AKERSHUS UNIVERSITY HOSPITAL

Annual Report 2021

Academic Activities

Department of Orthopedic Surgery

UNIVERSITY
OF OSLO

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

Research positions

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

Research Fellows

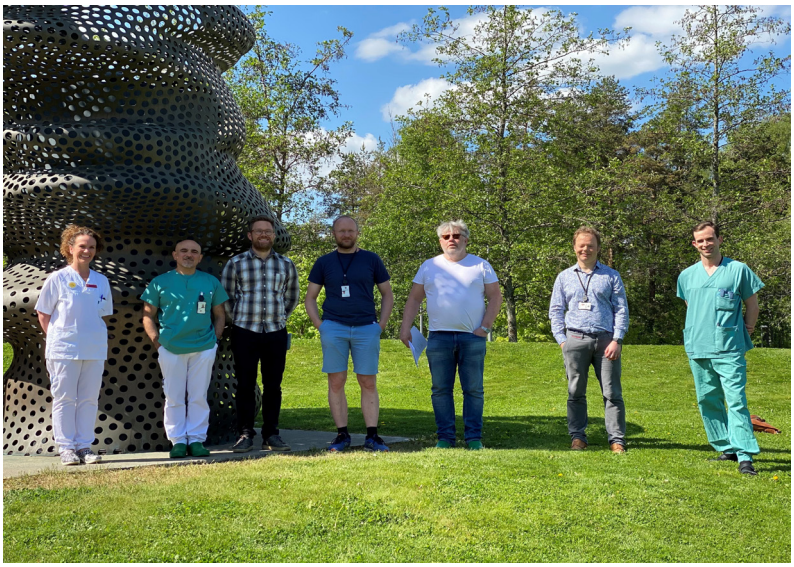
Truls M. Straume-Næsheim	Postdoc, consultant
Per-Henrik Randsborg	Postdoc, consultant
Aron Adelved	PhD, consultant
Christian Owesen	PhD, consultant
Hendrik S.F. Fuglesang	PhD, consultant
Inge Skråmm	PhD, Head of Department of Orthopedic Surgery
Oliver Grundnes	PhD, consultant
Rune B. Jakobsen	PhD, consultant
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; the Raise of the New Dawn

Another research year is soon completed and it is season for counting the stocks for this year. Our research group keep the pace according to publications although the ambition is always higher. The continuum of manuscripts builds base for further increase in numbers, and hopefully we can reach a high impact journal based on all the excellent work produced the last decade. I am as such optimistic about the prospects for next year for both publications and dissertations. Although we have been able to follow the plan and strategy for our research group, the last year also carries some draw backs. Our grant applications last year were not as successful as warranted although we had some moments of success. It is still a week before the large money is revealed through Southern-Eastern Norway Regional Health Authority. We have six applications, that hopefully will be approved. Unfortunately, also the last year meant the end of some giants in our field. Personally, it is with great sadness that a mentor to me, Professor Freddie Fu in Pittsburgh, got to the end of his lifeline. The numbers of orthopedic surgeons that he has inspired and supported is countless. Locally here in Norway, we also have noted loss. Professor Pål Bennum in Trondheim was a true academic, that made a significant footprint in orthopedic research. Both these giants did make the academic relay continue with passing their research to continue in the hands of great successors providing potential for further improvements in our orthopedic care. I am happy to work in a great team of many excellent colleagues in orthopedic research and surely believe that several members in our team will contribute significantly to this raise of a new dawn in orthopedic care based on their academic contributions and skills expected to be fulfilled in the coming years. Excellent orthopedic care is a trademark of a modern society. All the best for the new year and seasonal holidays. Stay safe.

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 research strategy of the department.
- Promote research and research training for workers at the department.
- Contribute to developing the research activity at the department.
- 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 in 2021

Annette Wikerøy received a grant of 267 000 NOK from Sophies Minde Orhopedic Research Funding for her research project *Plate fixation versus intramedullary nailing of 3 and 4 part proximal humerus fractures. A prospective randomized controlled trial.*

Asbjørn Årøen and Axel S. Petterson received a grant of 765 000 NOK from Sophies Minde Orthopedic Research Funding for their research project *Save the meniscus - the Bucket Handle study*.

Maren Gundersen received a grant of 200 000 NOK from Sophies Minde Orthopedic Research Funding for her research project *Tibial Spine Avulsion fractures in children – Epidemiology, treatment and outcomes.*

Monica A. Sailer received a grant of 316 000 NOK from Sophies Minde Orthopedic Research Funding for her project *Reduksjon av amputasjoner i underekstremiteten ved innføring av pakkeforløp for diabetiske fotsår*.

Annette Wikerøy and Rune B. Jakobsen received a grant of 250 000 NOK in Interal Strategic Research Funding from Akershus University Hospital for their project *Plate fixation versus intramedullary nailing of 3 and 4 part proximal humerus fractures. A prospective randomized controlled trial.*

Maren Gundersen and Guri Ekås received a grant of 500 000 NOK in Internal Strategic Research Funding from Akershus University Hospital for their project *Tibial Spine Avulsion fractures in children – Epidemiology, treatment and outcomes.*

Hendrik Fuglesang and Max Temmesfeld was accepted at UiO:Life Science´s two-year innovation programme, SPARK, for their project *Patella fracture plate - a solution to the knee cap problem*. They will recieve mentoring, milestone-based funding and education to further develop their idea.

Tor Kristian M. Andresen and Rune B. Jakobsen received a grant of 50 000 NOK from Aase Bye and Trygve Hoff Research Fund for their project *Patient Reported Outcomes after Acute Achillestendon Rupture with a minimum of 5 year follow-up.*

Jakob V. Nordbø received a grant of 50 000 NOK from Ecbos legat for his research project *Physical Activity after Total Hip Replacement.*

Guri Ekås and co-others recieved the *Best Original Article Award* in the Journal of ISAKOS Best Article Competition for the article *2018 International Olympic Committee Consensus Statement on Prevention, Diagnosis and Management of Paediatric Anterior Cruciate Ligament (ACL) Injuries.*

Axel S. Petterson was awarded the Smith And Nephew Research Scholarship for his project *Save the meniscus - The Bucket Handle Study*.

