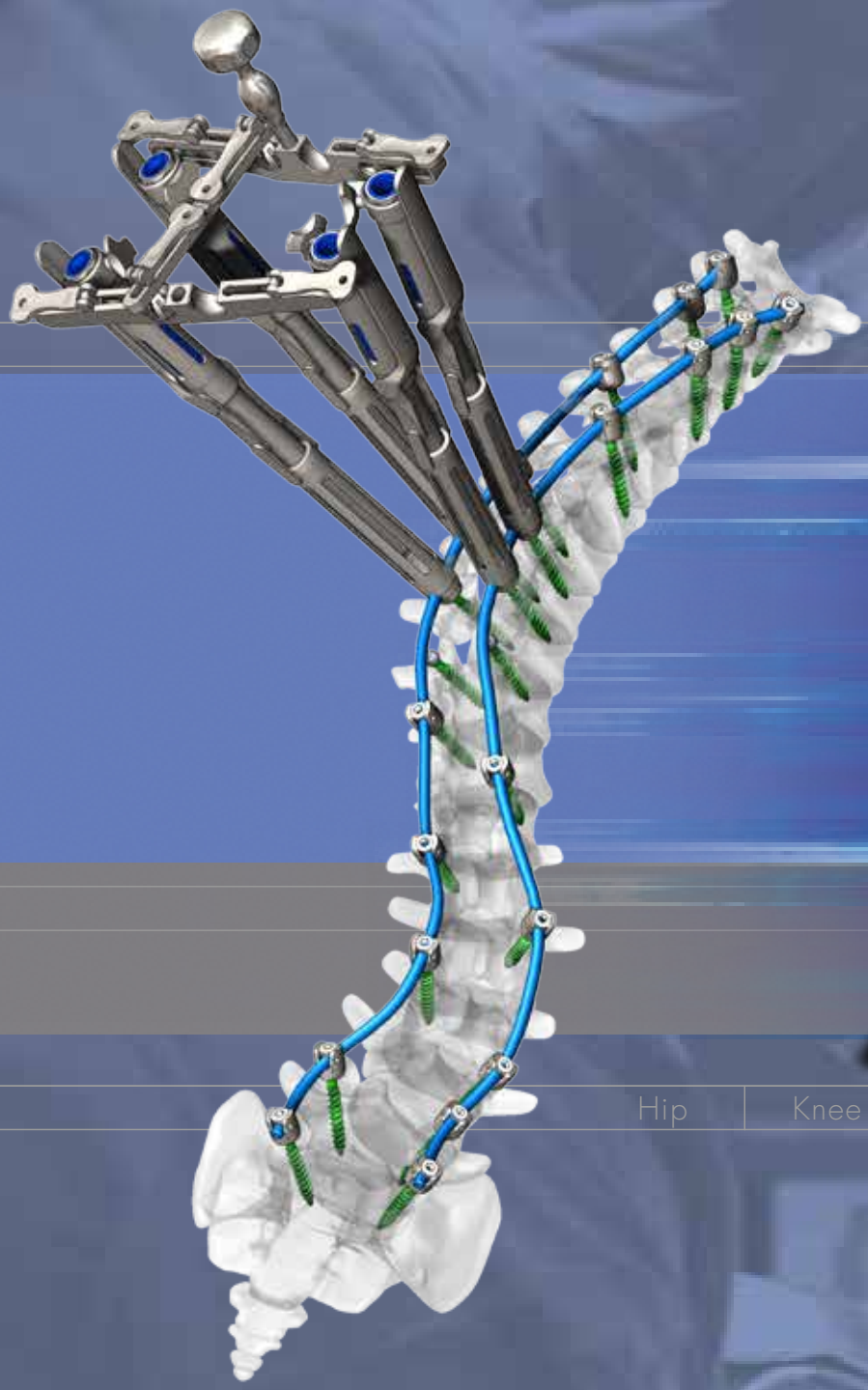
# .U.S.T.

VERTEBRAL BODY DEROTATION MODULE



## Surgical Technique

Hip | Knee | Spine | Navigation

Medacta International

# INTRODUCTION

Medacta Spine continues to support the goal of expanding the spine surgeon's options for the treatment of spinal disorders.
Medacta Spine has developed this surgical technique guide for vertebral body derotation.

