Study protocol & Statistical analysis plan, IQ-LP-03

For ClinicalTrials.gov

1 Version history

Version	Document date	Description
Version 1	15.9.2020	First version of the document. The document is based on the confidential version of the Clinical Investigation Plan version 1.2

2 Study information

Study name: The First Puncture Success Rate of a Novel Injeq IQ-Tip™ System in Pediatric Lumbar Punctures

Study code/ID: IQ-LP-03

NCT-identifier: NCT04070144

3 Study methods

3.1 Participants

Pediatric hemato-oncology patients (aged from 18 months to 18 years) treated for acute lymphoblastic leukemia in Helsinki, Turku, and Tampere university hospitals are eligible for the study. Informed consent is obtained from all patients and/or their parents, depending on the child's age.

The goal is to gather data from at least 150 lumbar puncture (LP) procedures of at least 50 patients and ≤ 4 procedures per patient.

3.2 Equipment

Bioimpedance spinal needle system: Injeq IQ-Tip® system

The system comprises a 22G Quincke-type spinal needle, bioimpedance analyzer and a cable for connecting the needle to the analyzer. The stylet of the needle is configured as a bioimpedance electrode. The procedure and stylet manipulation are similar with Injeq's needle and conventional spinal needle.

The equipment detects the cerebrospinal fluid (CSF) at the tip of the needle and gives clear detection alarm to the user.

3.3 Clinical procedure

Injeq's representatives gives a practical training session on the use of the equipment to principal investigators, other physicians, and research nurses before the patient recruitment begins.

All LP procedures included in the study are part of the patients' planned intrathecal treatment (IT) protocol. Lumbar punctures are performed under general anesthesia and physicians perform the procedures according to their normal schedules and otherwise normal practices.

After the CSF detection alarm, the physician removes the stylet and checks for a CSF flow through the needle. A physician can also perform the check based on his/her clinical judgement. The IT is delivered after the correct needle location is verified by the CSF flow and a CSF sample is taken for the laboratory analysis.

3.4 System performance assessment

After each LP procedure, the physician evaluates the system performance on a case report form (CRF). The first puncture success and accuracy of CSF detections are recorded.

First puncture success is defined as obtaining a CSF sample and/or successful IT with a single needle insertion; i.e., with one skin penetration. CSF detection sensitivity and False detection rate are defined as follows:

CSF detection sensitivity = # of correct CSF alarms / (# of correct CSF alarms + # of missing CSF alarms)

False detection rate = # of LP procedures with false alarms / # of all LP procedures

Erythrocyte count result (cells/ µL) from the CSF sample is recorded on CRF.

3.5 Complications

One week follow-up

The research nurse gives the patient and parents a symptom diary for recording symptoms (PDPH, headache, nausea, backache, fever & leaking or inflammation of the puncture site) for 8 days (day of the procedure and following week). After the week, the research nurse calls the parents and transfers the information to the study records.

Four-week follow-up

The research nurse or the investigator searches the patient's hospital records for potential complications that may be related to the procedure or the use of the system. The information is transferred to the study records.

3.6 Statistical analysis

Mean, median and min-max range are reported for the descriptive data, as appropriate.

The proportion of CSF samples with ≥ 10 erythrocytes/µL is reported with 95 % confidence interval.

The distribution of all CSF sample erythrocyte counts is reported as a cumulative distribution curve.

The first puncture success rate is reported with 95 % confidence interval.

The CSF detection sensitivity and false detection rates are reported with 95 % confidence intervals.

Confidence intervals are calculated with the exact Clopper-Pearson method.

3.7 Publication of results

- Peer-reviewed scientific report in a suitable journal.
- Confidential Clinical Investigation Report (CIR) is submitted for authorities.
- Conference abstracts or other relevant format may also be used to publish the results.

3.8 Ethics

The study was approved by the Regional Ethics Committee of the Expert Responsibility Area of Tampere University Hospital, Finland (R19050, 13 Aug 2019)

The study is conducted according to Helsinki Declaration and Good Clinical Practice (GCP) as per ISO 14155.