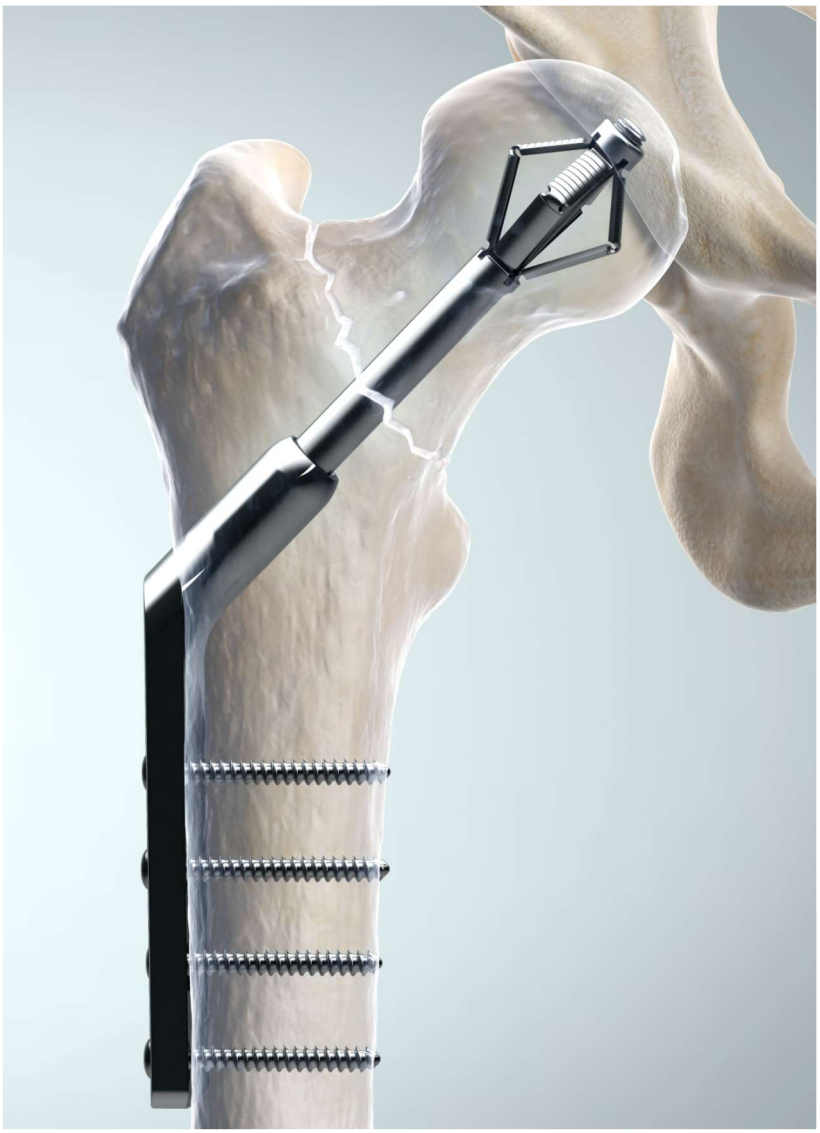
X-BOLT®

The Hip Fracture Fixation Company



X-**BOLT Hip System (XHS™)** Surgical Technique

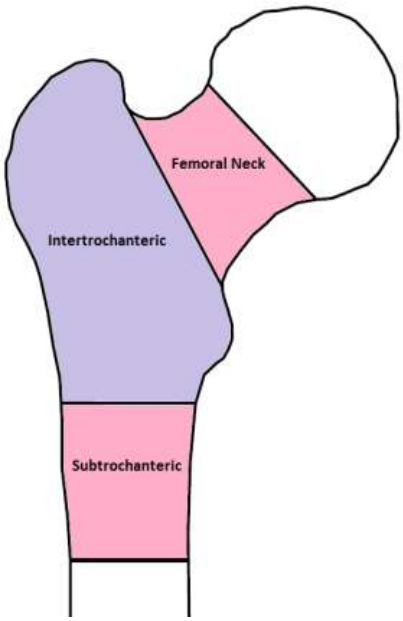
X-BOLT Mini-Plate Surgical Technique

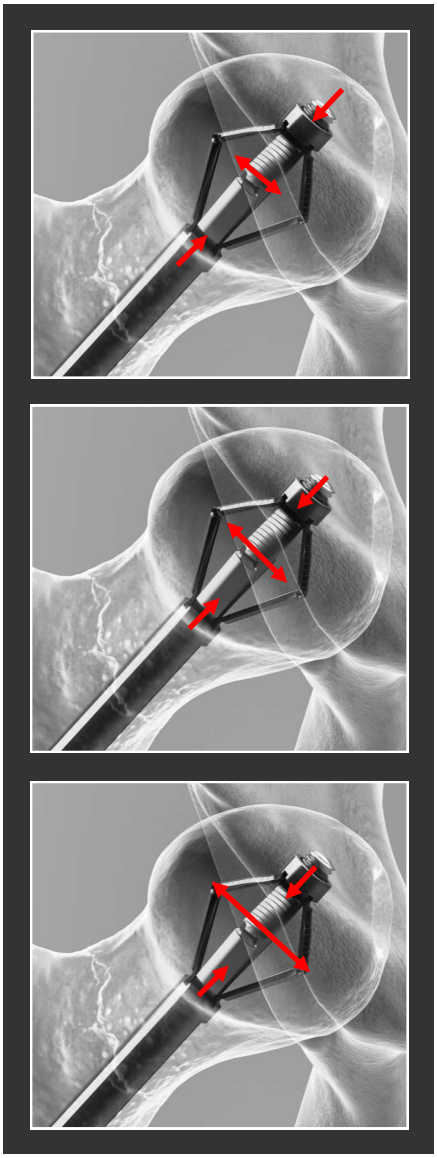
X-BOLT® SIMPLE AND SECURE

The X-BOLT® provides strong femoral head fixation and excellent rotational stability. The X-BOLT® comprehensive systems replicate traditional techniques. The simple, concise and user-friendly instrumentation ensures fast and dependable hip fracture surgery.

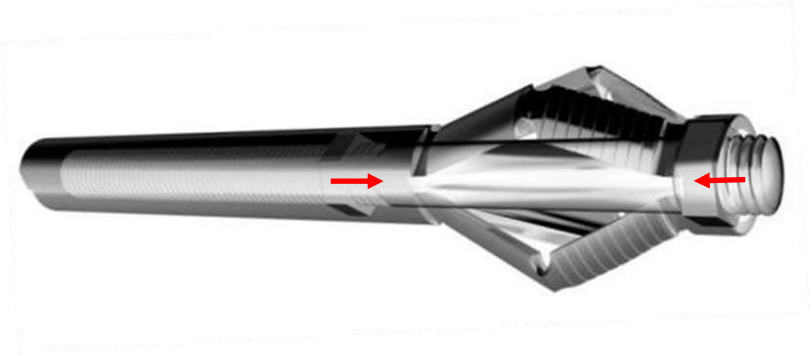
The user-friendly features allow surgeons the freedom to concentrate on the important steps of:

- ✓ **Fracture Reduction**
- ✓ **Guidewire Position**





X-BOLT® HOW IT WORKS



The X-BOLT® is an expanding bolt akin to a Chinese lantern with a central drive shaft. The opposing threads compress the expandable section from both ends to expand the wings perpendicularly to the shaft, without spinning, pushing or pulling the femoral head. Maximal expansion of the four wings is always easily seen on AP and lateral fluoroscopy.

- ✓ **Expanded (or retracted) with standard screwdriver**
- ✓ **Compacts surrounding cancellous bone**
- ✓ **Maximises resources within femoral head**
- ✓ **Single centre-centre guidewire shot**
- ✓ **No need for de-rotation screw**
- ✓ **Easily reversible and removable**

Part Code

XHS™ DYNAMIC HIP PLATING

1. **SET-UP.** Follow all steps on fluoroscopy and **check rotation or lateral view if any step is troublesome**. Reduce fracture on fracture table. Anatomical reduction is key to successful outcome. Standard approach through vastus lateralis to lateral femur.

