Intramedullary Nail for Lateral Proximal Femoral Fractures

SURGICAL TECHNIQUE
citieffe thanks:
Dr. Vincenzo Caiaffa - Taranto
Dr. Claudio Mori - Bari
Dr. Mario Manca - Viareggio
for their collaboration in the development of this surgical technique.

This surgical technique is written for orthopaedic surgeons and describes the standard procedures suggested by the manufacturer.
Surgeons should decide on the best approach to follow according to their clinical judgement and the patient’s needs.

⚠️ Before use, consult the instructions handbook provided with the packages.
The EBA2 intramedullary nailing system is designed for the treatment of lateral proximal femoral fractures, and consists of a standard or medium length nail implantable with the same set of instruments. This type of surgical treatment should be performed quickly (within 36 hours), so the system has been designed to allow:

- stable fracture synthesis for fast rehabilitation and early mobilization

- an efficient set of instruments (only 11) for a swift, reproducible operating technique (just 7 surgical steps).
**EBA\textsuperscript{2} STANDARD**

1 size - L 180 mm

Indicated for lateral proximal femoral fractures

(31A1, 31A2, 31A3 - AO Classification)

(with extension less than 1 cm distal to the lesser trochanter)

- **Proximal diameter:** 13.5 mm
- **Cervical-cephalic angle:** 130°
- **Metaphyseal angle:** 5°
- **Distal diameter:** 10 mm
- **Slot:** static or dynamic locking
- **Proximal flattening:** easier nail insertion
- **Diapason distal profile:** reduces rigidity in nail/bone contact
- **Longitudinal grooves:** easier insertion and better adaptability to various intramedullary canals

**EBA\textsuperscript{2} MEDIUM**

1 size - L 240 mm

Indicated for long-fissure subtrochanteric femoral fractures

(31A3 subgroup 3 AO Classification)

(with extension more than 1 cm distal to the lesser trochanter)

- **Proximal diameter:** 14 mm
- **Cervical-cephalic angle:** 130°
- **Metaphyseal angle:** 5°
- **Distal diameter:** 10 mm
- **Slot:** static or dynamic locking
- **Hole:** static locking
- **Diapason distal profile:** reduces rigidity in nail/bone contact
- **Longitudinal grooves:** easier insertion and better adaptability to various intramedullary canals

**SCALE 1:1**
All the nails of the EBA² system are made of titanium alloy and are supplied in a sterile package together with 1 screw guide wire (single-use).
The nails of the EBA² system use the same set of only 11 instruments.

<table>
<thead>
<tr>
<th></th>
<th>Instrument Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EBA-5010 Tissue Protection Sleeve</td>
</tr>
<tr>
<td>2</td>
<td>EBA-5015 Trochanteric Awl</td>
</tr>
<tr>
<td>3 - 4</td>
<td>EBA-5020 Cannula</td>
</tr>
<tr>
<td>5</td>
<td>EBA-5025 Trocar</td>
</tr>
<tr>
<td>6</td>
<td>EBA-5030 Multi-use 3 mm ø wire Chuck</td>
</tr>
<tr>
<td>7</td>
<td>EBA-5035 6 mm Allen T-screwdriver</td>
</tr>
<tr>
<td>8</td>
<td>EBA-5045 8 mm Allen T-wrench</td>
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</tr>
<tr>
<td>9</td>
<td>EBA-5100</td>
</tr>
<tr>
<td>10</td>
<td>EBA-5200</td>
</tr>
<tr>
<td>11</td>
<td>EBA-5205</td>
</tr>
</tbody>
</table>

**EBA-0270** Empty EBA² instrument Tray

**TK87170-2F-YE** 580x270x110 mm empty Sterilization Container
MULTI-USE CHUCK

Description of the instrument
Multi-use instrument indicated for the following uses:
1. 3 mm ø guide wire insertion
2. screw length measurement
3. screw drill handle

Chuck uses

1. 3 mm ø guide wire insertion
Push the lever into closed position (A) and turn the knob clockwise, locking the wire in the desired position (B).

2. Screw length measurement
Slide the Chuck up to the trocar and introduce the wire in its seat to read the graduated scale.

3. Screw drill handle
Insert the drill in its coupling (A), push the lever into closed position (B) and turn the knob clockwise until it locks into place (C).
INDICATIONS

STANDARD NAIL

All lateral proximal femoral fractures where treatment with an intramedullary nail is indicated, more precisely:

31A1 simple pertrochanteric fracture
31A2 multifragmentary pertrochanteric fracture
31A3 inter-subtrochanteric fracture
(with extension less than 1 cm distal to the lesser trochanter)

MEDIUM NAIL

Indicated for treatment of long-fissure subtrochanteric femoral fractures, AO classified as fractures 31A3 subgroup 3 (with extension more than 1 cm distal to the lesser trochanter). The special biomechanical characteristics of the nail allow its use also for less complex fractures, that require more distal locking.

