THE NANCY NAIL

- Nancy nails are manufactured from a specific titanium alloy with proprietary surface treatment, which provides increased fatigue resistance.
- Six nail diameters (1.5 mm 2.0 mm 2.5 mm 3.0 mm 3.5 mm 4.0 mm) for all indications can be used to treat
  - femoral and tibial fracture in children and adolescent.
  - humeral, radial and ulnar fractures in both pediatric and adult patients.
- Nail tip allows easy nail insertion and sliding along the medullary canal
- Height of the tip guarantees correct relation to the medullary cavity
- Facilitates nail manipulation for fracture reduction.
- The Nancy nail provides to the surgeon a means of bone fixation and helps generally in the management of fractures and reconstructive surgeries.
- These implants are intended as a guide to normal healing, and are NOT intended to replace normal body structure or bear the weight of the body in the presence of incomplete bone healing.
- Delayed unions or nonunions in the presence of load bearing or weight bearing might eventually cause the implant to break due to metal fatigue.
- All metal surgical implants are subjected to repeated stress in use, which can result in metal fatigue.

The End Caps

- Two sizes of end caps to cover all nail diameters
- Sharp self-cutting thread for proper fixation in bone
- Provide additional axial stability in unstable situation
- Prevent soft-tissue irritation
- Facilitate implant removal

ADVANTAGES OF NANCY NAIL

- Eliminates Casting
- Allows Earlier Weight Bearing
- Minimal Skin Incision
- Minimal Growth Disturbance
- Reduced Hospital Care
**INDICATIONS**

The Nancy Nail is specifically designed for Elastic Stable Intramedullary Nailing fracture fixation, for fixation of diaphyseal fractures of long bones where the medullary canal is narrow or flexibility of the implant is paramount. This includes:

- lower extremity fractures in pediatric patients, (4-14 yrs., <65 Kg)
- lower extremity fractures in small-statured patients,
- upper extremity fractures in all patients.
- Metacarpal, Metatarsal and Phalangeal Fractures (ø1mm)

**Indications in Pediatrics :**

- Nancy nail is indicated for the management of diaphyseal and certain metaphyseal /- piphyséal fractures of long bones in children and young adults. Besides its application for the osteosynthesis of pathological fractures in children.
- complex clavicular fractures:
- significant dislocation
- shortening > 2 cm
- vascular-/nerve injuries
- polytrauma
- bilateral injuries of scapula (“floating shoulder”)
- threat of skin perforation at fracture ends
- pathologic and open fractures

**Indications in Adults :**

In adult patients, used for the osteosynthesis of clavicle, forearm and humerus fractures. As follows:

- diaphyseal fractures of long bone fractures in upper extremity
- clavicle shaft fractures

**CONTRAINDICATIONS**

The Nancy nail are contraindicated in: active infection, conditions which tend to retard healing such as blood supply limitations, previous infections, insufficient quantity or quality of bone to permit stabilization of the facture complex, conditions that restrict the patient’s ability or willingness to follow postoperative instructions during the healing process, foreign body sensitivity.

**CHOOSİNG NAİL DİAMETER**

<table>
<thead>
<tr>
<th>Size (ø) of Medullary Canal</th>
<th>Age of Patient</th>
<th>Ø Nancy Nail</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,0 - 6,0 mm</td>
<td>4,0 – 6,0 Years</td>
<td>Ø 2,0 mm</td>
</tr>
<tr>
<td>6,0 - 7,5 mm</td>
<td>4,0 – 6,0 Years</td>
<td>Ø 2,5 mm</td>
</tr>
<tr>
<td>7,5 – 8,5 mm</td>
<td>6,0 – 8,0 Years</td>
<td>Ø 3,0 mm</td>
</tr>
<tr>
<td>8.5 – 10.0 mm</td>
<td>9,0 – 11,0 Years</td>
<td>Ø 3,5 mm</td>
</tr>
<tr>
<td>10.0 mm +</td>
<td>12,0 – 14,0 Years</td>
<td>Ø 4,0 mm</td>
</tr>
</tbody>
</table>

*Note : The Nancy nail is not intended for use in children under 4 years of age or in patients over 65 Kg
Nail diameter selection depends on both age and medullary canal diameter.*
SURGICAL TECHNIQUE FOR PEDIATRIC FEMUR FRACTURES

Femoral fractures in children are typically stabilized with two nails inserted in a retrograde manner from medial and lateral entry points above the distal physis.

