Instruments and implants approved by the AO Foundation.
This publication is not intended for distribution in the USA.
Warnings
These devices can break during use (when subjected to excessive forces or outside the recommended surgical technique). While the surgeon must make the final decision on removal of the broken part based on associated risk in doing so, we recommend that whenever possible and practical for the individual patient, the broken part should be removed.

Medical devices containing stainless steel may elicit an allergic reaction in patients with hypersensitivity to nickel.

This description alone does not provide sufficient background for direct use of the product. Instruction by a surgeon experienced in handling this product is recommended.

Processing/reprocessing of the device
Detailed instructions for processing implants and reprocessing reusable devices, instrument trays and cases are described in the DePuy Synthes brochure “Important Information”. Assembly and disassembly instructions of instruments “Dismantling multipart instruments” can be downloaded from http://emea.depuy.synthes.com/hcp/reprocessing-care-maintenance
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INTENDED USE AND INDICATIONS

INTENDED USE

The Subcondylar/Ramus Fixation Set [115.680] includes specialized instrumentation designed to support the endoscopic treatment of trauma and orthognathic surgery involving the subcondylar/ramus region of the mandible.

INDICATIONS

Subcondylar Fracture Management

- Endoscopic or open treatment of a noncomminuted subcondylar fracture of the mandible with plate and screw fixation in which a minimum of two screws can be placed through a plate into the proximal fracture fragment.
- Reduction of dislocated fracture fragment.

Orthognathic Surgery

- Endoscopic or open orthognathic procedures involving the ramus and condylar region of the mandible such as:
  - vertical ramus osteotomy with rigid fixation
  - condylectomy
  - condylotomy

This technique guide addresses the endoscopic intraoral and submandibular approaches to subcondylar fractures only.
AO PRINCIPLES, GENERAL ADVERSE EVENTS

AO PRINCIPLES

Anatomic Reduction
Specialized instrumentation assists in the exposure and reduction of the fracture or osteotomy.

Atraumatic Surgical Technique
Endoscopic approach reduces required dissection. Less disturbance of the soft tissue promotes rapid healing and return to function.

Stable Internal Fixation
Plate and screws provide stability for both the subcondylar fracture and ramus osteotomy.

Early, Active, Pain-Free Mobilization
Stable fixation eliminates traditional, long-term maxillo-mandibular fixation (MMF) permitting an early return to function.
GENERAL ADVERSE EVENTS

As with all major surgical procedures, risks, side effects and adverse events can occur. While many possible reactions may occur, some of the most common include:

Problems resulting from anesthesia and patient positioning (e.g. nausea, vomiting, neurological impairments, etc.), thrombosis, embolism, infection or injury of other critical structures including blood vessels, excessive bleeding, damage to soft tissues incl. swelling, abnormal scar formation, functional impairment of the musculo-skeletal system, pain, discomfort or abnormal sensation due to the presence of the device, allergy or hyperreactions, side effects associated with hardware prominence, loosening, bending, or breakage of the device, mal-union, non-union or delayed union which may lead to breakage of the implant, reoperation.

Device Specific Adverse Events
Device specific adverse events include but are not limited to: Screw Loosening/pull out, Plate breakage, Explantation, Pain, Seroma, Hematoma, Infection.
## INSTRUMENTS IN THE SUBCONDYLAR/ARAMUS FIXATION SET

