Anatomical Reconstruction of Medial Wall and Orbital Floor Fractures

MatrixORBITAL™ Plates

Surgical Technique
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**MR Information**
The MatrixORBITAL System 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 MatrixORBITAL System in the MR environment is unknown. Scanning a patient who has this device may result in patient injury.
MatrixORBITAL™ Plates
Anatomical reconstruction of medial wall and orbital floor fractures.

Features and benefits

Designed from CT-scan data, the three-dimensional implants closely approximate the topographical anatomy of the human orbital floor and medial wall, to provide accurate reconstruction even after significant two-wall fractures.1,2

Preformed three-dimensional shape
– For minimal bending and cutting which reduces the amount of time needed to contour plate

Contoured plate edges
– For easier plate insertion through skin incision and less interference between the plate and surrounding soft tissue

Segmented design
– To customize plate size to address orbital topography and to maintain contoured plate borders with minimal sharp edges

Rigid zone
– Restores the shape of the posterior orbital floor to help maintain the correct position of the globe

Intersection bars for minimal cutting and contoured plate borders

Medial wall

Rigid zone ensures consistent form in the posterior orbit

Orbital floor

Screw hole pattern
MatrixORBITAL Plates
Anatomical reconstruction of medial wall and orbital floor fractures.
Introduction

Orbital floor fractures are frequently associated with medial wall fractures. The complex geometry of the bony orbit makes anatomical reconstruction extremely challenging, particularly in two-wall fractures and when the deep orbital cone is affected.

The orbital floor has an initial shallow convex section behind the rim, then inclines upward behind the globe, and inclines upward to meet the medial wall, creating a distinct bulge behind the globe. These convex curves of the medial wall and floor create a “postbulbar constriction” of the orbital cavity, which must be reconstructed when the orbit is rebuilt following fractures. Treatment is directed at precise anatomical reconstruction of orbital shape and volume in order to restore the correct position of the eye.

The MatrixMIDFACE™ Preformed Orbital Plates may be used for acute orbital fractures or in secondary reconstruction of enophthalmos and dystopia.

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.
- Instruments, screws and cut plates may have sharp edges or moving joints that may pinch or tear user’s glove or skin.
- Remove all fragments that are not fixated during the surgery.
- While the surgeon must make the final decision on implant removal, we recommend that whenever possible and practical for the individual patient, fixation devices should be removed once their service as an aid to healing is accomplished. Implant removal should be followed by adequate post-operative management to avoid refracture.

Precautions:
- Confirm functionality of instruments and check for wear during reprocessing. Replace worn or damaged instruments prior to use.
- Handle devices with care and dispose of worn bone cutting instruments in an approved sharps container.
- Always irrigate and apply suction for removal of debris potentially generated during implantation or removal.
- It is recommended to only use the instruments identified for use within the MatrixMIDFACE and MatrixORBITAL™ Plating Systems with the MatrixMIDFACE Plating System.

Indications

DePuy Synthes MatrixMIDFACE Preformed Orbital Plates are intended for use in selective trauma of the midface and craniofacial skeleton, craniofacial surgery, reconstructive procedures and selective orthognathic surgery of the maxilla and chin.
Clinical Case*

Preoperative CT

25-year-old male sustaining blunt trauma to left orbit. Ophthalmological exam unremarkable except for severe soft tissue swelling and bruising. CT demonstrated severe displacement of medial wall and floor, putting the patient at risk for late enophthalmos and dystopia as well as strabismus.

Coronal preoperative

Axial preoperative

Postoperative CT

Orbit approached through transconjunctival incision with lateral canthotomy. MatrixMIDFACE Preformed Orbital Plate, large, left, placed without modification except slight bending and trimming of some fixation holes. The implant was fixed to the inferior orbital rim with two MatrixMIDFACE Screws.

Coronal postoperative

Axial postoperative

*Clinical case and all images are courtesy of Dr. Scott Bartlett, Children’s Hospital of Philadelphia, University of Pennsylvania, USA.
Orbital Landmarks

Implant placement according to the orbital landmarks

1. Inferior orbital rim
2. Inferior orbital fissure
3. Posterior orbital ledge
4. Transition zone between the medial wall and orbital floor
5. Optic canal
6. Lacrimal fossa

* Transition zone is located at the inferio-medial aspect of the orbital floor and refers to an inner buttress at the junction to the lower end of the medial orbital wall.

