Subcondylar/Ramus Fixation Set
Surgical Technique
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**MR Information**
The Subcondylar/Ramus Fixation Set has not been evaluated for safety and compatibility in the MR environment. It has not been tested for heating, migration or image artifact in the MR environment. The safety of the Subcondylar/Ramus Fixation Set in the MR environment is unknown. Scanning a patient who has this device may result in patient injury.
Subcondylar/Ramus Fixation Set

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. The set:

• Supports and enhances AO ASIF principles of internal fixation with improved patient benefits:
  – Reduced scarring;
  – Reduced risk to the facial nerve;
  – Shorter recovery time.
• Supports intraoral and submandibular endoscopic approaches.
• Supports open surgical approaches to trauma and orthognathic surgical procedures.
• Creates and maintains the optical cavity while achieving reduction and internal fixation.
• Assists in the manipulation of bone fragments.
• Facilitates controlled in-plane articulation of plates for anatomically correct placement and stabilization.

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.

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.
AO Principles

In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.1,2

Anatomic reduction
Fracture reduction and fixation to restore anatomical relationships.

Early, active mobilization
Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

Stable fixation
Fracture fixation providing absolute or relative stability, as required by the patient, the injury, and the personality of the fracture.

Preservation of blood supply
Preservation of the blood supply to soft tissues and bone by gentle reduction techniques and careful handling.

Instruments in the Subcondylar/Ramus Fixation Set

Double-Ended Elevator, straight, 240 mm [398.415]
For soft tissue dissection

Double-Ended Elevator, 20 cm, size 1 [U44-482-20]
For soft tissue dissection and fracture reduction

Freer Suction Elevator and 1.8 mm Cleaning Stylet [386.906]
For soft tissue dissection and removal of fluid for improved visualization

Retractor Blade, 12 mm width [386.917]*

Retractor Blade, 17 mm width [386.918]*
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

Optical Retractor Handle [386.915]*
Retracts soft tissue to provide optical cavity while securing endoscope in desired position. Use with interchangeable retractor blades

4.5 mm Pin Wrench [321.17]
2.0 mm Cannula and Obturator, threaded, long [386.914]*
Provides portal for drilling and placing screws. Accepts threaded cheek retractorb ring for retraction of soft tissue

Universal Trocar Handle [397.211]
Aids insertion and positioning of 2.0 mm Cannula and Obturator

Cheek Retractor Ring, threaded [386.908]*
Optional instrument for retraction of soft tissue. Used with the 2.0 mm threaded cannula

Fragment Manipulating Forceps [386.912]
Reduces fracture fragments. Aids assembly of Cheek Retractor Ring to 2.0 mm threaded cannula

Subcondylar Elevator, angled right [386.910]
Subcondylar Elevator, angled left [386.911]
Supports and manipulates fracture fragments to achieve fracture reduction
**Instruments in the Subcondylar/Ramus Fixation Set**

(continued)

2.0 mm Cannula and Obturator, self-retaining [386.904]

Provides portal for drilling and placing screws

Fragment Manipulator, threaded, 1.9 mm, self-drilling [386.902]

Aids fracture reduction and temporary plate fixation

Handle, with mini quick coupling [311.01.98]

Used for inserting the Threaded Fragment Manipulator and with screwdriver blades

Fragment Manipulator Handle [386.903]

Used with the Threaded Fragment Manipulator to aid in fracture reduction

Plate Holding Tip [386.901]

Articulating Plate Introducer with Plate Holding Tip [386.900]

Aids in plate insertion and alignment
Subcondylar/Ramus Fixation Set Surgical Technique DePuy Synthes

1.5 mm/2.0 mm Screwdriver Blade, self-retaining, wedge, long [313.923]
For screw insertion and to secure the plate to the Plate Holding Tip of the Articulating Plate Introducer

1.5 mm Drill Bit, Stryker J-latch, 110 mm [317.835]
Creates hole for insertion of 2.0 mm screws

1.5 mm Insert Drill Guide, long [386.913]
Provides portal for predrilling for screws

Hook, angled, 1.5 mm flat tip [386.905]
Assists in plate positioning and fracture reduction

Retractor, 8 mm x 60 mm [386.920]
Assists with retraction of soft tissue when creating a limited temporary optical cavity

Plate Holding Forceps [347.98]
Assists with handling of plates and screws
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.