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>398.415</td>
<td>Retractor, straight, double-ended, length 240 mm, for soft tissue dissection</td>
<td><img src="image1.jpg" alt="Image" /></td>
</tr>
<tr>
<td>U44-48220</td>
<td>Retractor, curved, double-ended, length 200 mm, size 1, for soft tissue dissection and fracture reduction</td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
<tr>
<td>386.906</td>
<td>Freer Suction Elevator, with Cleaning Stylet Ø 1.8 mm</td>
<td><img src="image3.jpg" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>For soft tissue dissection and removal of fluid for improved visualization.</td>
<td></td>
</tr>
<tr>
<td>386.915</td>
<td>Handle for Optical Retractor</td>
<td><img src="image4.jpg" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>Retracts soft tissue to provide optical cavity while securing endoscope in desired position. Use with interchangeable retractor blades.</td>
<td></td>
</tr>
<tr>
<td>386.917</td>
<td>Insert for Optical Retractor, width 12 mm</td>
<td><img src="image5.jpg" alt="Image" /></td>
</tr>
<tr>
<td>386.918</td>
<td>Insert for Optical Retractor, width 17 mm</td>
<td><img src="image6.jpg" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>Used with Optical Retractor Handle for retraction of soft tissue and maintaining optical cavity. Opening in 17 mm blade allows passage of 2.0 mm Cannula and Obturator.</td>
<td></td>
</tr>
<tr>
<td>321.170</td>
<td>Pin Wrench Ø 4.5 mm, length 120 mm</td>
<td><img src="image7.jpg" alt="Image" /></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>386.914</td>
<td>Drill Sleeve 2.0 with Trocar, with thread, length 72 mm&lt;br&gt;Provides portal for drilling and placing screws. Accepts threaded cheek retractor ring for retraction of soft tissue.</td>
<td></td>
</tr>
<tr>
<td>397.211</td>
<td>Universal Handle for Drill Sleeves&lt;br&gt;Aids insertion and positioning of 2.0 mm Cannula and Obturator.</td>
<td></td>
</tr>
<tr>
<td>386.908</td>
<td>Cheek Retractor Ring with thread, for No. 386.914&lt;br&gt;Optional instrument for retraction of soft tissue. Used with the 2.0 mm threaded cannula.</td>
<td></td>
</tr>
<tr>
<td>386.912</td>
<td>Reduction Forceps for Fragments, with Points, narrow, ratchet lock, length 210 mm&lt;br&gt;Reduces fracture fragments. Aids assembly of Cheek Retractor Ring to 2.0 mm threaded cannula.</td>
<td></td>
</tr>
<tr>
<td>386.910</td>
<td>Subcondylar Elevator, right angled&lt;br&gt;Subcondylar Elevator, left angled&lt;br&gt;Supports and manipulates fracture fragments to achieve fracture reduction.</td>
<td></td>
</tr>
</tbody>
</table>
386.904  Drill Sleeve 2.0 with Trocar, self-holding, length 62 mm
Provides portal for drilling and placing screws.

386.902  Manipulation Screw Ø 1.9 mm, self-drilling, length 80 mm
Aids fracture reduction and temporary plate fixation.

311.013  Handle, large, with mini quick coupling
Used for inserting the Manipulation Screw Ø 1.9 mm, self-drilling, length 80 mm and with screwdriver blades.

386.903  Handle for Manipulation Screw No. 386.902
Used with the Manipulation Screw Ø 1.9 mm, self-drilling, length 80 mm to aid in fracture reduction.

386.901  Tip for Plate Holder No. 386.900

386.900  Plate Holder, adjustable, complete
Aids in plate insertion and alignment.
### Instruments in the Subcondylar/Ramus Fixation Set

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>314.442</td>
<td>Screwdriver Shaft 1.5/2.0, cruciform, self-holding, length 92 mm</td>
<td>For screw insertion and to secure the plate to the Plate Holding Tip of the Articulating Plate Introducer.</td>
</tr>
<tr>
<td>316.520</td>
<td>Drill Bit Ø 1.5 mm, length 125 mm, 2-flute, for J-Latch Coupling</td>
<td>Creates hole for insertion of 2.0 mm screws.</td>
</tr>
<tr>
<td>386.913</td>
<td>Drill Sleeve 1.5, length 67 mm</td>
<td>Provides portal for predrilling for screws.</td>
</tr>
<tr>
<td>386.905</td>
<td>Hook, blunt, angled, Ø 1.5 mm</td>
<td>Assists in plate positioning and fracture reduction.</td>
</tr>
<tr>
<td>386.920</td>
<td>Retractor, length 60 mm, width 8 mm</td>
<td>Assists with retraction of soft tissue when creating a limited temporary optical cavity.</td>
</tr>
<tr>
<td>347.980</td>
<td>Holding Forceps for Plates</td>
<td>Assists with handling of plates and screws.</td>
</tr>
</tbody>
</table>
INTRAORAL LESS INVASIVE APPROACH – SUBCONDYLAR FRACTURE REPAIR

PREPARATION

1 Identify and mark landmarks

Prior to patient intubation, identify and mark the following relevant anatomic landmarks of the mandible and outline the fracture site or planned osteotomy:
• Midline
• Inferior border
• Sigmoid notch
• Angle
• Posterior border
• Temporomandibular joint
• Zygomatic arch
• Anterior border
• Superior border of the body

2 Position video monitor for endoscope

The top and both sides of the patient’s head must be accessible to the surgeon and assistant. Position the video monitor for the endoscope at the head of the operating table towards the patient’s contralateral shoulder. The surgeon should stand on the ipsilateral side and the assistant on the contralateral side of the incision site.

