Gamma3
U-Blade Lag Screw

Operative Technique

Hip Fracture
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Special thanks to

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and all surgeons, who supported the idea of the U-Blade Lag Screw for the treatment of proximal femur fractures.
This publication sets forth detailed recommended procedures for using Stryker Osteosynthesis devices and instruments.

It offers guidance that you should heed, but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required.

A workshop training is required prior to first surgery.

See package insert (L22000007) for a complete list of potential adverse effects, contraindications, warnings and precautions. The surgeon must discuss all relevant risks, including the finite lifetime of the device, with the patient, when necessary.

**Warning:**

All bone screws referenced in this brochure are not approved for screw attachment or fixation to the posterior elements (pedicles) of the cervical, thoracic or lumbar spine.
Features & Benefits

The Gamma3 U-Blade Lag Screw Set

![Gamma3 U-Blade Lag Screw](image1)

Gammut3 U-Blade Lag Screw

![Gamma3 U-Blade](image2)

Gamma3 U-Blade

![End Cap](image3)

End Cap

**Fig. 1: Gamma3 U-Blade Lag Screw Set disassembled**

**Fig. 1a: Gamma3 U-Blade Lag Screw Set assembled and spread**

**Design Features of the Gamma3 U-Blade Lag Screw Set**

The Gamma3 U-Blade Lag Screw Set features a combination of a standard Gamma Lag Screw and a spreading Blade.

The implant components of the Gamma3 U-Blade Lag Screw Set are made of Titanium Alloy (Ti6Al4V) (Fig. 1 & 1a) with Anodized Type II surface. They are designed for use with the Gamma3 Trochanteric (Fig. 2) and Gamma3 Long Nails.

The unique Gamma3 U-Blade Lag Screw Set concept and its straightforward instrumentation enables quick and secure insertion. The insertion procedure of the Gamma3 U-Blade Lag Screw is similar to the standard Gamma3 Lag Screw. Insertion of the Gamma3 U-Blade into the Gamma3 U-Blade Lag Screw will be performed with ease to use instrumentation.

**Design Benefits of the Gamma3 U-Blade Lag Screw Set**

The Gamma3 U-Blade spreads at the tip of the Gamma3 U-Blade Lag Screw thread (Fig. 1a), a useful feature for treating especially rotational and unstable fracture situations of the proximal femur. The Gamma3 U-Blade Lag Screw Set is designed to provide a monoaxial rotational stability of the femoral head and neck fragment. The spreading effect also increases the surface by 15% in the cranial-caudal direction comparing with the standard Gamma3 Lag Screw, which results in even higher resistance to failure [4] in order to improve cut-out resistance that can particularly occur in osteoporotic bone. In the literature, a cut-out rate of 2–8% is reported with ordinary lag screws [1, 2, 3].

Summarized the design offers the following major benefits:

- Monoaxial rotational stability of the femoral head and neck fragment [4] (no second lag screw or pin is needed as with other implant designs)
- Increased resistance to cut-out of the femoral head due to the larger implant surface [4]
- Fully compatible with the Gamma3 Nail System.

The Gamma3 U-Blade Lag Screw Set is recommended for the following indications:

- Highly osteoporotic bone in the femoral head
- Short femoral head/neck fragment (Fig. 2a)
- Unstable pertrochanteric or intertrochanteric fractures with missing medial-caudal bone support as shown in the preoperative X-Rays (Fig. 2b).

**Relative Contraindications**

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 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 overweight or 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.

**Note:**

Follow the Gamma3 Operative Technique for Trochanteric or Long Nails, depending which nail you are using, up to the part of the chapter entitled Lag Screw Insertion where the K-Wire is in place, the Lag Screw length determination has been done and the value of the length measurement has been transferred to adjustable stop of the Lag Screw Step Drill. At this point, continue with this Operative Technique. The instructions for the Gamma3 U-Blade Lag Screw Operative Technique should not interfere with or replace any chapters in the Gamma3 Operative Technique except for those detailing Lag Screw insertion and fixation. This manual is describing the surgical technique using a Gamma3 Trochanteric Nail 180.

For optimal positioning of the Gamma3 U-Blade Lag Screw, use of the Gamma3 One Shot Device is recommended.