For femoral fractures in children of average stature, use of 3.0 mm, 3.5 mm or 4.0 mm diameter nails is recommended according to the patient anatomy.

A good three point contact of the nail with the inner side of the cortex is essential, especially for long oblique, spiral or complex fractures, where a danger of shortening exists. Pre-bending in this case is therefore highly recommended.

Position supine on radiolucent table and do freehand (preferred option) or on fracture table, if started out freehand and need more traction consider using femoral distractor.

**Fractures of middle and proximal thirds:**

- Retrograde insertion of 2 C-shaped nails.
- Entry point in supracondylar area medial and lateral, 2 cm proximal to the distal femoral physis
- Make entry point with an awl, insert nails medial and lateral of similar diameter (40% diameter of canal) and similar curvature to create balanced construct.
- Insert both nails up to fracture site, reduce fracture then pass nail across fracture site.
- It is better to tap the nails gently with a hammer than rotate them round and round, AVOID winding nails around each other and creating a corkscrew.
- Advance to level just above lesser trochanter, just prior to achieving final position cut them off so you can drive them in a little.
- Leaving just enough to grab later when removing but not too much to irritate the soft tissue (about 1 cm proud). Don't bend the ends it irritates the soft tissue.
- Check rotation prior to finally seating nails.

**Fractures of distal third:**

- Use antegrade technique,
- Entry point - lateral surface of femur just below lesser trochanter, using separate starting points, the second being slightly distal and anterior to the first.
- To achieve divergent nails bend 1 nail in a C shape and the second in an S shape.

- Remove metalwork once fracture consolidated around 6 months.
SURGICAL TECHNIQUE FOR PEDİATRİC TİBİA FRACTURES

- Use 2 pre bent nails inserted from medial and lateral entry points at the proximal tibia.
- Position the patient supine on a standard or fracture table.
- Beware if fibula intact drifts into varus if fibula fractured drifts into valgus.
- If fibula intact asymetrically bend nails to obtain greater elastic recoil of the lateral nail. Alternatively consider two parallel lateral nails, bent in the same direction and introduced into the lateral side of the distal metaphysis.
- For both bone fractures increase the bend on the medial nail to resist the strong muscular forces on the lateral side.
- Usually rotational stable.
- The tibia is triangular in nature with the sides diagonal and the base posterior, as such as the nails are inserted they exert a posterior force leading to recurvatum of the tibia, correct this by rotating the nail tips in a posterior direction.

- Consider below knee cast for a few weeks.
- Depends on child, fracture configuration leave 6 weeks, remove nails 10-12 weeks.

Incision:

- The symmetrical skin incisions are made on the same level on the medial and lateral sides of the tibial tuberosity.
- These are 2 –3 cm in length proximal to the planned entry points.

Nail insertion:

The entry points are situated anteriorly on the proximal medial and proximal lateral metaphyseal cortices, 2 cm distal to the proximal physis, next to the tibial tuberosity.
SURGICAL TECHNIQUE FOR PEDIATRIC FOREARM FRACTURES

- Forearm fractures in children typically require a single nail inserted in each bone.
- Nails may be used either antegrade or retrograde, depending on fracture location and surgeon preference.
- It is recommended that the nail be placed in the radius from a distal approach and the nail be placed in the ulna from a proximal approach.
- The nail diameters are normally between 2.0 mm and 3.0 mm, depending upon patient anatomy. Single nail hence 60% diameter canal.
- In forearm indications where hammering is not required for nail insertion.
- Position the patient supine with the affected arm placed on a radiolucent arm table. The image intensifier is positioned perpendicular to the arm, entering from the foot of the table.
- Retrograde nailing of radius and ante or retrograde nailing of ulna
- Pre bending not normally necessary, ulna is straight, if bending radius consider bow of radius.
- Do most difficult nail first often radial nail.