Credit: Reid Mueller, MD
3
Place patient in MMF

Place the patient in temporary MMF with elastic traction

**Precaution:** Address other fractures, if present, prior to subcondylar fracture fixation.
Intraoral

FRACTURE EXPOSURE AND CREATION OF OPTICAL CAVITY

1

Expose fracture

Expose the fracture through a 2 cm intraoral incision, along the anterior border of the ascending ramus, carried down to the periosteum.

Credit: Reid Mueller, MD

2

Create optical cavity

Create an optical cavity for visualization by elevating the soft tissue in a subperiosteal plane from the entire lateral ramus of the mandible and the posterior border. Using the Retractor, straight, double-ended, length 240 mm [398.415] or Retractor, curved, double-ended, length 200 mm, size 1 [U44-48220] create a wide subperiosteal dissection to provide a large optical cavity for improved visualization.
3  
**Insert endoscope**

Retract the soft tissue and insert the endoscope, with matching irrigating sheath, into the optical cavity. Lighted telescopes, of 2.7 mm through 4.0 mm diameter and with 30° or 45° angles, are commonly used for this application.

4  
**Carry dissection proximally**

Carry the periosteal dissection proximally using the double-ended elevators or the Freer Suction Elevator [386.906] to maximize visualization and access. Continue dissection along the posterior border and over the lateral surface of the proximal fragment after it is identified.

**Note:** Fit a suction tube onto the back end of the Freer Suction Elevator and activate suction by placing a finger over the port.
5

Assemble the optical retractor

Insert the endoscope with sheath into the assembled optical retractor.

**Note:** The optical retractor assembly consists of two parts, the Handle for Optical Retractor [386.915] which accepts a lighted endoscope with sheath (2.7 mm–4.0 mm), and a Insert for Optical Retractor, available in two widths, 12 mm [386.917] and 17 mm [386.918]. The 17 mm blade is typically used for the intraoral approach.

To assemble the retractor, first place the appropriate Retractor Blade into the coupling nut on the Optical Retractor Handle and secure by finger tightening the nut (Fig. 5A). Then insert the endoscope with sheath into the securing clamp on the Optical Retractor Handle (Fig. 5B). Position the endoscope so that the preferred view is obtained. Secure by turning the knob (Fig. 5C). Attach the optional handle extension to the Optical Retractor Handle for alternate holding positions (Fig. 5D).

**Precaution:** To prevent damage to the endoscope, the appropriate sheath must be used.
6

Place optical retractor assembly

Insert the optical retractor assembly with endoscope into the optical cavity and place the hooked tip around the posterior border.

Complete dissection of the proximal fragment as necessary for plate placement. Support of the retractor and endoscope can be transferred to an assistant.

**Precaution:** Sufficient periosteum must be elevated from the posterior border of the ramus to allow placement of the optical retractor.
Optional Technique:
The Cheek Retractor Ring with thread, for No. 386.914 [386.908] when assembled to the Drill Sleeve 2.0 with Trocar [386.914] may be used as an alternative to the optical retractor assembly. The cannula will also provide a transbuccal portal for drilling and passage of 2.0 mm screws.

Insert Drill Sleeve 2.0 with Trocar [386.914] into the Universal Handle for Drill Sleeves [397.211].

Make a cutaneous puncture for the trocar placement at a point perpendicular to, and directly over, the subcondylar fracture line. A curved clamp may be inserted into the intraoral incision and the cheek pushed out over the fracture to identify the correct placement of the trocar stab incision.

Precaution: The patient should not be paralyzed during insertion of the trocar so stimulation to the facial nerve can be identified and the trocar redirected if necessary. Initial spreading dissection with a clamp prior to trocar insertion is helpful.

Insert the cannula and obturator through the stab incision and press down to the bone.

Thread the Cheek Retractor Ring [386.908] onto the Drill Sleeve 2.0 with Trocar [386.914] using the Reduction Forceps for Fragments [386.912]. Rotate the cannula head clockwise to engage the ring on the threads of the cannula.
Fracture reduction is often the most challenging part of the surgical procedure. Musculoskeletal forces typically drive the ramus superiorly resulting in proximal fragment override. Distracting the mandible inferiorly can significantly aid in reduction. Transverse fractures so reduced may provide sufficient interfragmentary friction to maintain reduction during plating.