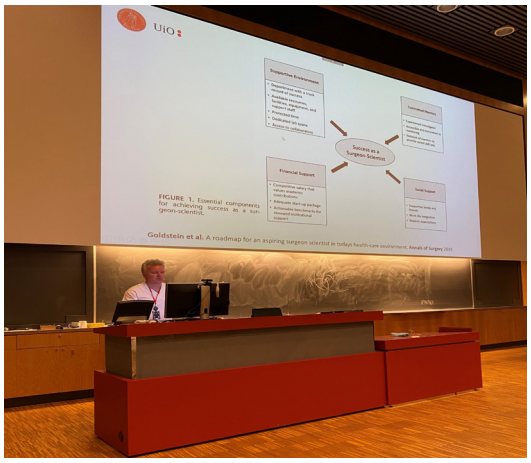
Maren Gundersen recieved the NOF-scholarship of 50 000 NOK from the Norwegian Orthopedic Society for her project *Tibial Spine Avulsion fractures in children – Epidemiology, treatment and outcomes.*

Research seminar at the Department of Orthopedic Surgery

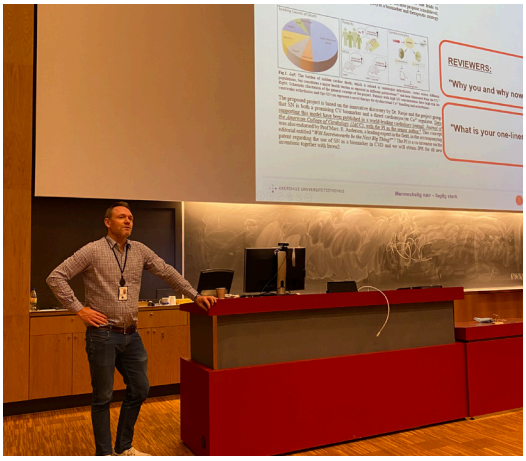
The Ortopedic Research Committee at the Department of Orthopedic Surgery arrange a yearly research seminar for all employers at the department. The topic for this year´s seminar was; *How to improve grant application skills and academic writing.*

Every year at the seminar, there is a nomination of best publication from the department. All publications with Impact Factor higher than Acta Orthopedica with first author from the department are nominated. The nominated publications are rewied by external reviewers.

Asbjørn Årøen, head of research at our department, handing out the best publication award to Ola-Lars Hammer, consultant and PhD candidate for the article; *Cost-Effectiveness of Volar Locking Plate Compared with Augmented External Fixation for Displaced Intra-Articular Wrist Fractures.*



Knut-Magne Augestad, head of Divison of Surgery Campus Ahus, held a lecture on the topic; *How to increase the publication rate at the department and how to improve collaboration across departments.*



Helge Røsjø, Head of Research at Akershus University Hospital, used one of his projects as a practical example to talk about tips for success with external research applications.

Ongoing research projects

Research projects: upper extremities

“Radius C-study” -Volar Locked Plating Versus Bridging External Fixation

Project group: Ola-Lars Hammer MD PhD candidate, Jan Erik Madsen MD Professor (Oslo University Hospital), Ståle Clementsen MD PhD student, Per-Henrik Randsborg MD PhD

Introduction: Earlier, the standard method of fixation of the most comminuted distal radius fractures was an external fixation supplemented by K-wires. Since the development of the volar locking plate technology, a new approach to the treatment of these fractures has gained popularity worldwide. Over the past couple of years, the volar locking plate has achieved dominance in the treatment of most fractures of the distal radius. This has occurred without the backing of large prospective, randomized studies. There is to date little solid scientific data to support this drastic change in treatment rationale. External fixation and volar locking plates differ widely in operative technique, duration of immobilization postoperatively and potential complications. The newer implants are also significantly more expensive than the established option of external fixation.

Aim: 1. We hope to disclose the various benefits and possible drawbacks of volar locked plating versus augmented external fixation and hopefully make a recommendation for a treatment rationale.

2. A secondary aim of our study is to thoroughly examine the cost of volar locked plating versus augmented external fixation.

Materials and methods: We have designed a randomized, prospective study for comparison of volar locked plating versus Hoffman II bridging external fixation supplemented by K-wire fixation in patients with comminuted distal radius fractures, AO/OTA type C2 and C3. On the basis of power analysis, a total of 166 patients are to be included in this project. The follow-up period is two years and evaluation is based on x-ray analysis, grip strength, range of movement, pain and various tools to measure quality of life and satisfaction with the treatment (EQ-5d, SF-36, QuickDASH).

Status: By February 2015, two-year follow-up of all patients was concluded. The authors spent 2016 finishing the database, entering a substantial amount of data and performing the statistical analysis. During 2018 the first publication was completed. The second publication, focusing on the cost-benefit of surgical interventions following wrist fractures was published in 2020. The third publication focusing on Patient Rated Outcome Measures was published in May 2021. The main author of these publications, Ola-Lars Hammer, will defend his PhD-thesis on March 11, 2022.

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

Introduction: 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 Neers 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 7 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

Introduction: 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. This project is a semi-blinded randomized controlled trial on the treatment of PHFs that aim 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.

Aim: 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 aim 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 outpatients clinic for two years after surgery. Primary outcome is The 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, 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 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 results other than this is available yet.

Status: Inclusion of 79 patients was completed in June this year. The duration of follow-up is two years.

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

Introduction: 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 forty percent for fascieectomy and sixty percent 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: Clinical RCT comparing functional results and recurrence rate following enzymatic treatment versus needle aponeurotomy.

Materials and methods: 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. Patients with primary disease of the hand. Total of 80 patients needed to detect 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. Follow ups is being done continuously 2021 is the last follow up year.

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.

Present status: Due to conflicts with other projects, this study still remains uncomplete and is not published. After finished PhD thesis and projects, 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 Orthopaedic Surgery, Haukeland University Hospital, Bergen), Jan-Erik Gjertsen MD PhD (Department of Orthopaedic Surgery, Haukeland University Hospital, Bergen, Norwegian Hip Fracture Register, Department of Orthopaedic Surgery, Haukeland University Hospital, Bergen, Department of Clinical Medicine, University of Bergen, Bergen), Frede Frihagen MD PhD (Department of Orthopaedic Surgery, Østfold Hospital), Cecilia Rogmark MD PhD (Department of Orthopaedics, Skåne University Hospital, Lund University, Malmö, Sweden), Filip C. Dolatowski MD PhD (Department of Orthopaedic Surgery, Oslo University Hospital), Wender Figved MD PhD (Department of Orthopaedic 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. Harris Hip Score (HHS) assessed 12 months postoperatively was the primary outcome. Secondary outcomes were HHS at 4 and 24 months, Oxford Hip Score (OHS), Hip Dysfunction 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: The manuscript was submitted to JBJS on 25.11.21.

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 Diakonale sykehus), Geir Hallan MD PhD (The Norwegian Arthroplasty Register), Anne Marie Fenstad statistician (The Norwegian Arthroplasty Register), Stefan Bartels MD, Asbjørn Årøen MD Prof.

