Olecranon Osteotomy Nail.
For simple fractures and osteotomies of the olecranon.
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The Olecranon Osteotomy Nail incorporates several features for fixing olecranon osteotomies. These include:

**Easy, simplified reduction**
- Predrilling and inserting the nail prior to osteotomy allows quick realignment and fixation
- Stable thread connection between nail and end cap for correct alignment of fragments

**Reduced soft tissue irritations**
- Nail buried inside the medullary canal
- Threaded screwheads sit below the surface of the bone

**Stable, anatomical fixation**
- Angled locking screws in two planes provide stability
- The screwheads make contact with the nail to prevent toggling of the implant inside the medullary canal
Olecranon Osteotomy Nail and End Cap

- One size nail and end cap reduces inventory
- Easy procedure allowing excellent visibility
- Excellent stability achieved with angled locking options and end cap
- End cap provides compression across osteotomy or fracture
- Retention feature on the end cap resists loosening

Locking screws

- The threaded head enhances stability in the bone
- Threaded screwhead below the surface of the bone avoids soft tissue irritation
- Screwheads contact the nail to prevent toggling of the implant in the medullary canal, for stable fixation
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation. Those principles, as applied to the Olecranon Osteotomy Nail, are:

**Anatomic reduction**
The Olecranon Osteotomy Nail allows anatomic alignment of the olecranon fragment.

**Stable fixation**
The oblique locking screws prevent the nail from moving within the medullary canal, stabilizing the construct. The end cap inserted through the olecranon fragment and secured to the nail stabilizes the fragment for postoperative healing.

**Preservation of blood supply**
Targeted locking of the nail permits a minimum amount of soft tissue dissection, preserving the blood supply at the elbow. Threaded screwhead below the surface of the bone avoids soft tissue irritation.

**Early, active mobilization**
The Olecranon Osteotomy Nail provides secure fixation which permits controlled, early, active rehabilitation conducive to optimal recovery.

Indications

The Olecranon Osteotomy Nail is indicated to treat simple olecranon fractures and osteotomies of the olecranon.
Patient Positioning

**Position patient**

Place the patient in the lateral decubitus position to accommodate distal humerus surgery. The prone position can also be selected according to the surgeon’s preference and the severity of the patient’s injury.

Rest the arm on a padded bar, allowing elbow flexion of 120°.
**Recommended approach**

Beginning level with the junction of the middle and distal thirds of, and centered on, the humeral shaft, make a straight or curved incision around the olecranon to the radial side. The incision ends over the ulnar diaphysis. An ulnar-based subcutaneous flap is developed.

Determine the site of the osteotomy by incising either the medial capsule, after retracting the ulnar nerve, or the lateral capsule, after elevating part of the anconeus muscle and finding the center of the trochlear notch. Split the triceps tendon longitudinally for nail insertion.

Remember that the nail is to be inserted before the osteotomy.

**Note:** The chevron osteotomy is preferred, to give a better and more stable bony contact during the repair of the olecranon. The larger surface improves bone healing, and the shape improves rotational stability.
Open Proximal Ulna and Ream Canal

1 Open proximal ulna and ream canal

Instruments

<table>
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<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>03.007.006</td>
<td>6 mm Stepped Opening Drill Bit</td>
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<tr>
<td>03.007.007</td>
<td>Opening Drill Sleeve</td>
</tr>
<tr>
<td>03.007.020</td>
<td>2.8 mm Guide Wire</td>
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</table>

**Note:** If using the nail for a simple fracture of the olecranon, reduce the fracture first and then proceed.

Insert the guide wire into the olecranon process, targeting the center of the proximal third of the ulnar medullary canal. Verify that the guide wire is centered in the canal in both AP and lateral views.

Ensure that the guide wire is positioned at least 5 mm from the humeroulnar joint, to prevent the opening drill bit and implant from entering the articular surface.

Place the opening drill sleeve and drill bit over the guide wire and down to the bone. When drilling, an automatic stop will prevent the drill bit from penetrating too far.

Remove the opening drill, drill sleeve and guide wire.

**Note:** Dispose of the guide wire.
Assemble Insertion Instruments

Instruments
03.007.008 Nail Inserter
03.007.009 Aiming Arm
03.007.010 Aiming Arm Pinch Screw
03.007.011 Alignment Tool
03.007.015 5 mm Ball Hex Screwdriver

Attach nail
Thread the proximal end of the nail into the nail inserter. Align the recess in the alignment tool with the flats at the tip of the nail and secure the assembly by tightening the nail in the nail inserter.

Attach aiming arm
Insert the inserter/nail assembly through the aiming arm. Verify the construct alignment by inserting the alignment tool through the center hole in the aiming arm and into the center transverse hole in the nail (Figure 1).

