Hansson Pinloc® System
Using two isolated Hansson Pins for femoral neck fractures

Swemac
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The Hansson Pinloc System is an evolution of the Hansson Pin System, designed to allow the Hansson Pins to be locked into one dynamic unit for improved stability (see separate surgical technique). This surgical technique describes how to use two isolated Hansson Pins for femoral neck fractures.

The Hansson Pin was designed by Professor Lars-Ingvar Hansson at the University of Lund in Sweden. It was developed based on research concerning the effects of implants on the blood supply to the femoral head, with the objective to reduce the risk of femoral head necrosis. Thirty years of successful clinical use have led the Hansson Pin to its current form. Until 2011, more than 250,000 patients suffering from femoral neck fractures or slipped capital femoral epiphyses have been operated.

The late Professor Lars-Ingvar Hansson

Japanese patents
Patent Application No. 2010-534107 Pending
Patent Application No. 2011-515186 Pending
Patent No. 4917731
Patent No. 4421901
Femoral Neck Fracture

The principle

This simple and precise procedure is used for fixation of femoral neck fracture. After reduction of the fracture, two cylindrical Pins are inserted through drilled canals and atraumatically advanced into the femoral head. After deployment of the hook, strong and stable fixation is achieved.

The Hansson Pin consists of three parts, an outer Pin, an inner sliding tongue and an introduction screw. Fixation in the femoral head is achieved by pushing the inner sliding tongue out through the window of the outer Pin. All implants are made from titanium alloy (Ti6Al4V) and available sterile for immediate use. MRI scans can be undertaken without removal of the implant.
Strong stable fixation

Provides secure fixation

- **Strong resistance to rotation.** Peripheral Pin placement within the neck provides strong resistance to rotation.

- **Use of cortical bone for buttressing.** Each Pin contacts strong cortical bone in three places to provide maximum stability. The Hansson Pin System does not rely on soft cancellous bone for support and the risk of displacement is thereby minimized.

- **Large contact area.** It is important to have a large contact area at the fracture site in order to stabilize the fracture. The shaft diameter of the Hansson Pin is 6.5 mm. The most common screws used for femoral neck fractures have a shaft diameter of only 4.5-4.8 mm.

- **Firm anchorage.** The hook of each Pin engages in subchondral bone to provide secure anchorage and prevent migration or backing out.

"Two Hansson Pins placed more than 8 mm apart have better rotational resistance than three cannulated screws (ACE-CHS)"

"Two Hansson Pins have greater fixation strength of the femoral head than three cannulated screws (ACE-CHS)"


Maintains contact with bone

- **Precise parallel placement.** Precise parallel placement allows for fracture dynamization thus ensuring continuous contact with bone, even during resorption.

“Convergence has been reported to increase the incidence of non-union. Therefore, placement of peripheral pins, is considered ideal”

Bray TJ, Smith-Hoefler E, Hooper A, Timmerman L.


“The positioning of the osteosynthesis material was significantly (P=0.042) better for the hook-pins”

“ The hook pin was considered easier to use by the surgeons due to more easy handling and better guide instrument”

Mjørud J, Skaro O, Solhaug JH, Thorngren KG.


Allows early mobilisation

- The security and stability of the fixation allow most patients to be mobilized during their first postoperative day and discharged early.
Minimal surgical trauma

Preserves the blood supply

- **Minimum surgical trauma.** The smooth profile of the Hansson Pins allows for sliding into final positioning without applying torque forces or hammering. This minimizes disruption to the blood supply and the consequent danger of avascular necrosis.

- **Preserves the lateral epiphyseal arteries.** The posterior Pin is placed just above the central axis of the femoral neck, avoiding the area where the lateral epiphyseal arteries enters the femoral head.

The difference in the incidence of necrosis of the femoral head was significantly lower in the Hook Pin group for displaced fractures (odds ratio 3.5 p = 0.036).

Lykke N, Lerud PJ, Strømsøe K, Thorngren KG.
Fixation of fractures of the femoral neck. A prospective, randomised trial of three Ullevaal hip screws versus two Hansson hook-pins.

Too much metal is biologically unfavourable regarding the viability of the femoral head.

Benterud JG, Alho A, Höiseth A.

A cylindrical Pin is inserted through a drilled hole and atraumatically advanced into the femoral head.

