Opening Wedge High Tibial Osteotomy

Complete system for minimally-invasive surgery

OTIS-C-PLUS®
Low profile locking plate

100 % β-TCP
Bioabsorbable wedge

+ complete instrumentation set
**Bioabsorbable synthetic wedge**

SBM, which boasts 20 years of experience in its field, was the first company (as early as 1996) to manufacture synthetic wedges for High Tibial Osteotomy (HTO) by metaphyseal addition. Manufactured in Biosorb (100% β Tricalcium Phosphate), the OTIS® line of osteotomy wedges is designed to meet different porosity and size needs which makes it the most complete line of its kind available to this day.

**Adaptability**

**Anatomically shaped 1-15**

OTIS® implants, which combine a flat lower surface with an angulated upper surface, are designed to fit into the tibial osteotomy plane.

**Several porosities**

OTIS® implants have been adapted in terms of porosity to fit to any need: 30% porosity for high mechanical resistance, 50% porosity for quick resorption.

**Perfect precision**

A complete set of 10 different wedge heights ranging from 6 to 15 mm in 1 mm increments, offering a precision of correction equal to 1°.

**Ensuring results**

**Bioactivity 1-15**

Biosorb closely resembles the mineral phase of bone, which enables a genuine chemical bond with the bone tissue without fibrous encapsulation nor inflammatory reaction.

**Osteointegration 1-15**

Complete control of the macroporosity guides bone cell penetration and improves bone graft integration with the bone tissue.

**Resorption 1-15**

OTIS® wedges are bioabsorbable: the implants are thus replaced by healthy new-formed bone once the cellular resorption process is complete.

**Wide choice of corrections**

**OTIS®**

30% porosity
Mechanical strength
(associated to a plate or staples)

50% porosity
Accelerated resorption
(must be associated to a locking plate).

![Wide choice of corrections diagram]
Compressive locking plate

The OTIS-C-PLUS® plate is made of biocompatible stainless steel, it is anatomically shaped and low profile which makes it perfect for minimally-invasive surgical approaches. Its locking system ensures graft compression to guarantee optimal tibial stabilization as well as rapid weight-bearing.

Safe and fast placement

Anatomically shaped
Specially designed for HTO stabilization, OTIS-C-PLUS® fits to the patient’s anatomy and does not need to be pre-formed in most cases.

Resistant
Biocompatible stainless steel plates are very resistant and can be easily removed (unlike titanium alloy plates).

Lockable
The twelve lengths of self-tapping locking screws are pre-oriented, which provides the ability to adapt the surgery (mono or bicortical anchorage) and to reduce surgical time.

Quicker recovery

Compression
OTIS-C-PLUS® is a compression plate: graft compression promotes its absorption and provides stability.

Almost immediate weight-bearing
The rigidity of the plate is provided by its shape: the more rigid the osteosynthesis, the quicker weight-bearing can occur. Full weight-bearing is possible after 45 days.

Limited scars
The plate is low-profile (30% shorter than standard osteosynthesis, only 3 mm thick), which makes it perfect for a genuine minimally-invasive surgical approach.

An optimized design

Proximal screws
Perpendicular to the plate

Central fold
Anatomically shaped
Avoids twisting the plate

Distal screws
oriented downwards
Ensure compression

Twelve lengths of ø 6.5 mm self-tapping screws, without counter nuts (length in mm)
Surgical technique

Two models of OTIS-C-PLUS® plates are available: right and left knee. To ensure proper positioning of the wedge and the plate, it is important to adhere to the following procedure (right knee in this example).

CAUTION: Do not insert the screws through the wedge to prevent graft damage.

Planning
Pre-operative confirmation of the correction required can be done in various ways:
- The method using a cord allows for visualization of the lateral to medial mechanical axis.
- A protractor is used to measure the angle per-operatively.
Step 1

Medial metaphyseal incision

The medial metaphyseal incision has three reference points: the medial border of the tibial metaphysis, the posterior border of the patellar ligament, and the joint line.

The incision is short, 5 to 6 cm, longitudinal and equidistant from the patellar ligament and the posterior border of the tibia, just under the joint line. After incision through the subcutaneous tissue, the medial border of the patellar ligament and the deep tissue under the ligaments are dissected.

The internal fibroligamentous plane is incised longitudinally and progressively lifted from the tibial metaphyseal surface to allow the rugine to slide behind the medial border, and a right angle retractor to be inserted to protect the popliteal fossa.

To limit the risk of partition of the lateral tibial plateau, the opening can be achieved with Lambotte osteotomes.

Step 2

Trial implant selection

The instrumentation set offers a range of 10 metallic trial implants with heights from 6 to 15 mm corresponding to the definitive implants.

Step 3

Implant from H 8 to 15 mm: (a)

Directly screw the handle on the trial implant.