This detailed technique guide includes step-by-step descriptions of segmental as well as en bloc vertebral body derotation manoeuvres.
The surgical steps of these techniques are described here with MUST Spine System instrumentation and the Vertebral Body Derotation (VBD) module.

The MUST VBD Set has been developed to address some of the challenges of the derotation manoeuvres.

The MUST family of products includes a wide selection of deformity specific implants and instruments to support the Medacta Spine philosophy of patient driven, pathology specific solutions.

# ACKNOWLEDGEMENTS

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*for their valuable contributions in the development of the M.U.S.T. implants, instruments and the surgical technique.*

# CONTENTS

## 1 INTRODUCTION

It is accepted that with the use of pedicle screws in scoliosis correction, significant coronal plane correction can be consistently obtained.
True axial plane correction can now be achieved to address the rotational deformity of the spine, ribs and chest wall.
The main goal of vertebral body derotation (VBD) is to achieve rotational deformity correction, which may decrease the need for thoracoplasty.

## 2 SCREW PLACEMENT

Place the pedicle screws according to the MUST standard or reduction screws technique and the pre-operative surgery plan.
On the concave side: insert monoaxial, reduction screws or polyaxial screws at every level.
On the convex side: insert monoaxial, reduction or polyaxial screws into at least 3-4 convex pedicles at the apex, as well as the proximal and distal foundations.
Confirm placement of screws and check screw length with fluoroscopy prior to rod insertion.

## 3 ROD CONTOURING

Using the dual rod benders/holders it is possible to simultaneously pre-bend two rods at the same time. The following steps address accurate rod contouring to avoid any asymmetrical bending of the rods themselves.

**Step 1:** Insert the rods through both the left and right dual rod benders and link the rod together with the dual rod holders to both rod extremities.

**Step 2:** Begin the bending manoeuvre firmly holding the dual rod benders and applying a distraction (Fig. 1a) or compression (Fig. 1b) force in order to achieve the desired curvature of the rods. Proceed through the whole length of the rod until the final bending is achieved.

Fig. 1a

Fig. 1b

**NOTICE:** The rod's mechanical properties will be an important factor in kyphosis restoration and derotation. The stronger rods in the MUST portfolio (i.e. CoCr Alloy rods) will be more effective than Ti rods in axial derotation and sagittal plane restoration, since less flattening of the rod can be expected. The rod strength, however, should be matched to the patient's bone density.
Insert the first rod into the pedicle screws on the concave side of the spine leaving the set screws loose. The second rod can be inserted immediatley after the first one if needed (Fig. 2).

Fig. 2

# 4 ROD INSERTION AND REDUCTION

If rod reduction is needed, the rod can be inserted into the screw heads via one of the following options:

- 1-Step Reducer
- 2-Step Reducer and Reduction Driver
- Locking Towers 2.0

## 4.1 1-Step Reducer

The 1-Step Reducer can be used when simple reductions are needed (up to 10 mm) (Fig. 3).

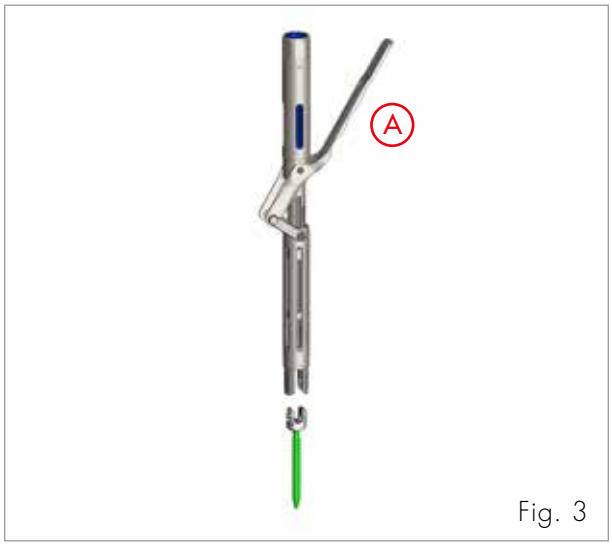


Fig. 3

Set the 1-Step Reducer in the open position and then connect it to the screw head at the level where the reduction is needed (Fig. 4).

