ZIMMER BIOMET
Your progress. Our promise.®

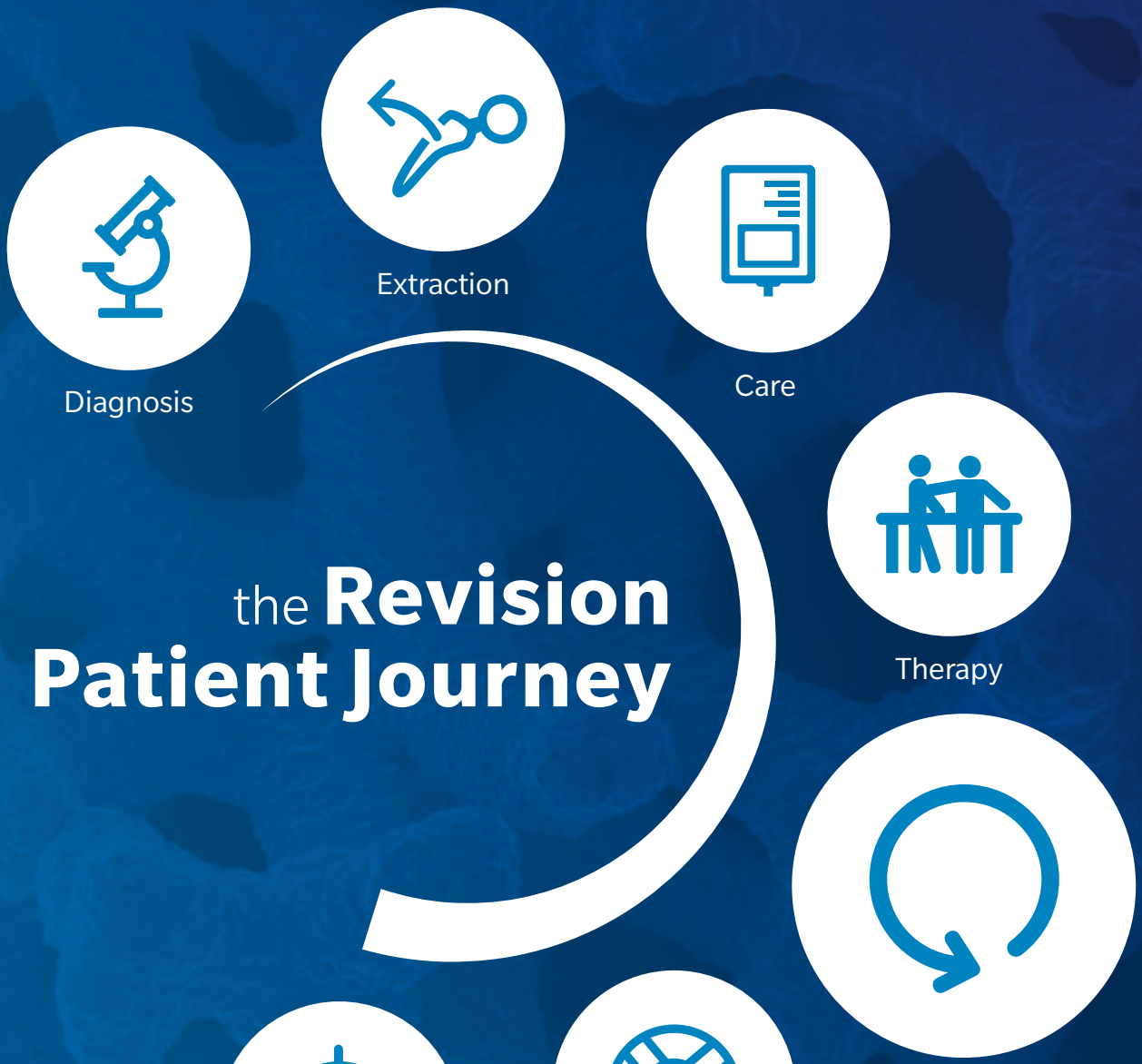
Trabecular Metal™ Acetabular Revision System

(TMARS)

BREAKING the REVISION CYCLE

Zimmer Biomet offers customers solutions to address the most common issues leading to revision procedures.