Ensure that the side of the nail with the etched target is aligned toward the aiming arm. The alignment tool should thread into the aiming arm and go smoothly through the targeted hole of the nail.

Note: If the target is not aligned, rotate the nail 180°.

Tighten the aiming arm pinch screw with the 5.0 mm ball hex screwdriver to secure the assembly.

Unthread the alignment tool and double-check the alignment by placing the protection sleeve, drill sleeve, and drill bit through one of the oblique holes in the aiming arm. Ensure that the drill bit passes freely through the hole in the nail.

Figure 1
3 Insert nail

Insert the nail into the medullary canal. Ensure that the aiming arm is oriented posterior to the forearm.

Insert the nail until the hexagonal proximal end of the inserter makes contact with the olecranon process.

Verify appropriate insertion depth radiographically.

Place a scalpel blade (or similar) on the desired location of the osteotomy. A groove on the inserter shows the proximal end of the nail and can be seen radiographically. Ensure that the top of the nail is distal to the desired osteotomy location.

4 Insert stabilization guide wire

Instrument

| 03.007.020 | 2.8 mm Guide Wire |

Once the desired nail position is reached, insert a guide wire through the distal hole of the aiming arm to keep it from shifting while inserting the screws.
Drill and Measure for Screw Length

5

Drill and measure for screw length

Instruments

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<thead>
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<th>Code</th>
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<tr>
<td>03.007.012</td>
<td>8.0 mm/5.5 mm Protection Sleeve</td>
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<tr>
<td>03.007.013</td>
<td>5.5 mm/2.4 mm Drill Sleeve</td>
</tr>
<tr>
<td>03.007.016</td>
<td>Screw Measuring Device</td>
</tr>
<tr>
<td>03.007.024</td>
<td>2.4 mm Drill Bit</td>
</tr>
</tbody>
</table>

Assemble the drill sleeve into the protection sleeve. Insert the assembly through the distal oblique hole in the aiming arm. Make sure that the protection sleeve sits flush with the bone.

Insert the 2.4 mm drill bit through the drill sleeve. Ensure that the drill is running before the drill bit contacts the bone. Stop drilling immediately after penetrating the far cortex. Back up the drill bit so the tip of the drill bit sits inside the far cortex, to obtain proper screw measurement.

Verify drill depth radiographically. Remove the drill leaving the drill bit in the bone to obtain the appropriate screw measurement.

Place the screw measuring device around the drill bit and sleeves and ensure it is pressed down to the aiming arm. Read the measurement from the back of the drill bit. This measurement corresponds to the appropriate length 2.7 mm locking screw.

Remove the drill bit and drill sleeve.
5. Drill and measure for screw length continued

Alternative instrument

| 03.007.025 Depth Gauge for 2.7 mm Screws, for Olecranon Osteotomy Nail |

Remove the drill bit and drill sleeve.

Measure the screw length using the depth gauge. Ensure that the outer sleeve of the depth gauge is in contact with the aiming arm.

Verify position radiographically. Read the measurement at the back of the outer sleeve.
6

Insert proximal locking screw

Instrument

03.007.014  T8 StarDrive Screwdriver with Stop

Select the appropriate length locking screw and insert it with the T8 screwdriver through the protection sleeve.

The screwdriver has a hard stop. Insert the screw until the screwdriver stop bottoms out on the aiming arm. The screw incorporates a threaded head designed to gain purchase in the near cortex.

Note: Once the screwdriver stops on the aiming arm, the screw will continue turning until it threads itself off the screwdriver. This may give the feeling that the screw has stripped. At this point, the head of the screw has just made contact with the nail.

Verify correct screw length and insertion depth radiographically. The screws should not protrude past the far cortex.
7

**Insert distal locking screw**

Insert distal locking screw and locate osteotomy.

**Note:** Inserting two locking screws is necessary to stabilize the nail in the canal.

8

**Locate osteotomy (optional)**

Locate osteotomy (optional) and repeat Steps 5 and 6 through the proximal oblique hole in the aiming arm.

A guide wire can be placed through the osteotomy targeting hole, indicating the ideal location of the distal apex of the chevron osteotomy.

Mark the osteotomy location and remove the guide wire.
Alternate technique

The groove on the inserter, when viewed under fluoroscopy, can be used to locate the top of the nail. Make a mark 5 mm above the groove to indicate the location of the apex of the chevron osteotomy.

If locating the groove is difficult, remove the aiming arm and inserter and locate the top of the nail under fluoroscopy.
9

Remove insertion instrument

**Instruments**

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<tr>
<td>03.007.015</td>
<td>5 mm Ball Hex Screwdriver</td>
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<td>321.17</td>
<td>4.5 mm Pin Wrench</td>
</tr>
<tr>
<td>321.20</td>
<td>Ratchet Wrench, 11 mm</td>
</tr>
</tbody>
</table>

Remove the stabilization guide wire.