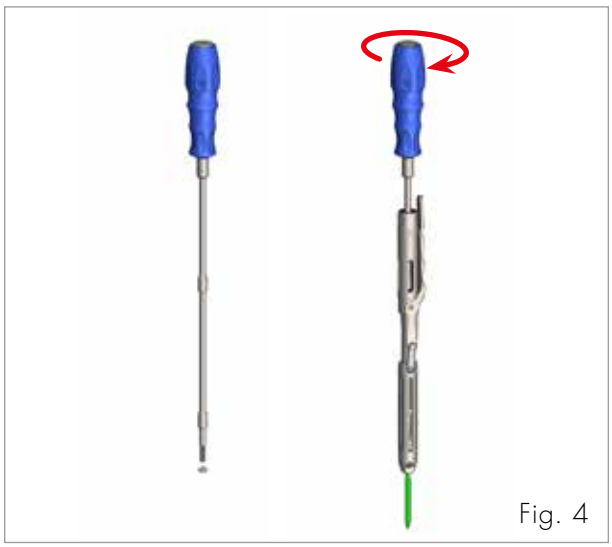

Fig. 4

**NOTICE:** Check that the implant is properly engaged with the instrument (Fig. 5 & 6).

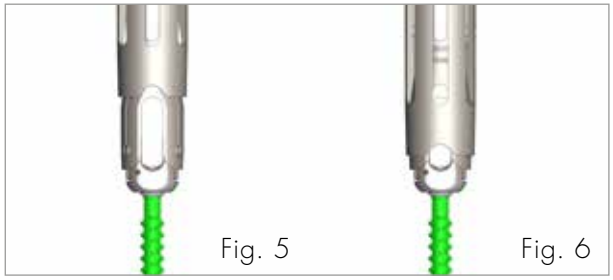

Fig. 5 Fig. 6

Close the 1-Step Reducer by clipping the lever (A) at the handle; with the locking sleeve fully locked, insert the temporary set screwdriver with the set screw engaged into the 1-Step Reducer at the top of the instrument in order to temporary tighten the set screw into the screw head.

## 4.2 2-Step Reducer and Reduction Driver

The 2-Step Reducer can be used when a higher reduction power is needed (up to 35 mm).
Set the 2-Step Reducer in the open position and then connect it to the screw head at the level where the reduction is needed (Fig. 7).

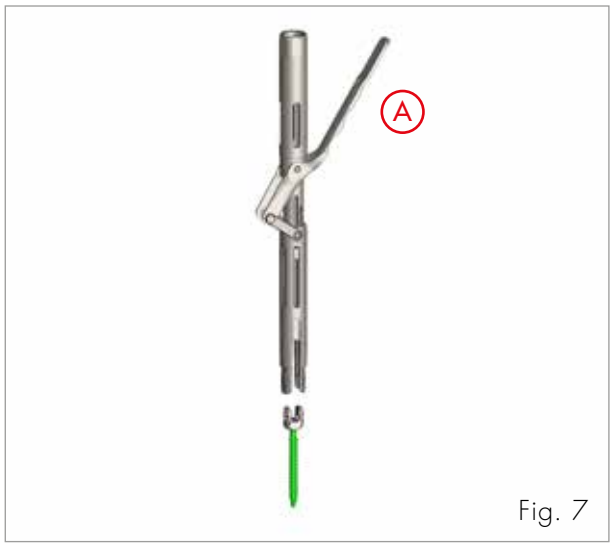


Fig. 7

Close the 2-Step Reducer by clipping the lever (A) at the handle; with the locking sleeve fully locked, insert the Reduction Driver into the 2-Step Reducer up to the beginning of the thread.
To reduce the rod, simply screw the Reduction Driver down through the 2-Step Reducer. Now insert the temporary setscrewdriver with the set screw engaged through the reduction driver in order to temporary tighten the set screw into the screw head (Fig. 8).