Preoperative planning*

Three-dimensional  Coronal  Sagittal  Axial

* All images are courtesy of Prof. Dr. R. Schmelzeisen and Dr. Dr. M.C. Metzger, Department of Craniomaxillofacial Surgery, University of Freiburg, Germany.
Orbital Retractors

- Minimize orbital soft tissue prolapse
- Provide soft tissue protection
- Large and small retractor ends
- Right and left retractors
- Stainless steel, malleable

Calibration scale on both sides

Concave ends

Design follows orbital anatomy
1

**Select implant**

**Implants**

- 04.503.801 Preformed Orbital Plate, small, left
- 04.503.802 Preformed Orbital Plate, large, left
- 04.503.811 Preformed Orbital Plate, small, right
- 04.503.812 Preformed Orbital Plate, large, right

Select the MatrixMIDFACE Preformed Orbital Plate that best suits the patient’s orbital anatomy, the fracture type and extent, and which is based on the preoperative plan.

**Note:** In three-wall fractures involving the lateral wall, an additional orbital implant must be used (e.g. DePuy Synthes orbital mesh plate).

2

**Size implant (if required)**

**Instruments**

- 03.503.033 Cutting Scissors for Mesh Plates, short
- 03.503.037 Cutting Scissors for Mesh Plates, long

Reduce the height of the medial wall and/or the orbital floor length when not used for bridging the fracture. Always cut the implant along the cutting lines to ensure smooth edges, using scissors or mesh cutters.

**Precaution:** Take care to protect soft tissue from trimmed plate edges.
Contour implant (if required)

Instrument

| 03.503.038 | Bending Pliers for MatrixMIDFACE Plates |

The implant can be further contoured to match patient anatomy.

Precautions:
- Avoid contouring of the implant in situ that may lead to implant malposition and/or posterior cantilever effect.
- The lateral anterior part of the plate (circled right) is intentionally prebent higher than the orbital rim anatomy to allow free plate movement during plate positioning. The lateral anterior part can be further contoured to match patient anatomy.
- If contouring is necessary, the surgeon should avoid bending the device at a screw hole.
- Avoid sharp bends, repetitive and reverse bending as it increases the risk of implant breakage.
4
Retract soft tissue

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>03.503.801</td>
<td>Orbital Retractor, left</td>
</tr>
<tr>
<td>03.503.802</td>
<td>Orbital Retractor, right</td>
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</tbody>
</table>

The malleable orbital retractors can be used to retract the soft tissue as well as size the defect.

The spoon shaped shield of the malleable retractors is bent perpendicular to the handle.

Fat prolapsing beside the retractor shield can be retracted by the additional insertion of a flexible foil.

**Note:** Make an angled bend (red line) to allow the hand position to rest conveniently and away from the surgical view on the patient’s forehead. Twisting of the bent end can further improve or facilitate the handling.
5

Insert implant

Position the lateral edge of the plate along the inferior orbital fissure. Since the implant is anatomic and preformed, it should be positioned in the same location for every patient. The orientation of the implant does not need to change based on the anatomy of the fracture. Place the plate on the stable bony contour.

**Note:** Confirm appropriate dissection. Insert the medial wall section of the plate first (Figure 1). While inserting the rest of the plate, turn the plate (Figure 2) until the implant is in the correct anatomical position (Figure 3). (Refer to page 6 for orbital landmarks.)
Secure implant

Stabilize the implant with MatrixMIDFACE Screws inserted through selected screw holes in the plate.

Fixation arms should be removed when not used for fixation.

Note: Test for impingement

- A forced duction test must be completed to ensure unrestricted lateral and medial movement of the globe.
- Screws are available in self-drilling (silver), self-tapping (bronze), and emergency (blue) designs.
- If a pilot hole is desired, use the appropriate 1.1 mm diameter MatrixMIDFACE Plating System drill bit for drilling up to 8 mm length and the 1.25 mm diameter MatrixMIDFACE Plating System drill bit for screw lengths of 10 mm or more.

