

# Clinical Trial Protocol

## Iranian Registry of Clinical Trials

11 Sep 2026

### Evaluation of efficacy, safety and cost of using patient specific implants in distal femoral osteotomy in patients with cerebral palsy with Crouch gait compared to conventional method

#### Protocol summary

##### Study aim

The main objectives: Comparison of efficacy, safety and cost of using patient specific implants in distal femoral osteotomy in patients with cerebral palsy (Crouch gait) with conventional method in these patients Practical aim: Widespread use of patient specific implants in patients with cerebral palsy

##### Design

The clinical trial has a control group with parallel, one-blind, randomized, phase 1-2 groups on 20 patients with crouch gait. Random numbers used for randomization.

##### Settings and conduct

This study is a clinical trial study on cerebral palsy patients with crouchgait referred to Shariati Hospital. In order to design the implant, patients in the intervention group will undergo CT Scan scan. With the help of CT Scan images and computer software design, PSI and 3D design, surgical procedures will be performed. In control group, radiologic images will be taken to determine the location of osteotomy and planning for operation. Then, lateral osteotomy will be performed from the posterior muscle of the osteotomy lateral laxity and angled blade plate will be placed in place. After surgery, patients will be followed for 1 year. During this period, radiographic gait analysis, physical examinations, functional tests and postoperative complications will be evaluated. Cases such as duration of surgery and bleeding during surgery will also be evaluated in two groups. The final cost of surgery will be evaluated in two groups.

##### Participants/Inclusion and exclusion criteria

Documented diagnosis of CP spastic diplegic type  
Extreme curved walking Level I-III according to GMFCS  
Age  $\leq$  18 at the time of surgery

##### Intervention groups

40 CP patients with 20 are in group A, who treated by conventional method. 20 are in group B, who treated by PSI.

##### Main outcome variables

Knee pain Stiff knee Damage to nerves and vessels  
Motor function Quality of Life Not boiling bones  
Angularity of bone alignment Gait Analysis

#### General information

##### Reason for update

##### Acronym

##### IRCT registration information

IRCT registration number: **IRCT20210712051854N5**  
Registration date: **2022-12-23, 1401/10/02**  
Registration timing: **registered\_while\_recruiting**

Last update: **2022-12-23, 1401/10/02**

Update count: **0**

##### Registration date

2022-12-23, 1401/10/02

##### Registrant information

##### Name

Mohammad Hossein Nabian

##### Name of organization / entity

##### Country

Iran (Islamic Republic of)

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##### Email address

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##### Recruitment status

**Recruitment complete**

##### Funding source

##### Expected recruitment start date

2022-10-23, 1401/08/01

##### Expected recruitment end date

2023-10-23, 1402/08/01

##### Actual recruitment start date

empty

**Actual recruitment end date**  
empty

**Trial completion date**  
empty

**Scientific title**  
Evaluation of efficacy, safety and cost of using patient specific implants in distal femoral osteotomy in patients with cerebral palsy with Crouch gait compared to conventional method

**Public title**  
Evaluation of patient specific implant outcomes in distal femoral osteotomy

**Purpose**  
Treatment

**Inclusion/Exclusion criteria**  
**Inclusion criteria:**  
Documented diagnosis of CP spastic diplegic type severe crouch gait (dorsal ankle flexion > 15 degrees, knee bending > 30 degrees, and pelvic extension <3 degrees in late stand-up in sagittal plane kinematics data) Level I-III according to GMFCS classification Minimum function of 3D gait analysis before and after surgery in the three months before surgery and at least 2 years after surgery Age ≤ 18 at the time of surgery  
**Exclusion criteria:**  
Patients with other motor disorders Any surgical prohibition (heart or respiratory problems) previous history of dorsal rhizotomy (Selective dorsal rhizotomy) botulinum toxin injection in the past 6 months or use of intraspinal baclofen pump

**Age**  
From **4 years** old to **18 years** old

**Gender**  
Both

**Phase**  
1-2

**Groups that have been masked**  
• Participant

**Sample size**  
Target sample size: **20**

**Randomization (investigator's opinion)**  
Randomized

**Randomization description**  
In this study, the block method was used for randomization. At first, blocks of 4 were defined using the randomization tool of the website <https://www.sealedenvelope.com/simple-randomiser/v1/lis>. Based on the placement order of groups A and B in each of these blocks, the order of the type of operation will be determined. Group A includes patients who will be treated with the old (conventional) method, and group B will be treated with the PSI method. The order of placement of patients in groups A and B in each of the blocks is determined based on the time of the patient's visit for surgery. For example, the first client is placed as person number one of block one in group A or B (determined by the software). The second client is placed as person number two of block one in group A or B

(determined by the software). In this way, randomization will be done.