CONTRAINDICATIONS

Fractures of the trochanteric region (fractures classified as 31 A2 and A3) extending more than 4 cm distal to the lesser trochanter.
**PATIENT POSITIONING**

Position the patient with the contralateral hip and knee flexed 90° (to avoid obstructing the image intensifier) and tilt the patient’s torso towards the contralateral limb by 20-30°. Proceed with synthesis only after having optimally reduced the fracture.

**INCISION**

The incision should extend proximally 4 - 6 cm from the apex of the greater trochanter.
SURGICAL TECHNIQUE

STEP 1 - PREPARING FOR NAIL INSERTION

Fig. 1
Under image intensifier control insert the tissue protection Sleeve together with the trochanteric Drill on the apex of the greater trochanter in line with the femoral head. Perforate the cortex and insert the Awl by hand.

Fig. 2
Lock the 3øx750 mm guide wire in the Chuck (EBA-0005 accessory not provided with the set of instruments) pushing the lever (A) and turning the knob clockwise. (B).
Insert the wire in the medullary canal through the trochanteric Drill until making contact with the condyles. Remove the Chuck, the trochanteric Drill and the tissue protection Sleeve.

INSTRUMENTS REQUIRED

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
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<tbody>
<tr>
<td>EBA-5015</td>
<td>Trochanteric drill</td>
</tr>
<tr>
<td>EBA-5010</td>
<td>Tissue protection sleeve</td>
</tr>
<tr>
<td>EBA-5030</td>
<td>Chuck</td>
</tr>
<tr>
<td>EBA-0005</td>
<td>3øx750 mm guide wire</td>
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</table>
STEP 2 - INTRODUCING THE NAIL

Fig. 3
Mount the nail on the Guide lining up the nail groove with the complementary Guide groove. Tighten the screw using the T-wrench.

Fig. 4
Introduce the nail over the guide wire and remove the latter when the nail has gone beyond the fracture rim. The nail is normally introduced by with rotary movements by hand without hammering on the Guide.

INSTRUMENTS REQUIRED

EBA-5100
Nail guide

EBA-5045
8 mm Allen T-wrench
**STEP 3 - INSERTING THE GUIDE WIRE IN THE DISTAL CEPHALIC HOLE**

**Fig. 5**
Insert the Cannula in the most distal cephalic hole of the Guide down to the skin.
Take an X-ray in anteroposterior projection to check nail penetration.

Introduce the intracannular scalpel (40470810 accessory not provided with the set of instruments) into the Cannula and make the incision in the skin and fascia, in succession inserting and extracting the scalpel turning it 180°.

Insert the Trocar in the Cannula and check that it reaches the cortex.

Prepare the guide wire (provided with the nail) and lock it on the multi-use Chuck or on a power driver up to the marking C (cephalic), which corresponds to a 90 mm-long screw.

Insert the wire up to the stop on the Trocar and check that it is correctly positioned: in anteroposterior projection it must pass close to the calcar (Fig. 5A); in axial projection (Fig. 5B) it must be in the centre of the femoral head.

**INSTRUMENTS REQUIRED**

- **EBA-5030** Chuck
- **EBA-5020** Cannula
- **EBA-5025** Trocar
- **40470810** Intracannular scalpel
Fig. 6
Introduce the second Cannula into the proximal cephalic hole of the Guide down to the skin.

Introduce the intracannular scalpel (40470810 accessory not provided with the set of instruments) into the Cannula and make the incision in the skin and fascia.

Mount the cephalic screw Drill on the Chuck and insert the Drill and Cannula together down to the bone.

Prepare the screw seat by turning and inserting the Drill up to the mechanical stop.

**INSTRUMENTS REQUIRED**

- EBA-5020 Cannula
- EBA-5200 Cephalic screw drill
- EBA-5030 Chuck
**Fig. 7**
Slide the Chuck over the wire up to the Trocar and read the screw length on the graduated scale.

Fix the first proximal cephalic screw (with a length 1 cm shorter than previously measured on the graduated scale) to the Screwdriver and lock it by turning the knob clockwise (A).

Insert the screw and Screwdriver through the Cannula into the proximal cephalic hole of the Guide. Make sure that the Cannula stays in contact with the bone.