The Gamma3 One Shot Device is a radiolucent instrument that is used to find the ideal position for the Lag Screw before skin incision and opening the lateral cortex for K-Wire placement.
Operative Technique

Gamma3 U-Blade Lag Screw Placement

The K-Wire Sleeve is removed and the adjusted Lag Screw Step Drill is passed over the K-Wire, through the Lag Screw Guide Sleeve. The canal for the Gamma3 U-Blade Lag Screw is prepared using the T-Handle connected to the Lag Screw Step Drill (Fig. 3). If exceptional resistance is encountered, a power drill may be used with great care. Drilling should continue until the stop of the Step Drill comes into contact with the Lag Screw Guide Sleeve (Fig. 3a). Ensure that the Targeting Device is well supported to prevent it from slipping back or rotating.

The drilling process, especially when the tip of the drill comes close to its final position in the femoral head, should be controlled under an image intensifier to avoid hip joint penetration. The K-Wire also may be observed in the K-Wire Window of the Step Drill (Fig. 3b).

Caution:
It is important to observe the K-Wire tip during drilling on the intensifier.
The K-Wire window provides an additional possibility to double check the K-Wire position.

Warning:
Ensure that under no circumstances the K-Wire is advanced into the pelvis. In case a deflection of the K-Wire is observed, it is strongly recommended to remove the K-Wire and replace it by a new one. A deflected K-Wire may lead to nail damage during reaming procedure with the Lag Screw Stepdrill.

The correct length of the Gamma3 U-Blade Lag Screw is chosen by selecting a size that was measured previously with the Lag Screw Ruler. It is important that the assembled Gamma3 U-Blade Lag Screw protrudes through the lateral femoral cortex. This will ensure rotational stability in the nail axis and allows the Gamma3 U-Blade Lag Screw to slide laterally.

In case of using compression/apposition the U-Blade Lag Screw must be chosen shorter depending on the expected amount of compression.

Caution:
The coupling of Elastosil handles contains a mechanism with one or multiple ball bearings. In case of applied axial stress on the Elastosil handle, those components are pressed into the surrounding cylinder resulting in a complete blockage of the device and possible bending. To avoid intra-operative complications and secure long-term functionality, we mandate that Elastosil handles be used only for their intended use. DO NOT HIT on them.
Separate the selected Gamma3 U-Blade Lag Screw Set from the End Cap and the Gamma3 U-Blade and attach the Gamma3 U-Blade Lag Screw to the Gamma3 U-Blade Lag Screwdriver (Fig. 4b) by turning the end thumbwheel clockwise (Fig. 4). Make sure that the pins of the U-Blade Screwdriver are in the slot of the Gamma3 U-Blade Lag Screw (Fig. 4b).

Tighten the thumbwheel. Make sure that the compression wheel of the Lag Screwdriver (Fig. 4a) is positioned closest to the handle.

Note:
The Gamma3 U-Blade Lag Screw CAN NOT be connected to the regular Gamma3 Lag Screwdriver (1320-0200) because their designs differ.
Operative Technique

Gamma3 U-Blade Lag Screw Insertion

The U-Blade Lag Screw assembly is now passed over the K-Wire, through the Lag Screw Guide Sleeve, and threaded up to the end of the predrilled hole of the femoral head. Check the end position of the U-Blade Lag Screw on the image intensifier. A double check of the end position is also possible with the indicator ring on the U-Blade Lag Screwdriver when it reached the end of the Lag Screw Guide Sleeve.

Compression / Apposition

If compression or apposition of the fracture gap is required, this can be achieved by gently turning the thumb-wheel of the Lag Screwdriver clockwise against the Guide Sleeve.

Note:

In osteoporotic bone care must be taken to prevent Lag Screw pullout in the femoral head. The U-Blade Lag Screw must be chosen shorter depending on the expected amount of compression.

Fig. 5: Gamma3 U-Blade Lag Screw positioning

Fig. 5a: Gamma3 U-Blade Lag Screw Driver T-Handle positioned 90° to the Targeting Device arm

Fig. 5b: Indicator ring

Fig. 5c: Set Screw Alignment Indicator

Note:

The handle MUST be perpendicular to the Targeting Device, when the U-Blade Lag Screw is in the final position to ensure that the Set Screw is able to fit into one of the 2 Grooves of the Lag Screw shafts. The Set Screw alignment indicator will help to find the right position of the handle.
Operative Technique

Gamma3 U-Blade Lag Screw Fixation

Warning:
The Set Screw must be used. The use of the Set Screw is not an option.

Assemble the Set Screw to the Set Screw Driver. Insert the Set Screw as shown in Fig. 6 along the opening of the post of the Targeting Device and advance it through the Nail Holding Screw pushing the Set Screwdriver.

Push the Set Screw Driver down until you are sure, that the Set Screw engages the corresponding thread in the nail. While pushing down the assembly, you may feel a slight resistance.