Loosen the aiming arm pinch screw with the 5 mm ball hex screwdriver or 11 mm ratchet wrench.

Unthread the nail inserter from the nail by hand or by using the 5 mm ball hex screwdriver, pin wrench, or 11 mm ratchet wrench. Remove the assembly.
Create osteotomy

Create a chevron osteotomy of the olecranon with a distal apex, proximal to the threaded tip of the nail.

Note: For detailed osteotomy technique, refer to next page.
Detailed Osteotomy Technique

**Saw**
Use a fine oscillating saw to divide only up to three-quarters of the depth of the bone.

**Chisel**
Use a chisel on the last part of the bone, but only just short of the subchondral bone. The central ridge of the olecranon, which is very strong, will need to be divided deeper, using a very narrow-bladed chisel.
Insert End Cap and Restore Alignment

11

Insert end cap and restore alignment

Instruments

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<tr>
<th>Item Code</th>
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<td>5 mm Ball Hex Screwdriver</td>
</tr>
<tr>
<td>03.007.017</td>
<td>Hollow Reamer</td>
</tr>
</tbody>
</table>

To complete fixation of the osteotomy or fracture, insert the end cap through the opening created in the olecranon during Step 1.

Align the distal end of the end cap with the proximal end of the nail. Manually perform anatomic reduction of the olecranon fragment to the ulna.

Insert the hex screwdriver into the head of the end cap and thread the end cap into the nail. Tighten until anatomic reduction of the olecranon fragment is obtained. Remove the hex screwdriver.

Notes: Some resistance may be felt while inserting the end cap, due to the retention feature on the end cap engaging the nail. This does not indicate that the olecranon has been fully reduced. Visual confirmation of fracture reduction is necessary.

Resistance may also be felt if small bone chips are in the canal. If needed, use the hollow reamer to clear the canal of any debris.

To prevent damage to the retention feature, the end cap should be treated as a single-use item. If removed intraoperatively, the end cap should be replaced with a new one.
1

Remove end cap and insert extraction device

Instruments

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<td>Nail Inserter</td>
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<tr>
<td>03.007.014</td>
<td>T8 StarDrive Screwdriver with Stop</td>
</tr>
<tr>
<td>03.007.015</td>
<td>5 mm Ball Hex Screwdriver</td>
</tr>
<tr>
<td>03.007.017</td>
<td>Hollow Reamer</td>
</tr>
<tr>
<td>03.007.019</td>
<td>Nail Removal Alignment Drill</td>
</tr>
</tbody>
</table>

Use the hex screwdriver to remove the end cap. If bone has grown over the exposed threads of the nail, attach the hollow reamer to a drill and insert it over the nail. Run the drill counterclockwise to clear the bone.

Thread the inserter onto the nail.
2
Remove locking screws and nail

Remove the locking screws using the T8 StarDrive screwdriver. Remove the nail.

**Note:** If resistance is met when extracting the nail, bone may have grown into the transverse alignment hole. Use the nail removal alignment drill to drill out bony ingrowth, using freehand technique.

Align the C-arm with the center transverse hole in the nail until a perfect circle is seen. Keeping the drill bit perpendicular to the beam of the C-arm, place the drill bit on the bone so that the tip of the drill bit is in the center of the alignment hole. Raise the drill so that it aligns with the C-arm and drill through the near cortex and the hole in the nail.
2. Remove locking screws and nail continued

**Alternative technique**

**Alternative instruments**

<table>
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<td>Nail Inserter</td>
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<td>8.0 mm/5.5 mm Protection Sleeve</td>
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<tr>
<td>03.007.015</td>
<td>5 mm Ball Hex Screwdriver</td>
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<tr>
<td>03.007.018</td>
<td>Conical Extraction Screw</td>
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<td>03.007.019</td>
<td>Nail Removal Alignment Drill</td>
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<td>03.007.021</td>
<td>T8 StarDrive Shaft, quick coupling</td>
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<td>03.010.104</td>
<td>4.2 mm Three-Fluted Drill Bit, quick coupling, 145 mm</td>
</tr>
<tr>
<td>311.44</td>
<td>T-Handle, with quick coupling</td>
</tr>
</tbody>
</table>

If finding the screws is difficult due to bony overgrowth, use the nail removal alignment drill freehand technique to drill through the transverse alignment hole. Leave the drill bit in place and remove the drill.

Place the aiming arm over the body of the alignment drill through the aiming arm alignment hole. Thread the inserter onto the top of the nail through the slotted hole in the aiming arm until it stops. Tighten the aiming arm pinch nut using the 5 mm ball hex screwdriver.

