Motec®
Wrist Joint Arthrodesis
Metacarpal Taper and Radius Connector

Swemac
Motec®
Wrist Joint Arthrodesis

The Motec Wrist Joint Arthrodesis has been developed as a part of the Motec Wrist Prosthesis family to enable easy conversion of the prosthesis to a total wrist fusion, if the need should arise.

The Motec Wrist Arthrodesis implant is intended to be used as a salvage procedure for the Motec Wrist System, using the pre-existing prosthesis implants. Removal of bone during primary procedures, bony erosion, and bone loss during implant extraction will otherwise decrease the bone stock that is available for arthrodesis.

The intramedullary Motec Wrist Arthrodesis System has been developed to overcome the problem of soft tissue irritation in wrist fusions and thereby minimize the need for unnecessary implant removal.

The Motec Wrist Arthrodesis is a patented product with worldwide protection.

The different techniques of Motec Wrist Joint Arthrodesis

The Motec Wrist Joint Arthrodesis is suitable in several cases. When the Metacarpal Threaded Implant is loose, the first option is always to insert a new, longer Metacarpal Threaded Implant, if prosthesis still is the optimal choice for the patient.

depending on the patient and the implant situation, three different options of Motec Wrist Joint Arthrodesis are available. The physician’s education, training and professional judgement must be relied upon to choose the most appropriate device and treatment.

Metacarpal Taper & Radius Connector

Requirements: Fixed Radius Threaded Implant and fixed Metacarpal Threaded Implant.

- Fixation of the Radius Threaded Implant and Metacarpal Threaded Implant but failure of the Motec Wrist Prosthesis for other problems such as continuing pain or abnormal soft tissue balance.

Straight Double Taper

Requirements: Fixed Radius Threaded Implant and fixed Metacarpal Threaded Implant.

- Fixation of the Radius Threaded Implant and Metacarpal Threaded Implant but failure of the Motec Wrist Prosthesis for other problems such as continuing pain or abnormal soft tissue balance.

Metacarpal Nail & Radius Connector

Requirements: Fixed Radius Threaded Implant.

- If the Metacarpal Threaded Implant is loose or otherwise unsuitable.
Metacarpal Taper and Radius Connector

This surgical technique only covers the conversion of a Motec Wrist Prosthesis to a Motec Wrist Arthrodesis using a Metacarpal Taper and Radius Connector.

The system requires a fixed Metacarpal Threaded Implant.

Features and benefits

- Fully compatible salvage procedure.
- Minimizes the need for unnecessary implant removal procedures.
- Minimally invasive, only a 4-6 cm incision.
- No tension on soft tissue during surgery.
- Adjustable rotation angle
  - The angle of the arthrodesis can be set at 0°, 15° or 30° in extension (or 0°, 15° or 30° in flexion).
  - The angle of arthrodesis can be decided at any stage in the operation procedure.
- Rigid fixation.
- Medium to large space between the Radius Threaded Implant and the Metacarpal Threaded Implant.
- The Radius Connector is available in two sizes; Medium and Long.
- Manufactured from blasted Ti6Al4V to optimize osseointegration.
Product description

The Motec Wrist Arthrodesis system, Metacarpal Taper and Radius Connector solution, consists of fixed bone screws from the Motec Wrist Prosthesis and an adjustable connection of tapers and lock screws.

All implants are made from titanium alloy (Ti6Al4V) and available sterile for immediate use. All components are designed and manufactured for maximal osseointegration with surrounding bones in the wrist joint. The implants are MRI compatible.

A Metacarpal Taper is attached to the Metacarpal Threaded Implant by a Morse-taper. The distal hole in the Metacarpal Taper is the centre of rotation of the system, and one of the proximal holes sets the angle of the wrist fusion.

The distal Lock Screw is the rotation axis when the angle of the wrist shall be set. It is important not to tighten the distal screw before the proximal one.

The proximal Lock Screw is inserted when the angle of the wrist is definite. When this screw is tightened, do the final tightening of the distal screw.

The Radius Connector is available in two sizes; Medium and Long (Medium is presented in this picture). The orientation of the Radius Connector is very important; the countersunk holes must be visible from the radial side (right picture). It is possible to rotate the Radius Connector slightly clockwise or slightly counterclockwise before the long Lock Screw is tighten in the Radius Threaded Implant.

A fully osseointegrated Metacarpal Threaded Implant is a requirement for using the Metacarpal Taper – Radius Connector solution.

The long Lock screw locks the Radius Connector into the Radius Threaded Implant.