XDG-135
*XNI-010

2. **GUIDEWIRE.** Using angle guide, place femoral head guidewire centre-centre to within 2-3 mm of joint line (optimum tip-apex point). Remove angle guide. **In unstable fracture patterns, consider placing a second guidewire** to skewer and anchor reduced fracture position, as primary guidewire will lose its grip when over-reamed.

XMG-001

3. **MEASURE.** Measure depth of laser mark on guidewire shaft with guidewire measuring ruler. **Round down to nearest 5mm** for reamer and X-Bolt length**.** Note X-Bolt shortens by 2mm from base end on full expansion. Make allowance for any post-operative fracture collapse.

XRT-090

4. **REAM.** Set reamer to measured length. Insert over guidewire. Ream to tip-apex point, also creating barrel channel and lateral counter-sink. Follow closely under fluoroscopy, ensuring guidewire does not advance inadvertently. **Ream fully deep to tip-apex point** (reset longer depth if necessary), as final drilling depth dictates X-Bolt final position. Remove reamer and primary guidewire.

XBC-001

5. **BONE CRUSHER. Insert bone crusher fully to tip-apex point**. Starting with handle facing at 6 o'clock position, deploy at 'hourly' intervals, compacting the cancellous bone, through an arc of 180°, to the 12 o'clock position. This creates a diamond-shaped starter cavity that the X-Bolt will expand into. **Note: It is always necessary to complete this step regardless of the nature/density of bone.**

XHS-035
XSH-001
XPI-300

6. **INSERT X-BOLT AND PLATE.** On side table, slide X-Bolt into plate barrel. Insert screwdriver into base of X-Bolt for use as an insertion instrument; the screw holding sleeve prevents plate from sliding off. Insert X-Bolt and plate into reamed channel. Remove the screw holding sleeve and advance X-Bolt fully to tip-apex point. If necessary, seat plate onto femur using plastic impactor. Remove the second guidewire if it has been used.

XCG-035
*XDS-032
XNI-030

7. **STABILISE PLATE.** Drill, measure and place most proximal cortical screw through the plate, ensuring correct plate rotation on femur. The stabilised plate counters X-Bolt rotation when deploying.

XHS-035

8. **EXPAND X-BOLT.** Follow expansion on fluoroscopy. Expand by clockwise screwdriver rotation until a stop is felt, or to 4.5Nm torque screwdriver limit, or by surgeon choice. If initial resistance to expansion is felt, do not force; remove plate and repeat bone crusher step. **Note: X-Bolt must be discarded and replaced if expansion has been reversed, or if the X-Bolt is damaged in any way.**

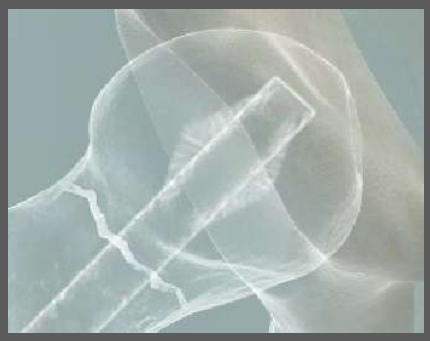
XSR-300
XPI-300

9. **(Optional) FRACTURE COMPRESSION.** Remove leg traction. Insert compression rod (note: anticlockwise threads) into the base of X-Bolt. Manually retract rod and thus X-Bolt, using plastic impactor as counter force, to achieve desired compression.

XHS-035

10. **FINAL STEPS.** Insert remaining cortical screws and check final position. Wound closure in layers, post-operative management and weight-bearing as per surgeon's instructions.

(single packed sterile)*



X-BOLT® MINI-PLATE

Part Code

1. **INDICATIONS.** The X-Bolt Mini-Plate should be reserved for patients with stable intracapsular fractures (Garden I & II).

2. **SET-UP.** Follow all steps on AP & lateral fluoroscopy. Use a mini-open approach through or below vastus lateralis to lateral femur.