Radial nail:

- Entry point lateral or dorsal avoiding physis, use bone awl not drill.
- Lateral beware superficial radial nevre.
- Dorsal, through Listers tubercle, ensure when cutting wire that it is placed well outside the tendon compartment to prevent any tendon injury by continuous friction over the nail ends.
- Be prepared to do small open reduction at fracture site, can be difficult to reduce and pass wire.
- Distal shaft fractures require a radial nail insertion site as far distally as possible, but at least 5 mm from the epiphyseal plate, in order to reach the opposite inner cortex before crossing the fracture, which is essential for a stable fixation. Otherwise the distal fragment is fixed at the entrance point of the nail only and tends to tilt. A descending radial nailing is not advisable because of the risk of injuring the deep radial nerve.

Ulnar nail:

- Two different techniques can be used for nailing of the ulna:
  1. antegrade approach from the lateral cortex of the proximal metaphysis;
  2. retrograde approach from the medial cortex of the distal metaphysis.
- As for radius advance to fracture pass closed if possible if not do mini open reduction.
- Turn tips of both nails towards each other to spread the interosseous membrane.
- Cut and bury ends of the nails.
- Generally children with Nancy Nail do not need a cast, encourage immediate movement.
- Remove nails depending on healing around 3 months, some groups wait 8 months.
Radial neck:

Use 1.5-2.5 mm Nancy nail. Use same entry as for distal radius, advance retrograde to radial neck. Direct the point to face the inferior aspect of the fracture, where the tilt is the greatest. Advance nail with gentle taps on hammered, elevating and transfixing the radial head, repositioning it under the lateral condyle. Once the tilt has been corrected, correct the lateral shift by rotation the Nancy nail around 180° so the point faces inward. If needed aid reduction with digital pressure or percutaneous wire to push radial head into place. Immobilize in cast 2 weeks, wire out after 8 weeks.

Surgical Technique for Pediatric Humerus Fractures

- Humeral fractures including supracondylar humerus fractures in both pediatric and adults typically require two nails inserted with a retrograde technique from a posterior insertion site.
- The nail diameters are normally between 2.5 mm and 3.5 mm, depending upon patient anatomy as previously described in the standard femoral technique.
- The entry point for each nail is posterolateral off the lateral supracondylar ridge, one hole above the other, angled upwards.
- Alternatively, two nails can be inserted with an antegrade technique.
- The entry point for antegrade technique is located on the lateral humerus, level with the attachment point of the deltoid muscle.
- Position the patient supine without a tourniquet.
- The arm may be placed on a radiolucent arm table or suspended vertically in traction. Prep and drape the arm from elbow to shoulder.

Incision:

Make a 3 – 4 cm skin incision in children and a 4 – 5 cm skin incision in adults, proximal to the planned insertion point. Then expose the humerus subperiostally.

Nail insertion:

The insertion points are located laterally and distal to the insertion of the deltoid muscle. A more distal entry point could cause injury to the radial nerve. The nail insertion points are separated from each other vertically by 1.5 – 2.5 cm and horizontally by 0.5 –1 cm.
SURGICAL TECHNIQUE FOR PEDIATRIC CLAVICLE FRACTURES

- Because of their elasticity, Nancy nails are used to treat fractures of the clavicle.
- The nail adapts to the anatomic requirements and allows minimally invasive surgery.
- The use of Nancy Nails allows a small incision, immediate resumption of activities and load bearing, significant pain reduction and optimal functional results.
- Usually one Nancy nail is inserted through the medial portion of the clavicle towards the lateral side.
- The insertion from the medial side allows better identification of the medial aspect of the clavicle and easier handling compared to a lateral approach. It also minimizes the risk of damage to the central vessels.
Cutter for Nancy Nail

Straight Impactor

Bevelled Impactor

Combined Hammer

Screwdriver Shaft for End Cap

Hammer Guide

Extraction Pliers for Nancy Nail
NANCY NAIL INSTRUMENTS SET

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