45% including a 10% mortality rate.

Aim: This project aims to develop and commercialise a novel plate fixation with a better fixation and distribution of force vectors compared to present solutions.

Status: The implant is in the design phase for a proof of concept study using a renowned ISO 13485 engineering company.

The project is financially supported by the Norwegian Research Council

Publications

Peer-reviewed publications

Alhaug OK, Dolatowski FC, Solberg TK, Lønne G. Predictors for failure after surgery for lumbar spinal stenosis: a prospective observational study. Spine J. 2023;23(2):261-70.

Alhaug OK, Kaur S, Dolatowski F, Småstuen MC, Solberg TK, Lønne G. Accuracy and agreement of national spine register data for 474 patients compared to corresponding electronic patient records. Eur Spine J. 2022;31(3):801-11.

Banitalebi H, Espeland A, Anvar M, Hermansen E, Hellum C, Brox JI, et al. Reliability of preoperative MRI findings in patients with lumbar spinal stenosis. BMC Musculoskeletal Disorders. 2022;23(1):51.

Bartels S, Kristensen TB, Gjertsen JE, Frihagen F, Rogmark C, Dolatowski FC, et al. Total Hip Arthroplasty Leads to Better Results After Low-Energy Displaced Femoral Neck Fracture in Patients Aged 55 to 70 Years: A Randomized Controlled Multicenter Trial Comparing Internal Fixation and Total Hip Arthroplasty. J Bone Joint Surg Am. 2022;104(15):1341-51.

Clementsen SØ, Jakobsen RB, Hammer O-L, Randsborg P-H. The Effect of Ulnar Styloid Fractures on Patient-Reported Outcomes After Surgically Treated Distal Radial Fractures. JBJS Open Access. 2022;7(3):e22.00021.

Hermansen E, Austevoll IM, Hellum C, Storheim K, Myklebust TÅ, Aaen J, et al. Comparison of 3 Different Minimally Invasive Surgical Techniques for Lumbar Spinal Stenosis: A Randomized Clinical Trial. JAMA Network Open. 2022;5(3):e224291-e.

Jiang H, Wu L, Randsborg PH, Houck J, Sun L, Marine M, et al. Analysis of Polyethylene-Related Revisions After Total Ankle Replacements Reported in US Food and Drug Administration Medical Device Adverse Event Database. Foot Ankle Int. 2022:10711007221134284.

Kirkevold M, Welding NM, Hammer T, Andresen L, Benth JŠ. Faktorer som påvirker funksjonsnivået til eldre pasienter operert for hoftebrudd – implikasjoner for målrettede sykepleietiltak. Sykepleien Forskning. 2022;17(89198).

Mouton C, Magosch A, Moksnes H, Janssen R, Fink C, Zaffagnini S, et al. Steigerung der Evidenz zur optimalen Behandlung kindlicher VKB-Verletzungen: Die Initiative zur Erfassung von Verletzungen des vorderen Kreuzbandes bei Kindern und Jugendlichen (Paediatric Anterior Cruciate Ligament Monitoring Initiative, PAMI). Sports Orthopaedics and Traumatology. 2022;38(4):413-23.

Myhrvold SB, Brouwer EF, Andresen TKM, Rydevik K, Amundsen M, Grün W, et al. Nonoperative or Surgical Treatment of Acute Achilles' Tendon Rupture. New England Journal of Medicine. 2022;386(15):1409-20.

Pettersen PM, Radojicic N, Grün W, Andresen TKM, Molund M. Proximal Fifth Metatarsal Fractures: A Retrospective Study of 834 Fractures With a Minimum Follow-up of 5 Years. Foot Ankle Int. 2022;43(5):602-8.

Randsborg PH, Cepeda N, Adamec D, Rodeo SA, Ranawat A, Pearle AD. Patient-Reported Outcome, Return to Sport, and Revision Rates 7-9 Years After Anterior Cruciate Ligament Reconstruction: Results From a Cohort of 2042 Patients. Am J Sports Med. 2022:3635465211060333.