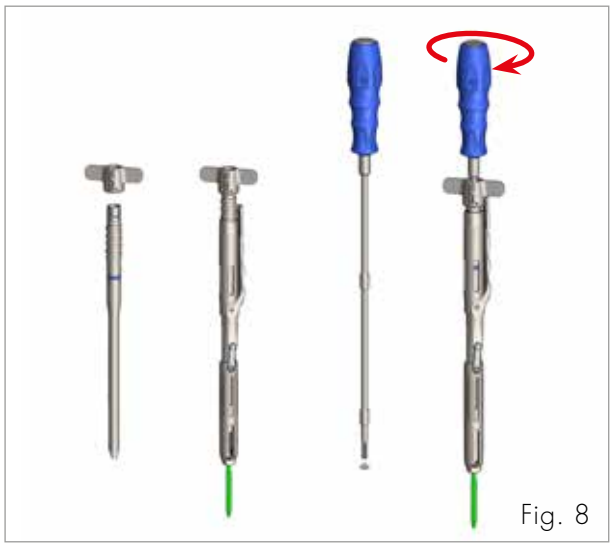
Fig. 8

**NOTICE:** Check that the implant is properly engaged with the instrument (Fig. 9 & 10).


Fig. 9 Fig. 10

## 4.3 Locking Towers 2.0

Open the handle on the Locking Tower.
Connect the Locking Tower to the screw head at the level where the reduction or the temporary locking fixation is needed.
Close the locking handle (A) (Fig. 11).

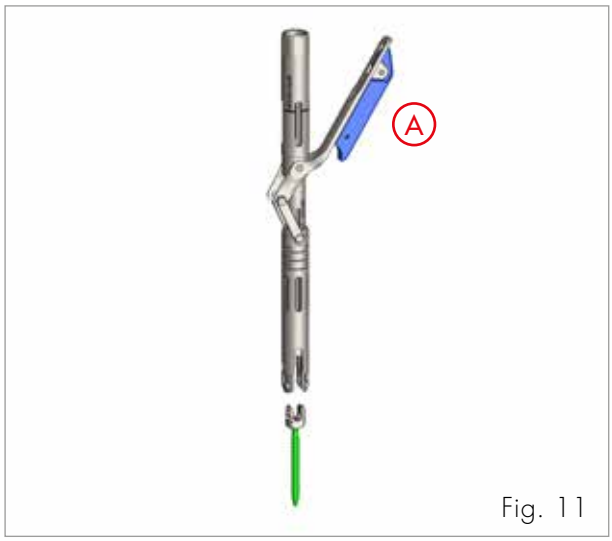

Fig. 11

With the Locking Tower fully locked in position, insert the Reduction Driver into the Locking Tower up to the beginning of the thread.
To reduce the rod, screw the Reduction Driver down through the Locking Tower. When the reduction is completed, the blue ring of the Reduction Driver will match the marking on the tower.
It is now possible to insert the set screw through the Reduction Driver with the Temporary Set Screwdriver to temporarily tighten the set screw into the pedicle screw head (Fig. 12).

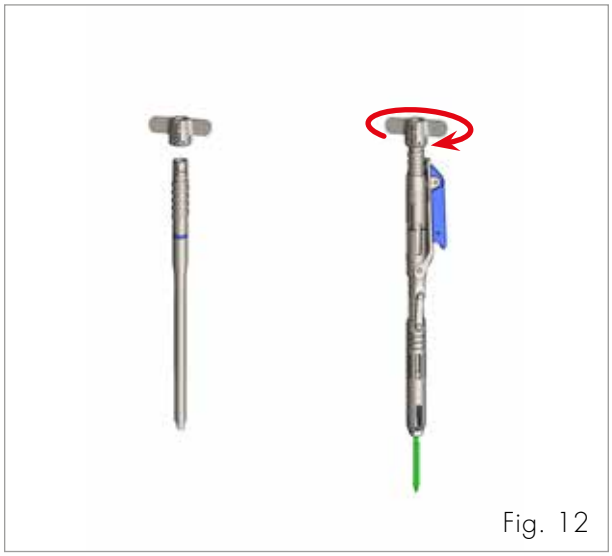
Fig. 12

To disengage the Locking Tower from the pedicle screws, release the blue handle and open the metal lever. It is now possible to remove the instrument from the implant (Fig. 13).

