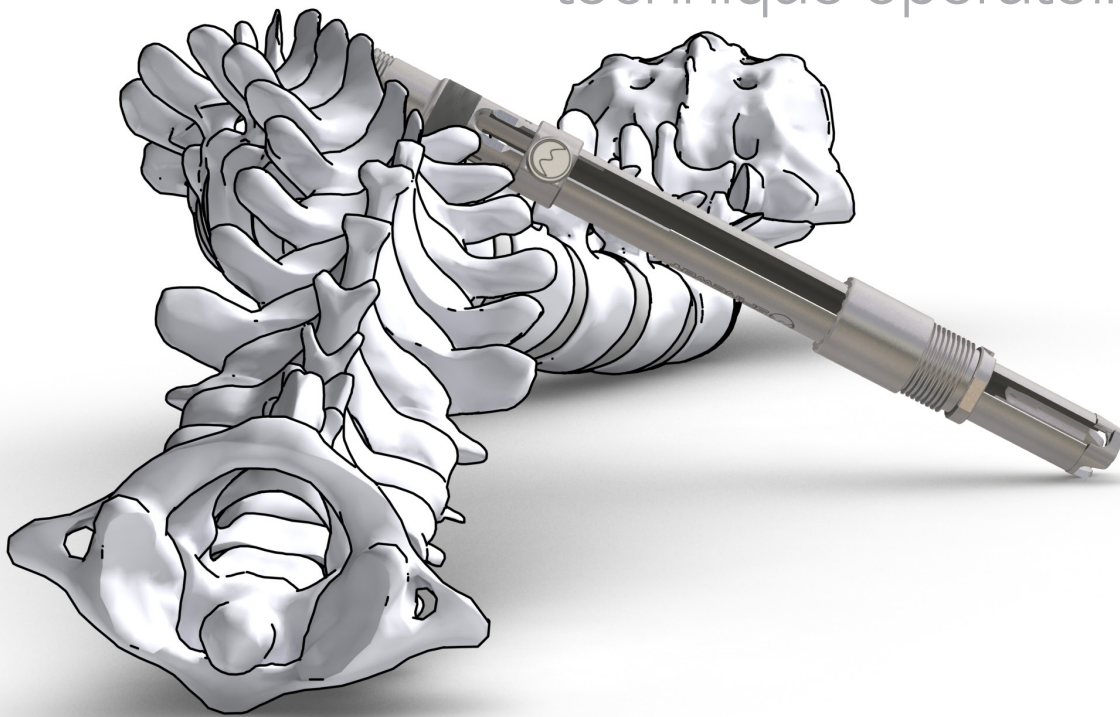


3D+

Mont Blanc 3D+

surgical technique

technique opératoire



ISO 400 >>

◀ 13 B

>> AR 3D film making

ISO 400 >>

◀ 11 B

>> AR 3D film making

ISO 400 >>



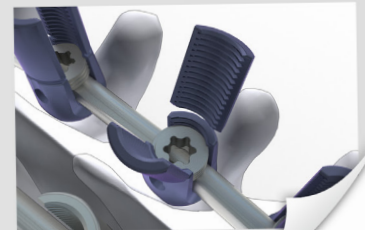
13 ▶ 13 A



12 ▶ 12 A



11 ▶ 11 A



10 ▶ 10 A

Introduction

We thank you for choosing the Mont Blanc 3D+ system.

The Mont Blanc 3D+ is a system of implants and instruments for the correction of idiopathic scoliosis, by posterior approach.

The main advantages of this device are:

- » three dimensional correction
- » correction all along the deformed spine.
- » alignment and implantation in one single step.
- » better correction of the hunch back.
- » simple instrumentation and full compatibility with Mont Blanc screws.

Mont Blanc 3D+ implants range

- » screws available in 4 diameters : 4, 5, 6, 7mm
- » lengths : 25 to 55 mm
- » rods Ø 5.5mm available in length 250 to 550mm
- » 2 kinds of rods: Titanium for all rods, but also Chrome-Cobalt for reduction and alignment rods.

Indications

After clinical and radiological examinations, the Mont Blanc 3D+ system can be used in the following cases : Adolescent idiopathic scoliosis, Lenke curves 1 and 3.

Precautions of use

Implants must be used by qualified professionals. It is requested to fully read and understand the information printed on the instruction sheet delivered with Mont Blanc 3D+ instrumentation.

Nous vous remercions d'avoir choisi le système Mont Blanc 3D +.

Le Mont Blanc 3D+ est un système complet d'implants et instruments destiné à la correction de la scoliose idiopathique par voie postérieure.