1  
**Distract the mandible**

Distract the mandible if necessary. This may be accomplished by placing the straight elevator between the patient’s molars and rotating it. Distraction may also be achieved by using the Reduction Forceps for Fragments [386.912] to grasp the angle and distract as needed. Release MMF elastics if necessary but reapply after reduction.
2
Reduce the fracture

Option 1
Reduce the laterally displaced proximal fragment by manipulating it medially. Use the obturator tip, Freer elevators or Fragment Manipulating Forceps to aid reduction.

Option 2
Use the Subcondylar Elevator, right angled [386.910] or left angled [386.911] to laterally reduce a medially displaced fragment.
**Option 3**

Reduction can also be achieved using the Manipulation Screw Ø 1.9 mm [386.902] and Handle for Manipulation Screw No. 386.902 [386.903].

First insert the Drill Sleeve 2.0 with Trocar, self-holding [386.904] through a trocar incision at a suitable location, superior to the fracture line, where the top plate hole will be located. Remove the obturator and insert the Manipulation Screw Ø 1.9 mm through this 2.0 mm cannula.

**Precaution:** The patient should not be paralyzed during insertion of the trocar so stimulation to the facial nerve can be identified and the trocar redirected if necessary. Initial spreading dissection with a clamp prior to trocar insertion is helpful.

The Manipulation Screw Ø 1.9 mm is self-drilling and must be fully inserted into the proximal fragment using the Handle, large, with mini quick coupling [311.013].

**Precaution:** This device should be used only in healthy bone, in an area with adequate bone stock to prevent splitting the bony margins.

Prior to manipulation of the bone, replace the screwdriver handle with the lightweight Fragment Manipulator Handle for manipulation and reduction of the proximal fragment.

**Precaution:** If the screwdriver handle is not replaced, loss of reduction and bending of the Manipulation Screw Ø 1.9 mm may occur.

Gently manipulate the fracture fragment until reduction is achieved.

**Note:** See Step 3, page 22, for use of the Manipulation Screw Ø 1.9 mm in conjunction with a plate.
Stable fracture fixation may be achieved using a 2.0 mm Dynamic Compression Plate affixed with a minimum of two screws, but preferably three screws, on either side of the fracture.

1 Load plate onto Articulating Plate Introducer

Load the desired 2.0 mm plate onto the flexible Plate Holding Tip of the Articulating Plate Introducer [386.900] by first ensuring that the “U” (unlocked position) on the retention fastener is aligned with the arrow on the Plate Holding Tip. The Screwdriver Shaft 1.5/2.0, cruciform, self-holding [314.442] and Handle, large, with mini quick coupling [311.013], may be used to achieve alignment if necessary.

Turn the Plate Holding Tip so the cruciform retention fastener faces downward. Turn the selected Dynamic Compression Plate over to view the underside of the plate (the beveled edges of the DCP® holes are not visible). Assemble the plate to the Plate Holding Tip by placing an end hole over the post on the back of the Plate Holding Tip and pressing it into place.

Turn the plate and holder over so that the retention fastener faces up. Secure the plate to the Plate Holding Tip using the cruciform screwdriver blade. Turn the retention fastener clockwise ¼ turn, so the arrow points to the “L” (locked) position.

Turn retention fastener ¼ turn clockwise to lock plate into place.
The plate may now be angulated left or right, as needed, by sliding the two-part grooved handle of the Articulating Plate Introducer between the thumb and forefinger.
Position and contour the plate

Insert the Articulating Plate Introducer (with plate attached) through the intraoral incision and angulate the plate in the desired orientation. Position the plate along the posterior border of the mandible, allowing for a minimum of two screws to be placed on either side of the fracture. Three screws on either side of the fracture are optimal.

Once the plate is in the proper position over the fracture, evaluate any need for contouring. Remove the introducer and plate and contour the plate as needed to match the anatomy. Reinsert the plate and confirm that the contouring and the reduction are adequate.

The Hook, blunt, angled [386.905] may also be used to assist in positioning the plate.
3

Temporarily fix the plate using the Manipulation Screw ∅ 1.9 mm [386.902]

When the Manipulation Screw ∅ 1.9 mm is used for temporary plate fixation, it must be inserted into the proximal fragment using the Handle, large, with mini quick coupling [311.013].

Insert the Manipulation Screw ∅ 1.9 mm through the cannula into the most superior plate hole and thread into the bone. The Manipulation Screw ∅ 1.9 mm must be fully inserted against the plate before manipulation of the fragment.