Turn the Screwdriver handle clockwise under continuous pressure. You may notice a slight resistance when turning the Set Screw. This is because the Set Screw thread is equipped with the “Nylstop” system to prevent spontaneous loosening.

Turn the Set Screw until you feel contact in one of the two grooves of the U-Blade Lag Screw.

When slightly tightening the Set Screw, make sure that the handle of the Lag Screwdriver is at right angles (90°) to the target arm (Fig. 5a). The Set Screw alignment indicator will help to find the right position of the T-handle.

This ensures that the Set Screw will engage in one of the two Lag Screw sliding grooves (Fig. 6a). To verify the engagement the Set Screw in sliding groove of the Lag Screw, try to turn the U-Blade Lag Screwdriver gently clockwise and counter-clockwise. If it is not possible to turn the U-Blade Lag Screwdriver the Set Screw is engaged in one of the two sliding grooves. If the U-Blade Lag Screw moves, recorrect the T-Handle position and tighten the Set Screw again until it engages in one of the two Lag Screw sliding grooves.

After slightly tightening the Set Screw, it should then be unscrewed by one quarter (¼) of a turn, until a small play can be felt at the U-Blade Lag Screwdriver. This ensures a free sliding of the U-Blade Lag Screw.

Make sure that the Set Screw is still engaged in the sliding groove by checking that it is still not possible to turn the U-Blade Lag Screw with the U-Blade Lag Screwdriver. Subsequently remove the Set Screw Driver.

Warning:
Do not unscrew the Set Screw more than ¼ of a turn.

As an alternative, the Set Screw can be inserted using the Gamma3 Closed Tube Clip.

Warning:
If the Gamma3 U-Blade Lag Screw is not correctly secured with the Set Screw, rotational stability of the head fragment cannot be assured.
Operative Technique

Gamma3 U-Blade Insertion

Before inserting the Gamma3 U-Blade, disconnect the Gamma3 U-Blade Lag Screwdriver from the Gamma3 U-Blade Lag Screw by turning the thumbwheel counterclockwise. Remove the Gamma3 U-Blade Lag Screwdriver and the K-Wire.

The Gamma3 U-Blade Lag Screw Connector has to be preattached to the T-Handle first (Fig. 7).

Pass this assembly through the Lag Screw Guide Sleeve (Fig. 8) and turn it clockwise using the T-Handle (Fig. 8a). Turning stops when the Gamma3 U-Blade Lag Screw Connector has reached its end position. Remove the T-Handle from the connector.
Operative Technique

Now connect the Gamma3 U-Blade to the Gamma3 U-Blade Connector by turning the Gamma3 U-Blade Connector clockwise (Fig. 9).

Push the Gamma3 U-Blade assembly gently over the Gamma3 U-Blade Lag Screw Connector and into the flutes of the Gamma3 U-Blade Lag Screw. If you do not hit the flutes directly turn your Gamma3 U-Blade Connector assembly by hand until the assembly glides in easily. The Gamma3 U-Blade should be inserted in the position shown in Fig. 10 & 10a so that it glides easily along the flutes of the Gamma3 U-Blade Lag Screw. This is done by hand until the Gamma3 U-Blade stops when it reaches the bone. At this point, the Gamma3 U-Blade should be approximately 25 mm away from its final position.
The Gamma3 U-Blade Inserter is required to move the Gamma3 U-Blade into its final position. The Gamma3 U-Blade will now start to spread to the anterior and posterior side.

Position the Gamma3 U-Blade Inserter over the Gamma3 U-Blade Lag Screw Connector until it contacts the Gamma3 U-Blade Connector (Fig. 11).

Note:
In rare cases if the U-Blade cannot be seated manually to its final position, remove the U-Blade Inserter and tap gently against the U-Blade Lag Screw Connector.

Fig. 11: U-Blade Inserter adapted to U-Blade Lag Screw Connector
A visual check with the intensifier in the axial view is recommended to affirm the Gamma3 U-Blade's final position.

Remove the Gamma3 U-Blade Inserter by moving it backwards away from the Gamma3 U-Blade Lag Screw Connector.

The Gamma3 U-Blade Connector and the Gamma3 U-Blade Lag Screw Connector are disassembled in the opposite order.

Press the lever several times and the Gamma3 U-Blade Inserter will push the Gamma3 U-Blade forward (Fig. 11a). The Gamma3 U-Blade Inserter stops mechanically when the Gamma3 U-Blade has been inserted completely. The final position of the Gamma3 U-Blade is indicated when the peg of the Gamma3 U-Blade Inserter is in line with the indicator ring on the Gamma3 U-Blade Lag Screw Connector (Fig. 11b).
Note: Fixation of the Gamma3 U-Blade is always completed by securely fastening the End Cap into the Gamma3 U-Blade Lag Screw.

