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Official Title: Preoperative and postoperative spatiotemporal gait parameters and gait asymmetry in patients with lumbar disc herniation: a prospective, cross-sectional study

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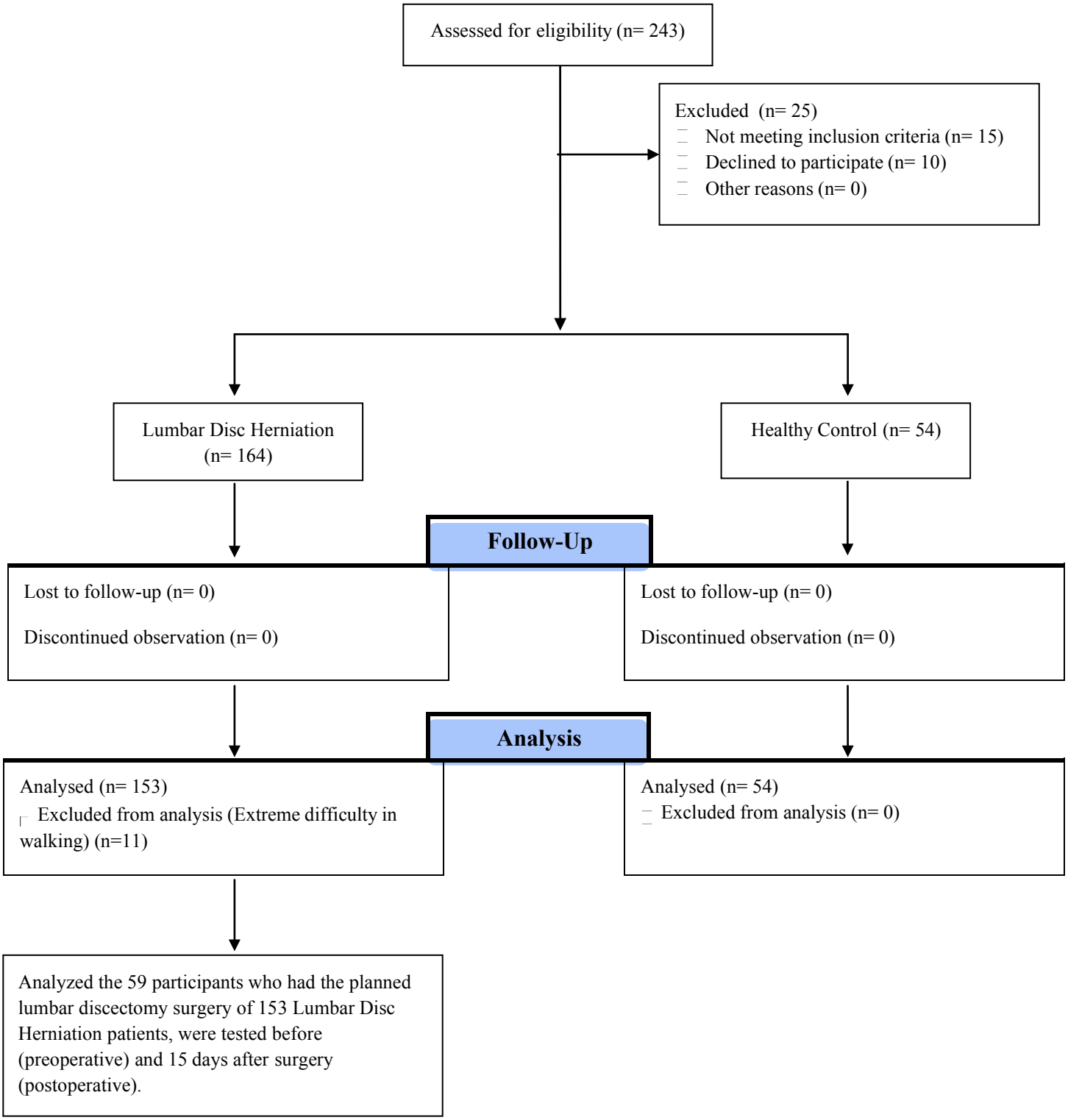
The study has no clinical trials registration number yet.