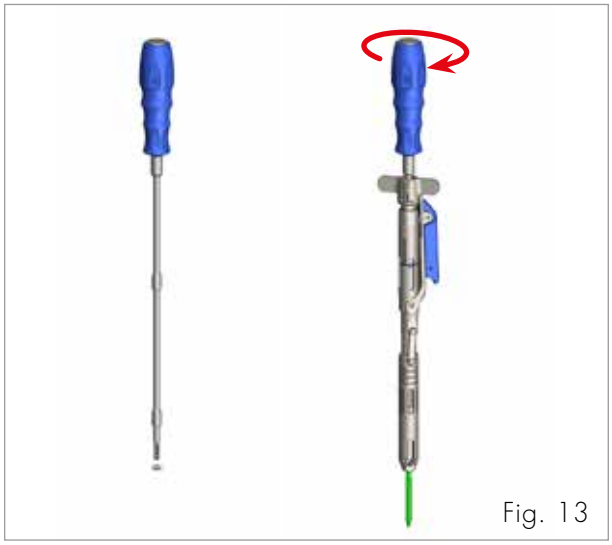
Fig. 13

# 5 DEROTATION OPTIONS

## 5.1 Direct En Bloc derotation

When the concave rod is engaged in all the screw heads, attach the instruments needed for the derotation: MUST 1-Step Reducer, 2-Step Reducer or Locking Tower to apical screw heads on both concave and convex sides.
When using MUST monoaxial screws both the 1 or the 2 step reducers can be used.
If polyaxial screws have been placed, in order to achieve a proper correction, manoeuvre the Locking Tower usage is recommended.

NOTICE: A simultaneous action is recommended in order to distribute strain and to limit loading of the bone-screw interface (Fig. 14).

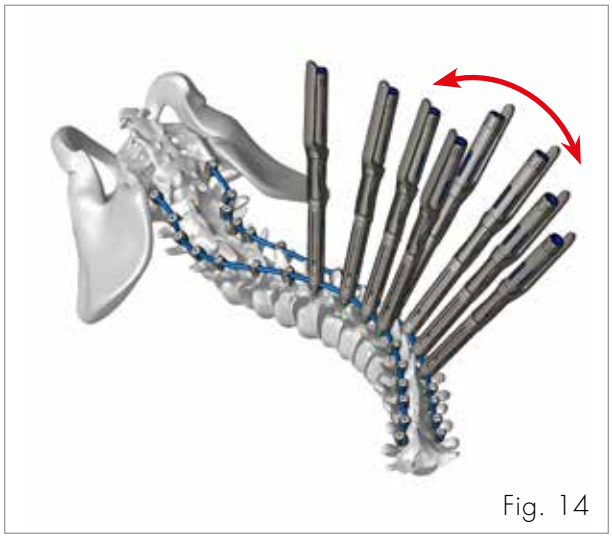

Fig. 14

## 5.2 Direct En Bloc derotation with In-line module

The MUST VBD In-line module is specifically designed to link together up to four reduction instrument options and to let the surgeon perform a simultaneous derotation of the so connected vertebrae.

Step 1: With the four cams open, engage the In-line module onto the reduction instruments connected to the implants (Fig. 15).

Fig. 15

Step 2: After the In-line module engagement, turn the thumbwheels clockwise in order to lock the module on the reduction instruments. This step is needed to avoid any disengagement from the reduction instruments. The module connectors can still slide cranially or caudally (Fig. 16).

Fig. 16

Step 3: To lock the sliding movement of the connection the cams must be switched from the "open" to the "closed" position. From now on, the In-line module is fully engaged and locked on to the reduction instruments (Fig 17).


Fig. 17

NOTICE: All the handles of the reduction instruments must be positioned on the same side.

NOTICE: Check that the position of the In-line connector ring does not interfere with the handles of the reduction instruments
A threaded attachable handle, to be mounted on top of the module, can be used in order to achieve the manipulation and the correction manoeuvres on the treated levels (Fig. 18).


Fig.18

NOTICE: It is also possible to perform the VBD manoeuvre with both rods in place in order to minimise the loss of rotational correction that might occur when inserting and rotating one rod at a time. In this case, follow the same steps described above but with both rods already implanted.
Tighten the set screws on the concave rod holding this position.
Implant the convex rod and tighten the set screws on the convex side.

Step 4: In order to remove the In-line module from the reduction instruments, it is now necessary to open the cams and turn counter-clockwise the thumbwheels of the connectors. A cam opener is also available to easily unlock the cams (Fig. 19 & 20).