Precaution: This device should only be used in healthy bone with adequate bone stock to prevent splitting the bony margins.

Replace the screwdriver handle with the Handle for Manipulation Screw No. 386.902 [386.903] prior to manipulating fragment.
4

**Drill first screw hole and place screw**

Place the Drill Sleeve 1.5 [386.913] through the Drill Sleeve 2.0 with Trocar [386.914] and position the tip into the plate hole just distal to the fracture. Drill with the Drill Bit $\Theta 1.5$ mm [316.520]. Remove the drill guide and insert the appropriate length 2.0 mm screw.

**Note:** Low-profile, right-angled drills can be used in this application.
5

Drill and insert remaining screws

Insert the next screw into the plate hole just proximal to the fracture. Insert screws into all remaining visible plate holes. The sequence in Figure 1 is recommended.
6
Remove the Articulating Plate Introducer

Remove the Articulating Plate Introducer from the plate by turning the retention fastener a \( \frac{1}{4} \) turn counterclockwise to the “U” (unlocked position).
Drill and insert screw

Drill for the remaining distal hole and insert the appropriate length 2.0 mm screw.
8

Remove Manipulation Screw Ø 1.9 mm [386.902] and insert screw

Remove the Manipulation Screw Ø 1.9 mm [386.902] and insert the appropriate length 2.4 mm emergency screw through the 2.0 mm cannula and into the hole created by the Manipulation Screw Ø 1.9 mm.

Precaution: The Manipulation Screw Ø 1.9 mm [386.902] is single use only and should be discarded after use.
9
Confirm reduction

Confirm proper reduction and inspect the anterior and posterior borders of the fracture through the endoscope.
SUBMANDIBULAR LESS INVASIVE APPROACH – SUBCONDYLAR FRACTURE REPAIR

PREPARATION

1 Identify and mark landmarks

Prior to patient intubation, identify and mark the following relevant anatomic landmarks of the mandible and outline the fracture site or planned osteotomy:

- Midline
- Inferior border
- Antigonal notch
- Angle
- Posterior border
- Temporomandibular joint
- Zygomatic arch
- Anterior border
- Superior border of the body
- Sigmoid notch

2 Mark incision site

Draw a line from the sigmoid notch, parallel to the posterior border, extending to the submandibular area, and mark a 1.5 cm incision parallel to the neck skin crease located at the angle of the mandible.

Precaution: It is important that the incision be at the mandible angle, to allow an endoscope to fit in the wound parallel to the anterior/posterior borders of the vertical ramus.
3

Position video monitor for endoscope

The top and both sides of the patient’s head must be accessible to the surgeon and assistant. Position the video monitor for the endoscope at the head of the operating table towards the patient’s contralateral shoulder. The surgeon should stand on the ipsilateral side and the assistant on the contralateral side of the incision site.

4

Place patient in MMF

Place patient in temporary MMF with wire or elastic traction.

Precaution: Address other fractures, if present, prior to subcondylar fracture fixation.
Submandibular
EXPOSURE AND CREATION OF THE OPTICAL CAVITY

1
Make a 1.5 cm submandibular incision

Make a 1.5 cm submandibular incision, 1.5 cm to 2.0 cm below the mandible angle, to avoid the marginal mandibular branch of the facial nerve.

2
Dissect through the fascia

Spread the tissue with a curved hemostat down to the platysmal layer. Using Senn retractors, stretch the incision both vertically and horizontally. With the retractors parallel to the wound and facial nerve, dissect through the fascia down to the masseter muscle plane.
3

**Extend the dissection to the bone**

Extend the dissection down to the bone, and then superiorly in a subperiosteal plane. To increase the optical cavity and visualization, complete the dissection over the lateral surface of the proximal fragment after it is identified.

**Note:** Use the Retractor, curved, double-ended [U44-48220] and Retractor, straight, double-ended [398.415] or Freer Suction Elevator [386.906] to maximize visualization and access. Fit a suction tube onto the back end of the Freer Suction Elevator and activate suction by placing a finger over the port.
4
Create optical cavity

Insert the Retractor, length 60 mm, width 8 mm [386.920] or Optical Retractor Handle with the appropriate retractor blade to obtain a limited temporary optical cavity.

5
Insert endoscope

Retract the soft tissue and insert the endoscope, with matching irrigating sheath, into the optical cavity. Lighted telescopes, of 2.7 mm through 4.0 mm diameter and with 30° or 45° angles, are commonly used for this application.
6

Carry dissection proximally

Carry the periosteal dissection proximally, using the
double-ended elevators or the Freer Suction Elevator
[386.906] to maximize visualization and access. Continue
dissection along the posterior border and over the lateral
surface of the proximal fragment after it is identified.