Les principaux avantages de ce dispositif:

- » *une correction tridimensionnelle.*
- » *une correction sur toute la longueur de la colonne déformée.*
- » *alignement et implantation en une seule étape.*
- » *une meilleure correction de la gibbosité.*
- » *une instrumentation simple et entièrement compatible avec les vis Mont Blanc.*

Gamme d'implants Mont Blanc 3D+

- » *vis disponibles en 4 diamètres : 4, 5, 6, 7mm*
- » *longueurs des vis : de 25 à 55 mm*
- » *tiges Ø 5,5mm, de longueur 250 à 550mm*
- » *2 types de tiges: En titane pour toutes les tiges mais aussi en Chrome-Cobalt pour les tiges de réduction et d'alignement.*

Indications

Après des examens clinique et radiologique méticuleux, le dispositif Mont Blanc 3D+ peut être utilisé dans les cas suivants : Scoliose idiopathique adolescente, Lenke 1 et 3.

Précautions d'emploi

Les implants et instruments ne doivent être utilisés que par des professionnels qualifiés. Il est impératif de prendre connaissance et d'assimiler les informations fournies sur la notice d'instructions jointe avec les implants.

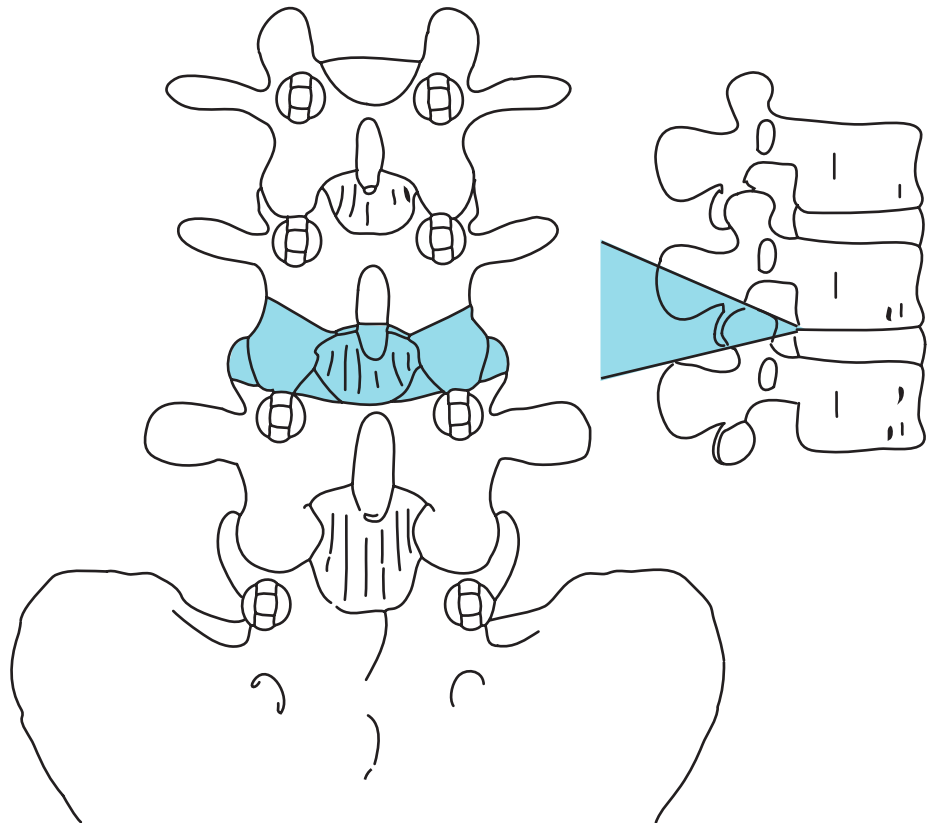
Summary

| | |
|----------------------------------|-------|
| Introduction | 3 |
| Preparing site | 5 |
| Setting the tubes, option 1 | 6-7 |
| Setting the tubes, option 2 | 8 |
| Setting the rings | 9 |
| Setting reduction rod | 10 |
| Setting alignment rod | 11 |
| Setting horizontal spacers | 12 |
| Preparing rods | 13 |
| Setting implantable rod | 14 |
| Setting rod pusher | 15 |
| Coplanar alignment manoeuvres | 16-19 |
| Rib prominence correction | 20-22 |
| Final tightening and dismantling | 23 |
| Implants/instruments references | 24-25 |

Preparing site

It is important to start with a Smith Petersen Osteotomy to set free the vertebral plates and thus facilitate the correction.