The Radius Threaded Implant from the Motec Wrist prosthesis has to be fully osseointegrated in the radius bone. This is a requirement for all three variants of Motec Wrist Arthrodesis.
Angular flexibility

The angle of the Metacarpal Taper in relation to the Radius Connector is stepwise set by the proximal Lock Screw. It is important to not tighten the distal Lock Screw before the angle is decided.

Rotational flexibility

To achieve a slight ulnar deviation, it is possible to rotate the Radius Connector slightly clockwise or slightly counterclockwise before the Lock Screw is tightened in the Radius Threaded Implant.

Selection of size

<table>
<thead>
<tr>
<th>Distance in joint for Metacarpal Taper &amp; Radius Connector</th>
<th>Size of Radius Connector</th>
<th>Cat.No.</th>
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<tbody>
<tr>
<td>~ 16 mm</td>
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<tr>
<td>~ 19 mm</td>
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</table>

- Use Trials to make the best suitable choice of model
Case

Pre-op: Motec Wrist Prosthesis. Female, 75 years old (age at revision). Diagnosis: RA/Sequelae distal radius fracture.

Post op; 0.5 years. Motec Wrist Arthrodesis, Straight Double Taper. The pain at rest has decreased from 4 to no pain at all and pain during activity; from 5 to no pain at all (scale 0-10).

Pre-op: Motec Wrist Arthrodesis. Male, 32 years old (age at revision). Diagnosis: SNAC.

Post op; 4.3 years. Motec Wrist Arthrodesis, Straight Double Taper. The pain during activity has decreased from 8 to 5 (scale 0-10).

Pre-op: Motec Wrist Prosthesis. Female, 24 years old (age at revision). Diagnosis: JRA.

Post op; 4.1 years. Motec Wrist Arthrodesis, Straight Double Taper. The pain at rest have decreased from 8 to no pain at all and pain during activity; from 10 to 2 (scale 0-10). The QDASH have increased from 0 kg to 11 kg.

Conversion of a failed total wrist arthroplasty to arthrodesis can be difficult. A custom made titanium alloy peg was constructed to enable arthrodesis with the original arthroplasty components in situ. Two out of three patients were especially challenging cases with little bone available. Bony union was achieved in 2 to 3 months. The peg simplified a difficult revision situation and gave good, predictable results at follow-up.

Pre-operative planning

Make sure that the instrumentations for both Motec Wrist Prosthesis system and for Motec Wrist Arthrodesis system are available in the operation theatre.

To use Motec Wrist Arthrodesis system safely the surgeon is required to have extensive knowledge about the implant, the methods of application, instrumentation and the recommended surgical technique for the implant.

It is recommended as an important part of the preoperative planning process that the surgeon should be familiar with the anatomy of the carpal area with special attention to the neuromuscular system.

For detailed information about the position of the patient and incision see the Motec Wrist Prosthesis surgical technique.

Indication

- Conversion from a Motec Wrist Prosthesis

Contraindications

The physician’s education, training and professional judgement must be relied upon to choose the most appropriate device and treatment. Conditions presenting an increased risk of failure include:

- Any active or suspected latent infection, sepsis or marked local inflammation in or around the surgical area.
- Severe osteoporosis, insufficient quantity or quality of bone/soft tissue.
- Material sensitivity, documented or suspected.
- Physical interference with other implants during implantation or use.
- Compromised vascularity, inadequate skin or neurovascular status.
- Compromised bone stock that cannot provide adequate support and/or fixation of the device due to disease, infection or prior implantation.
- Patients who are unwilling or incapable of following post-operative care instructions.
- Other physical, medical or surgical conditions that would preclude the potential benefit of surgery.
- Previous open fracture or infection in the joint.

References

Articles


Surgical Technique

1. Motec Wrist Prosthesis

For detailed information about the position of the patient, incision and the Motec Wrist Prosthesis, see the Motec Wrist Prosthesis system brochure and the surgical technique.

2. Remove the Metacarpal Head

Gently pull the hand downwards until the Metacarpal Head luxates from the Radius Cup.

Keep the wrist in maximum flexion and use the Impactor to release the Metacarpal Head from the Metacarpal Threaded Implant. Remove the Metacarpal Head.
3. Remove the Radius Cup

Use the Cup Remover to release the Radius Cup from the Radius Threaded Implant. The Cup Remover is compatible with both metal- and PEEK Cup. Place the tips of the Cup Remover between the Radius Threaded Implant and the Radius Cup. Keep the Cup Remover perpendicular to the Radius Threaded Implant and tap gently with the Hammer. The Radius Cup will release from the conical press-fit inside the Radius Threaded Implant. Remove the Radius Cup.