3. Place patient in Mandibulomaxillary Fixation (MMF)

Place the patient in temporary MMF with elastic traction.

*Precaution: Address other fractures, if present, prior to subcondylar fracture fixation.*
Fracture Exposure and Creation of Optical Cavity

1. **Exposure fracture**

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

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 straight or curved double-ended elevators [398.415 or U44-482-20] 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.
Fracture Exposure and Creation of Optical Cavity
(continued)

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 Optical Retractor Handle [386.915] which accepts a lighted endoscope with sheath (2.7 mm – 4.0 mm), and a Retractor Blade, 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.

Handle extension can be inserted on either side of the handle.
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.
Fracture Exposure and Creation of Optical Cavity
(continued)

Optional Technique:
The Cheek Retractor Ring, threaded [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 transbuccal portal for drilling and passage of 2.0 mm screws.

Insert the 2.0 mm Cannula and Obturator, threaded, long [386.914] into the Universal Trocar Handle [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 onto the 2.0 mm Cannula, threaded [386.914] using the Fragment Manipulating Forceps [386.912]. Rotate the cannula head clockwise to engage the ring on the threads of the cannula.
Fracture Reduction

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 Fragment Manipulating Forceps [386.912] to grasp the angle and distract as needed. Release MMF elastics if necessary but reapply after reduction.
Fracture Reduction (continued)

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, angled right [386.910] or left [386.911] to laterally reduce a medially displaced fragment.
2. **Reduce the fracture** (continued)

**Option 3**

Reduction can also be achieved using the Threaded Fragment Manipulator [386.902] and Fragment Manipulator Handle [386.903].

First insert the 2.0 mm Cannula and Obturator, self-retaining [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 Threaded Fragment Manipulator 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 Threaded Fragment Manipulator is self-drilling and must be fully inserted into the proximal fragment using the screwdriver Handle, with mini quick coupling [311.01.98].

**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 Threaded Fragment Manipulator may occur.

Gently manipulate the fracture fragment until reduction is achieved.

**Note:** See Step 3, page 18, for use of the Threaded Fragment Manipulator in conjunction with a plate.
Fracture Fixation

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 cruciform 1.5 mm/2.0 mm Screwdriver Blade [313.923] and Handle, with mini quick coupling, 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® Plate 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.
1 Load plate onto Articulating Plate Introducer (continued)

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.

2 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 Angled Hook [386.905] may also be used to assist in positioning the plate.
Fracture Fixation (continued)

3 Temporarily fix the plate using the Threaded Fragment Manipulator

When the Threaded Fragment Manipulator is used for temporary plate fixation, it must be inserted into the proximal fragment using the screwdriver Handle, with mini quick coupling [311.01.98].

Insert the Threaded Fragment Manipulator through the cannula into the most superior plate hole and thread into the bone. The fragment manipulator 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 Fragment Manipulator Handle [386.903] prior to manipulating fragment.
4 Drill first screw hole and place screw

Place the 1.5 mm Insert Drill Guide, long [386.913] through the 2.0 mm Threaded Cannula [386.914] and position the tip into the plate hole just distal to the fracture. Drill with the 1.5 mm Drill Bit [317.835]. 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.

Figure 1
6 **Remove the Articulating Plate Introducer**

Remove the Articulating Plate Introducer from the plate by turning the retention fastener a 1/4 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 Threaded Fragment Manipulator and insert screw**

Remove the Threaded Fragment Manipulator and insert the appropriate length 2.4 mm emergency screw through the 2.0 mm cannula and into the hole created by the Threaded Fragment Manipulator.