The screw progression can be seen on the graduated scale on the Screwdriver: screw down until the “0” reference is next to the edge of the Cannula.

**INSTRUMENTS REQUIRED**

EBA-5035
6 mm Allen T-screwdriver
STEP 6 - PREPARING FOR INSERTION OF THE DISTAL CEPHALIC SCREW

Fig. 8
Remove the guide wire and the Trocar.
Mount the cephalic screw Drill on the Chuck.

Prepare the screw seat by turning and inserting the Drill up to the mechanical stop.

INSTRUMENTS REQUIRED

| EBA-5200  | Cephalic screw drill |
| EBA-5030  | Chuck                |
Fig. 9
Leaving the proximal Cannula in place (after checking that it is still over the screw head), follow the same procedure to introduce the second cephalic screw (with the actual length previously measured on the chuck – see STEP 5).

**STEP 7 - INSERTING THE DISTAL CEPHALIC SCREW**

**INSTRUMENTS REQUIRED**

EBA-5035
6 mm Allen T-screwdriver
STANDARD NAIL - distal locking option

It is suggested to use distal locking in case of fractures not sufficiently stabilized by the cephalic screws (e.g. fractures type 31A2/31A3 with lesion of the lateral wall and subtrochanteric fractures type 31A3).

**Fig. 10**

For **STATIC** distal locking, introduce the Cannula and the Trocar into the corresponding hole of the Guide until making contact with the cortex (after making the incision of the skin and fascia).

Prepare the guide wire (provided with the nail) and lock it on the multi-use Chuck or on a power driver up to the marking D (distal), which corresponds to a 35 mm-long screw.

Insert the wire up to the stop on the Trocar and check that it has gone beyond the medial cortex.

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**Fig. 11**

For **DYNAMIC** distal locking, introduce the Cannula and the Trocar into the corresponding hole of the Guide.

Follow the same procedure as described for static locking.

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**INSTRUMENTS REQUIRED**

- EBA-5020 Cannula
- EBA-5025 Trocar
**MEDIUM NAIL - distal locking option**

The MEDIUM EBA² nail offers the possibility of 3 different types of distal locking, which can be selected in relation to the fracture and the healing process one wants to follow.

| STATIC      | Carried out with the most proximal screw. | DYNAMIC        | Carried out with the most distal screw: possibility of axial dynamization and rotation control. | STATIC - DYNAMIC | Carried out with both screws: possibility of secondary dynamization by removing the proximal screw. |

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**Fig. 12**

For **STATIC** distal locking, introduce the Cannula and the Trocar through the corresponding hole of the Guide down to the bone (after making the incision of the skin and fascia).

Prepare the guide wire (provided with the nail) and lock it on the multi-use Chuck or on a power driver up to the marking D (distal), which corresponds to a 35 mm-long screw.

Insert the wire up to the stop on the Trocar and check that it has gone beyond the medial cortex.

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**Fig. 13**

For **DYNAMIC** distal locking, introduce the Cannula and the Trocar into the corresponding hole of the Guide. Follow the same procedure as described for static locking.

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**INSTRUMENTS REQUIRED**

- **EBA-5020** Cannula
- **EBA-5025** Trocar
CORTICAL SCREW INSERTION (static or dynamic)

**Fig. 14**
Slide the Chuck over the wire up to the Trocar and read the screw length on the graduated scale.

**Fig. 15**
Mount the Cannulated Drill on the Chuck.
Remove the Trocar and introduce the Cannulated Drill up to the mechanical stop.

**Fig. 16**
Position the cortical screw (with a length the same as that measured) on the Screwdriver and lock it by turning the knob clockwise (A).

**INSTRUMENTS REQUIRED**
- EBA-5205 Cannulated drill
- EBA-5030 Chuck
- EBA-5035 6 mm Allen T-screwdriver
Fig. 17
Insert the screw fastened on the Screwdriver through the Cannula and check that the Cannula is in contact with the bone. The screw progression can be seen on the graduated scale on the Screwdriver: screw down until the “0” reference is next to the edge of the Cannula.

Fig. 18
Complete the procedure by inserting the snap-on end cap in the proximal part of the nail.

Lock the end cap to the Screwdriver: to fasten it to the nail, lightly press on the handle.

Using the nail will facilitate implant removal.