It is time to break the revision cycle to focus on the entire patient journey from before, during and after surgery and provide surgeons the tools to make informed decisions in order to establish an appropriate treatment plan. From diagnostics to re-implantation, the innovative solutions seamlessly deliver a comprehensive platform transforming the revision patient journey with customizable, interconnected and interdependent services and solutions.



the **Revision Patient Journey**

Re-implantation

TMARS works alongside innovative solutions to seamlessly deliver a comprehensive platform tailored to the individual patient needs.

Paprosky Acetabular Defect Classification

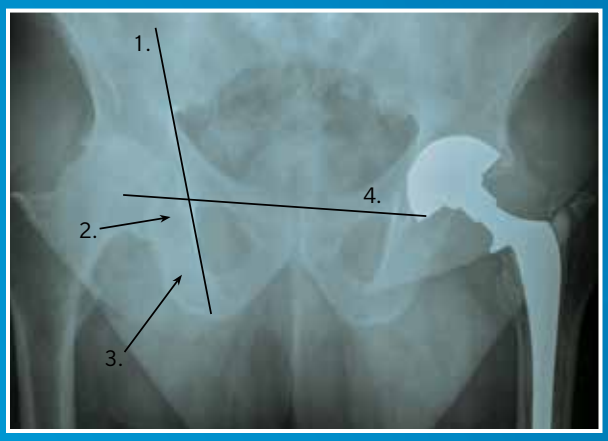
Defects spanning Paprosky Type I through IV have been successfully treated with the TMARS.[1–6]

Initial stability and long-term biologic fixation is key in revision hip arthroplasty. Some revision surgeons may find even more challenges due to severe bone loss in a patient. By leveraging our advanced technologies with an algorithmic approach, an extensive range of patients with Paprosky's Acetabular Defects can be treated and mobility restored.

Four Landmarks

Indications for component revision are dependent upon four **radiographic criteria**.

Radiographic Criteria



1. Kohler's Line:
Integrity of medial wall and superior column

2. Acetabular Tear Drop:
Integrity of medial wall and inferior portion of anterior and posterior column

3. Ischial Lysis:
Integrity of posterior wall and posterior column

4. Vertical Migration:
Integrity of superior dome

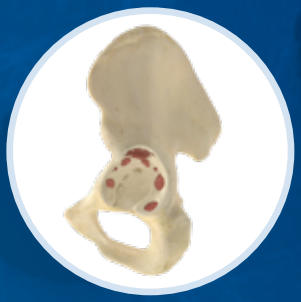
Type I & IIA

Type I Defect Characteristics

Acetabular rim, anterior column, and posterior column intact and supportive; small, local, contained defects

Type IIA Defect Characteristics

Moderate superomedial migration <3 cm; >50% host-bone contact



Type IIB

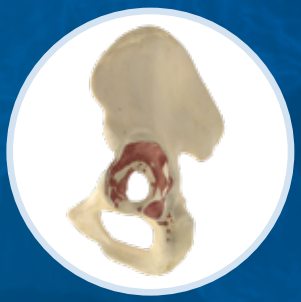
Type IIB Defect Characteristics

Moderate superolateral migration <3 cm; >50% host-bone contact

Type IIC

Type IIC Defect Characteristics

Isolated medial migration, medial to Kohler's line; intact rim



Type IIIA

Type IIIA Defect Characteristics

Severe superolateral migration >3 cm; 40–60% host-bone contact; inadequate stability; defect <½ circumference

Type IV

Type IV Pelvic Discontinuity Characteristics

Partial or complete fracture

INDIVIDUALIZED
SOLUTIONS FOR EVERY PATIENT

TMARS allows surgeons to have flexibility, longevity and reliability within one system that boasts a clinical history of over 20 years.[7–9] By combining clinically proven Trabecular Metal Technology[7–9] with an array of augments, liners, shells, buttresses and cages, a surgeon can form and customize a construct to better address acetabular defects, poor bone quality and personalize care.

Flexibility
Mix and match implants intraoperatively, enabling more efficient case management and execution.

The Right Fit
Interfaces are cemented against the Trabecular Metal Revision Shell, creating a monolithic construct without concerns of micromotion.

Fixation

Fully-interconnected trabecular structure enables tissue and bony in-growth.[10]

Stability

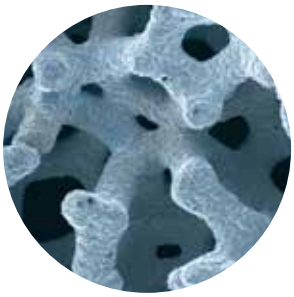
Cemented liners are designed to allow for placement at the exact coverage angle and have a grooved backside to provide rotational stability.