The hook is deployed by turning the introducer handle clockwise whilst gently pushing medially on the introducer assembly. This minimizes disruption to the blood supply and the consequent danger of avascular necrosis.
Preserves bone integrity

- **Reduced bone disruption.** By using only two 6.5 mm Hansson Pins to treat a femoral neck fracture, cancellous bone within the femoral head and neck is preserved. Furthermore, no additional fixation points are required in the femoral shaft, reducing the risk of subtrochanteric hip fractures.

  
  "Strength is a function of implant and bone properties. Too much metal may destroy too much of the bone trabeculae. Three or more screws doesn’t necessarily give a better stability than two."

  

**Minimal invasive surgery**

- **Small incisions.** The complete procedure is carried out through two percutaneous skin incisions.

- **Short procedure.** Simple instrumentation and a reproducible procedure allows fixation to be achieved within an adequate time frame.

- **Easy extraction.** The procedure for Pin removal is quick and straightforward. The risk of the Pin being trapped in the bone is reduced as the Pin surface is smooth. The hook is easily withdrawn into the body of the Pin, which can then be pulled out.
Case 1

A patient suffering from a severe heart disease sustained a garden 4 fracture. She was successfully operated with the Hansson Pin System.

X-rays by Dr. Nonomia

Preoperatively

One day postoperatively

Two weeks postoperatively

Three weeks postoperatively. The fracture has settled in a stable configuration.

Three months later, the patient returned to the same functionality as before her injury.
Case 2

This patient sustained a garden 2 fracture with a dorsal angulation of 80°. The fracture was reduced and she was operated with the Hansson Pin System.

X-rays and CT-pictures by Dr. Nonomia

Preoperatively, X-ray

Preoperatively, CT

One day postoperatively

Inferior Pin contacts inferior cortex.

Posterior Pin contacts posterior cortex.
Results

Results of two year follow-up of 300 femoral neck fracture cases, treated with the Hansson Pin at the University Hospital of Lund, Sweden. Ref. 5.

Total number of cases 300
Average age of patient: 78 years
Ratio - female : male 2.6:1
Ratio – undisplaced : displaced 2.5:1
Incidence of perioperative mortality 0%
Incidence of mortality at two year follow-up 28%

Two year follow-up results for 216 surviving patients of the same study, by fracture type.

<table>
<thead>
<tr>
<th>Result</th>
<th>Undisplaced (64 cases)</th>
<th>Displaced (152 cases)</th>
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</thead>
<tbody>
<tr>
<td>Incidence of deep infection</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>Complications (redisplacement/ non-union or segmental collapse)</td>
<td>5%</td>
<td>35%</td>
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<tr>
<td>Incidence of redisplacement /non-union</td>
<td>2%</td>
<td>25%</td>
</tr>
<tr>
<td>Incidence of segmental collapse</td>
<td>3%</td>
<td>9%</td>
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</tbody>
</table>

Incidence of reoperation

THA 5% 21%
Pin extraction 0% 3%
Intertrochanteric osteotomy 0% 1%

Reoperation in the form of THA was performed in 34 cases in the total series: i.e. 11%. The well vascularized femoral heads prone to uncomplicated healing will be saved.

Strömqvist B, Hansson LI.


References

Extensive research has been carried out on The Hansson Pin System, 6 theses and more than 75 articles have been published (Another 50 articles have been published in Japanese).


Indications

Adult femoral neck fractures.

Other indications

Slipped Capital Femoral Epiphysis. (This is covered by a separate brochure)

Contraindications

Due to a lack of any supportive clinical experience, the Hansson Pinloc system is not recommended for use with pediatric hip fractures.

The physician’s education, training and professional judgement must be relied upon to choose the most appropriate device and treatment. Conditions presenting an increased risk of implant failure include:

- Any active or suspected latent infection or marked local inflammation in or about the affected area.
- Compromised vascularity that would inhibit adequate blood supply to the fracture or the operative site.
- Bone stock compromised by disease, infection or prior implantation that can not provide adequate support and/or fixation of the devices.
- Material sensitivity, documented or suspected.
- Obesity. An obese patient can produce loads on the implant that can lead to failure of the fixation of the device or to failure of the device itself.
- Patients having inadequate tissue coverage over the operative site.
- Implant utilization that would interfere with anatomical structures or physiological performance.
- Any mental or neuromuscular disorder which would create an unacceptable risk of fixation failure or complications in postoperative care.
- Other medical or surgical conditions which would preclude the potential benefit of surgery.