Note: Fit a suction tube onto the back end of the
Freer Suction Elevator and activate suction by
placing a finger over the port.
Assemble the optical retractor

Insert the endoscope with sheath into the assembled optical retractor.

Note: The optical retractor assembly consists of two parts, the Handle for Optical Retractor [386.915] which accepts a lighted endoscope with sheath (2.7 mm—4.0 mm), and an Insert for Optical Retractor, available in two widths, 12 mm [386.917] and 17 mm [386.918]. The 12 mm blade is typically used for the submandibular approach, requiring a smaller extraoral incision.

To assemble the retractor, first place the appropriate Retractor Blade into the coupling nut on the Optical Retractor Handle and secure by finger tightening the nut (Fig. 5A). Then insert the endoscope with sheath into the securing clamp on the Optical Retractor Handle (Fig. 5B). Position the endoscope so that the preferred view is obtained. Secure by turning the knob (Fig. 5C).

Attach the optional handle extension to the Optical Retractor Handle for alternate holding positions (Fig. 5D).

Precaution: To prevent damage to the endoscope, the appropriate sheath must be used.
8

Place the optical retractor assembly

Insert the hooked tip of the optical retractor assembly with endoscope into the sigmoid notch. Adjust the position of the scope for the best visualization.

Complete dissection of the proximal fragment as necessary for plate placement. Support of the retractor and endoscope can be transferred to an assistant.

Precaution: Sufficient periosteum must be elevated from the sigmoid notch to allow placement of the optical retractor.
Optional Technique:

The Cheek Retractor Ring with thread, for No. 386.914 [386.908] when assembled to the 2.0 mm Threaded Cannula may be used as an alternative to the optical retractor assembly. The cannula will also provide a trans-buccal portal for drilling and passage of 2.0 mm screws.

Insert the Drill Sleeve 2.0 with Trocar [386.914] into the Universal Handle for Drill Sleeves [397.211].

Make a cutaneous puncture for the trocar placement at a point perpendicular to and directly over the subcondylar fracture line. A curved clamp may be inserted into the submandibular incision and the cheek pushed out over the fracture to identify the correct placement of the trocar stab incision.

**Precaution:** The patient should not be paralyzed during insertion of the trocar so stimulation to the facial nerve can be identified and the trocar redirected if necessary. Initial spreading dissection with a clamp prior to trocar insertion is helpful.

Insert the cannula and obturator through the stab incision and press down to the bone.

Thread the Cheek Retractor Ring [386.908] onto the Drill Sleeve 2.0 with Trocar [386.914] using the Reduction Forceps for Fragments [386.912]. Rotate the cannula head clockwise to engage the ring on the threads of the cannula.
Fracture reduction is often the most challenging part of the surgical procedure. Musculoskeletal forces typically drive the ramus superiorly resulting in proximal fragment override. Distracting the mandible inferiorly can significantly aid in reduction. Transverse fractures so reduced may provide sufficient interfragmentary friction to maintain reduction during plating.

1

**Distract the mandible**

Distract the mandible, if necessary. This may be accomplished by placing a straight elevator between the patient’s molars and rotating it. Distraction may also be achieved through the submandibular portal, using the Reduction Forceps for Fragments [386.912] to grasp the angle and distract as needed. Release MMF elastic if necessary but reapply after reduction.
Note: Distraction can also be achieved by passing wire through a predrilled hole at the angle, twisting the free ends, and pulling inferiorly. This reduces the number of instruments through the incision.

Credit: Reid Mueller, MD
2
Reduce the fracture

Option 1
Reduce the laterally displaced proximal fragment by manipulating it medially. Use the obturator tip, Freer elevators, or Fragment Manipulating Forceps to aid reduction.
Option 2

Use the Subcondylar Elevator, right angled [386.910] or left angled [386.911] to laterally reduce a medially displaced fragment.

Option 3

Reduction can also be achieved by using the Manipulation Screw Ø 1.9 mm [386.902] with the Handle for Manipulation Screw No. 386.902 [386.903].

First insert the Drill Sleeve 2.0 with Trocar, self-holding [386.904] through a trocar incision at a suitable location superior to the fracture line, where the top plate hole will be located. Remove the obturator and insert the Manipulation Screw Ø 1.9 mm through the self-retaining 2.0 mm Cannula.