3. **GUIDEWIRE.** Freehand starting point: opposite superior aspect of lesser trochanter. Place femoral head guidewire centre-centre in femoral head to within 2-3mm of joint line (optimum tip-apex point). The green & gold drill guide can be used as a soft tissue protector. — *XNI-010, XCG-035

4. **MEASURE.** Measure depth of laser mark on guidewire shaft with guidewire measuring ruler. Note: X-Bolt shortens by 2mm from base end on full expansion and to ensure that X-Bolt does not disengage in situ with mini-plate, **add 5-10mm for X-Bolt length.** — XMG-001

5. **REAM.** Remove barrel part of triple reamer. Ream over guidewire to tip-apex point, to within 2-3mm of joint line (optimum tip-apex point). **Follow closely under fluoroscopy** to ensure guidewire or reamer does not advance inadvertently. Remove reamer and guidewire. — XRT-090

6. **BONE CRUSHER. Insert bone crusher fully to tip-apex point**. Starting with handle facing at 6 o'clock position, deploy at 'hourly' intervals, compacting the cancellous bone, through an arc of 180^{o}, to the 12 o'clock position. This creates a diamond-shaped starter cavity that the X-Bolt will expand into. **Note: It is always necessary to complete this step regardless of the nature/density of bone.** — XBC-001

7. **INSERT X-BOLT AND MINI-PLATE.** On side table, slide X-Bolt into mini-plate. Insert screwdriver into base of X-Bolt for use as an insertion instrument; the screw holding sleeve prevents mini-plate from sliding off. Insert X-Bolt into reamed channel. Remove the screw holding sleeve and advance X-Bolt fully to tip-apex point. — *XMP-125, XHS-035, XSH-001

8. **LOCKING SCREW.** Insert threaded drill guide into hole in plate. Drill via guide using Ø4.0mm drill bit. This should not penetrate medial cortex. Remove drill guide. Using screwdriver, place unicortical 30mm x Ø5.0mm locking screw into plate. This stabilises the mini-plate to counter rotation of X-Bolt when deploying. — *XNI-029

9. **EXPAND X-BOLT.** Follow expansion on fluoroscopy. Expand by clockwise screwdriver rotation until a stop is felt, or to 4.5Nm torque screwdriver limit, or by surgeon choice. If initial resistance to expansion is felt, do not force; remove mini-plate and X-Bolt and repeat bone crusher step. **Note: X-Bolt must be discarded and replaced if expansion has been reversed, or if the X-Bolt is damaged in any way.** — XHS-035

10. **CLOSURE.** Wound closure, post-operative management and weight-bearing as per surgeon's instructions.

TIPS FOR SUCCESS

1. **ANATOMICAL REDUCTION**. Avoid varus; check medial cortex congruity. Lateral view on fluoroscopy vital to identify and correct sag and to check rotational alignment.

2. **REAMING TO TIP-APEX POINT**. Vitally important to maintain a deep tip-apex point to further reduce the risk of cut-out.
   (a) Reamer depth dictates X-Bolt final position
   (b) Bone crusher must be inserted fully to tip-apex point

3. **BONE CRUSHER**. Deploy at multiple intervals to compact cancellous bone, creating a 18mm span diamond-shaped starter cavity. No bone is removed, it is compacted radially. It further improves rotational stability by creating a peripheral zone of compacted bone. The X-Bolt expands to a maximum 24mm span.

Part Code

REMOVAL INSTRUCTIONS

XHS-035

1. **SCREWDRIVER.** Reverse X-Bolt expansion with anticlockwise rotation of screwdriver inserted into base of X-Bolt. The X-Bolt is able to crush new bone formed within expanded wings. Remove cortical screws and plate when X-Bolt wings fully retracted.

XSR-300

2. **COUPLING SCREW.** Insert coupling screw rod into X-Bolt, noting anticlockwise threads. Remove X-Bolt.

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XHS-035

1. **BROKEN REMOVAL.** In the rare event of X-Bolt breaking at the wing elbows, continue anticlockwise turns to disengage drive screw from deep parachute fragment.

XSR-300

2. **REMOVE SHAFT OF X-BOLT.** Insert holder coupling screw rod into base of X-Bolt, noting the anticlockwise threads. Remove X-Bolt shaft and drive screw, along with cortical screws and plate, leaving the parachute fragment in-situ.