Randsborg PH, Jiang H, Mao J, Devlin V, Marinac-Dabic D, Peat R, et al. Two-Year Revision Rates in Total Ankle Replacement Versus Ankle Arthrodesis: A Population-Based Propensity-Score-Matched Comparison from New York State and California. JB JS Open Access. 2022;7(2).

Randsborg PH, Årøen A, Owesen C. The Effect of Lesion Size on Pain and Function in Patients Scheduled for Cartilage Surgery of the Knee. Cartilage. 2022;13(2):19476035221109242.

Sandmo SB, Matyasova K, Filipcik P, Cente M, Koerte IK, Pasternak O, et al. Changes in circulating microRNAs following head impacts in soccer. Brain Inj. 2022;36(4):560-71.

Straume-Næsheim TM, Randsborg P-H, Mikaelsen JR, Årøen A. Medial patellofemoral ligament reconstruction is superior to active rehabilitation in protecting against further patella dislocations. Knee Surgery, Sports Traumatology, Arthroscopy. 2022.

Watne LO, Pollmann CT, Neerland BE, Quist-Paulsen E, Halaas NB, Idland A-V, et al. Cerebrospinal fluid quinolinic acid is strongly associated with delirium and mortality in hip fracture patients. The Journal of Clinical Investigation. 2022.

Aaen J, Austevoll IM, Hellum C, Storheim K, Myklebust TA, Banitalebi H, et al. Clinical and MRI findings in lumbar spinal stenosis: baseline data from the NORDSTEN study. European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society. 2022;31(6):1391-8.

Aaen J, Banitalebi H, Austevoll IM, Hellum C, Storheim K, Myklebust TÅ, et al. The association between preoperative MRI findings and clinical improvement in patients included in the NORDSTEN spinal stenosis trial. European Spine Journal. 2022;31(10):2777-85.

Conference attendings

Presentations

The Norwegian Orthopedic Socicety´s Meeting, Oslo, October 2022

Free lectures

Bartels S. Totalprotese gir bedre resultater etter lavenergetisk dislokert lårhalsbrudd hos pasienter mellom 55-70 år.

Ekås GR. Pediatric ACL Monitoring Initiative- I Norge og Europa.

Gundersen M. Avrivningsbrudd av korsbåndsfeste hos barn – hvordan går det egentlig?

Randsborg PH. Effekten av bruskskaders størrelse på pasientrapporterte symptomer. En studie fra Norwegian Cartilage Project.

Randsborg PH. Risiko for revisjon etter ankelprotese med fixed eller mobil bearing plastkomponent. En analyse fra FDAs MAUDE database.

Randsborg PH. Kjønnsforskjeller i risiko for tidlig revisjon etter kneprotese.

Randsborg PH. Machine Learning for å forutsi klinisk meningsfull forbedring etter korsbåndsrekonstruksjon.

Other presentations

Alhaug OK. Predictors for failure after surgery for lumbar spinal stenosis, a prospective observational study.

Hammer OL. Konservativ versus operativ behandling av distale radiusfrakturer hos eldre.

Jakobsen RB. Hamstringsskader i idrett. Hvor sitter skaden- på tuber ischii, senen, sene-muskelovergang eller i buskelbuken?

Jakobsen RB. Ortopediske kvalitetsregistres rolle og nytte i fremtiden.

Mjønes S. Infeksjoner i rygg. Case: Lang fiksasjon av infisert rygg.

Nordbø JV. Nytt og nyttig om sekundær bruddforebygging. Hvem skal følge opp osteoporosebehandling?

Randsborg PH. Vi står på skuldrene til kjemper.

Randsborg PH. Treatment of focal cartilage injuries of the knee. What will we learn from the Norwegian Cartilage Project.

Randsborg PH. Autologous chondrocyte implantation

Temmesfeld M. Ortopedi og 3D-printing: Grensesnitt mellom medisin og teknologi.

Other conferences

Ekås GR. Pediatric ACL Monitoring Initative. Sports Medicine Autumn Congress 2022.

Myhrvold S. Skal akillesrupturer opereres eller ikke? Sports Medicine Autumn Congress 2022.

Straume-Næsheim T., Randsborg PH. Årøen A. Medial patellofemoral ligament reconstruction vs conservative treatment for recurrent lateral patellar dislocation- 3 years results from a randomized control trail. 20th ESSKA Congress 2022, Milano.