## Blinding (investigator's opinion)

Single blinded

## Blinding description

All patients will be given complete information about the surgical procedure of each of the two groups, case and control. Also, patients will be informed about the possibility of being placed in any of these two groups. After that, based on random numbers, patients are placed in one of the two groups A and B. Patients will not know which group they are in, and thus they will enter the study blind. In this way, the relevant intervention will be carried out in a one-sided blind way on the two study groups. The treating doctor, surgeon and other medical personnel will be informed about the type of treatment if needed. But all the people involved in the surgical process, hospitalization and subsequent follow-up of patients will be justified not to provide information about the type of operation to the patient. It should be noted that the surgical scar of both operations is the same and it is not possible to know the type of operation from the appearance of the operation site. If necessary, the doctor can determine the type of plaque used and therefore the patient's operation group based on the graphs obtained from the patients after the operation.

## Placebo

Not used

## Assignment

Parallel

## Other design features

## Secondary Ids

empty

## Ethics committees

### 1

#### Ethics committee

##### Name of ethics committee

Research Ethics Committee of Medical School-Tehran  
University of Medical Sciences

##### Street address

Islamic Revolution Street- University of Tehran

##### City

Tehran

##### Province

Tehran

##### Postal code

9561757393

#### Approval date

2022-08-11, 1401/05/20

#### Ethics committee reference number

IR.TUMS.MEDICINE.REC.1401.316

## Health conditions studied

### 1

#### Description of health condition studied

crouch gait in cerebral palsy

**ICD-10 code**

G80.8

**ICD-10 code description**

Other cerebral palsy

## Primary outcomes

### 1

**Description**

Motor function collected by functional mobility scale questionnaire

**Timepoint**

6 months and 1 year after surgery

**Method of measurement**

The child's motor ability and gait in three specified distances (5,50,500 meters) will be measured using functional mobility scale questionnaire.

## Secondary outcomes

empty

## Intervention groups

### 1

**Description**

Intervention group number 1: 20 cerebral palsy patients with crouch gait. Plaque design: First, 3D images are prepared with the help of ct scan, and with the help of it, special plaques for each patient are designed virtually. Then the plaques that are designed virtually are used by the casting expert team to make patient-specific plaques (PSI). In the next step, PSI is tested in terms of quality and resistance and other necessary criteria. Finally, PSI is sterilized and packaged and used for use in surgery. Surgical technique: Distal femur extension osteotomy is performed using a lateral approach to the end of the femur behind the vastus lateralis. Also, the patellar tendon is separated from the tibia and passes under the periosteal flap. Surgery in both groups will be performed by the same surgeons and surgical team. Patients will be examined in terms of clinical parameters (including pain level, joint range of motion, and gait status), radiography, and walking 1, 3, and then every 6 months after surgery until 12 months after surgery. In order to perform these examinations, patients will visit the clinic at specified times, and clinical and graphic examinations will be taken from the patients at the surgery site. The data obtained from these actions will be recorded in SPSS 25.0 software for statistical analysis.

**Category**

Treatment - Devices

### 2

**Description**

Intervention group number 2: 20 cerebral palsy patients with crouch gait. In this group, the common method of distal femur osteotomy and the use of angular blade

plates will be used. These plates are designed with an angle of 90 degrees and after osteotomy, they fix the parts at the angle desired by the surgeon. 1, 3 and then every 6 months after surgery until 12 months after surgery will be checked. In order to perform these examinations, patients will visit the clinic at specified times, and clinical and graphic examinations will be taken from the patients at the surgery site. The data obtained from these actions will be recorded in SPSS 25.0 software for statistical analysis.

**Category**

Treatment - Devices

## Recruitment centers

### 1

**Recruitment center**

**Name of recruitment center**

Shariati Hospital

**Full name of responsible person**

Mohammadhossein Nabian

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## Sponsors / Funding sources

### 1

**Sponsor**

**Name of organization / entity**

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**Full name of responsible person**

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**Grant name**

**Grant code / Reference number**

**Is the source of funding the same sponsor organization/entity?**

Yes  
**Title of funding source**  
Tehran University of Medical Sciences  
**Proportion provided by this source**  
100  
**Public or private sector**  
Public  
**Domestic or foreign origin**  
Domestic  
**Category of foreign source of funding**  
*empty*  
**Country of origin**  
**Type of organization providing the funding**  
Academic

## Person responsible for general inquiries

**Contact**  
**Name of organization / entity**  
Tehran University of Medical Sciences  
**Full name of responsible person**  
Mosayeb Soleymani  
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## Sharing plan

**Deidentified Individual Participant Data Set (IPD)**  
Yes - There is a plan to make this available  
**Study Protocol**  
Yes - There is a plan to make this available  
**Statistical Analysis Plan**  
Yes - There is a plan to make this available  
**Informed Consent Form**  
No - There is not a plan to make this available  
**Clinical Study Report**  
Yes - There is a plan to make this available  
**Analytic Code**  
No - There is not a plan to make this available  
**Data Dictionary**  
No - There is not a plan to make this available  
**Title and more details about the data/document**  
Information about the main outcome is shared  
**When the data will become available and for how long**  
After printing the results  
**To whom data/document is available**  
Researchers working in academic and scientific institutions  
**Under which criteria data/document could be used**  
Ensure participants' privacy Data will be provided to academic researchers  
**From where data/document is obtainable**  
e-mail  
**What processes are involved for a request to access**

**data/document**

After submitting the request, the reviews will be carried out within a week and if possible, the data will be

provided to them.

**Comments**