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Study to measure the direct portal vein pressure gradient in patients with liver disease

Submission date
04/06/2020

Recruitment status
No longer recruiting

Registration date
21/11/2023

Overall study status
Completed

Last Edited
21/11/2023

Condition category
Other

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
Portal pressure measurements are of high value as the initial diagnostic for patients with portal hypertension (high blood pressure within the portal venous system) and their close follow-up under individual medical therapy. Historically several direct and indirect techniques to measure portal pressure have been investigated, but today the most commonly used is an indirect method of measuring the free and wedged hepatic venous pressure (FHVP and WHVP) known as hepatic venous pressure gradient (HVPG) measurement. However, as the current standard HVPG measurement is still invasive in nature, involves radiation and a radiocontrast agent and requires the availability of an experienced interventional radiologist, it still only represents an indirect measurement of portal pressure, which may eventually differ by underestimating the real pressure in the portal vein (i.e. false normal pressure) as it is taken in the hepatic vein.
Direct portal vein pressure is not routinely measured. Despite varied non-invasive methods such as serum markers, ultrasound elastography or Doppler ultrasound being tested for monitoring portal pressure, its widespread adoption is not yet feasible.
There is a potential for a new direct ultrasound-guided measurement of portal pressure, which is less invasive and does not require radiation, when placing an Ecochiba® needle into the intrahepatic portal vein. The aim of this study is to investigate the technical feasibility and safety of this new direct method of portal pressure measurement.

Who can participate?
Patients aged 18 years and over undergoing a percutaneous liver biopsy

What does the study involve?
Patients are informed about the study at the study information visit being performed within 35 to 30 days before the screening visit. After informed consent, screening assessments are conducted during a 30-day screening period before the study intervention. Blood samples are taken. Patients undergo standard non-study percutaneous ultrasound-guided liver biopsy as per the local centre’s medical standard on Day 1. Each patient receives the study intervention of ultrasound-guided direct portal vein pressure measurement, conducted by the investigator or his /her authorized designee right after the liver biopsy. The median duration of study intervention per patient is expected to be a couple of minutes. An abdominal Doppler ultrasound and contrast-enhanced ultrasound of the liver are conducted on Day 1 and at follow-up visits 3 and 4

as per the local centre’s medical standard and related safety data are collected. The two follow-up visits are conducted earliest 3 hours after the study intervention and at month 1 (+/- 14 days) after the study intervention. The total study duration for a given patient is estimated to be 1 month.

What are the possible benefits and risks of participating?
The risks associated with the medical devices and contrast agents in use for the study intervention are well-known and do not involve a greater risk than standard interventions such as a liver biopsy. The addition of the study intervention may pose a minimal increased risk for haemorrhage (bleeding) than for liver biopsy alone, so risk minimization measures are applied such as considering the patient’s individual blood vessel anatomy. The study intervention may even be associated with a lower risk than the standard invasive HVPG measurement.

Where is the study run from?
Kantosspital St. Gallen, Klinik für Gastroenterologie/Hepatologie (Switzerland)

When is the study starting and how long is it expected to run for?
October 2019 to July 2021

Who is funding the study?
Kantonsspital St. Gallen, Klinik für Gastroenterologie/Hepatologie (Switzerland)

Who is the main contact?
Dr David Semela, david.semela@kssg.ch

Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
CTU 19/034

Study information

Scientific Title

A prospective, single-centre pilot trial to evaluate the feasibility and safety of ultrasound-guided direct portal vein pressure gradient measurement in patients with non-neoplastic hepatic disorders

Acronym
DPPM

Study objectives
Measurement of portal pressure is technically feasible and safe by ultrasound-guided direct portal vein pressure gradient measurement in patients with non-neoplastic hepatic disorders.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 02/06/2020, Ethikkommission Ostschweiz (Scheibenackerstrasse 4, 9000 St. Gallen, Switzerland; +41 (0)584112891; sekretariat@ekos.ch), ref: BASEC 2020-0098

Study design
Prospective pilot single-centre feasibility and safety trial

Primary study design
Interventional

Study type(s)
Diagnostic

Health condition(s) or problem(s) studied
Ultrasound-guided direct measurement of pressure in the portal vein

Interventions
A non-randomized, open, clinical pilot study to assess the feasibility and safety of a new approach to measure portal pressure by ultrasound-guided direct measurement of pressure in the portal vein passing directly through the liver and in the liver vein.

Screening assessments are conducted during a 30-day screening period prior to the study intervention. Blood samples in the frame of eligibility assessment are analysed locally for haematology and coagulation. Once all screening procedures are completed and entry criteria met, patients undergo standard non-study percutaneous ultrasound-guided liver biopsy as per the local centre’s medical standard on Day 1.
Each patient receives the study intervention of ultrasound-guided direct portal vein pressure measurement, conducted by the Investigator or his/her authorized designee in line with the study protocol, right after the liver biopsy. The median duration of study intervention per patient is expected to be a couple of minutes on the day of the study intervention.