Detailed information is included in the instructions for use being provided with each implant. See package insert for a complete list of potential adverse effects and contraindications. The surgeon must discuss all relevant risks, including the service life of the device and the need for postoperative protection of the implant with the patient, when necessary.
Optimal implant position

The inferior Pin

1. Enters the lateral femoral cortex at a point opposite the lesser trochanter or just below.
2. Touches the internal surface of the medial cortex in the femoral neck below the fracture.
3. Reaches the subchondral bone in the femoral head just below the centre.

![Diagram showing the inferior Pin](image)

Three point contact with cortical bone provides maximum stability. Inferior Pin contacts inferior cortex of the femoral neck.

The posterior Pin

The posterior Pin is placed parallel to the inferior Pin.

4. Enters the lateral femoral cortex.
5. Touches the internal surface of the posterior cortex of the femoral neck below the fracture.
6. Reaches the subchondral bone of the femoral head.

In the lateral projection the Pin is placed slightly posteriorly to the central femoral axis line.

![Diagram showing the posterior Pin](image)

Posterior Pin contacts posterior cortex of the femoral neck.
Surgical technique

1. Patient positioning

Place the patient in supine position on an extension table. Position the leg on the healthy side with the hip in flexion and adequate abduction so that the C-arm can be adjusted intraoperatively for both the anterior/posterior view, and the lateral view which is necessary to obtain a true axial view of the femoral neck and head.

2. Reduction

Reduction should be obtained by gentle manipulation according to the normal procedure for displaced fractures. The fracture position should be anatomical or with a slight valgus tilt and held by immobilization on an extension table. The femoral head and neck should be positioned parallel to the floor.

The foot should therefore be rotated inwards and fixed between 15° and 30° of internal rotation. The patella should have an either horizontally or slightly inward position. The patient is then prepared and draped.
3. Locate the optimal point for skin incision

How to locate the optimal point for skin incision and entry point for the Guide Wire.

A Guide Wire, (1) is held under AP-view of the image intensifier, above the skin anterior to the hip joint and in line with the medial cortex of the femoral neck.

A second Guide Wire, (2), is held in a vertical position to the femoral shaft and directed against the point where the first Guide Wire and the skin meet, (A).

A third Guide Wire, (3) (the first Guide Wire can be used), is held under lateral view of the image intensifier. It is placed along the midline to the axis of the femoral shaft.

The point where the second and the third Guide Wires cross, (B), is the optimal starting point for a stab incision.
4. Incision

A percutaneous stab incision is made through the soft tissues down to the lateral cortex in about 130° to the length axis of the femoral shaft. A Triangular Guide with one Guide Wire Sleeve is introduced together with a Guide Wire through the incision. A Guide Wire Adapter can be used to facilitate the insertion of the Guide Wires.

In the AP-view the tip of the Guide Wire should be at the level, but not below, the lower edge of the lesser trochanter.

5. Inferior Guide Wire insertion

It is essential to have the Guide Wire close to the inner inferior cortex. Once the alignment of the Guide Wire is satisfactory, the Guide Wire is advanced to the subchondral bone of the femoral head.

In the lateral view it should be central in relation to the femoral head and neck.

⚠️ It is important to ensure that the Guide Wire does not penetrate the hip joint.
6. Select a Triangular Guide

The next step is to introduce the posterior Guide Wire as close as possible to the posterior cortex of the femoral neck. This is achieved by selecting the Triangular Guide (6, 8 or 10 mm) which gives the widest possible separation of the Pins without cutting through the posterior and superior cortex.

A stab incision is made for the posterior Guide Wire Sleeve. The selected Triangular Guide is rotated, in order that the new Guide Wire is situated posteriorly and proximally. The teeth of the Guide Wire Sleeves are pushed into the cortex to enhance stability.

7. Posterior Guide Wire insertion

Image intensification is used in both AP and lateral views to ensure that the Guide Wire does not cut through the posterior cortex.

The Guide wire is advanced to the subchondral bone of the femoral head.