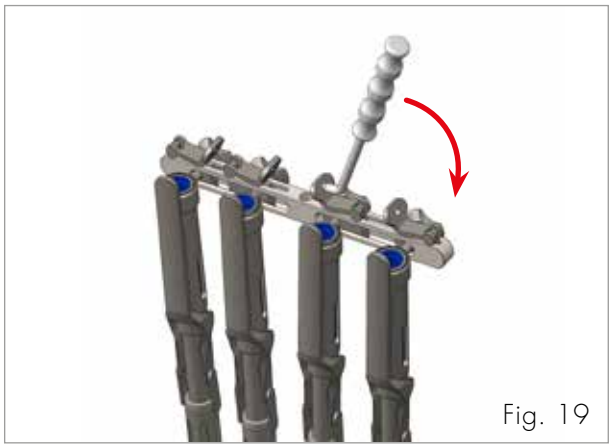
Fig. 19

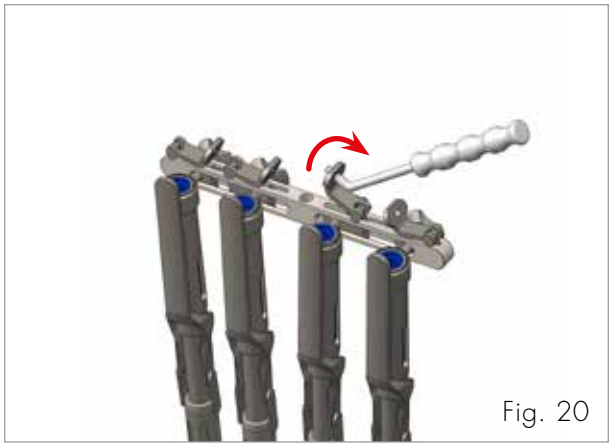
Fig. 20

## 5.3 Segmental vertebral body derotation (Individual Vertebral Level)

Segmental vertebral body derotation can be done as the sole derotation manoeuvre or in addition to the En Bloc direct derotation manoeuvre previously described.
Insert both rods and lock them using the set screws. Most set screws should be left loose since lengthening of the spine is expected at each level that will be segmentally derotated. Only the set screws in the distal neutral vertebra should be tightened.
Two lenghts of transverse module (short and long) are available in order to accommodate different anatomies.
Turn the thumbwheels clockwise and turn the cams into the "locked" position in order to fix either the connection with the reduction instruments or the lateral shifting of the connectors (Fig. 21).

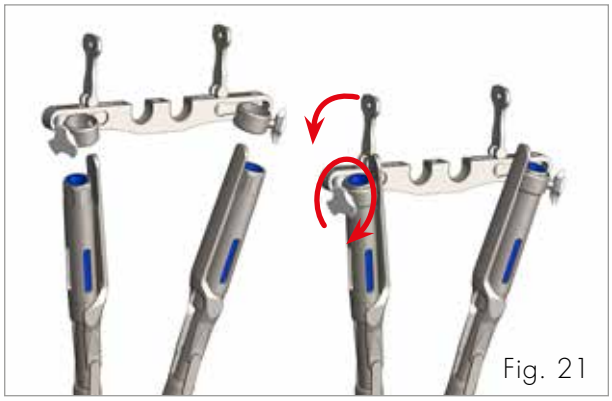
Fig. 21

NOTICE: Check that the position of the transverse module ring does not interfere with the handles of the reduction instruments.
A modular handle is also available to make it easier to handle the transverse modules (Fig. 22).


Fig. 22

To unlock the safety cams of the In-Line module, a cam opener can be used to simplify the disengagement of the module itself from the reduction instruments.

## 5.4 Multi-segmental vertebral body derotation

It is also possible to link together two VBD transverse modules in order to perform a multi-level segmental derotation.
Insert the transverse link into the grooves on the module itself and then turn both cams 90° and push them down in the "lock" position in order to fix and ensure the connection during the correction manoeuvres (Fig. 23, 24 & 25).