Introduction: 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 8 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 education, comorbidity and surgery-related variables.

Results: We have not published any results per 31.12.21.

Status: The data acquisition is completed and the project is in the analysis and writing phase. The project will be finished in 2022.

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 Diakonale sykehus), Geir Hallan MD PhD (The Norwegian Arthroplasty Register), Anne Marie Fenstad statistician (The Norwegian Arthroplasty Register), Stefan Bartels MD, Asbjørn Årøen MD PhD

Introduction: 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 2005-12. 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 31.12.21.

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

”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)

Introduction: In the light of poor physical function before surgery 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 total hip arthroplasty (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 by dividing 40 m. by total time. A regular walking aid is allowed and recorded. Sample size estimation requires 128 patients, 64 in each group.

Status: Data acquisition. We have included about 90% of the participants, and aim to finish the inclusion phase during 2022.

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, Örlygur Arnarson MD (Stavanger university hospital), Aksel Paulsen MD PhD (Stavanger university hospital)

Introduction: 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 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) and an application was sent to NPR in September 2021. NPR estimates 9 months processing time on the application. We aim to analyze the data in the second half of 2022.

Orthogeriatric Co-management Reduces Incidence of Delirium in Hip Fracture Patients

Project group: **Christian Thomas Pollmann** MD PhD candidate, Marte Rognstad Mellingsæter, Bjørn Erik Neerland MD PhD (Oslo Delirium Research Group, Department of Geriatric Medicine, Oslo), Truls Straume-Næsheim MD PhD, Asbjørn Årøen MD Prof., Leiv Otto Watne MD PhD (Oslo Delirium Research Group, Department of Geriatric Medicine, Oslo)

Introduction: Delirium is characterized by sudden impairment in awareness and cognition, and is a common complication to acute somatic illness in the elderly. There is evidence that delirium can precipitate dementia in patients that are previously cognitively intact, and accelerate deterioration in those who already are demented. Hip fracture patients, who typically are elderly and frail, have a high risk of developing delirium with reported rates of up to 50%. Orthogeriatric co-management, the treatment of hip fracture patients in a multidisciplinary team including orthopedic surgeons and geriatricians, might be suited to reduce the incidence of delirium in hip fracture patients.

Aim: To investigate if the introduction of orthogeriatric co-management reduced the incidence of delirium in hip fracture patients.

Methods: We compared the incidence of delirium and subsyndromal delirium (SSD) before (usual care group, n = 94) and after (orthogeriatric group, n = 103) the introduction of orthogeriatric co-management in a single centre, prospective observational study. Patients were assessed for delirium daily using the DSM-5 criteria. For the main analysis, the outcome measure 'no delirium / SSD / delirium' was treated as an ordinal variable and analysed using the Chi-squared test and multivariable ordinal logistic regression. To calculate the number needed to treat (NNT), the outcome was dichotomized to 'no delirium' vs. 'SSD or delirium'.

Results: SSD and delirium were less common in the orthogeriatric group (no delirium: 59 % vs. 40% / SSD: 6 % vs. 13 % / delirium: 35 % vs. 47%; p = 0.021). With a dichotomized outcome ('no delirium' vs. 'SSD or delirium'), this corresponds to a NNT of 5.3 (95% CI: 3.1 – 19.7). The patients in the usual care group and the patients in the orthogeriatric group were comparable except for a higher proportion of patients with pre-existing cognitive impairment in the usual care group (51% vs. 37%, p = 0.045). Pre-existing cognitive impairment is an important risk factor for the development of delirium. However, we performed a multivariable ordinal logistic regression analysis adjusted for pre-existing cognitive impairment, age, sex, ASA-score, time to surgery, type of surgery, and the occurrence of any type of complication. Also in this analysis, orthogeriatric co-management remained a significant predictor for a lower incidence of SSD/delirium (OR = 0.46, 95% CI: 0.23 – 0.89).

Conclusion: Orthogeriatric co-management reduced the incidence of SSD / delirium in hip fracture patients.

Status: Project finished.

Factors that may Impact the Functional Level of Older Patients Following Hip Fracture Surgery

Project group: Marit Kirkevold PhD (Oslo Metropolitan Hospital), Linda Andresen, Torunn Hammer, Nina Mickelson Weldingh

Introduction: 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 make it possible 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 three months post discharge.

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 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: 131 patients are included in the study. One article is in progress, and is expected submitted in the beginning of 2022.

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 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 and younger, girls 14 years or younger at injury) with a tibial spine fracture from 2009-2019 treated at Akershus University Hospital (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 (HSS Pedi-FABS). 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 or similar hand held measuring device). 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.

The Regional Ethics committee of South Eastern Norway has reviewed the project protocol and has approved this project. (REK 213026)). The project is also submitted to the local ethics board at Akershus University Hospital (PVO-Ahus).

A preliminary nested case series within the retrospective study are under planning to develop a protocol for evaluating the structure of the ACL in conservatively treated tibial spine fracture patients with 7.0 Tesla MRI. This case series is performed in cooperation with the Department of R adiology at Akershus University Hospital and St. Olavs University Hospital, Trondheim where the Tesla 7.0 MRI machine is located.

Status: Patient inclusion is initiated.

Return to Sports Activity Minimum 1 year after Anterior Cruciate Ligament Injury in Children

Study group: **Guri Ekås** MD PhD, Synne Lyng medical student, Asbjørn Årøen MD Prof.

Background: Anterior cruciate ligament (ACL) reconstructions in children are increasing. It is reasonable to believe that the incidence of ACL injuries is increasing as well. Treatment is challenging because current evidence is inconsistent and has scientific limitations. Return to sports after injury is the main goal for many of the patients, who are typically very active. Furthermore, the desire to return to sports, especially pivoting sports, is an important factor in the treatment decision process. Several studies report high return to sports in children, but very few studies have return to sports as the primary outcome measure. Therefore, the primary aim of this study was to evaluate return to sports and activity at least one year after ACL injury in children. Secondary aims were to describe knee symptoms and function, readiness to return to sports, operational status and number of re-injuries in the injured and opposite knee at final follow-up.

Material and methods: In this retrospective case series fifteen participants (18 knees) with an ACL injury, sustained while skeletally immature, and treated at Oslo University Hospital in the time period 2016-2019, were included. The participants completed a standardized telephone conversation and the following patient-reported outcome measures (PROMs): the Hospital for Special Surgery Pediatric Functional Activity Brief Scale (HSS Pedi-FABS), Anterior Cruciate Ligament-Return to Sport after Injury (ACL-RSI) scale and the Pediatric International Knee Documentation Committee (Pedi-IKDC) Subjective Knee Evaluation Form. The primary outcome was return to pre-injury sport or activity. Secondary outcomes were mean scores at the PROMs, injury mechanisms and rates of additional injuries, re-injuries, treatment (reconstructive surgery or non-operative) and re-surgeries.