Abstracts

The Norwegian Orthopedic Socicety´s Meeting, Oslo, October 2022

Alhaug OK. Predictors for failure after surgery for lumbar spinal stenosis, a prospective observational study.

Bartels S. Utvåg SE. Totalprotese gir bedre resultater etter lavenergetisk dislokert lårhalsbrudd hos pasienter mellom 55-70 år.

Cetinkaya A. Co-author. Short musculoskeletal function assessment questionnaire- en norsk oversettelse og krysskulturell adaptasjon.

Ekås GR. Pediatric ACL Monitoring Initiative- I Norge og Europa.

Grundnes O. Co-author. Comparison of the three different minimally invasive surgical techniques for lumbar spinal stenosis: A RCT.

Grundnes O. Co-author. Prediktorer for valg av avstivning hos pasienter med degenerativ spondylolistese? Sekundær analyse fra NORDSTEN studien**.**

Grundnes O. Co-author. Hvor god er kirurger til å velge beste operasjonsmetode hos pasienter med degenerativ spondylolistese? Fra NORDSTEN-DS.

Grundnes O. Co-author. The association between preoperative MRI findings and clinical improvement. The NORDSTEN spinal stenosis trial.

Gundersen M, Ekås G. Avrivningsbrudd av korsbåndsfestet hos barn- Hvordan går det egentlig?

Randsborg PH. Kjønnsforskjeller i risiko for tidlig revisjon etter kneprotese.

Randsborg PH. Risiko for revisjon etter ankelprotese med fixed eller mobil bearing plastkomponent. En analyse fra FDAs MAUDE database.

Randsborg PH, Owesen C, Årøen A. Effekten av bruskskaders størrelse på pasientrapporterte symptomer. En studie fra Norwegian Cartilage Project.

Randsborg PH. Machine learning for å forutsi klinisk meningsfull forbedring etter korsbåndsrekonstruksjon.

Poster presentations

Temmesfeld M. Jakobsen RB. and others. Rapid intrahospital modification of surgical helmets into a respiratory protective device as an emergency measure. **International Symposium for Production Research, 2022**

Media

Myhrvold S. Kirurgi gir ikke bedre resultat hos pasienter røket akilles. Dagens Medisin 19.04.2022. https://www.dagensmedisin.no/akershus-universitetssykehus-ahus-eldre-ikke-bruk-folkehelse-forskning/kirurgi-gir-ikke-bedre-resultat-hos-pasienter-med-roket-akilles/121115

Temmesfeld M, Fuglesang HF. Har fått fem millioner for å videreutvikle denne ideen. Romerrike Blad, 6.06.2022. https://www.rb.no/har-fatt-fem-millioner-kroner-for-a-videreutvikle-denne-ideen-haper-det-skal-fa-oss-over-terskelen/s/5-129-29062

Academic assignments

Supervising activity

Main supervisor for Jan Rune Mikaelsen, Akershus University Hospital, Røtterud JH.

Main supervisor for Jakob V. Nordbø, Akershus University Hospital, Årøen A.

Main supervisor for Christian Pollmann, Akershus University Hospital, Årøen A.

Main supervisor for Stian Kjennvold, Akershus University Hospital, Årøen A.

Main supervisor for Stefan Bartels, Akershus University Hospital, Utvåg SE.

Main supervisor for Ingi Thor Hauksson, Akershus University Hospital, Randsborg PH.

Main supervisor for Ståle Clementsen, Akershus University Hospital, Randsborg PH.

Main supervisor for Annette Wikerøy, Akershus University Hospital, Randsborg PH.

Main supervisor for Ola-Lars Hammer, Akershus University Hospital, Randsborg PH.

Main supervisor for Max J. Temmesfeld, Akershus University Hospital, Jakobsen RB.

Main supervisor for Inni S. Figenschou, Akershus University Hospital, Adelved A.

Main supervisor for Milan Duong Nguyen, Medical Student, University of Oslo, Årøen A.

Main supervisor for Helene B. Rontén, Medical Student, University of Oslo, Jakobsen RB.