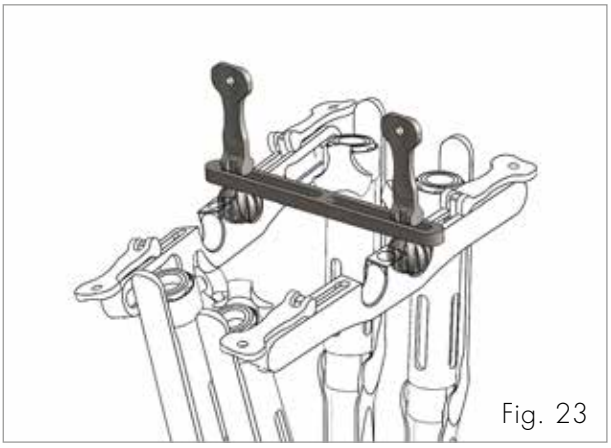
Fig. 23

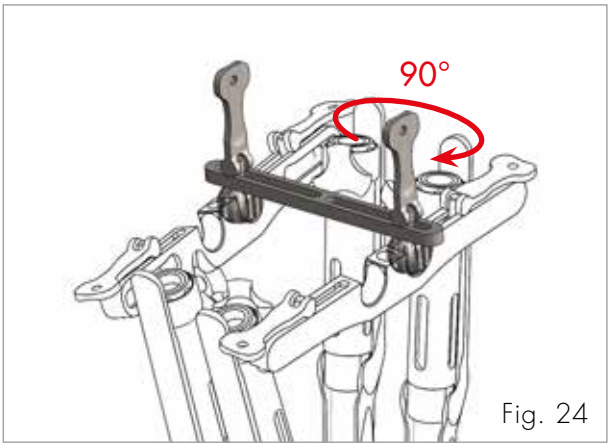

Fig. 24

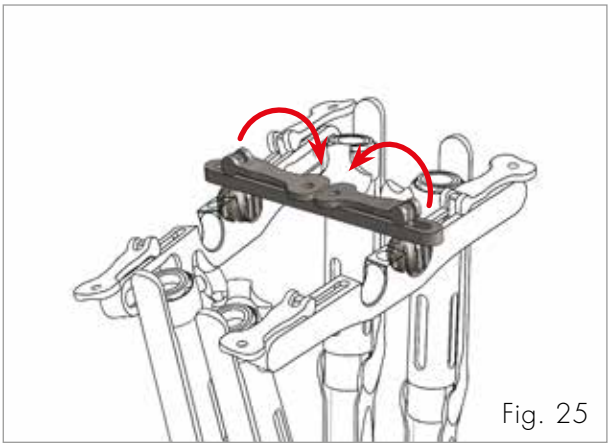
Fig. 25

**NOTICE:** Cams can be closed in both directions to avoid any overlapping during the locking step.

The second groove on the transverse module, allows for a multi-segmental derotation manoeuvre can be performed by connecting together multiple transverse modules with further links (Fig. 26).

Fig. 26

**NOTICE:** Either during the segmental derotation manoeuver or the multi-segmental one, the frame is firmly anchored to the polyaxial screws on the transverse plane. Any reduction instrument can be used for a segmental vertebral body derotation manoeuvre.
After achieving the desired correction, tighten the set screws according to the standard MUST surgical technique. A progressive tightening is recommended in order to avoid any correction loosening (Fig. 27 & 28).

Fig. 27

Fig. 28

# 6 INSTRUMENT CATALOGUE

| Ref. | Description | Picture |
|---|---|---|
| 03.51.10.0114 | 1-step reducer |  |
| 03.51.10.0115 | 2-step reducer |  |
| 03.51.10.0146 | Dual rod bender |  |
| 03.51.10.0147 | Dual rod holder |  |
| 03.51.10.0151 | Locking Tower 2.0 |  |
| 03.51.10.0153 | Vertebral Body Derotation Transverse Short |  |
| 03.51.10.0154 | Vertebral Body Derotation Transverse Long |  |
| 03.51.10.0155 | Vertebral Body Derotation In-Line |  |
| 03.51.10.0157 | Vertebral Body Derotation Connector |  |
| 03.51.10.0158 | Vertebral Body Derotation Handle |  |
| 03.51.10.0159 | Vertebral Body Derotation CAM Opener |  |

| | | |
|---|---|---|
| 03.51s.028 | MUST Deformity Extended |  |

Part numbers subject to change.

## NOTE FOR STERILISATION

**Note for sterilisation**: the instrumentation is not sterile upon delivery. It must be cleaned before use and sterilised in an autoclave respecting the regulations of the country, EU directives where applicable and following the instructions for use of the autoclave manufacturer.
For detailed instructions please refer to the document "Recommendations for cleaning decontamination and sterilisation of Medacta International reusable orthopedic devices" available at www.medacta.com.

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M.U.S.T. Vertebral Body Derotation module
Surgical Technique

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