INSTRUMENTS REQUIRED

EBA:5035
6 mm Allen T-screwdriver
### Implants Order Information

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>EBA-6100</td>
<td>EBA² standard nail ø10 mm, L 180 mm</td>
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<tr>
<td>EBA-6500</td>
<td>EBA² medium nail ø10 mm, L 240 mm</td>
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<tr>
<td>EBA-6000</td>
<td>EBA² snap-on end cap</td>
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The nails are supplied in a STERILE package with 1 screw guide wire (SINGLE USE).

<table>
<thead>
<tr>
<th>Code</th>
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**Cephalic Screw**

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<tr>
<th>Code</th>
<th>Description</th>
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<tr>
<td>EBA-7070</td>
<td>Screw ø7,5 mm, L 70 mm</td>
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<tr>
<td>EBA-7075</td>
<td>Screw ø7,5 mm, L 75 mm</td>
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<td>EBA-7080</td>
<td>Screw ø7,5 mm, L 80 mm</td>
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<td>EBA-7085</td>
<td>Screw ø7,5 mm, L 85 mm</td>
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<td>EBA-7090</td>
<td>Screw ø7,5 mm, L 90 mm</td>
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<td>EBA-7095</td>
<td>Screw ø7,5 mm, L 95 mm</td>
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<tr>
<td>EBA-7100</td>
<td>Screw ø7,5 mm, L 100 mm</td>
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<tr>
<td>EBA-7105</td>
<td>Screw ø7,5 mm, L 105 mm</td>
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<tr>
<td>EBA-7110</td>
<td>Screw ø7,5 mm, L 110 mm</td>
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**Cephalic Screw HA Coated**

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<th>Code</th>
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<td>EBA-8070</td>
<td>Screw ø7,5 mm, L 70 mm</td>
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<tr>
<td>EBA-8075</td>
<td>Screw ø7,5 mm, L 75 mm</td>
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<tr>
<td>EBA-8080</td>
<td>Screw ø7,5 mm, L 80 mm</td>
</tr>
<tr>
<td>EBA-8085</td>
<td>Screw ø7,5 mm, L 85 mm</td>
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<tr>
<td>EBA-8090</td>
<td>Screw ø7,5 mm, L 90 mm</td>
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<tr>
<td>EBA-8095</td>
<td>Screw ø7,5 mm, L 95 mm</td>
</tr>
<tr>
<td>EBA-8100</td>
<td>Screw ø7,5 mm, L 100 mm</td>
</tr>
<tr>
<td>EBA-8105</td>
<td>Screw ø7,5 mm, L 105 mm</td>
</tr>
<tr>
<td>EBA-8110</td>
<td>Screw ø7,5 mm, L 110 mm</td>
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**Cortical Screw**

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<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>EBA-9030</td>
<td>Screw ø5 mm, L 30 mm</td>
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<tr>
<td>EBA-9035</td>
<td>Screw ø5 mm, L 35 mm</td>
</tr>
<tr>
<td>EBA-9040</td>
<td>Screw ø5 mm, L 40 mm</td>
</tr>
<tr>
<td>EBA-9045</td>
<td>Screw ø5 mm, L 45 mm</td>
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</table>
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<table>
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<tr>
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<tbody>
<tr>
<td>EBA-5010</td>
<td>Tissue protection sleeve</td>
</tr>
<tr>
<td>EBA-5015</td>
<td>Trochanteric drill</td>
</tr>
<tr>
<td>EBA-5020</td>
<td>Cannula (2 pieces)</td>
</tr>
<tr>
<td>EBA-5025</td>
<td>Trocar</td>
</tr>
<tr>
<td>EBA-5030</td>
<td>Multi-use 3 mm ø wire chuck</td>
</tr>
<tr>
<td>EBA-5035</td>
<td>6 mm Allen T-screwdriver</td>
</tr>
<tr>
<td>EBA-5045</td>
<td>8 mm Allen T-wrench</td>
</tr>
<tr>
<td>EBA-5100</td>
<td>EBA(^2) standard and medium nail guide</td>
</tr>
<tr>
<td>EBA-5200</td>
<td>Cephalic screw drill</td>
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<tr>
<td>EBA-5205</td>
<td>Cannulated drill</td>
</tr>
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<td>EBA-0270</td>
<td>Empty EBA(^2) instrument tray</td>
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<td>EBA-0270c</td>
<td>Full EBA(^2) instrument tray</td>
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<tr>
<td>TK87170-2F-YE</td>
<td>580x270x110 mm empty container sterilization</td>
</tr>
</tbody>
</table>

Accessories **(not included in the set of instruments):**

- **40470810** 8øx240 mm scalpel, 10 mm blade, sterile and single-use
- **EBA-0005** 3øx750 mm guide wire