Results: Data analysis is completed.

Status: Medical student Synne Lyng has completed her master thesis. The study is completed. A manuscript is not yet published.

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)

Introduction: 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.

There is an urgent need to join forces and collaborate to build a knowledge base in order to overcome these challenges.

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.

To reach the secondary aim we have the following objectives:
3) Document current practice for pediatric ACL injuries (i.e treatment approach, surgical technique).

4) 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 multicentre 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 University Hospital and Akershus University Hospital). A secure data collection platform has been created (PAMI database) 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: (1) A physical activity-related ACL injury (isolated or combined with collateral ligament injury), (2) ACL injury diagnosed with MRI and a positive Lachman's test and (3) Skeletal age 8-14 in girls and 8-16 in boys (based on x-ray of left hand evaluated according to the Greulich & Pyle atlas criteria at the time on inclusion). Exclusion criteria: congenital ACL deficiency, tibial spine fractures, combined ACL and posterior cruciate ligament injuries, and knee dislocations.

Status: Data collection is ongoing at Akershus University Hospital. Preliminary results based on data from all including centres in Europe is published.

Low-Input RNA-Sequencing in Patients with Cartilage Lesions, Osteoarthritis, and Healthy Cartilage

Project group: **Katherine Wang** MD, Qin Ying Esbensen PhD, Tommy Karlsen, PhD, Cathrine Eftang, MD PhD, Christian Owesen, MD PhD, Asbjørn Arøen, MD PhD, Rune B. Jakobsen, MD PhD

Introduction: Cartilage damage and degeneration are some of the most common health-related issues affecting today's aging population. Isolated cartilage and osteochondral lesions of the knee present a difficult clinical challenge, especially in younger patients for whom alternatives such as partial or total knee replacement (TKR) are rarely advised. Age, obesity, biomechanical instability, and genetics are part of the multifactorial etiology of osteoarthritis (OA). It is also well established that injury to the knee joint leads to earlier development of OA than in those without previous injury. However, little is known about this process that leads to the earlier development of OA. In this study, we aimed to firmly establish differences and similarities in gene expression based on low-input RNA-sequencing from samples of HC, cartilage from patients with a CL, and cartilage from patients with osteoarthritic cartilage, to provide the basis for future studies.

Aim: To analyze and compare cartilage samples from 3 groups of patients utilizing low-input RNA-sequencing.

Materials and Methods: Cartilage biopsies were collected from patients in 3 groups (n = 48): Cartilage lesion (CL) patients had at least ICRS grade 2, osteoarthritis (OA) samples were taken from patients undergoing knee replacement, and healthy cartilage (HC) was taken from ACL-reconstruction patients without cartilage lesions. RNA was isolated using an optimized protocol. RNA samples were assessed for quality and sequenced with a low-input SmartSeq2 protocol.

Results: RNA isolation yielded 48 samples with sufficient quality for sequencing. After quality control, 13 samples in the OA group, 9 in the HC group, and 9 in the CL group were included in the analysis. There was a high degree of co-clustering between the HC and CL groups with only 6 genes significantly up- or downregulated. OA and the combined HC/CL group clustered significantly separate from each other, yielding 659 significantly upregulated and 1.369 downregulated genes. GO-term analysis revealed that genes matched to cartilage and connective tissue development terms. The gene expression profiles from the 3 groups suggest that there are no major differences in gene expression between cartilage from knees with a cartilage injury and knees without an apparent cartilage injury. OA cartilage, as expected, showed markedly different gene expression from the other two groups. The gene expression profiles resulting from this low-input RNA-sequencing study offer opportunities to discover new pathways not previously recognized that may be explored in future studies.

Status: Project completed. Paper published in Cartilage.

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 (Martina Hansen Hosptial), Guri Ekås MD PhD, Gunnar Knutsen MD 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

Introduction: 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.

Results: None at present.

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

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

Introduction: 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.

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.

Concomitant Full-thickness Cartilage Lesions do not Affect Patient-Reported Outcomes at Minimum 10-year Follow-Up after ACL Reconstruction

Project group: **Katherine Wang** MD, Cathrine Eftang MD PhD, Svend Ulstein MD PhD, Asbjørn Årøen MD PhD, Rune Jakobsen MD PhD

Aim: To compare patients with a concomitant full-thickness cartilage lesion and anterior cruciate ligament (ACL) injury to patients with an isolated ACL injury at 10–15 years post ACL reconstruction.

Introduction: Anterior cruciate ligament (ACL) reconstruction is one of the most commonly performed orthopedic procedures and a well-established treatment option with multiple reports on the long-term outcomes, both subjective and objective. ACL injuries are often associated with other injuries in the knee and the choice of treatment for these injuries is not always clear. Cartilage lesions can be found in 16–46% of knees undergoing primary ACL reconstructions. There is yet to be a consensus for whether, and how, these lesions should be treated and rehabilitated.

Materials and methods: This is a longitudinal follow-up of a cohort of 89 patients that were identified in the Norwegian National Knee Ligament Registry and included in the index study in 2007. The study group consisted of 30 patients that underwent ACL reconstruction and had a concomitant, isolated full-thickness cartilage lesion (International Cartilage Repair Society [ICRS] grade 3–4). Each study patient was matched with two control patients who underwent ACL reconstruction but had no cartilage lesions (ICRS grade 1–4) (n = 59). At a median follow-up of 10.2 years (range 9.9–15.6), 65 patients (74%) completed the Knee Injury and Osteoarthritis Outcome Score (KOOS), which was the main outcome measure, resulting in 23 pairs after matching.

Results: At a follow-up of 10–15 years after ACL reconstruction, no significant differences in KOOS were found between patients with a concomitant full-thickness cartilage lesion and patients without cartilage lesions. There was also no significant difference between the two groups when comparing the change over time in KOOS scores from preoperative to follow-up. Both groups showed significant improvement in all KOOS subscales from preoperative to follow-up, except for in the Symptoms subscale for the control group. The greatest improvement was in the QoL subscale for the study group.

ACL-reconstructed patients with a full-thickness cartilage lesion did not report worse outcomes at 10–15 years after surgery compared with patients with an isolated ACL injury. Our findings support that there is no long-term negative effect of a concomitant cartilage lesion in an ACL-reconstructed knee.

Status: Project completed. Paper published in KSSTA.

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.