Precaution: The patient should not be paralyzed during insertion of the trocar so stimulation to the facial nerve can be identified and the trocar redirected if necessary. Initial spreading dissection with a clamp prior to trocar insertion is helpful.
The Manipulation Screw Ø 1.9 mm [386.902] is selfdrilling and must be fully inserted into the proximal fragment using the Handle, large, with mini quick coupling [311.013].

**Precaution:** This device should be used only in healthy bone in an area with adequate bone stock to prevent splitting the bony margins.

Prior to manipulation of the bone, replace the screwdriver handle with the lightweight Fragment Manipulator Handle for manipulation and reduction of the proximal fragment.

**Precaution:** If the screwdriver handle is not replaced, loss of reduction and bending of the Manipulation Screw Ø 1.9 mm may occur.

Gently manipulate the fracture fragment until reduction is achieved.

**Note:** See Step 3, page 46, for use of the Manipulation Screw Ø 1.9 mm in conjunction with a plate.
Stable fracture fixation may be achieved using a 2.0 mm Dynamic Compression Plate affixed with a minimum of two screws, but preferably three screws, on either side of the fracture.

1
Load plate onto Articulating Plate Introducer

Load the desired 2.0 mm plate onto the flexible Plate Holding Tip of the Articulating Plate Introducer [386.900] by first ensuring that the “U” (unlocked position) on the retention fastener is aligned with the arrow on the Plate Holding Tip. The Screwdriver Shaft 1.5/2.0, cruciform, self-holding [314.442] with the Handle, large, with mini quick coupling [311.013], may be used to achieve alignment if necessary.

Turn the Plate Holding Tip so the cruciform retention fastener faces downward. Turn the selected Dynamic Compression Plate over to view the underside of the plate (the beveled edges of the DCP holes are not visible). Assemble the plate to the Plate Holding Tip by placing an end hole over the post on the back of the Plate Holding Tip and pressing it into place.

Turn the plate and holder over so that the retention fastener faces up. Secure the plate to the Plate Holding Tip, using the cruciform screwdriver blade. Turn the retention fastener clockwise 1/4 turn, so the arrow points to the “L” (locked) position.

Turn retention fastener 1/4 turn clockwise to lock plate into place.
The plate may now be angulated left or right, as needed, by sliding the two-part grooved handle of the Articulating Plate Introducer between the thumb and forefinger.
Position and contour the plate

Insert the Articulating Plate Introducer (with plate attached) through the submandibular incision and angulate the plate in the desired orientation. Position the plate along the posterior border of the mandible, allowing for a minimum of two screws to be placed on either side of the fracture. Three screws on either side of the fracture are optimal.

Once the plate is in the proper position over the fracture, evaluate any need for contouring. Remove the introducer and plate, and contour the plate as needed to match the anatomy. Reinsert the plate and confirm that the contouring and the reduction are adequate.

The Hook, blunt, angled [386.905] may also be used to assist in positioning the plate.
3
Temporarily fix the plate using the Manipulation Screw Ø 1.9 mm [386.902]

When the Manipulation Screw Ø 1.9 mm is used for temporary plate fixation, it must be inserted into the proximal fragment using the screwdriver Handle, with mini quick coupling [311.013].

Insert the Manipulation Screw Ø 1.9 mm through the cannula into the most superior plate hole, and thread into the bone. The Manipulation Screw Ø 1.9 mm must be fully inserted against the plate before manipulation of the fragment.

**Precaution:** This device should only be used in healthy bone with adequate bone stock to prevent splitting the bony margins.

Replace the screwdriver handle [311.013] with the Handle for Manipulation Screw No. 386.902 [386.903] prior to manipulating fragment.
Drill first screw hole and place screw

Place the Drill Sleeve 1.5 [386.913] through the Drill Sleeve 2.0 with Trocar [386.914] and position the tip into the plate hole just distal to the fracture. Drill with the Drill Bit $\varnothing$ 1.5 mm [316.520]. Remove the drill guide and insert the appropriate length 2.0 mm screw.

Note: Low-profile, right-angled drills can be used in this application.
Drill and insert remaining screws

Insert the next screw into the plate hole just proximal to the fracture. Insert screws into all remaining visible plate holes. The sequence in Figure 1 is recommended.
Remove the Articulating Plate Introducer

Remove the Articulating Plate Introducer from the plate by turning the retention fastener ¼ turn counterclockwise, to the “U” (unlocked position).
7
Drill and insert screw

Drill for the remaining distal hole and insert the appropriate length 2.0 mm screw.
8

Remove Manipulation Screw Ø 1.9 mm and insert screw

Remove the Manipulation Screw Ø 1.9 mm and insert the appropriate length 2.4 mm emergency screw through the 2.0 mm cannula and into the hole created by the Manipulation Screw Ø 1.9 mm.