Mitigate Challenges

Secure mechanical and biologic fixation for a stable construct without the the need for graft resorption or structural allograft.[11]

ADVANCED
TECHNOLOGY
IN ONE SYSTEM

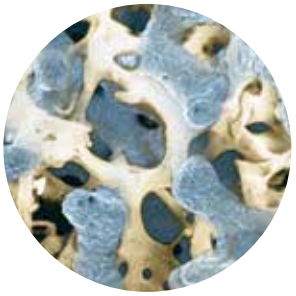
TMARS features modularity as well as a variety of other **technologies** within **one comprehensive system** to provide a **simple solution** to the surgeon in challenging acetabular revisions.



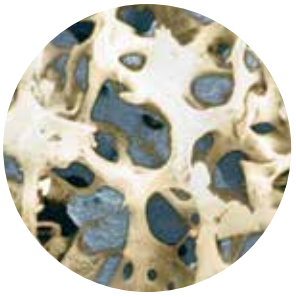
Trabecular Metal

- Evidence supporting Trabecular Metal acetabular components is well-documented across more than **300** publications.

- Trabecular Metal cups used in revision THA have shown to be **21% less** likely to be re-revised due to infection and **11% less** likely to be re-revised for any reason.[11–13]



- **Up to 80%** porosity with **100%** open, interconnected pore structure, designed to support bony in-growth and vascularization.[14]



- **65% less** likely to be revised for aseptic loosening compared to non-TM cups.[15]

Augments, Cages and Shells

- Shims placed between the buttress augment flange and host bone **optimize** the fit of the device against iliac bone conserving host bone and providing **structural support**.
- Cages can be contoured to fit the acetabulum while providing mechanical **stability**.
- Restrictors and augments come in many **sizes** supporting coverage of defects.
- Revision shells **feature** multiple hole options to support the system.

ADVANCED
TECHNOLOGY
IN ONE SYSTEM

Bone Cement

- For TMARS, bone cement is used to cement the liner to the shell, cage and between any augments to create a monolithic structure.
- High-viscosity bone cement, with and without antibiotics.
- Reliable performance based on international laboratory testing.[16]
- Green color for easy recognition during surgery.
- Easy handling with modern vacuum mixing systems standards.[17]

Constrained Liners

- Designed for **performance** and **dislocation** resistance.
- Longevity® Highly Cross-linked Polyethylene is used in up to **19%** of revision **THAs**, highly resistant to wear and aging.[18–20]
- RSA study demonstrates proximal head penetration in Longevity inserts is **significantly lower** than conventional polyethylene.[19,10]
- Traditional constrained inserts can **restrict** range of motion, potentially leading to implant-on-implant impingement. This could lead to component failure,[19,20] further dislocation,[21] or implant loosening.[19]

RECONSTRUCTION OPTIONS

We utilize Paprosky's Defect Classification to discuss revision and better develop solutions both intraoperatively and preoperatively. Utilizing the modularity of TMARS while defining reconstruction options based on the radiographic criteria, we can address the severity of bone loss and the ability to obtain cementless fixation all for a given bone-loss pattern. Depending upon your radiographic criteria and your understanding of the defects the patient may exhibit, TMARS can help in planning your approach to reconstruction.

Type I & IIA | Type IIB | Type IV | Type IIIA | Type IIC

The integrity of the host-bone stock determines the reconstruction option available:

Completely supportive acetabulum (ingrowth likely)

- Trabecular Metal Revision Shell

Partially supportive acetabulum (ingrowth possible)

- Trabecular Metal Revision Shell with Augments

Non-supportive (ingrowth unlikely)

- Trabecular Metal Revision Shell with Buttress Augments and/or Cage

Type I & Type II Defects

Radiograph of Defect

Example of Defect

Algorithmic Repair

Type I Defect

Kohler's Line: Intact

Tear Drop: Intact

Ischial Lysis: Minimal to none

Vertical Migration: Minimal to none

Type IIA Defect

Kohler's Line: Intact
Tear Drop: Violated
Ischial Lysis: Mild to moderate
Vertical Migration: Minimal to none