Introduction: 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 randomized trials. 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 of chronic focal cartilage injuries.

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, urin- 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 cartilage lesion to either of the femoral condyles
- Lesion size > 2cm^2
- 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.

Results: The randomized clinical trial is still ongoing and results will be published upon completion.

Status: We are currently conducting the 10 year follow-up of the operated patients. We expect data collection to be completed within the first half of 2022 and plan for submission within the following 6 months.

Incidence of pediatric Anterior Cruciate Ligament Reconstructions in Norway (2005-2019)

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

Introduction: 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 is offered to patients with additional injuries, which warrants immediate repair. Patients without such injuries are initially treated non-operatively with rehabilitation. Delayed ACL reconstruction 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 reconstructions in the pediatric population both in Australia and United States. Even though not all patients seem to need surgery, ACL-reconstruction is still an important treatment alternative – but not without risk in skeletally immature children. The increasing trend in ACL-reconstructions internationally is therefore of great concern, also because it may imply an increase in ACL-injuries in the young population. Pediatric ACL reconstructions 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 reconstructions in Norway during the past 15 years. Secondly, we want to investigate details regarding trends in surgical practice, patient characteristics, and to see how they cope.

Material and methods: Data were 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 reconstruction registered between January 2005 and December 2019. Main outcome measurement was annual incidence of pediatric ACL reconstructions, 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. We adhered to the STROBE (Strengthening the Reporting

of Observational studies in Epidemiology) statement in study planning and protocol writing.

Results: N.A.

Status: Data collection is completed. Final data-analysis is currently ongoing, and manuscript is in preparation. Planned submission by June 2022, to the American Journal of Sports Medicine (AJSM).

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

Introduction: The prevalence of overweight, (Body Mass Index (BMI) 25 – 30 kg/m^2) and obesity (BMI >30 kg/m^2) 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 selfreported outcome after TKR in patients with BMI > 30 kg/m^2 at the time of surgery, compared to patients with BMI < 30 kg/m^2. 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.

Results: Not available.

Status: Data acquisition phase.

Save the Meniscus – the Bucket Handle 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)

Introduction: Meniscal injuries are severe injuries, which follows an individual for life. It affects the young, and is a particular malign rupture pattern. Untreated it will inevitably lead to a loss of meniscus, and greatly increase the risk for early osteoarthritis, 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”. The “all inside technique” is widely used today, especially in the posterior horn. This technique is increasingly popular, and is believed to be quick, effective and safe. However, it has not yet been studied properly, and fear is that it does not live up to the traditional gold standard.

To assess this, we plan to conduct a multicenter randomized controlled trial (RCT) comparing the two methods.

This study will provide fundamental information regarding the most cost-effective and superior treatment of this common meniscal injury, which potentially could dictate further handling of this large patient group both nationally and internationally.

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

Materials and methods: To prepare and better understand the matter of investigation, we will conduct two studies using data from the Norwegian Cruciate Ligament Register (NCLR). There will be one retrospective, epidemiological study, and one prospective study. After the introduction of the electronic version of the NCLR, data on meniscal treatment was included in increasing manner. We will use these data, evaluating today´s treatment.

For the RCT, 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.

The patients will fill in knee specific PROMs preoperatively, and at 3, 6, 12 and 36 months. The primary endpoint will be failure of the meniscal repair verified during a reoperation. The secondary endpoints will be knee function assessed by the PROMs and a cost analysis of the two treatments.

Status: The project is in the planning phase, and will start in 2022.

Compensation Claims after Knee Arthroplasty Surgery in Norway 2008–2018

Project group: **Per-Henrik Randsborg** MD PhD, Tommy Frøseth Aae MD PhD student (Kristiansund Hospital), Ida Rashida Khan Bukholm (Norwegian System of Patient Injury Compensation), Anne Marie Fenstad (Norwegian Arthroplasty Register), Ove Furnes (Norwegian Arthroplasty Register) and Rune Bruhn Jakobsen MD PhD

Introduction: The number of knee arthroplasty procedures in Norway has increased over the last decade and is now over 7.000 per year. About 1 in 5 patients receiving a TKA remains dissatisfied with the result. Although serious complications are rare, infections, implant loosening, misplaced implants, residual pain, and other complications do occur, with potential detrimental results. To monitor the safety of implants and define the epidemiology of the procedures, the Norwegian Arthroplasty Register (NAR) was established in 1987. NAR provides a comprehensive overview of knee arthroplasties taking place in Norway. Compliance with the registry is 97.6% for primary TKA and 93.2% for revisions.

Aim: To assess the claims following knee arthroplasty surgery reported to the Norwegian System of Patient Injury Compensation (NPE) in light of institutional procedure volume.

Material and methods: We collected data from NPE and the Norwegian Arthroplasty Register (NAR) for the study period (2008–2018). Age, sex, type of claim, and reason for compensation were collected from NPE, while the number of arthroplasty surgeries was collected from NAR. The treating hospitals were grouped by quartiles according to annual procedure volume. The effect of hospital volume on the likelihood of an accepted claim was estimated.

Results: NAR received 64.241 reports of arthroplasty procedures, of which 572 (0.9%) patients filed a claim for treatment injury. 55% of the claims were accepted, representing 0.5 % of all knee arthroplasties. The most common reason for accepted claim was a hospital-acquired infection, in 28% of the patients, followed by misplaced implant (26%) and aseptic loosening (13%). The hospitals with the lowest annual volume (57 or fewer arthroplasties per year, first quarter) had a statistically significantly larger fraction of granted claims per procedures compared with other institutions.

Interpretation: The overall risk of ending up with compensation due to treatment error following knee arthroplasty was 0.5%. The risk of accepted claim was greater for patients operated in the lowest volume hospitals.

Status: This project is finished and was published in Acta Orthoapedica in 2021.

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

Introduction: 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 data has been collected from NPE, and is currently being categorized. Data analysis is projected to commence Q3 2022.

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: **Olav Nordanå** MD, 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 has concluded 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 have 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 have 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).

Aim: 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 our institution during 2015-2019.

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 at our institution between 2015 and 2019 treated surgically for a meniscal injury will be included in the study. The patients will be identified from our internal 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 to sport. Complications or reoperations will be registered. A standard visual analogue scale will be used to quantify pain.

Status: The patient list has been extracted from the electronical files, and the data is currently being collected and transferred to a secure database at Akershus University Hospital. Data collection is estimated to be finished by summer 2022.

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)

Introduction: 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.

Status: The recruitment of patients has been finalized with a total of 60 patients included. The patients will be followed for three years and all follow-up testing will be finished by January 2022.

The first paper assessing the baseline was published in 2019.