3. **REMOVE PARACHUTE FRAGMENT WITH FEMORAL HEAD.** Parachute fragment may be left in-situ or removed with femoral head if converting to hemiarthroplasty or total hip replacement.

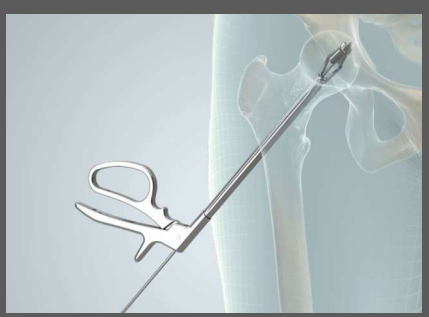
*XNI-038
XNI-037

4. **PARACHUTE GRASPER.** If necessary to remove parachute fragment, insert threaded grasper guidewire into parachute fragment. Slide parachute grasper over guidewire, under fluoroscopy, and flatten parachute wings. The parachute fragment and guidewire are removed together by manually pulling backwards on the guidewire.

(single packed sterile)*

STANDARD REMOVAL

BROKEN REMOVAL



ORDERING INFORMATION

X-BOLT®
stainless steel
Ø 9.0mm

Code	NHS NPC	Description
XBB-080	FJY7494	80mm X-Bolt
XBB-085	FJY7495	85mm X-Bolt
XBB-090	FJY7496	90mm X-Bolt
XBB-095	FJY7497	95mm X-Bolt
XBB-100	FJY7498	100mm X-Bolt
XBB-105	FJY7499	105mm X-Bolt
XBB-110	FJY7500	110mm X-Bolt
XBB-115	FJY7501	115mm X-Bolt
XBB-120	FJY7502	120mm X-Bolt
XBB-125	FJY7503	125mm X-Bolt

XHS™ Barrel-Plate
stainless steel
135-degree

XBP-1352	FJY7504	2-hole 135° Dynamic Barrel-Plate
XBP-1354	FJY7505	4-hole 135° Dynamic Barrel-Plate
XBP-1355	FJY7506	5-hole 135° Dynamic Barrel-Plate
XBP-1356	FJY7507	6-hole 135° Dynamic Barrel-Plate

X-BOLT® Mini-Plate
stainless steel
125-degree

XMP-125	FJY7509	Mini-Plate, 30mm x Ø5.0mm locking screw, locking screw drill guide

Cortical Screws
stainless steel
Ø 4.5mm, self-tapping

XSS-030	FJY7535	30mm x Ø4.5mm cortical screw, self-tapping
XSS-032	FJY7536	32mm x Ø4.5mm cortical screw, self-tapping
XSS-034	FJY7537	34mm x Ø4.5mm cortical screw, self-tapping
XSS-036	FJY7538	36mm x Ø4.5mm cortical screw, self-tapping
XSS-038	FJY7539	38mm x Ø4.5mm cortical screw, self-tapping
XSS-040	FJY7540	40mm x Ø4.5mm cortical screw, self-tapping
XSS-042	FJY7541	42mm x Ø4.5mm cortical screw, self-tapping
XSS-044	FJY7542	44mm x Ø4.5mm cortical screw, self-tapping
XSS-046	FJY7543	46mm x Ø4.5mm cortical screw, self-tapping
XSS-048	FJY7544	48mm x Ø4.5mm cortical screw, self-tapping

