EndoPRIME - Prehabilitation and exercise before arthroplasty

Over the last two decades the number of total joint replacement surgeries increased consistently. With the patient population growing older and therefore suffering from more comorbidities and total joint replacement being progressively indicated even in patients with compromised medical status, the need for preoperative optimization of medical conditions appears a promising approach to reduce perioperative risk for complication, and readmission rates, avoid prolonged functional deficiency and improve functional, objective as well as patient reported, subjective outcome following surgery. Literature addressing the question of preoperative status afflicting postoperative outcome after total joint replacement is still imprecise and inconsistent. There seems to be some data, that a worse preoperative functional status predicts worse outcome in terms of both function and pain after total joint replacement. It is still not clear, what preoperatively evaluable parameters can be modified by which kind of intervention and which measures are suitable to monitor improvement of the outcome following such interventions. Based on the hypothesis that patient reported outcome, the frequency of untoward events and functional outcome following total joint replacement can be improved by establishing an individualized concept aiming at improving medical conditions and physical performance preoperatively, the EndoPRIME Trial (ENDOprosthetic joint replacement – improving treatment by integrating Prehabilitation, Rehabilitation, Individualized Management and Education) was initiated. The trial was approved by the competent ethics committee at Wuerzburg University. The project aims at expanding current knowledge about the feasibility and potential of preoperative improvement and quantifiy respective effects on postoperative outcome after total joint replacement, The proposed study is an interventional, prospective, single-center pilot study with exploratory data analysis to evaluate the feasibility and potential of improving peri- and postoperative outcome in total joint replacement of the hip, knee and shoulder by a standardized, individually optimized
treatment pathway including pre- and postoperative exercising, risk management and patient education based on a comprehensive preoperative functional assessment and expanded clinical evaluation. Study duration for each individual patient comprises 12 weeks prior to surgery and one year after surgery, i.e. individual participation will last weeks. The primary endpoint of the trial is intraindividual development of osteoarthritis-associated health-limitations as measured by the WOMAC-Score. Further objectives include Patient Reported Outcome measures, type and frequency of perioperative untoward events, and a wide range of clinical and technical assessments of physical performance. Results can be expected by the third quarter 2017.
EndoPRIME
- Prehabilitation and Exercise before Arthroplasty

Lothar Seefried
Nicole Luksche
Michael Schneider
Franca Genest

www.orthopaedie.uni-wuerzburg.de
Following joint replacement, participation in sporting activity is common principally determined by pre-operative patient activity levels, BMI and patient age. The type of joint replaced is of less significance. Total time spent performing activity does not change but tends to be at a lower intensity. There is little evidence in the literature of an association between high activity levels and early implant failure.

Life course model of Sarcopenia

Early life
Growth and development to maximise peak

Adult life
Maintaining peak

Range of mass strength in individuals

Disability threshold

Older life
Minimising loss

Environmental changes can lower the disability threshold

Rehabilitation and ensuring quality of life

Sayer, J Nutr Health Aging. 2008
Cross-sectional study with 1235 premenopausal women

Exercise influences Sclerostin level

Sarcopenia

Older subject (> 65 years)⁺

Measure gait speed

> 0.8 m/s

Measure grip strength

Normal

No sarcopenia

Low

≥ 0.8 m/s

Measure muscle mass

Low

Sarcopenia

Normal

No sarcopenia

* Comorbidity and individual circumstances that may explain each finding must be considered
* This algorithm can also be applied to younger individuals at risk

Cruz-Jentoft et al, Age Ageing, 2010
Frailty is considered if at least 3 of the following symptoms apply:

- Reduced Gait Speed
- Weight loss
- Reduced Grip Strentgh
- Reduced Physical Activity
- Mental Exhaustion

... and in some case limited ability to care for themselves

Prehabilitation

Prehab | Surgery | Rehab
Clinical Trial Protocol

ENDOprosthetic joint replacement

Improving treatment by integrating Prehabilitation, Rehabilitation, Individualized Management and Education

EndoPRIME
Clinical Examination
Lab Results
Muscle Function
Constitutional Analysis
Bone Metabolism
Pulmonary Function
Assessment of daily activities
...
Relevance of Osteoporosis-Treatment for Arthroplasty-Survival

- Blood Tests
- Osteodensitometry
- Individual fracture risk
- Prosthesis survival

Body-Composition

- Bone Mineral Density
- Lean Body Mass
- Fat Mass
- Bio-Impedance-Analysis (BIA)

Exercise Groups 2x/Week with instruction

Min. 4-5x/Week Flexibility and Strength Training

Private training session with professional PT instructor, if possible aqua training

Individualized Training on Galileo

Special joint/arthrosis programs
Aktiv mit Arthrose -
Aktiv mit Endoprothese
Training with PT instruction

Courtesy of Predia-Institut, Würzburg
Activity monitoring – Actibelt®

Measurement with ActiBelt (accelerations) and Polar watch (heart rate)

- Test person
  - gender: female
  - height: 160 cm
  - weight: 51 kg

- Activities:
  - jumping & sitting down
  - taking the lift
  - knocking on the belt
  - up-down
  - left-right
  - forward-backward
  - pulse
  - sprinting stairs

Time in seconds:
0 100 200 300 400 500 600

Pulse in beats per minute:
0 60 120 180

Courtesy of M. Daumer
What happens in the hospital?

What happens during surgery?

What kind of prosthesis?

Sports after surgery?

Nutrition?
Efficacy of Exercise and Nutrition


- 107 adults > 65 years of age
- balanced diet that provided an energy deficit of 500 to 750 kcal per day from their daily energy requirement
- Three group exercise-training sessions per week aerobic (exercises, resistance training, and exercises to improve flexibility and balance)

- Physical Performance Test
- VO2peak = peak oxygen consumption during graded treadmill walking
- Functional Status Questionnaire
EndoPRIME

- Einschluss
- Anamnese
- Untersuchung
- Fragebogen
- Blutentnahme
- Risikofaktor-Screening
- Körp.-Funktionstests

Notwendige körperliche Untersuchungen

- OP
  - Untersuchung
  - Fragebogen
  - Blutentnahme
  - Körp.-Funktionstests

- Zeitraum zw. V1 und V2
  - V1
    - Tag 0

- V2 - Zwischenevaluation
  - Tag 84 +/- 14

- V3 - Zwischenevaluation
  - Tag 182 +/- 14

- V4 - Abschluss
  - Tag 356 +/- 14

Training über einen Zeitraum von 12 Wochen vor der OP:
Mind. 2 x Training die Woche unter Anleitung mit PT/Gruppe
Mind. 4-5x/Woche Beweglichkeit und Kraft in Eigenregie (Fitness, Thera-Band)-Patient führt Log

Während der 12 Wochen vor OP:
Teilnahme an 3 Informationsveranstaltungen, pro Monat wird jeweils eine informationsveranstaltung angeboten.

Training ab direkt nach der OP bis 12 Monate danach:
Mind. 2 x Training die Woche unter Anleitung mit PT
Mind. 4-5x/Woche Beweglichkeit und Kraft in Eigenregie (Fitness, Thera-Band)-Patient führt Log