**Precaution:** *The Threaded Fragment Manipulator 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.*
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 Double-Ended Elevators, curved [U44-482-20] and straight [398.415] or the 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 angled Retractor [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.
7 Assemble the optical retractor

Insert the endoscope with sheath into the assembled optical retractor.

**Note:** The optical retractor assembly consists of two parts, the Optical Retractor Handle [386.915] which accepts a lighted endoscope with sheath (2.7 mm – 4.0 mm), and a Retractor Blade, 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.
Exposure and Creation of the Optical Cavity (continued)

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, threaded [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 transbuccal portal for drilling and passage of 2.0 mm screws.

Insert the 2.0 mm Cannula and Obturator, threaded, long [386.914] into the Universal Trocar Handle [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 onto the 2.0 mm Cannula, threaded [386.914] using the Fragment Manipulating Forceps [386.912]. Rotate the cannula head clockwise to engage the ring on the threads of the cannula.
Fracture Reduction

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 Fragment Manipulating Forceps [386.912] to grasp the angle and distract as needed. Release MMF elastic if necessary but reapply after reduction.
1. Distract the mandible (continued)

Credit: Reid Mueller, MD

**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.

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.
Fracture Reduction (continued)

2  Reduce the fracture (continued)

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

Option 3
Reduction can also be achieved by using the Threaded Fragment Manipulator [386.902] with the Fragment Manipulator Handle [386.903].

First insert the 2.0 mm Cannula and Obturator, self-retaining [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 Threaded Fragment Manipulator 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.
2 \textbf{Reduce the fracture (continued)}

The Threaded Fragment Manipulator is self-drilling and must be fully inserted into the proximal fragment using the screwdriver Handle, with mini quick coupling [311.01.98].

\textbf{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.

\textbf{Precaution:} If the screwdriver handle is not replaced, loss of reduction and bending of the Threaded Fragment Manipulator may occur.

Gently manipulate the fracture fragment until reduction is achieved.

\textbf{Note:} See Step 3, page 36, for use of the Threaded Fragment Manipulator in conjunction with a plate.

\begin{itemize}
\item Threaded Fragment Manipulator 386.902
\item Use 311.01.98 handle for \textbf{insertion} of 386.902
\item Use 386.903 handle for \textbf{manipulation} of fragment with 386.902
\end{itemize}
Fracture Fixation

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 cruciform 1.5 mm/2.0 mm Screwdriver Blade [313.923] with the Handle, with mini quick coupling, 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 Plate 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.
1. **Load plate onto Articulating Plate Introducer (continued)**

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.

2. **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 Angled Hook [386.905] may also be used to assist in positioning the plate.
Fracture Fixation (continued)

3. Temporarily fix the plate using the Threaded Fragment Manipulator

When the Threaded Fragment Manipulator is used for temporary plate fixation, it must be inserted into the proximal fragment using the screwdriver Handle, with mini quick coupling.

Insert the Threaded Fragment Manipulator through the cannula into the most superior plate hole, and thread into the bone. The fragment manipulator 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 Fragment Manipulator Handle [386.903] prior to manipulating fragment.
4  **Drill first screw hole and place screw**

Place the 1.5 mm Insert Drill Guide, long [386.913] through the 2.0 mm Threaded Cannula [386.914] and position the tip into the plate hole just distal to the fracture. Drill with the 1.5 mm Drill Bit [317.835]. 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.*

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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.

*Figure 1*
Fracture Fixation (continued)

6  Remove the Articulating Plate Introducer
Remove the Articulating Plate Introducer from the plate by turning the retention fastener 1/4 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 Threaded Fragment Manipulator and insert screw

Remove the Threaded Fragment Manipulator and insert the appropriate length 2.4 mm emergency screw through the 2.0 mm cannula and into the hole created by the Threaded Fragment Manipulator.

