The Kocher-Langenbeck Approach

Andreas Panagopoulos, MD, PhD
Lecturer in Orthopaedics
University Hospital of Patras
Bernhard von Langenbeck (1810-1887)

1st description in 1867

In 1874 described his “longitudinal incision for hip infections"

"from above the ischiadic notch to the middle of the greater trochanter passing between the bundles of the gluteal muscles“

"hip joint resections"
In 1911 described the caudal extension of Langenbeck’s approach

"The incision is an angular (or curved) one, extending from the base of the outer surface of the great trochanter upwards to its anterior superior angle, and from thence obliquely upwards and backwards in the direction of the gluteus maximus"
Kocher's depiction of the incision from his 1911 textbook
In 1954, Judet et al combined these two to create the so called Kocher-Langenbeck approach, named so in 1980 for surgical procedures, which they performed with the patient prone on an orthopedic table.
Definition

most commonly used surgical exposure for the stabilization of displaced **posterior wall** fractures of the acetabulum
Indications

- Direct visualization
- Indirect visualization
- Visualization after quadratus femoris origin release

Posterior wall
Posterior column
Posterior column & wall

Transverse,
Transverse & posterior wall
T-shaped
Indications

If the transverse component is located at (juxta-) or below (infra-) the level of the roof (tectum) of the acetabulum (therefore not involving the weight-bearing area of the acetabulum)
Preparation & Positioning

Special instruments

Surgeon familiarity and preference

Pelvic fracture table

Femoral traction

C-arm control

Lateral or Prone
Prone Positioning

femoral head in reduced position (gravity helps reduction)

90° knee flexion places the sciatic nerve in a relaxed position

allows digital access to the quadrilateral surface (transverse or T type fractures)

avoid excessive abdominal pressure

Unscrubbed assistant is required for intraoperative adjustment of the table
Lateral Positioning

easy maneuverability of the limb facilitates the approach to the greater sciatic notch and, therefore, to the inner side of the pelvis.

femoral head would tend to keep the fracture surfaces apart because of gravity.

sciatic nerve at risk
No advantage to either position for the posterior approach could be found

With equivalent radiologic outcomes between both groups, a significantly higher rate of infection ($p = 0.017$) and need for revision surgery ($p = 0.009$) were found in the prone group.

For severe fractures (11 B2 vs 4) longer inpatient wait for definitive fixation, leading to a higher risk of nosocomial colonization.
residual fracture displacement in patients with transverse fractures reduced and stabilized in the **lateral position** compared with those positioned prone.
Skin incision

bony landmarks:
1. posterior superior iliac spine
2. greater trochanter
3. shaft of femur

A more proximal extension may improve exposure in obese or muscular patients.
Superficial fascial dissection

the gluteus maximus muscle (using scissors)

the tractus iliotibialis (using a scalpel)
Gluteus maximum splitting

- posterior muscle belly (inferior gluteal artery),
- anterior belly (superior gluteal artery) that includes one third of the gluteus maximus and the muscle of the tensor fasciae latae.
Deep dissection

Free the layer of fat covering the short external rotators, exposing the insertion of the piriformis tendon, the gemelli, and the internal obturator muscle.

Carefully visualize the sciatic nerve.
Deep dissection (option)

Detach the gluteus maximus 1 cm from its insertion into the gluteal tuberosity of the femur.

Detachment can be done partially or completely.

This allows a decrease of tension and easier mobilization of the gluteus maximus muscle.
External rotators dissection

Isolate the piriformis tendon and the conjoined tendons of the obturator internus and superior and inferior gemelli muscles.

They are tagged and incised 1 cm lateral from their femoral insertions.
Exposure of posterior wall

Release and reflect each of the short external rotator muscles

Expose the greater sciatic notch, the ischial spine, and the lesser sciatic notch.

Insert two retractors in the greater and the lesser sciatic notches.

Protect the sciatic nerve
Optional: T-capsulotomy
Reduction-internal fixation
Wound closure

meticulous debridement

Remove necrotic tissue and irrigate the entire wound

two suction drains

Reinsert all tendons and approximate the split parts of the gluteus maximus

closure of the iliotibial tract
Complications

- sciatic nerve injury,
- infection,
- severe bleeding,
- heterotopic bone formation,
- thromboembolic disease
Modifications
two windows: between the gluteus medius and piriformis superiorly and between the external rotators and ischial tuberosity inferiorly.

The approach spares the division of external rotators and of the abductors of the hip, thus preventing iatrogenic damage to the vascularity of the head of the femur and of the fracture fragments.
19 pt - 8 in each group

the gait analysis, and the short musculoskeletal function assessment test showed no statistical difference

the operation time was even lower in the modified group

The fracture reduction was good and did not seem to have additional approach-related complications
Trochanteric Flip Osteotomy for Cranial Extension and Muscle Protection in Acetabular Fracture Fixation Using a Kocher–Langenbeck Approach

*K. A. Siebenrock, *E. Gautier, †B. H. Ziran, and R. Ganz

- mobilization of the vastus lateralis
- slice of the greater trochanter with the attached gluteus medius
- free access to posterosuperior and superior acetabular wall area
- better visualization, more accurate reduction, and easier fixation of cranial acetabular fragments.
Considerations

Is There a Benefit to Drains With a Kocher-Langenbeck Approach? A Prospective Randomized Pilot Study

Joseph R. Hsu, MD, Daniel J. Stinner, MD, Seth D. Rosezweig, MD, Jose Salinas, PhD, and Kyle F. Dickson, MD

With the numbers available, we showed no benefit to the use of drains for acetabular surgery performed through a K-L approach.

- 1,000 patients to show a decrease in drainage time by 1

- > 16,000 patients would be needed to show a decrease in the infection rate
Considerations

Typically (about 84% of the time), the sciatic nerve runs deep to the piriformis muscle.

One part of the nerve (the peroneal division) pass through the muscle and the other part (the tibial division) appear below the muscle (12%).

The entire nerve also may pass through the muscle (1%).

The third variation is passage of the peroneal division above the piriformis and the tibial division below it (3%).
Conclusions

Non extensile posterior wall fractures

Prone is better

Special instruments

Fracture table & C-arm

Sciatic nerve (10%)

Bleeding superior gluteal artery (5%)

Heterotopic ossification (10%)