Preliminary one year data was presented at the biannual meeting of the European Society for Sports Traumatology, Knee Surgery and Arthroscopy in Glasgow in May 2018.

In 2020 all the one-year follow up was completed for all patients and the manuscript for paper no 2 is currently being revised for publication in KSSTA. The corresponding abstract of this paper has been accepted for presentation at the ESSKA conference in Paris in April 2022.

In 2020, a collaboration with Oslo Metropolitan University was initiated, and physiotherapist Tina Løkken Nygård was included in the research group. Her aim is to assess the functional assessments of the patients at baseline and the two follow up points to write up a master degree in physiotherapy.

Effect of Concomitant Meniscal Lesions and Meniscus Surgery in Anterior Cruciate Ligament Reconstruction - A nationwide prospective cohort study from Norway and Sweden of 8408 patients with 5-year follow-up

Project group: **Svend Ulstein** MD PhD, Asbjørn Årøen MD Prof., Magnus Forssblad MD PhD (Karolinska Institute), Lars Engebretsen Md Prof. (Oslo University Hospital), Jan Harald Røtterud MD PhD

Introduction: Patient-reported outcome measures (PROMs) have become the mainstay in understanding patients` perceptions of treatment outcome in medicine, and in particular in the field of orthopedic surgery. The Scandinavian knee ligament registries allow for large scale monitoring as well as comparisons of PROMs for subgroups of patients. As responder analyses have revealed that only 55-66% of anterior cruciate ligament (ACL) reconstructed patients perceive their symptoms acceptable after ACL-reconstruction (ACLR), increased knowledge of the factors that might contribute to outcome is required.

Aim: The aim of this study was to determine the effect of concomitant meniscal lesions, and the surgical management of these, on patient reported outcome 5 years after ACLR.

Materials and methods: 15.703 patients with a primary unilateral ACLR registered in the Norwegian and Swedish National Knee Ligament registries between 2005 and 2008 were prospectively enrolled and longitudinally followed. 8.408 patients returned their Knee injury and Osteoarthritis Outcome Score (KOOS) 5 years after ACLR.

A multivariable linear regression model was used to assess possible impact on prognosis, as measured by KOOS, of a concomitant meniscus lesion and its associated surgical treatment.

Results: At a mean ± standard deviation (SD) follow-up of 5.1 ± 0.2 years and mean ± SD patient age of 33.8 ± 10.7 years, KOOS data were available from 4.774 (57%) patients with no concomitant meniscus lesion, and 3.634 (43%) patients with a concomitant meniscus lesion. Patients with concomitant meniscal lesions reported equal crude mean scores compared to patients without meniscal lesions in all KOOS subscales 5 years after ACLR. The mean improvement in scores from preoperative to the 5-year follow-up was greater for patients with a concomitant meniscus lesion for the KOOS subscales Pain, Activities of Daily Living (ADL) and Sport and Recreation (Sport/Rec). In the adjusted regression analyses, using patients without concomitant meniscal lesions as the reference, neither “no treatment”, nor resection or repair of medial meniscal lesions were significantly associated with KOOS scores 5 years after ACLR. Except from the subscale ADL, in which a repaired lateral meniscus lesion was associated with better outcome, no significant associations between any of the lateral meniscus lesion treatment-categories and KOOS outcome at 5-year follow-up were identified.

Status: Project finished and published.

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 (Christian Owesen replaced Randsborg between August 2019 and September 2021) at Akershus University Hospital (Ahus). It includes eight different hospitals in all four health regions of Norway, and the projects includes two RCTs, a register study and a basic science.

Focal cartilage lesions in adults are common, and affect young adults. The treatment is difficult, and no current gold standard is established. Autologous Chondrocyte Implantation (ACI) has been recommended for larger lesions, but has never been compared with physiotherapy alone.

Aim: The aim is to compare ACI with arthroscopic debridement and physiotherapy as well as investigate biomarkers as a prognostic factor for the aimed result of PROMs at two years.

Materials and methods: Patients aged 18-50 with isolated grade III or IV cartilage lesions of the femoral condyles or trochlea larger than 2 cm^2 are prospectively randomized to receive either ACI or arthroscopic debridement. We aimed to include 82 patients. The patients will be treated at Ahus or Oslo University Hospital, and followed up at a designated research clinic at Ahus. All patients are subjected to a blood sample that will be analyzed when all patients pass the last follow-up in September 2024.

Status: By the end of 2021 we have been able to include 27 patients, which are much lower than the estimated numbers to be included. Since the inclusion period now has passed seven years, we are forced to end inclusion at September 2022 and start to finalize the result two years after the last inclusion, followed by publication in a proper journal in the field.

NCP - Microfracture Study (MFX)

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

Introduction: Focal cartilage lesions in adults are common, and affect young adults. The treatment is difficult, and no current gold standard is established. Microfracture has been recommended for years for smaller lesions, but has never been compared with physiotherapy alone.

Aim: The aim is to compare microfracture with arthroscopic debridement and physiotherapy.

Material and methods: Patients aged 18-50 with isolated grade III or IV cartilage lesions of the femoral condyles or trochlea less than 2 cm^2 are prospectively randomized to receive either microfracture or arthroscopic debridement. 114 patients are aimed to be include in seven different hospitals; Ahus, Ullevål, Diakonhjemmet, Kristiansund, Ålesund, Haukeland and Haraldsplass.

Status: We have included 52 patients and will continue until September 2022, when the funding period terminates. Unfortunately, the inclusion has been not been as numerous as we hoped for, and the covid pandemic has been a major challenge.

Treatment Results after Achilles Tendon Rupture: A Randomized Controlled Trial Comparing Non-Operative Treatment, Open Repair and Minimal Invasive Surgery

Project group: Ståle Myhrvold MD PhD student, Espen Femmo Brouwer MD (Diakonhjemmet hospital Oslo), Tor Kristian Mostad Andresen MD, Karin Rydevik M.Sc. (NIMI / The National Association for Heart and Lung Disorders (LHL)), Madeleine Amundsen MD (Oslo University Hospital), Wolfram Grün MD (OUS), Faisal Butt MD (Vestre Viken Hospital Trust), Morten Valberg PhD (Oslo Centre for Biostatistics and Epidemiology, Oslo University Hospital), Svend Ulstein MD PhD, Sigurd Erik Hoelsbrekken MD PhD (LHL)

Introduction: Ruptures of the Achilles´ tendon can be treated by surgical repair or by immobilization using a cast or a brace allowing the tendon to heal without surgery. Even though such ruptures represent a common injury, there is no consensus regarding the best treatment protocol. In general, the Norwegian orthopedic community has recommended surgical repair based on studies published the past thirty years showing that surgical repair conveys a significantly lower risk of re-rupture compared to non-operative treatment (NT). Moreover, the comparatively low number of re-ruptures has been used to justify the risk of infections and nerve injuries inferred by surgical treatment. To reduce the number of complications associated with open repair (OR), minimally invasive surgical techniques (MIS) have been developed thereby significantly reducing the number of wound problems while retaining good functional results. This has led to an increasing popularity of the minimally invasive approach and a growing number of patients are treated by minimally invasive surgery. The use of different suture materials and techniques have also been investigated, but none have proven to be consistently better than other alternatives and there are no clear recommendations. There is also uncertainty as to what time point re-ruptures tend to occur, and if re-ruptures happens when the healing tendon carries most of the tensile strength, regardless of suture techniques and material used.