Precaution: The Threaded Fragment Manipulator 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]

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>690.600</td>
<td>Subcondylar/Ramus Fixation Set</td>
</tr>
<tr>
<td>304.679</td>
<td>2.0 mm Compact Fixation Module</td>
</tr>
<tr>
<td>311.01.98</td>
<td>Handle, with mini quick coupling</td>
</tr>
<tr>
<td>313.923</td>
<td>1.5 mm/2.0 mm Screwdriver Blade, self-retaining, wedge, long, 2 ea.</td>
</tr>
<tr>
<td>317.835</td>
<td>1.5 mm Drill Bit, Stryker J-latch, 110 mm, 2 ea.</td>
</tr>
<tr>
<td>319.27</td>
<td>2.1 mm Cleaning Brush</td>
</tr>
<tr>
<td>321.17</td>
<td>4.5 mm Pin Wrench, 120 mm</td>
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<tr>
<td>347.98</td>
<td>Plate Holding Forceps, for 1.5 mm, 2.0 mm and 2.4 mm plates</td>
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<tr>
<td>386.900</td>
<td>Articulating Plate Introducer with Plate Holding Tip</td>
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<tr>
<td>386.901</td>
<td>Plate Holding Tip for Articulating Plate Introducer</td>
</tr>
<tr>
<td>386.902</td>
<td>Fragment Manipulator, Threaded, 1.9 mm, self-drilling, 2 ea.</td>
</tr>
<tr>
<td>386.903</td>
<td>Fragment Manipulator Handle</td>
</tr>
<tr>
<td>386.904</td>
<td>2.0 mm Cannula and Obturator, self-retaining</td>
</tr>
<tr>
<td>386.905</td>
<td>Hook, angled, 1.5 mm flat tip</td>
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<tr>
<td>386.906</td>
<td>Freer Suction Elevator and 1.8 mm Cleaning Stylet</td>
</tr>
<tr>
<td>386.908</td>
<td>Cheek Retractor Ring, threaded</td>
</tr>
<tr>
<td>386.910</td>
<td>Subcondylar Elevator, angled right</td>
</tr>
<tr>
<td>386.911</td>
<td>Subcondylar Elevator, angled left</td>
</tr>
<tr>
<td>386.912</td>
<td>Fragment Manipulating Forceps</td>
</tr>
<tr>
<td>386.913</td>
<td>1.5 mm Insert Drill Guide, long</td>
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<tr>
<td>386.914</td>
<td>2.0 mm Cannula and Obturator, threaded, long</td>
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<tr>
<td>386.915</td>
<td>Optical Retractor Handle</td>
</tr>
<tr>
<td>386.916</td>
<td>Retractor Blade, 12 mm width</td>
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<tr>
<td>386.917</td>
<td>Retractor Blade, 17 mm width</td>
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<tr>
<td>386.920</td>
<td>Retractor, 8 mm x 60 mm</td>
</tr>
<tr>
<td>397.211</td>
<td>Universal Trocar Handle</td>
</tr>
<tr>
<td>398.415</td>
<td>Double Ended Elevator, straight, 240 mm</td>
</tr>
<tr>
<td>U44-482-20</td>
<td>Double Ended Elevator, 20 cm, size 1</td>
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</table>

**Also Available**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>304.106—118</td>
<td>Screw Length Markers, 6 mm–18 mm (10/pkg.)</td>
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<tr>
<td>313.843</td>
<td>2.0 mm Screwdriver Blade, self-retaining, StarDrive, long</td>
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<tr>
<td>319.007</td>
<td>Depth Gauge, for 2.0 mm and 2.4 mm screws, long</td>
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<tr>
<td>386.907</td>
<td>1.8 mm Cleaning Stylet</td>
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</tbody>
</table>

For detailed cleaning and sterilization instructions, please refer to [www.synthes.com/cleaning-sterilization](http://www.synthes.com/cleaning-sterilization) or sterilization instructions, if provided.
Suggested Reading List


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Not all products may currently be available in all markets.