An abdominal Doppler ultrasound and contrast-enhanced ultrasound of the liver are conducted on Day 1 and at follow-up visits 3 and 4 as per the local centre’s medical standard and related safety data collected. Follow-up visits are performed at the earliest 3 hours after study intervention and at month 1 (+/- 14 days) after study intervention. The total study duration for a given patient is estimated to be 1 month.

Intervention Type
Other

Primary outcome(s)
Technical feasibility is measured by evaluating the number of patients with valid portal pressure gradient* (PPG) derived from the means of ultrasound-guided measurements of direct portal venous pressure and direct hepatic venous pressure in a patient at the first attempt. A PPG value is rated as being valid and reliable if falling between 1 and 30 mmHg in a patient. *PPG is calculated by subtracting the mean hepatic venous (HV) pressure from the mean portal venous (PV) pressure.

Key secondary outcome(s))
Secondary outcome measure:
1. Reproducibility is measured by evaluating the number of patients for whom the portal pressure gradient value is reproducible by repeated measurement of portal venous and hepatic venous pressure at three times per patient, whereby PPG values are rated as reproducible and plausible if the range of values between highest and lowest value is ≤3 mmHg in a patient.

Safety outcome measure:
1. Number and type of intervention-related adverse events and serious adverse events in patients from study intervention until follow-up at 1 month.

Other outcome measures of interest:
1. Distribution of individual patient's PPG values, PV and HV measurements in relation to liver biopsy result, transient elastography result and clinical parameters from the day of the study intervention are listed descriptively.
2. Distribution of intervention-related pain ratings assessed by the patient's subjective assessment of pain intensity on the Verbal Numerical Pain Rating Scale (VNPRS-11) right after ultrasound concluding the study intervention and earliest at 3 hours after the study intervention.
3. User acceptance of the study intervention assessed using a self-report questionnaire right after the conduct of the study intervention.

Completion date
08/07/2021

Eligibility

Key inclusion criteria
1. Patient planned to undergo transient elastography and percutaneous liver biopsy via the right lobe of the liver in frame of standard diagnostics for non-neoplastic hepatic disorders regardless of the stage of fibrosis
2. Patient available for planned follow-up for at least 1 month
3. Male or female aged ≥18 years
4. Must be willing and able to give written informed consent to participate in the study and agree to comply with the study protocol prior to initiation of any study-mandated procedure and study intervention

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex
All

Key exclusion criteria
1. Patient with primary neoplastic hepatic disorders and/or liver metastasis
2. Patient planned to undergo biopsy of a focal liver lesion or biopsy via the left lobe of the liver
3. Patient on any anticoagulation therapy at the time point of liver biopsy that cannot be stopped prior to actual conduct of liver biopsy
4. Patient having coagulation disorder defined as INR ≥1.5 and thrombocytes ≤70 G/l
5. Patient with Body Mass Index (BMI) ≥35
6. Patient with ascites
7. Patient with known allergies to ultrasound contrast agent SonoVue®
8. Patient with known right-to-left shunts, severe pulmonary hypertension (pulmonary arterial pressure > 90 mmHg), uncontrolled systemic hypertension or Respiratory Distress Syndrome (ARDS)
9. Patient on dobutamine therapy
10. Patient allergic to porcine collagen
11. Participation in another study with an investigational drug/device within the 30 days preceding and during the present study
12. Previous enrolment into the current study
13. Enrolment of the study investigator, his/her family members, employees and other dependent persons
14. If female and of childbearing potential: known pregnancy or a positive urine pregnancy test (confirmed by a positive serum pregnancy test), or lactating
Note: female patients who are surgically sterilized/hysterectomized or post-menopausal for longer than 2 years are not considered as being of child-bearing potential

Date of first enrolment
08/06/2020

Date of final enrolment
01/06/2021

Locations

Countries of recruitment
Switzerland

Study participating centre

Kantonnspital St. Gallen, Klinik für Gastroenterologie / Hepatologie
Rorschacherstrasse 95
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Sponsor information

Organisation
Kantonsspital St. Gallen

ROR
https://ror.org/00gpmb873

Funder(s)

Funder type
Hospital/treatment centre

Funder Name
Kantonsspital St Gallen

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study are not expected to be made available because of their high competitive sensitivity and the negligible benefit to the public of publication of results of nontherapeutic clinical trials.

IPD sharing plan summary
Not expected to be made available, Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Study website	Study website	11/11/2025	11/11/2025	No	Yes