Aim: To guide decisions regarding treatment recommendations, we conducted a multicenter randomized trial comparing NT, OR and MIS enrolling a sufficient number of patients to detect differences as small as the minimal detectable change defined by the primary outcome measure, the Achilles´ Tendon total Rupture Score (ATRS). A key secondary objective in this trial is to assess differences in the re-rupture rates between treatments.

Materials and methods: We performed a three-armed randomized, controlled, multicenter trial comparing NT, OR, and MIS for ATRs.

532 patients between 18 and 60 (including) years with no prior injury to the Achilles´ tendons presenting with an ATR at four hospitals in South-Eastern Norway participated. Patients randomized to either NT, OR or MIS went through a 3-, 6- and 12-month follow-up post injury. The primary outcome measure was the injury-specific patient reported outcome measure, ATRS.

Secondary outcome measures were the Short Form Health Survey v2 (SF-36), physical performance comprised of 5 different tests, and re-rupture rate.

Results: This is the largest RCT ever performed on treatment for ATRs. The results are analyzed, and article submitted to peer reviewed journal and is currently in the revision process.

Present status: Inclusion of the last patient was completed in May 2018 and the follow-up was completed in May 2019. For the time being, the journal to which the article is submitted restricts publication of the results elsewhere until the article is accepted.

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, 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. 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 anonymised form. Sveen and co-workers described 324 acute ATR registered in the Danish system of patient injury compensation (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.
The aim of our study is to investigate:

1. The epidemiology of compensation claims following treatment for ATR as reported to the Norwegian System of Patient Injury Compensation (NPE).
2. Correlations between treatment type and compensation claims.
3. 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 analysed 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 now 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)

Introduction: 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 fractures 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. Both non-operatively and surgical treatment are with the current knowledge 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 weightbearing as tolerated or nonweightbearing 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: Multicentre 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 out-patient clinic within two weeks. Both the groups follows a weightbearing 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 by spring 2021. 5 patients are included at 14th January 2022.

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

Introduction: 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 analysed 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.

Results: None at present.

Status: Data have been collected, analysis in final stage and manuscript under preparation.

Modification of Surgical Helmets for the Use as Personal Protective Equipment During the Ongoing COVID-19 Pandemics

Project group: **Max Temmesfeld** MD, Rune B. Jakobsen, MD PhD

Introduction: The risk of transmission of droplet- and/or airborne pathogens, such as the Severe Acute Respiratory Syndrome Coronavirus 2, while treating patients has been proven with numerous reports of healthcare personnel around the globe falling ill and, not infrequently, also dying. Therefore, adequate respiratory protection of healthcare personnel during the care of infectious patients, including in the operating room (OR) is mandatory. Powered air-purifying respirators (PAPRs) avoid filtering facepiece respirator´s (FFR's) inherent problems, but are not designed for healthcare personnel, and are challenging to disinfect. Surgical helmets (SH) are available in many hospitals worldwide. SHs do share many features with PAPRs, but the air is not drawn through a certified filter medium, and the SH does not generate a positive differential pressure. We investigated the inherent filtration capacity of the original Stryker Flyte SH and found that the average total inward leakage (TIL) was 81% -unacceptably high for a Respiratory Protective Device. Findings were published in 2020. Additionally, we recorded an accumulation of 0.3 µm particles inside the helmet. Several modifications to SH have been suggested, but none are sufficiently compliant with safety and efficiency standards.

Aim: The purpose of this investigation was the research and development (R&D) of a filter adaptor, which converts SHs into efficient, safe and disinfectable PAPRs.

Materials and methods: We utilized computer-aided design, computational fluid dynamics and additive manufacturing, commonly known as 3D printing to design a filter adapter. Four critical PAPR features were investigated close to regulatory requirements: total inward leakage of particles, CO2 concentrations, intra-helmet differential pressure, and automated disinfection.

Results: The average total inward leakage in the two independent tests were 0.005% and 0.01%. CO2 concentrations were lower than in the original SH. The modification generates a positive differential pressure. The filter's performance was not compromised after 50 cycles in a sterilization machine.

Conclusion: The modified SH provides several hundred times better protection than FFP-3 masks.

Status: The filter adapter is in use in the OR, the intensive care unit and the intermediate care unit at our hospital. Results have been published.

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

Introduction: 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 statistically 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 be 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 additional 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 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 that 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

Introduction: 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 will be approved by the local ethical committee (PVO) before initiation of the intervention. The data acquisition phase is 2022-2023. The analysis is planned for the second half of 2023 and publication in the first half of 2024.

Publications

Peer-reviewed publications

Alhaug OK, Dolatowski FC, Solberg TK, Lønne G. Criteria for failure and worsening after surgery for lumbar spinal stenosis: a prospective national spine registry observational study. Spine J. 2021;21(9):1489-96.

Austevoll IM, Hermansen E, Fagerland MW, Storheim K, Brox JI, Solberg T, et al. Decompression with or without Fusion in Degenerative Lumbar Spondylolisthesis. N Engl J Med. 2021;385(6):526-38.

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Ulstein S, **Årøen A**, Engebretsen L, Forssblad M, **Røtterud JH**. Effect of Concomitant Meniscal Lesions and Meniscal Surgery in ACL Reconstruction With 5-Year Follow-Up: A Nationwide Prospective Cohort Study From Norway and Sweden of 8408 Patients. Orthopaedic Journal of Sports Medicine. 2021;9(10):23259671211038375.

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Commentaries

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Randsborg PH. Is It Time to Consider Single-Stage Revision for Periprosthetic Joint Infections After Total Knee Replacement?: Commentary on an article by Louis Dagneaux, MD, et al.: ”Acute Kidney Injury When Treating Periprosthetic Joint Infections After Total Knee Arthroplasties with Antibiotic-Loaded Spacers. Incidence, Risks, and Outcomes ”. J Bone Joint Surg Am. 2021 May 5;103(9):e37.