Implant H 6 or H 7: (b)

Grab the one-piece trial implant and insert it directly up to the osteotomy incision.
Step 4

**Impaction**
Impact the metallic trial implant within the osteotomy incision, until it is level with the postero-medial cortical bone.
Control the correction obtained by fluoroscopy.

Step 5

**Retrieval**
Retrieve the metallic implant by using the slotted hammer.

Step 6

**Wedge positioning**
Replace the metallic trial implant by the definitive implant. Carefully position the graft by hand in the osteotomy incision (e.g. using a gauze), an arrow located on the top surface helps position the implant properly.

*Note: if the edges of the implant are damaged during impaction, this will not affect the mechanical strength of the implant.*

Step 7

**Impaction**
The instrumentation set provides you with an impactor and its adapted tip specially designed to adjust the implant in the osteotomy incision.
Screw the polyoxymethylene (POM) tip on the impactor handle: the POM is polymer that acts as a shock absorber thus reducing the risk of fracture during final implant positioning.
Step 8

**Temporary screws**
If needed, pre-form the plate by using the plate twister (screw in the drill guides to avoid thread damage).
Place the OTIS-C-PLUS® plate and drill with the Ø 3 mm lock drill through the holes meant for the temporary screws, then screw in the temporary screws.

Step 9

**Posterior epiphysseal orifice (hole n° 1)**
Twelve lengths are available: from 27 to 70 mm with increments of 3 to 5 mm for optimal adaptation.
Drill through the Ø 3,5 mm guide with the Ø 3,5 mm drill to the appropriate length then withdraw the guide.

Step 10

**1st screw (hole n°1)**
Use the countersink bit to ease the insertion of the screw.
Measure the thread length using the depth gauge. Insert a screw with a length equal to or immediately less than the measured length.
In order to lock the plate, screw until part of the screw comes level with the plate (see side view of the plate - page 4).

Step 11

**2nd screw (hole n°2)**
Drill through the Ø 3.5 mm drill guide using the Ø 3.5 mm drill. Use the countersink bit to ease the insertion of the screw.
Measure the thread length using the depth gauge. Insert a screw with a length equal to or immediately less than the measured length.
In order to lock the plate, screw until part of the screw comes level with the plate.
Screw the drill Ø 4.5 mm guide on hole n°3 for the third screw.
Step 12

3rd screw (hole n°3)
Drill through the drill guide with Ø 4.5 mm drill bit. Then use the countersink bit to ease the insertion of the screw.
Measure the thread length using the depth gauge.
Insert a screw with a length equal to or immediately less than the measured length.
In order to lock the plate, screw until part of the screw comes level with the plate.

Step 13

4th screw (hole n°4)
Remove the temporary screws with the screwdriver.
Drill through the drill guide with the Ø 4.5 mm drill bit. Use the countersink bit to ease the insertion of the screw.
Measure the thread length using the depth gauge.
Insert a screw with a length equal to or immediately less than the measured length.
In order to lock the plate, screw until part of the screw comes level with the plate.
Double-check that each screw is properly locked in.

OTIS-C-PLUS® placement

Follow-up
When a locking plate such as the OTIS-C-PLUS® plate is used, early weight-bearing is possible with the help of two crutches for a period of 6 weeks. Hospitalization lasts 3 to 4 days, weight-bearing is allowed after approximately 45 days. Thigh/knee splints offer an undeniable analgesic effect.

Radiological integration of the OTIS® implant starts as early as the sixth month on both surfaces; the border between the metaphyseal bone and the implant becomes indistinct and the graft loses its geometric appearance.
Clinical examples

Opening Wedge High Tibial Osteotomy, right knee.
*Courtesy of Doctor Jean-Claude PANISSET, Clinique des cèdres, Grenoble, France.*

Opening Wedge High Tibial Osteotomy, left knee.
*Courtesy of Professor Dominique SARAGAGLIA, CHU Sud Grenoble, France.*
Instrumentation

Instruments

- **Drill guides** Ø 3.5 and Ø 4.5 mm
- **Drill for temporary screw** Ø 3 mm
- **L 195 mm drills** Ø 3.5 and Ø 4.5 mm
- **OTIS metallic trial implants**
  - Heights 8, 9, 10, 11, 12, 13, 14, 15 mm
- **Handle for OTIS metallic trial implants** (x2)
- **OTIS one-piece metallic trial implant**
  - Heigths 6 and 7 mm
- **Round headed temporary screw** (x2)
- **Countersink bit**
- **Depth gauge**
- **Impactor (body and tip)**
- **Plate twister**
- **Slotted hammer**
- **Hexagonal screwdriver Ø 3.5 mm**
### Ordering Information

#### OTIS® osteotomy wedges

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#### OTIS® 50 osteotomy wedges

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#### OTIS-C-PLUS® plates and screws

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### Complete instrumentation for High Tibial Osteotomy

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### Extraction kit for OTIS plate and screws

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