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Can perioperative vitamin C supplementation reduce the risk of arthrofibrosis after total knee arthroplasty?

Submission date
07/02/2018

Recruitment status
No longer recruiting

Registration date
08/02/2018

Overall study status
Completed

Last Edited
02/07/2018

Condition category
Musculoskeletal Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[X] Results
[ ] Individual participant data

Plain English summary of protocol

Background and study aims
Arthrofibrosis is one of the most common complications after knee replacement surgery and occurs in up to 16% of patients. It is defined as painful limitation in knee range of motion. An extended scar tissue layer cause by chronic inflammation can be observed within the joint. An accumulation of free radicals may lead to this excessive tissue formation. Vitamin C is a reducing agent that eliminates free radicals. The aim of this study is to find out whether vitamin C supplementation can prevent arthrofibrosis after knee replacement.

Who can participate?
Patients aged 18 and over with advanced osteoarthritis of the knee undergoing knee replacement surgery

What does the study involve?
Participants are randomly allocated to take either vitamin C to a placebo (dummy) supplement every day starting on the day before their operation and continuing for a total of 50 days. Knee joint range of motion is measured before the operation and at 8 weeks and 12 months after the operation.

What are the possible benefits and risks of participating?
If the study shows that vitamin C improves range of motion, it could provide valuable information about a possible new treatment. Prolonged courses of painful rehabilitation or even further surgery could be avoided. By reducing the need for further treatment and hospital stay healthcare costs could be lowered. Besides the risks of vitamin C overdose which are well documented and described in the product information, no further risks are expected.

Where is the study run from?
Cantonal Hospital St Gallen (Switzerland)

When is the study starting and how long is it expected to run for?
February 2010 to July 2016

Who is funding the study?
Cantonal Hospital St Gallen (Switzerland)

Who is the main contact?
Dr Henrik Behrend

Contact information

Type(s)
Public

Contact name
Dr Henrik Behrend

Contact details
Cantonal Hospital St Gallen
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Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers
CTU 10/050

Study information

Scientific Title
Perioperative Vitamin C supplementation following total knee arthroplasty: a double-blind placebo-controlled randomized study

Study objectives
Arthrofibrosis (AF) is a debilitating complication after total knee arthroplasty (TKA) with a reported incidence of up to 16%. It is considered a clinical diagnosis defined as limited range of motion (ROM) in flexion and/or extension as a result of post-operative soft-tissue fibrosis.

The primary objective of the study is to investigate whether the administration of vitamin C improves the range of motion (ROM) in patients undergoing TKA. It is hypothesized that vitamin C improves the joint mobility, avoids intra articular tissue damages by eliminating free radicals and reduces thereby the risk for arthrofibrosis in patients undergoing TKA.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Ethics Committee of the Cantonal Hospital St Gallen, 27/10/2010, ref: EKSG 10/098

Study design
Single-center randomized double-blind placebo-controlled two-arm Phase IV study

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Hospital

Study type(s)
Prevention

Participant information sheet
Not available in web format, please use contact details to request a participant information sheet

Health condition(s) or problem(s) studied
Arthrofibrosis

Interventions
Registered patients were randomized to either VC at a daily dose of 1000 mg (two 500 mg tablets) or to matching placebo starting on the preoperative day and continuing for a total of 50 days. Randomization of patients was performed by the Clinical Trials Unit (CTU) using R statistical software version 2.9.2. VC and matching placebo was kindly provided by Burgerstein /Antistress AG (Rapperswil-Jona, Switzerland). Treatment compliance was assessed using a drug diary at 8 weeks (± 2 weeks) postoperatively.

Intervention Type
Supplement

Primary outcome measure
Knee joint ROM measured with a goniometer by a trained study nurse who was blinded to the research history, assessed preoperatively, at 8 weeks and 12 months postoperatively

Secondary outcome measures
1. Incidence of arthrofibrosis (AF), defined as extension deficit >5° and/or ≤ 100° flexion of the knee, measured at 8 weeks and 12 months postoperatively
2. Vitamin C plasma concentrations measured in µmol/l before surgery and 4 and 7 days after surgery
3. The Western Ontario and McMaster Universities Arthritis Index (WOMAC) measured at 8 weeks and 12 months postoperatively
4. The Forgotten Joint Score-12 (FJS-12) measured at 8 weeks and 12 months postoperatively

Overall study start date

10/02/2010

Completion date
12/07/2016

Eligibility

Key inclusion criteria
1. Patients with primary osteoarthritis of knee joint undergoing TKA presenting with grade 3 or 4 osteoarthritis (Kellgren-Lawrence score)
2. Age ≥18 years
3. Written informed consent, including written consent to participate in the local prosthesis registry of the hospital

Participant type(s)
Patient

Age group
Adult

Lower age limit
18 Years

Sex
Both

Target number of participants
With a two-sided significance level of 5%, and a total of 240 patients (including a dropout rate of 20%), the study had a power of 80% to detect a mean difference of 5 degrees in ROM at 8 weeks and 12 months postoperatively.

Key exclusion criteria
1. History of nephrolitiasis, hematochromatosis, uremia, beta-thalassemia
2. Known intolerance to vitamin C or any of the excipients
3. Dietary vitamin C intake <3 days before intervention
4. CRP values >10mg/l

Date of first enrolment
01/07/2011

Date of final enrolment
01/04/2015

Locations

Countries of recruitment
Switzerland

Study participating centre
Kantonsspital St Gallen
Rorschacherstreet 95
St Gallen
Switzerland
9007

Sponsor information

Organisation
Cantonal Hospital St Gallen

Sponsor details
Rorschacherstreet 95
St Gallen
Switzerland
9007

Sponsor type
Hospital/treatment centre

ROR
https://ror.org/00gpmb873

Funder(s)

Funder type
Hospital/treatment centre

Funder Name
Cantonal Hospital St Gallen

Results and Publications

Publication and dissemination plan
The trialists are planning to publish a manuscript with the title: "Perioperative Vitamin C Supplementation following Total Knee Arthroplasty: A double-blind placebo-controlled randomized study" in an orthopaedic Journal in March 2018.

Intention to publish date
10/03/2018

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are not expected to be made available as consent was not obtained from the participants.

IPD sharing plan summary

Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	01/04/2019		Yes	No