Precautions:

- Confirm that plate positioning allows for adequate clearance of nerves and any other critical structures.
- Confirm that drill bit length and diameter correspond to selected screw length prior to drilling.
- Drill speed rate should never exceed 1,800 rpm, particularly in dense, hard bone. Higher drill speed rates can result in:
  - thermal necrosis of the bone,
  - soft tissue burns,
  - an oversized hole, which can lead to reduced pull-out force, increased ease of the screws stripping in bone, suboptimal fixation, and/or the need for emergency screws.
- Always irrigate during drilling to avoid thermal damage to the bone and ensure drill bit is concentric to plate hole.
- Avoid drilling over nerve or tooth roots.
- Take care while drilling as to not damage, entrap, or tear a patient’s soft tissue or damage critical structures. Be sure to keep drill clear of loose surgical materials.
- Confirm screw length prior to implantation.
- Tighten screws in a controlled manner. Applying too much torque to the screws may cause screw/plate deformation or bone stripping. If bone becomes stripped, remove the screw from the bone and replace it with an emergency screw.
- In order to determine the appropriate amount of screws needed to achieve stable construct fixation, the surgeon should consider the fracture size and shape.
Surgical Technique

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**Confirm plate placement***

Sagittal view of the correct plate placement is demonstrated in the image. Placement on the posterior ledge should be confirmed intraoperatively.

* Image courtesy of Prof. Dr. Dr. M. Rasse, Department of Craniomaxillofacial Surgery, University of Innsbruck, Austria.
### Plates

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<thead>
<tr>
<th>Catalog Number</th>
<th>Size</th>
<th>Side</th>
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<tbody>
<tr>
<td>04.503.801</td>
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<td>left</td>
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<tr>
<td>04.503.802</td>
<td>large</td>
<td>left</td>
</tr>
<tr>
<td>04.503.811</td>
<td>small</td>
<td>right</td>
</tr>
<tr>
<td>04.503.812</td>
<td>large</td>
<td>right</td>
</tr>
</tbody>
</table>

Titanium MatrixMIDFACE Preformed Orbital Plates, 0.4 mm thick.

Note: MatrixMIDFACE Plates are commercially pure titanium. MatrixMIDFACE Screws are titanium alloy (Ti-6Al-7Nb).

◊ Available nonsterile or sterile-packed. Add S to catalog number for sterile product.
## Titanium MatrixMIDFACE Preformed Orbital Plate Set (01.503.801)

### Modules
- 306.610 Auxiliary Module, for MatrixMIDFACE System
- 306.640 Plate Insert, for MatrixMIDFACE System
- 306.641 Label Sheet, for Preformed Orbital Plates

### Plates
- **Titanium MatrixMIDFACE Preformed Orbital Plates**, 2 each
  - 04.503.801 Small, left
  - 04.503.802 Large, left
  - 04.503.811 Small, right
  - 04.503.812 Large, right

### Instruments
- Orbital Retractors, 1 each
  - 03.503.801 Left
  - 03.503.802 Right

### Also Available
- 01.503.504 MatrixMIDFACE Plating System Set
  - Titanium MatrixMIDFACE Screws, self-tapping (5/pkg.)
    - Length
      - 04.503.204.05 4 mm
      - 04.503.205.05 5 mm
      - 04.503.206.05 6 mm
      - 04.503.208.05 8 mm
  - Titanium MatrixMIDFACE Screws, self-drilling (5/pkg.)
    - Length
      - 04.503.224.05 4 mm
      - 04.503.225.05 5 mm
      - 04.503.226.05 6 mm
      - 04.503.228.05 8 mm
  - Titanium MatrixMIDFACE Emergency Screws (1/pkg.)
    - Length
      - 04.503.234.01 4 mm
      - 04.503.235.01 5 mm
      - 04.503.236.01 6 mm
      - 04.503.238.01 8 mm

- 04.503.301 Anatomic, small, 0.3 mm thick (blue)
- 04.503.302 Anatomic, medium, 0.3 mm thick (blue)
- 04.503.303 Anatomic, large, 0.3 mm thick (blue)
- 04.503.304 Universal Floor Plate, 0.4 mm thick (pink)
- 04.503.305 Universal Medial Wall Plate, 0.5 mm thick (gold)
- 04.503.306 Orbital Mesh Plate, 0.2 mm thick (silver)
- 04.503.307 Orbital Mesh Plate, 0.3 mm thick (blue)
- 04.503.308 Orbital Mesh Plate, 0.4 mm thick (pink)

- 04.503.313 12 holes, 0.4 mm thick (silver)
- 04.503.343 12 holes, 0.5 mm thick (blue)
- 04.503.373 12 holes, 0.7 mm thick (pink)

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.

Note: The MatrixMIDFACE Preformed Orbital Plate Set can be stored on the top level of the MatrixMIDFACE Graphic Case (306.601).
References


Additional Reading