Co-supervisor for Tommy Frøseth Aae, Kristiansund Hospital, Randsborg PH.

Co-supervisor for Stian Kjennvold, Akershus University Hospital, Randsborg PH.

Co-supervisor for John Christopher Noone, Akershus University Hospital, Skråmm I.

Co-supervisor for Stian Kjennvold, Akershus University Hospital, Årøen A.

Co-supervisor for Ingi Thor Hauksson, Akershus University Hospital, Årøen A.

Co-supervisor for Ståle Clementsen, Akershus University Hospital, Årøen A.

Co-supervisor for Tommy Frøseth Aae, Kristiansund Hospital, Årøen A.

Co-supervisor for Ole Kristian Alhaug, Lillehammer Hospital, Utvåg SE.

Co-supervisor for Christian Pollmann, Akershus University Hospital, Straume-Næsheim TM.

Co-supervisor for Jakob V. Nordbø, Akershus University Hospital, Straume-Næsheim TM.

Co-supervisor for Ståle Myhrvold, Akershus University Hospital, Ulstein S.

Co-supervisor for Ståle Clementsen, Akershus University Hospital, Jakobsen RB.

Co-supervisor for Jan Rune Mikaelsen, Akershus University Hospital, Jakobsen RB.

Co-supervisor for Annette Wikerøy, Akershus University Hospital, Jakobsen RB.

Co-supervisor for Jakob de Lange, medical student, University of Oslo, Nordbø JV.

Reviewer

Reviewer for BMJ – British Medical Journal, Ulstein S.

Reviewer for BMJ Open – British Medical Journal Open, Ulstein S.

Reviewer for BMC Musculoskeletal Disorders, Pollmann C.

Reviewer for KSSTA – Knee Surgery, Sports Traumatology Arthroscopy, Røtterud JH.

Reviewer for AJSM – American Journal of Sports Medicine, Røtterud JH.

Reviewer for OJSM- The Orthopaedic Journal of Sports Medicine, Røtterud JH.

Reviewer for KSSTA – Knee Surgery, Sports Traumatology Arthroscopy, Skråmm I.

Reviewer for JBJS – Journal of Bone and Joint Surgery, Årøen A.

Reviewer for AJSM – American Journal of Sports Medicine, Årøen A.

Reviewer for BMC- Musculoskeletal Disorders, Årøen A.

Reviewer for Cartilage, Årøen A.

Reviewer for KSSTA – Knee Surgery, Sports Traumatology Arthroscopy, Straume-Næsheim TM.

Reviewer for BMC Musculoskeletal Disorders, Straume-Næsheim TM.

Reviewer for Acta Ortopedica, Randsborg PH.

Reviewer for Cartilage, Randsborg PH.

Elite reviewer for JBJS – Journal of Bone and Joint Surgery, Randsborg PH.

Reviewer for KSSTA – Knee Surgery, Sports Traumatology Arthroscopy, Randsborg PH.

Reviewer for BMC Musculoskeletal Disorders, Randsborg PH.

Reviewer for British Medical Journal SIT, Randsborg PH.

Reviewer for JBJS case connector- Journal of Bone and Joint Surgery case connector, Randsborg PH.

Reviewer for JBJS reviews- Journal of Bone and Joint Surgery reviews, Randsborg PH.

Reviewer for Tidsskriftet, Den Norske Legeforeningen, Nordbø JV.

Editor

Associate Editor for The Journal of Bone and Joint Surgery, Open Access, Randsborg PH.

Associate Editor for BMC Musculoskeletal Disorders, Årøen A.

Associate Editor for BMC Pilot & Feasibility Studies, Årøen A.

Web-editor for Orthopedics, Store Norske Leksikon, Randsborg PH.

Editorial comittee, Tidsskriftet, Den Norske Legeforeningen, Randsborg PH.

Scientic co-worker for Tidsskriftet, Den Norske Legeforeningen, Randsborg PH.

Editorial Board Member for OJSM- The Orthopaedic Journal of Sports Medicine, Røtterud JH.

Co-editor for Felles Nettløsning for spesialisthelsetjenesten, Medical and health related editor, Nordbø JV.

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