Others

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Conference attendings

Presentations

The Norwegian Orthopedic Socicety´s Meeting, Oslo, October 2021

Alhaug OK. Accuracy and agreement of NORspine data for 474 patients compared to corresponding electronic patient records. Frie foredrag spinal.

Alhaug OK. Durarift påvirket klinisk utfall, liggetid og postoperative komplikasjoner etter kirurgi for spinal stenose. Frie foredrag Spinal.

Clementsen SØ. Effekt av ulna styloidfraktur på pasientrapportert resultat etter kirurgisk fiksasjon av DRF. Frie foredrag hånd.

Ekås G. Platelet-rich plasma: Background, rationale and current capabilities. Registersymposium.

Ekås G. Postoperative plager og komplikasjoner. – Hva dreier det seg om, hvor vanlig er det og hva klager pasientene på? Korsbåndrekonstruksjon: Behandlingsvalg, utfordringer underveis og postoperative komplikasjoner.

Hammer OL. The cost-effectiveness of volar locking plate compared to augmented external fixation in wrist fractures. Frie foredrag hånd.

Jakobsen RB. Korsbåndregisteret og R-RCT. Registersymposium.

Khalid K. Hvor flinke er vi til å reponere syndesmosen? Et kvalitetsforbedringsprosjekt. Frie foredrag fot/ankel.

Randsborg PH. Pasientskadeerstatning etter kneprotesekirurgi i Norge 2008-2018. Frie foredrag protese.

Randsborg PH. Ankelprotese versus artrodese – en befolkningsbasert propensity score-matched sammenligning fra New York og California. Frie foredrag fot/ankel.

Randsborg PH. Differences in characteristics and outcome between responders, late-responders and never-responders after ACL-R. Frie foredrag artroskopi.

Randsborg PH. Pasientrapportert resultat, retur til idrett og revisjonsrate 7-9 år etter rekonstruksjon av fremre korsbånd.. Frie foredrag artroskopi.

Straume-Næsheim T. MPFL-reconstruction: pearls and pitfalls. Patellar instability: diagnostic considerations and decision making in surgical treatment.

Tveiten CK. Incidence of pediatric anterior cruciate ligament reconstructions in Norway from 2005 to 2019. Frie foredrag artroskopi.

Wikerøy A. Hva bør en tenke på før en opererer skjørt bein? Ankelbrudd hos eldre.

Wikerøy A. Transolecranonfrakturer. Albueskader.

Other conferences

Ekås G. Intraartikulære kneskader hos barn inkludert diskoide menisker. Sports Medicine Autumn Congress 2021.

Randsborg PH. Epidemiologi og behandling av idrettsrelaterte brudd hos barn og unge. Sports Medicine Autumn Congress 2021.

Abstracts

The Norwegian Orthopedic Socicety´s Meeting, Oslo, October 2021

Aae TF, **Jakobsen RB,** Bukholm IRK, Fenstad AM, Furnes O, **Randsborg PH**. Pasientskaderstatninger etter hofteprotesekirurgi i Norge 2008-2018.

Aaen J, Austevoll IM, Hellum C, Storheim K, Bantilebi H, Anvar M, Brox JI, Solberg T, **Grundnes O**, Brisby H, Indrekvam K, Hermansen E. Clinical and MRI findings in lumbar spinal stenosis. Baseline data from the NORDSTEN study.

Alhaug OK, **Kaur S**. Dolatowski F, **Mjønes S**, Austevoll IM, Lønne G. Durarift påvirket klinisk utfall, liggetid og postoperative komplikasjoner etter kirurgi for spinal stenose.

Alhaug OK, **Kaur S**. Dolatowski F, Småstuen MC, Solberg T, Lønne G. Accuracy and agreement of NORspine data for 474 patients compared to corresponding electronic patient records.

Banitalebi H, **Owesen C**, **Årøen A,** Tran HT, Myklebust TÅ, **Randsborg PH**. Er T2 mapping MR pålitelig for vurdering av nativ og og postoperativ leddbrusk.

Birkenes T, Furnes O, **Årøen A**, Solheim E, Knutsen G, Drogset JO, Løken S, Engebretsen L, Lygre SHL, Visnes H. Langtidsresultater etter bruskkirurgi i Norge- PROM hos pasienter uten senere kneprotese eller osteotomi.

Clementsen SØ, **Jakobsen RB**, **Hammer OL**, **Randsborg PH**. Effekt av ulna styloidfraktur på pasientrapportert resultat etter kirurgisk fiksasjon av distale radius frakturer.

Dimmen S, **Owesen C**, Lundgreen K, Jenssen KK. Timing av rotatorcuffsuturer etter skuldertruame har ingen betydning for resultat.

Hammer OL, **Clementsen SØ**, **Fuglesang HF**, **Jakobsen RB**, Bjørnelv GMW, **Randsborg PH**. The cost-effectiveness of volar locking plate compared to augumented external fixation in wrist fractures.

Khalid K, **Lockert O**, **Kamalanathan S**, **Fuglesang H**. Hvor flinke er vi til å reparere syndesmosen? Et kvalitetsforbedringsprosjekt.

Ludvigsen T, **Hammer OL**, Fevang J, Matre K, Dybvik E, **Randsborg PH**. Complex regional pain syndrome following distal radius fracture. Does surgical method matter?

Lundgreen K, **Owesen C**, Dimmen S, Jenssen KK. Røykere kan oppleve god effekt av rotatorcuffsutur.

Randsborg PH, Adamec D, Cepeda N, Pearle A, Ranawat A. Differences in characteristics and outcome between responders, late-repsonders and never-responders after ACL-R.

Randsborg PH, Adamec D, Cepeda N, Pearle A, Ranawat A. Pasientrapportert resultat, retur til idrett og revisjonsrate 7-9 år etter rekonstruksjon av fremre korsbånd.

Randsborg PH, Jiang J, Devlin V, Peat R, Sedrakyan A. Ankelprotese versus artrodese- en befolkningsbasert propensity score-matched sammenligning mellom New York og California.

Randsborg PH, Aae TF, Bukholm IRK, Fenstad AM, Furnes O, **Jakobsen RB**. Pasientskaderstatninger etter kneprotesekirurgi i Norge 2008-2018.

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Media

Temmesfeld M. Her 3D-printer legene verktøy og modeller til operasjoner. Verdens Gang (14.06.2021). Oslo, Schibsted AS.

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.

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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.

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

Reviewer for BMC Musculoskeletal Disorders, Randsborg PH.

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Randsborg PH.

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