Place the 4.2 mm three-fluted drill bit through the protection sleeve and through the aiming arm, to find and clear the bone from the top of the screw.

Use the T8 StarDrive screwdriver shaft and quick coupling T-handle to remove the screws. Alternatively, use the conical extraction screw with the quick coupling T-handle to remove the screws.
Implant Specifications

Olecranon Osteotomy Nail
- 6 mm nail diameter (single size)
- 63 mm nail length
- 86 mm–90 mm overall construct length (including end cap)
- Universal right and left design
- Threaded proximal end for end cap fixation

Olecranon Osteotomy End Cap
- 6 mm end cap diameter
- 11 mm proximal head diameter
- 40 mm end cap length
- 86 mm–90 mm overall construct length (including nail)

Material
- 316L stainless steel

Locking Screws
- Locking screws targeted through the aiming arm
- 2.7 mm fully threaded stepped screws
- 2 locking screws angled 45° to axis of nail in ML view
- Locking screws angled 90° to one another in ML view
Instruments

<table>
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<tr>
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<td>03.007.010</td>
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<td>T8 StarDrive Screwdriver with Stop</td>
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<td>5 mm Ball Hex Screwdriver</td>
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<td>03.007.016</td>
<td>Screw Measuring Device</td>
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<td>03.007.017</td>
<td>Hollow Reamer, large quick coupling</td>
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<tr>
<td>03.007.018</td>
<td>Conical Extraction Screw, small, quick coupling</td>
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<td>03.010.104</td>
<td>4.2 mm Three-Fluted Drill Bit, quick coupling</td>
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<tr>
<td>309.039</td>
<td>Extraction Bolt, for 3.5 mm and 4.0 mm screws</td>
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<tr>
<td>309.069</td>
<td>Extraction Bolt, for 6.5 mm and 7.0 mm screws</td>
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<td>Screw Forceps</td>
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<td>321.17</td>
<td>4.5 mm Pin Wrench</td>
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<td>Ratchet Wrench, 11 mm width across flats</td>
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<tr>
<td>360.03</td>
<td>8.0 mm Cannulated Drill Bit</td>
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Olecranon Osteotomy Nail Set (01.007.002)

Graphic Case
60.007.002 Graphic Case, for Olecranon Osteotomy Nailing System

Instruments
03.007.006 6 mm Stepped Opening Drill Bit
03.007.007 Opening Drill Sleeve
03.007.008 Nail Inserter
03.007.009 Aiming Arm
03.007.010 Aiming Arm Pinch Screw, 2 ea.
03.007.011 Alignment Tool
03.007.012 8.0 mm/5.5 mm Protection Sleeve
03.007.013 5.5 mm/2.4 mm Drill Sleeve
03.007.014 T8 StarDrive Screwdriver with Stop
03.007.015 5 mm Ball Hex Screwdriver
03.007.016 Screw Measuring Device
03.007.017 Hollow Reamer, large, quick coupling
03.007.018 Conical Extraction Screw, small, quick coupling
03.007.019 Nail Removal Alignment Drill
03.007.020 2.8 mm Guide Wire, 180 mm length, 5 ea.
03.007.021 T8 StarDrive Screwdriver Shaft, small, quick coupling
03.007.024 2.4 mm Drill Bit, quick coupling, 2 ea.
03.007.025 Depth Gauge for 2.7 mm Screws, for Olecranon Osteotomy Nail
03.010.104 4.2 mm Three-Fluted Drill Bit, quick coupling
309.039 Extraction Bolt for 3.5 mm and 4.0 mm screws
309.069 Extraction Bolt for 6.5 mm and 7.0 mm screws
311.44 T-Handle, with quick coupling
319.97 Screw Forceps
321.17 4.5 mm Pin Wrench
321.20 Ratchet Wrench, 11 mm width across flats
360.03 8.0 mm Cannulated Drill Bit

Note: For additional information, please refer to package insert.
For detailed cleaning and sterilization instructions, please refer to http://us.synthes.com/Medical+Community/Cleaning+and+Sterilization.htm or to the below listed inserts, which will be included in the shipping container:
- Processing Synthes Reusable Medical Devices—Instruments, Instrument Trays and Graphic Cases—DJ1305
- Processing Non-sterile Synthes Implants—DJ1304
Implants
02.007.000S Olecranon Osteotomy Nail and End Cap, sterile, 2 ea.

2.7 mm Threaded Stepped Screws, sterile, 3 ea.

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Also Available

Instrument
532.041S— Saw Blades for Small Battery Drive, 0.4 mm thick
532.048S

Implants
02.007.001 Olecranon Osteotomy Nail
02.007.002 Olecranon Osteotomy End Cap