If the Guide Wire bends during insertion, it is important to remove the Guide Wire and re-insert it, to avoid pushing the Guide Wire forward during drilling.
8. Inferior drilling

A cannulated Drill is introduced through the Drill Sleeve. The Drill Sleeve handle is used to push and hold the Drill Sleeve. A Drill Adapter can be used to facilitate the insertion of the Drill.

Image intensification is used to ensure that the Cannulated Drill follows the line of the Guide Wire accurately and does not cut through the calcar. The Drill is advanced to the subchondral bone of the femoral head. The inferior Drill is left in position. It is also important to ensure that the Guide Wire does not penetrate the hip joint.

9. Measuring

When the tip of the Cannulated Drill has reached the subchondral bone, the required Hansson Pin length is read off the scale on the Cannulated Drill protruding from the Drill Sleeve.

Make sure that the Drill Sleeve is in contact with the bone when reading the scale. The Drill Sleeve is then removed.
10. Posterior drilling

A second cannulated Drill and a Drill Sleeve is used to prepare the posterior canal, using image intensification in both AP and lateral views to ensure that the Drill does not cut through the posterior cortex.

The drill is advanced to the subchondral bone of the femoral head.

11. Measuring

The required Hansson Pin length is again read off the scale on the cannulated Drill protruding from the Drill Sleeve.

The Drill and the Drill Sleeve are then removed to allow for posterior Hansson Pin insertion.
12. Instrument-to-Pin Assembly

**Introducer assembly**
Ratchet Handle + Screwdriver Hex introduced into T-handle Hex

**Mount the Pin on the introducer assembly**
Verify that the Inner Pin does not protrude from the window of the Outer Body and is in correct position. The introducer assembly is introduced into the Pin.

There are several arrows (guide lines) on the T-handle Hex that when introduced into the outer Pin should be in line with the window of the outer Pin to ensure the direction in which the hook will be deployed.
13. Insertion of the posterior Hansson Pin

A Pin of the length required for the posterior canal is mounted on the introducer assembly and inserted into the posterior canal.

Ensure that the Pin is fully inserted and in good position using image intensification.

14. Deploy the hook

The guide line on the T-handle Hex must point anteriorly, giving the direction in which the hook will point. The hook is deployed by turning the screwdriver whilst gently pushing medially on the T-handle Hex.

Continue turning the assembled screwdriver to completely deploy the hook using image intensification. The hook is fully extruded when the introduction screw reaches its mechanical stop. After deployment of the hook, the introducer assembly shall be removed.

⚠️ Do not over-tighten the introduction screw.
15. Insertion of the inferior Hansson Pin

A Hansson Pin of the length required for the inferior canal (usually 10 mm longer than the posterior Hansson Pin) is mounted on the introducer assembly and inserted in the same way, but with the guideline on the T-handle Hex facing superiorly so that the hook will emerge superiorly.

AP and lateral views imaging is used to ensure accurate placement.

After deployment of the hook, the introducer assembly shall be removed by pulling the introducer assembly backwards.

16. Check the position of the Hansson Pins

Before closing the skin incision, it is important to make sure that none of the Pins have penetrated the joint. This can be done by removing traction and rotating the hip under image intensification in both AP and lateral view.
Postoperative regime

Full weight-bearing as tolerated by the patient may be allowed in elderly patients. In younger patients, partial weight-bearing is preferable.

Implant extraction

1. Remove the introduction screw

Image intensification is used to locate the end of the Pin and a 20 mm skin incision is made. The T-handle Hex is introduced into the Pin. Assemble the Screwdriver Hex 3.0 and the Ratchet Handle.

The Screwdriver (with Ratchet Handle) is introduced into the T-handle Hex and rotated counter-clockwise to unscrew the introduction screw. The introduction screw is then removed.
2. Retract the hook

Assemble the Extractor and the Ratchet Handle. The Extractor (with Ratchet Handle) is inserted through the T-handle Hex and rotated clockwise as far as it will go. This will retract the hook.

3. Remove the inferior Pin

Check under image intensification that the hook is fully retracted prior to removing the Pin. The Pin is removed by rotating the T-handle Hex and pulling backwards.

In case the hook is removed on its own, leaving behind the outer body of the Hansson Pin, the outer body is removed by using a grasping instrument. The same procedure as used when removing the inferior Pin is repeated when removing the posterior Pin.
## Product information

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### INSTRUMENTS

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<td>Guide Wire</td>
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