Remove proximal and distal cartilage, and all cartilage between the small bones in the radius joint. These preparations will provide good conditions for bone ingrowth and facilitates the fusion of the wrist.

4. Trials

The Trials will be used to determine the correct size of implants for the joint. The Radius Connector is available in size Medium and Long and together with the Metacarpal Taper Trials the right tension in the joint will be achieved. Start by inserting the shortest Trials, size Medium of the Radius Connector.

Note: Do not use the impactor when inserting the Trials.

The Metacarpal Taper Trials shall be used together with the Radius Connector Trials to get the right tension in the joint. The angle of the metacarpal side can also be tried out with the Trials.
5. Insert the Radius Connector

Before introducing the Radius Connector, make sure that the internal Morse taper of the Radius Threaded Implant is clean.

**Note:** Place the countersunk holes on the radial side.

It is possible to adjust the Radius Connector by rotation before it is attached to the Radius Threaded Implant. When the orientation is definite, tap the connector gently with the Impactor to ensure firm seating.

6. Introduce the Lock Screw

Assemble the Hex Driver Tip and the Tri-Lobe Handle. Use the screwdriver to lock the Radius Connector into the Radius Threaded Implant using the Lock Screw.

Occasionally a Metacarpal Threaded Implant, size Small, might be used for fixation in the radius bone. Those implants are missing the internal thread for tightening the Lock Screw. In such special cases the fixation between the Threaded Implant and the Radius Connector achieved by the Morse tapers will be enough.
7. Insertion of the Metacarpal Taper

Before introducing the Metacarpal Taper, make sure that the internal Morse taper of the Metacarpal Threaded Implant is clean. The Metacarpal Taper is then inserted into the Metacarpal Threaded Implant. Tap the Impactor gently to ensure firm seating.

Reduce the joint and evaluate stability using image intensification. Place the Metacarpal Taper in the slot of the Radius Connector.

8. Introduce the distal Screw

Align the distal holes of the Radius Connector and the Metacarpal Taper. Use the assembled screwdriver to introduce a short Screw into the distal hole, make sure the threads are engaged but do not tighten the screw.

Note: Countersunk holes on the radial side.

The Distal Screw has to be un-tightened until the angle of the Metacarpal Threaded Implant and the Metacarpal Taper, in relation to the Radius Connector, is set.
9. Choose angle

Decide which angle is best suited for the patient’s needs (0°, 15° or 30° in extension).

Note: The Metacarpal Taper may be rotated 180° if necessary (0°, 15° or 30° in flexion).

10. Introduce the proximal Screw

When the best suited angle is definite, introduce a second Screw into the proximal holes of the Metacarpal Taper and Radius Connector, using the assembled screwdriver. Lock it in place using forward rotation. If there are problems to align the Screwdriver and the proximal screw, because of an impingement on the radial side, it is possible to use the Drill Sleeve Ø4 mm and the Drill Ø4 mm. Make a small incision (1-2 cm) on the radial side. Drill through the Radial Styloid and then insert the Screwdriver in the cavity and connect to the Screw. Finally tighten the Distal Screw.
11. Use bone to fill the wrist cavity

Make sure that the cartilage is removed both distally and proximally. Also remove the cartilage between the small bones in the joint, as in the traditional preparation of a wrist arthrodesis. All bone surfaces have to be rough. Fill the wrist cavity with autograft bone to get maximum stability and optimal conditions for fusion.

Observe: The implant is only for initial fixation. The bone ingrowth provides long term stability of the wrist.

12. Closure

The dorsal capsule is closed. The extensor retinaculum is sutured back and a subcutaneous drainage is introduced before the incision is closed.

Postoperative care

0-6 weeks: Casting for 6 weeks is recommended (first 2 weeks a plaster slab is used) with the wrist excluding the elbow, and allowing free forearm rotation, thumb and finger motion. Depending on the surgeon's judgement, additional weeks might be preferred. Start early hand therapy during the hospital stay, with finger, forearm, elbow and shoulder motion. At approximately 2 weeks the slab and sutures are removed and a circular cast applied for additional 4 weeks. If there is any problem with upper extremity motion the patient shall receive hand therapy.

6 weeks: The cast is removed (and radiographs are taken). Start with limited weight bearing and gradually increase the weight. Free weight-bearing is allowed if possible.
# Product information

## CAT. NO. IMPLANTS

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<th>IMPLANTS</th>
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- Needed for Metacarpal Taper and Radius Connector surgical technique.
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*Complete Motec Wrist Prosthesis Instrumentation*
Swemac develops and promotes innovative solutions for fracture treatment and joint replacement. We create outstanding value for our clients and their patients by being a very competent and reliable partner.