Insert the End Cap through the Lag Screw Guide Sleeve using the Straight Screwdriver 4mm and tighten firmly (Fig. 12). Gamma3 U-Blade insertion is now completed. Remove the Screwdriver and the Lag Screw Guide Sleeve (Fig. 13).

Follow the Gamma3 Operative Technique for Trochanteric or Long Nails, depending which nail is used. Beginning at the chapter entitled Distal Screw Locking, if distal locking is required. If no distal locking is required, continue with the chapter End Cap Insertion.
Operative Technique

Extraction of the Gamma3 U-Blade Lag Screw

Where implant extraction is indicated, please proceed as follows:

**Step I** (Fig. 14)
Remove the distal screw using the 3.5mm Screwdriver through a short incision.

**Step II** (Fig. 15)
When the end of the Gamma3 U-Blade Lag Screw is exposed from an incision, remove any bony ingrowth which may be obstructing the U-Blade End Cap to engage with the Screwdriver fully. Remove the U-Blade End Cap using the 4.0mm Screwdriver.

**Step III** (Fig. 16a & 16b)
Assemble the Gamma3 U-Blade Extractor to the Universal Rod by turning clockwise. Make a final tightening with the Wrench 8/10mm (Fig. 16a).

Mount the Gamma3 U-Blade Extractor assembly to the Gamma3 U-Blade by turning it clockwise until you feel a resistance. Check that no ingrowth or soft tissue is in between the connecting parts (Fig. 16b).

**Note:**
The printed arrows 1 and 2 on the Gamma3 U-Blade Extractor indicates the sequence of assembly and disassembly.
Operative Technique

**Step IV (Fig. 16c & 16d)**

Once the thread of the Extractor is fully engaged with the Gamma3 U-Blade, retract the Gamma3 U-Blade by simply pulling out (Fig. 16c). If the Gamma3 U-Blade is not pulled out manually at this stage, the Slotted Hammer can be used to drive out the Gamma3 U-Blade (Fig. 16d).

**Caution:**

Check that tissue does not obstruct secure engagement of the Gamma3 U-Blade Lag Screwdriver, otherwise the U-Blade Lag Screw or the Screwdriver may be damaged and extraction will be difficult.

**Note:**

The arrows on the Extraction Adopter also indicates the sequence of the disassembly from the Extraction Adopter. At first, detach the Universal Rod, then remove the U-Blade from the Extraction Adopter.

**Step V**

The K-Wire is then introduced via the Gamma3 U-Blade Lag Screw into the head of the femur. The K-Wire provides an easy guide for the next instrument assemblies to be used. Then pass the U-Blade Lag Screwdriver over the K-Wire and engage it with the distal end of the U-Blade Lag Screw. Make sure that the two pegs of the Gamma3 U-Blade Lag Screwdriver fit to the Gamma3 U-Blade Lag Screw. Turn the thumbwheel clockwise to tighten them.
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**Step VI** (Fig. 17)
An incision is made over the proximal end of the nail, the proximal End Cap if used is removed using the Ball Tip Screwdriver or Strike Plate. The Set Screw is then removed by turning anti-clockwise using the Straight Screwdriver 4.0mm.

*Note:*
As the targeting device is not connected to the nail, we recommend using the Straight Set Screwdriver (1320-0210) for better guidance through the soft tissue to get access to the Set Screw.

**Step VII** (Fig. 18)
The Conical Extraction Rod is then threaded and tightened into the proximal end of the nail. The U-Blade Lag Screw is extracted by turning anti-clockwise rotation and pulling of the U-Blade Lag Screwdriver. The K-Wire must then be removed.

*Note:*
It is recommended to turn the U-Blade Lag Screw Screwdriver clockwise slightly first to loosen any bony ingrowth into the screw threads before turning it counter clockwise.

**Step VIII** (Fig. 19a & 19b)
After assembling the Universal Rod to the Conical Extraction Rod, extract the nail by using the Slotted Hammer.
## Ordering Information - Instruments

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## Ordering Information - Implants

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*(End Cap can be ordered separately in case of a spare part)*

### End Cap*

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*(End Cap can be ordered separately in case of a spare part)*

* Implants are supplied in a sterile condition.
Gamma3 U-Blade Lag Screw, Gamma3 U-Blade and End Cap are packaged together in one box.
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