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Preventing limp after hip fracture surgery

Submission date
25/11/2026

Recruitment status
No longer recruiting

Registration date
26/11/2026

Overall study status
Completed

Last Edited
26/11/2026

Condition category
Musculoskeletal Diseases

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

Plain English summary of protocol

Background and study aims
Many people limp after surgery to fix a broken hip, even when the bone heals well. A limp can make walking harder, reduce independence and leave patients unhappy with their surgery. One possible cause is accidental injury during the operation to a nerve (the superior gluteal nerve) and a muscle (the gluteus medius) on the outer side of the hip, which together keep the pelvis level during walking. This study aimed to find out how often limp occurs after hip fracture surgery, what causes limp that does not go away, and whether a set of surgical precautions, called limp-preventive measures, can prevent it.

Who can participate?
Adults with a broken hip (a trochanteric or femoral neck fracture) treated by fixing the bone with a nail or plate, who walked without a limp before the injury.

What does the study involve?
At each of 8 hospitals, 2 of the 4 participating surgeons were chosen at random and trained in the limp-preventive measures. The other 2 operated in their usual way. Each patient was randomly allocated to one of the 4 surgeons. The measures included planning the skin cut so that it avoids the zone where the nerve and muscle are most at risk, careful positioning of the leg, gentle handling of the muscle and using as little pulling (traction) on the leg as possible. All patients had a nerve test (EMG) and an MRI scan at 3 months. Their walking was checked by an independent surgeon at 15 days and at 3, 6, 9, 12, 24 and 36 months, and they were asked how satisfied they were with their walking and their surgery.

What are the possible benefits and risks of participating?
Patients treated with the limp-preventive measures may have a lower chance of developing a lasting limp. The measures use standard surgical techniques and were not expected to add risk. The EMG involves a fine needle in the hip muscle and may cause brief discomfort. MRI is safe but requires lying still in the scanner.

Where is the study run from?
Ganga Clinic, Nagpur, India, with 8 participating hospitals in Nagpur.

When is the study starting and how long is it expected to run for?
The study was approved in December 2018. Patients were enrolled from January 2021 to December 2022 and followed up until December 2025. The study is complete.

Who is funding the study?
Investigator-funded (no external funding).

Who is the main contact?
Dr Amol Yashwant Patil, amolyashwantpatil@gmail.com

Contact information

Type(s)
Principal investigator, Public, Scientific

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Additional identifiers

Study information

Scientific Title
Limp after hip fracture fixation: a cluster-randomised trial of trochanteric incision zone (TIZ)-based limp-preventive measures

Acronym
LPM trial

Study objectives
1. To determine the incidence of limp after internal fixation of AO/OTA 31A and 31B fractures and identify the causes of persistent limp
2. To evaluate whether training surgeons in limp-preventive measures reduces persistent limp at 36 months
3. To assess the association between post-operative limp and patient satisfaction

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 14/12/2018, Kingsway Hospitals Ethics Committee (KIMS-Kingsway Hospitals, 44, Parwana Bhawan, Kingsway, Nagpur, 44001, India; +91 712 6789100; ethicscommittee@kimskingsway.com), ref: KIEC/2019/18

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Active

Assignment
Parallel

Purpose
Prevention

Study type(s)

Health condition(s) or problem(s) studied
Post-operative limp after internal fixation of proximal femoral fractures (AO/OTA 31A trochanteric and 31B femoral neck fractures), including iatrogenic superior gluteal nerve injury and gluteus medius injury

Interventions
At each of 8 centres, a central team used computer randomisation to allocate 2 of 4 surgeons to limp-preventive measures (LPM) and 2 to usual practice (control). LPM surgeons were trained beforehand (30 cases observed and 30 supervised). Consecutive eligible patients were randomised to surgeons (15 per surgeon, 60 per centre) using sealed, opaque, sequentially numbered envelopes.

LPM arm: no skin incision in Zone B (up to 8 cm proximal to the greater trochanter tip); nail-entry incision in Zone A; hip adduction 20–30° and flexion 10–20°; minimal traction, released once fixation holds the reduction; instruments passed through a steady protection sleeve within 15° of the incision line; a blunt gluteus medius split of 3 cm or less without self-retaining retractors, repaired at closure; and, for plating, a subvastus approach through Zones C and D without detaching the abductor insertion.

Control arm: surgeons operated according to their usual practice, without LPM training.

Implant choice (proximal femoral nail with or without trochanteric stabilising plate, dynamic hip screw constructs or angle blade plate) was at the surgeon's discretion. All patients had EMG and MRI at 3 months and were followed up at 15 days and at 3, 6, 9, 12, 24 and 36 months.

Intervention Type
Procedure/Surgery

Primary outcome(s)
1. Persistent limp measured using limp item of the Harris Hip Score, graded by an independent orthopaedic surgeon masked to allocation at 36 months

2. Causes of persistent limp measured using needle EMG of the gluteus medius and minimus (superior gluteal nerve injury), 3 T MRI (gluteus medius tear), and clinical and radiographic assessment of implant position and limb length at 3 months

Key secondary outcome(s)
1. Patient satisfaction and its association with limp measured using 5-point Likert scale, dichotomised as satisfied or dissatisfied at 3, 12 and 36 months

2. Incidence of limp measured using limp item of the Harris Hip Score, masked assessor at 3 months

3. Limp measured using limp item of the Harris Hip Score, masked assessor at interim visits

4. Trendelenburg sign measured using Trendelenburg test at 3 months

5. Abductor power measured using Medical Research Council scale at 3 months

6. Superior gluteal nerve injury (neurapraxia or axonotmesis–neurotmesis) measured using ultrasound-guided needle EMG, masked neurophysiologist at 3 months

7. Gluteus medius injury (partial or full-thickness tear) measured using 3 T MRI with metal-artefact reduction, masked radiologist at 3 months

8. Implant malposition and limb-length discrepancy over 1 cm measured using radiographs and clinical measurement at 3 months and each later visit up to 36 months

9. Fracture union measured using clinical criteria and bridging of at least 3 of 4 cortices on radiographs at each visit up to 36 months

10. Complications measured using clinical records at each visit up to 36 months

Completion date
31/12/2025

Eligibility

Key inclusion criteria
1. Adults (18 years or older)
2. AO/OTA 31A (trochanteric) or 31B (femoral neck) fracture treated with internal fixation
3. Walked independently without a limp before the injury
4. Fit for EMG, MRI and 36 months of follow-up
5. Written informed consent

Healthy volunteers allowed

No

Age group
Mixed

Lower age limit
18 Years

Upper age limit
100 Years

Sex
All

Total final enrolment
480

Key exclusion criteria
1. Treated with arthroplasty
2. Chronic kidney or liver disease
3. Previous surgery on the same hip
4. Pathological fracture
5. Post-polio residual paralysis
6. Parkinsonism
7. Hemiparesis

Date of first enrolment
01/01/2021

Date of final enrolment
31/12/2022

Locations

Countries of recruitment
India

Sponsor information

Organisation
Ganga Clinic

Funder(s)

Funder type

Funder Name
Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan
The de-identified individual participant data, together with the analysis code, are available from the corresponding author, Dr Amol Yashwant Patil (amolyashwantpatil@gmail.com), on reasonable request after publication, to researchers who provide a methodologically sound proposal. Data sharing requires approval from the Kingsway Hospitals Ethics Committee and a data-sharing agreement. The data are not publicly available because participants did not consent to public release of their clinical, EMG and MRI records.

IPD sharing plan summary
Available on request