Type IIB Defect

Kohler's Line: Intact

Tear Drop: Intact

Ischial Lysis: Mild

Vertical Migration: <3 cm

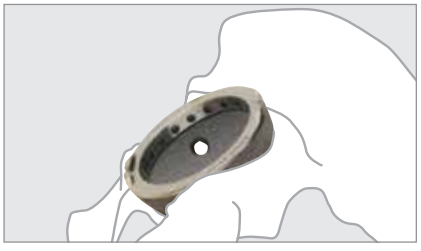
Type IIC Defect

Kohler's Line: Moderately violated
Tear Drop: Moderate lysis
Ischial Lysis: Minimal
Vertical Migration: Minimal to none

Solution

Trabecular Metal Revision Shell and Longevity® Highly Crosslinked Polyethylene Liner

- Designed to prevent backside micromotion
- Cement secures screws
- Isoelastic loading of bone
- Cemented Longevity Highly Crosslinked Polyethylene Liners with large-diameter heads, up to 40 mm, for additional joint stability and range of motion



Type IIIA—Cavitary Defect

Radiograph of Defect

Example of Defect

Algorithmic Repair

Type IIIA Cavitary Defect

Kohler's Line: Intact

Tear Drop: Minimal lysis

Ischial Lysis: Minimal

Vertical Migration: >3 cm

Solution

Trabecular Metal Augment in oblong cup position[2,16-18]

- Uses the Trabecular Metal Augment to fill the superior bone void and restore head center to natural anatomic position
- Cementing the Trabecular Metal Revision Shell to the augment creates a monolithic construct

Type IIIA—Segmental Defect

Radiograph of Defect

Example of Defect

Algorithmic Repair

Type IIIA Segmental Defect

Kohler's Line: Moderately violated but intact

Tear Drop: Minimal lysis

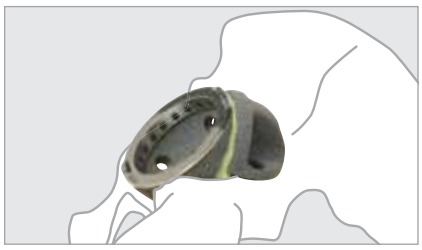
Ischial Lysis: Mild

Vertical Migration: >3 cm

Solution

Trabecular Metal Augment in flying buttress position[1–2,8–10]

- Uses the Trabecular Metal Augment, inverted, as a load-bearing structural support to replace the missing acetabular rim
- Cementing the Trabecular Metal Revision Shell to the augment creates a monolithic construct



Type IIIA—Extensive Segmental Defect

Radiograph of Defect

Example of Defect

Algorithmic Repair

Type IIIA Extensive Segmental Defect

Kohler's Line: Intact

Tear Drop: Minimal lysis

Ischial Lysis: Mild

Vertical Migration: >3cm

Solution

Trabecular Metal Buttress Augment

- Trabecular Metal Buttress Augment provides a superior step for placement against the ilium and is an alternative to allografts.
- Trabecular Metal Shim Augments are available to supplement the fit of the superior flange of the buttresses onto the ilium
- Cementing the Trabecular Metal Re-vision Shell to the augment creates a monolithic construct

Type IIIB—Contained Medial Defect

Radiograph of Defect

Example of Defect

Algorithmic Repair Step 1

Type IIIB Medial Defect

Kohler's Line: Violated

Tear Drop: Violated, significant lysis

Ischial Lysis: Severe

Vertical Migration: >3 cm

Solution

Trabecular Metal Augments

in footings position[1–6, 8]

- Trabecular Metal Augments sized to fit defect, providing a foundation for the shell and filling voids from medial and/or superior defects
- Cementing the Trabecular Metal Revision Shell to the augments creates a monolithic construct

Algorithmic Repair Step 2

Pelvic Discontinuity

Radiograph of Defect

Example of Defect

Algorithmic Repair

Pelvic Discontinuity

- Superior aspect of pelvis is separated from the inferior aspect as a result of bone loss or an acetabular fracture.
- If the defect is extensive and adequate stability cannot be reached through TMARS, it may require a custom device specifically matched to the patient's unique anatomy. Zimmer Biomet's Triflange Acetabular component is a patient-matched implant designed in partnership with the surgeon, using the patient's own CT scan data and could be considered as an option in this case.

Solution

Cup-Cage Construct

- The Cage spans the acetabular defect and provides mechanical stability until biological ingrowth occurs within the Trabecular Metal Revision Shell
- Used in situations where the Trabecular Metal Revision Shell alone does not provide adequate stability
- The Trabecular Metal Revision Shell provides potential for bone ingrowth and long-term fixation
- Three components—shell, cage, and liner—cemented together create a monolithic construct

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