Femoral Head Guidewire

XNI-010	FJY7519	Ø 3.2mm x 385mm threaded guidewire

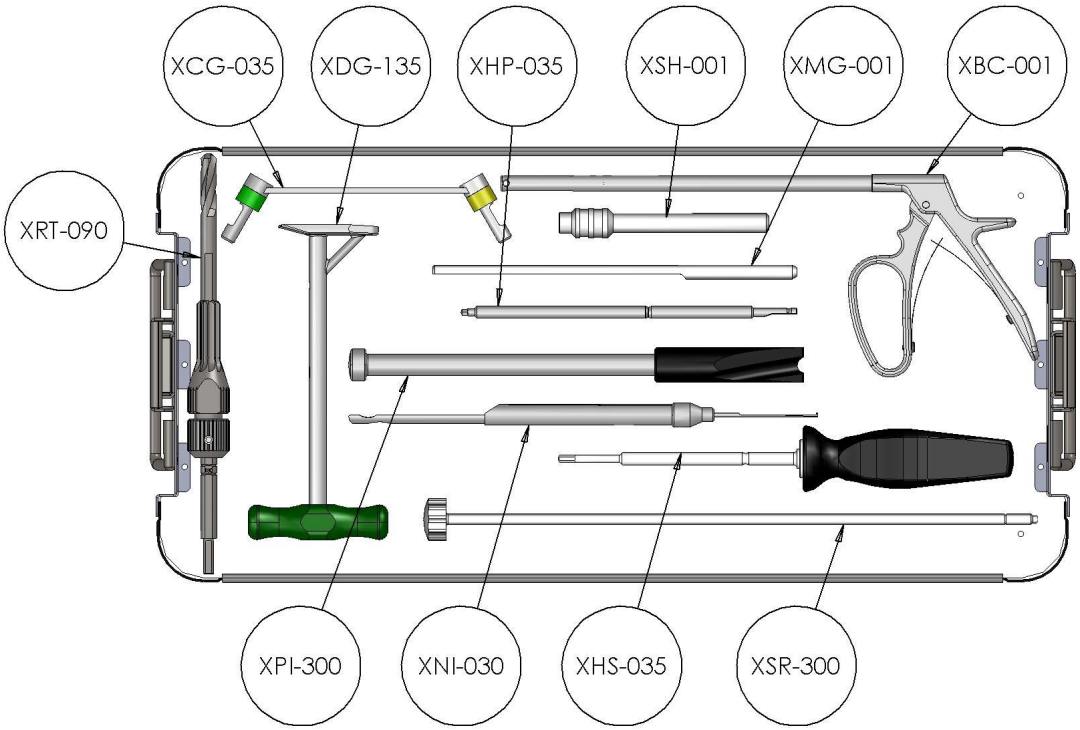
Drill bit for XHS™ cortical screws

XDS-032	FJY7508	Ø 3.2mm x 145mm drill bit, quick connect

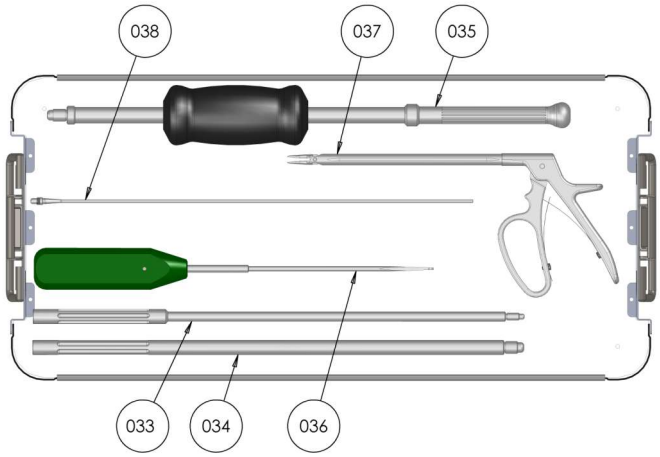
Drill bit for mini-plate locking screw

XNI-029	FJY7521	Ø 4.0mm x 150mm pilot drill bit, quick connect

INSTRUMENTATION (SET P)



Part Code	Description
XRT-090	Triple Reamer
XCG-035	Drill Guide, Green & Gold, Ø 3.2mm
XDG-135	135-degree drill guide
XHP-035	Power driver, 3.5mm-hex, quick coupling
XSH-001	Screw Holding Sleeve
XMG-001	Guidewire Measuring Ruler
XBC-001	Bone Crusher
XPI-300	Plastic Impactor
XNI-030	Depth Gauge for cortical screws
XHS-035	Screwdriver, 3.5mm-hex, 4.5Nm torque limit
XSR-300	Compression Screw Rod



Set Z (Removal Set)

Part Code	Description
XNI-033	X-Bolt extractor shaft
XNI-034	Nail extractor shaft
XNI-035	Slap hammer
XNI-036	Crochet hook removal tool
XNI-037	Parachute grasper
XNI-038	Guidewire for parachute grasper

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