Precaution: The Manipulation Screw Ø 1.9 mm is single use only and should be discarded after use.
9

**Confirm reduction**

Confirm proper reduction and inspect the anterior and posterior border of the fracture through the endoscope.
## SUBCONDYLAR/RAMUS FIXATION SET

**[115.680]**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>690.600</td>
<td>Graphic Case for Fixation Set for Subcondyles and for Ramus</td>
</tr>
<tr>
<td>304.679</td>
<td>Module Compact 2.0 Fixation System, with Lid, without Contents</td>
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</tbody>
</table>

### Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>311.013</td>
<td>Handle, large, with mini quick coupling</td>
</tr>
<tr>
<td>314.442</td>
<td>Screwdriver Shaft 1.5/2.0, cruciform, self-holding, length 92 mm</td>
</tr>
<tr>
<td>316.520</td>
<td>Drill Bit $\varnothing$ 1.5 mm, length 125 mm, 2-flute, for J-Latch Coupling</td>
</tr>
<tr>
<td>321.170</td>
<td>Pin Wrench $\varnothing$ 4.5 mm, length 120 mm</td>
</tr>
<tr>
<td>347.980</td>
<td>Holding Forceps for Plates</td>
</tr>
<tr>
<td>386.900</td>
<td>Plate Holder, adjustable, complete</td>
</tr>
<tr>
<td>386.901</td>
<td>Tip for Plate Holder No. 386.900</td>
</tr>
<tr>
<td>386.902</td>
<td>Manipulation Screw $\varnothing$ 1.9 mm, self-drilling, length 80 mm</td>
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<tr>
<td>386.903</td>
<td>Handle for Manipulation Screw No. 386.902</td>
</tr>
<tr>
<td>386.904</td>
<td>Drill Sleeve 2.0 with Trocar, self-holding, length 62 mm</td>
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<tr>
<td>386.905</td>
<td>Hook, blunt, angled, $\varnothing$ 1.5 mm</td>
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<tr>
<td>386.906</td>
<td>Freer Suction Elevator, with Cleaning Stylet $\varnothing$ 1.8 mm</td>
</tr>
<tr>
<td>386.908</td>
<td>Cheek Retractor Ring, with thread, for No. 386.914</td>
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<tr>
<td>386.910</td>
<td>Subcondylar Elevator, right angled</td>
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<tr>
<td>386.911</td>
<td>Subcondylar Elevator, left angled</td>
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<tr>
<td>386.912</td>
<td>Reduction Forceps for Fragments, with Points, narrow, ratchet lock, length 210 mm</td>
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<tr>
<td>386.913</td>
<td>Drill Sleeve 1.5, length 67 mm</td>
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<tr>
<td>386.914</td>
<td>Drill Sleeve 2.0 with Trocar, with thread, length 72 mm</td>
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<tr>
<td>386.915</td>
<td>Handle for Optical Retractor</td>
</tr>
<tr>
<td>386.917</td>
<td>Insert for Optical Retractor, width 12 mm</td>
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<tr>
<td>386.918</td>
<td>Insert for Optical Retractor, width 17 mm</td>
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<tr>
<td>386.920</td>
<td>Retractor, length 60 mm, width 8 mm</td>
</tr>
<tr>
<td>397.211</td>
<td>Universal Handle for Drill Sleeves</td>
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<tr>
<td>398.415</td>
<td>Retractor, straight, double-ended, length 240 mm</td>
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<tr>
<td>U44-48220</td>
<td>Retractor, curved, double-ended, length 200 mm, size 1</td>
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### Also Available

<table>
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<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>319.520</td>
<td>Depth Gauge for Screws $\varnothing$ 1.5 to 2.0 mm, measuring range up to 45 mm</td>
</tr>
<tr>
<td>319.270</td>
<td>Cleaning Brush $\varnothing$ 2.1 mm, for Cannulated Instruments</td>
</tr>
<tr>
<td>386.907</td>
<td>Cleaning Stylet $\varnothing$ 1.8 mm, for No. 386.906</td>
</tr>
</tbody>
</table>
SUGGESTED READING LIST