Study Protocol

Participant Flow



INTRODUCTION

Lumbar disc herniation (LDH) is a localized displacement of the lumbar intervertebral disc into the vertebral canal or intervertebral space, and is considered as a mechanical disorder characterized by degeneration of the disc.[1-3] Disc herniation leads to functional loss and disability in daily life activities and negatively affects the quality of life among these patients.[4-6] Depending on LDH in sprawling of pain to spine and legs, lower extremity functions, especially walking, are adversely affected and usually walk slower than their healthy individuals.[7-9] The gait parameters are important gait variables, because they can be easily evaluated and measured to obtain gait deviations and walking difficulties, make a diagnosis, determine appropriate therapy, monitor the patient's progress, determine the prognosis, and they can help in understanding the functional limitations during gait.

AIM

The aim of this study was to emphasize on the interaction of spatial and temporal gait parameters and gait asymmetry in patients with Lumbar Disc Herniation (LDH).

METHODS

Study Design

This study is an observational, prospective, and cross-sectional study. This study recruited patients diagnosed with Lumbar Disc Herniation between May 2016 and December 2017 at Bahçeşehir University Goztepe Medical Park Hospital, Brain and Spine Surgery Department. Prior to conducting the investigation, ethical clearance was obtained from the ethics committee of the Bahçeşehir University Faculty of Medicine (22481095-020-482, 2016-04/07), and it was performed in terms of the guidelines of the Declaration of Helsinki.

Inclusion criteria

(1) Individuals who were diagnosed with LDH by a specialist;
(2) Patients had a medical history and proven by MRI with more or less evidence of degenerative lumbar disc;
(3) Aged between 25-80 years old;
(4) Pain symptom on lumbal area or lower extremity.

Exclusion criteria

(1) Patients who have previously received a surgery or physical therapy treatment;

(2) Having congenital deformity in the spine or lower extremity;

(3) History of spinal surgery or other diseases affecting gait;

(4) Pregnancy;

(5) Situations that may cause gait balance problems;

(6) Using assistive gait appliance.

Participants

In total, 207 participants were included in this study as 153 patients with LDH (71 females, 82 males) and 54 healthy individuals in the control group (27 females, 27 males).

Procedure

In this study, the Analysis of the spatial and temporal gait assessment was performed using "Win-Track" gait analysis platform system (Medicapteurs, Balma, France). The dimensions of this device are 1610 mm × 652 mm × 30 mm (length/width/height); the thickness of the platform is 9 mm composed of 12288 resistive type sensors. The dimensions of these sensors are 7.8 × 7.8 mm2, and the acquisition frequency of the apparatus is up to 200 images/s enabling digitally recording the spatiotemporal information of subjects' gait based on the center of foot pressure. The participants were asked to continuously walk barefoot for ten times in their normal walking speed as straight as possible without any gait assist device on the "Win-Track" platform within the same day. The pain intensity of the patients was evaluated and recorded by a Visual Analog Scale (VAS) immediately before performing the analysis. Three flawless walking values analysis of spatiotemporal gait parameters were recorded and the arithmetic means were computed with three repetitions. Whenever they were about to take a rest, the patients were allowed to sit down on a chair. In addition, the analysis of spatiotemporal gait parameters and gait asymmetry of 59 participants who had the planned lumbar discectomy surgery, was tested before and 15 days after surgery. The analysis of the spatiotemporal gait parameters was performed on the healthy control group's participants by the same investigator using the same equipment and measurement protocol. The gait symmetry index was used to calculate the walking asymmetry.

Main Outcome Measures

The demographic data of the participants were recorded on a personal information form on the computer.

We used to Visual Analog Scale (VAS) for the Evaluation of Pain intensity.

The spatio-temporal data included the following values: step duration (seconds), gait cycle duration (seconds), double stance duration (seconds), swing duration (seconds), step length (cm), gait cycle length (cm), velocity (cm/s), and cadence (step/min); and these parameters were separately recorded for right and left extremity.

The gait symmetry index (Symmetry Index= 2*|X_R-X_L |/(X_R+X_L)*100%) was used to calculate the asymmetry between the left and right extremities during walking as a percentage.

Reporting of results

The results of this study will be presented at national and/or international meetings and will be published in journals.

Key Words: Lumbar disc herniation, Gait analysis, Spatiotemporal gait parameters, Pain, Gait asymettry

Funding: No

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