In blue on the drawing: the area to resect.



Sharp tip, curved



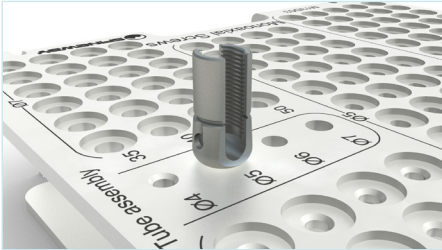
Insert the sharp tip long into the pedicle as shown in the picture above.



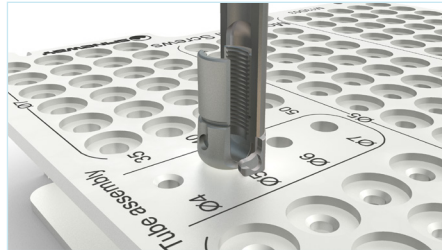
When you reach the graduation mark «20», turn the instrument to continue the piercing.

Setting the tubes

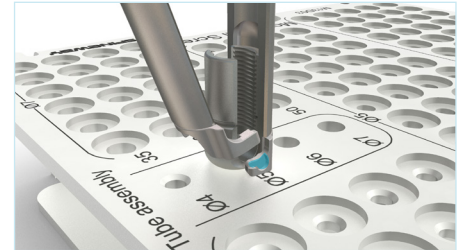
option 1



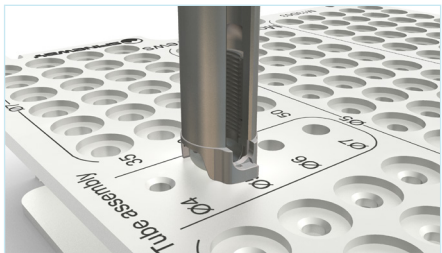
Set the screw into the hole matching its diameter on the assembling area of the implant rack.



Set the male part of the tube at one side of the screw.



Bring the female part and insert it into the male part as shown in blue on the picture.



The two part of the tube are now in place on the screw.



To maintain the two parts in this position, screw the nut of the tube on its top.



Use the monobloc screwdriver to set the monobloc correction screws.

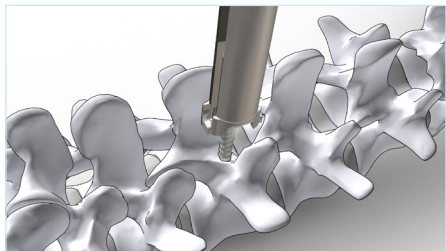


Insert the screwdriver into the tube, until it reaches the screw.

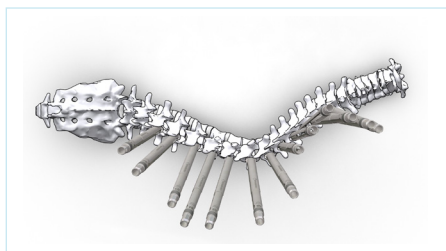
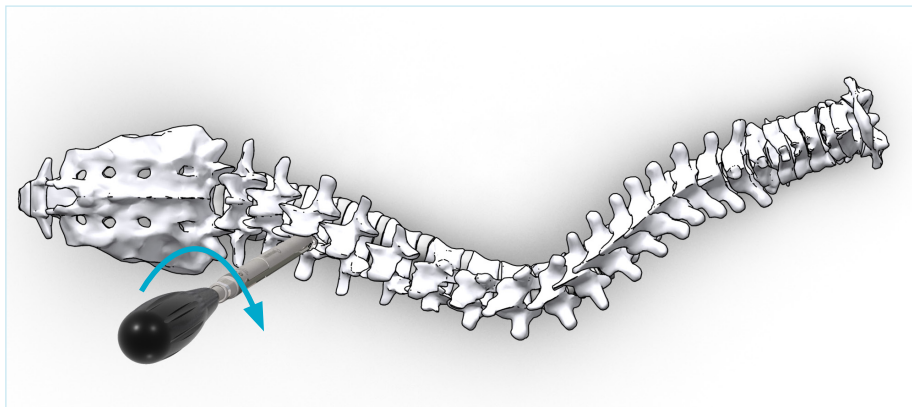


Setting the tubes

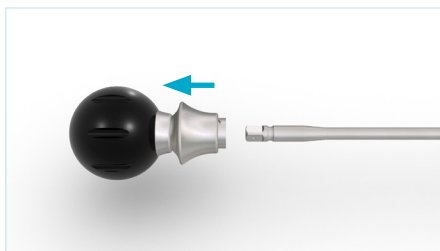
option 1



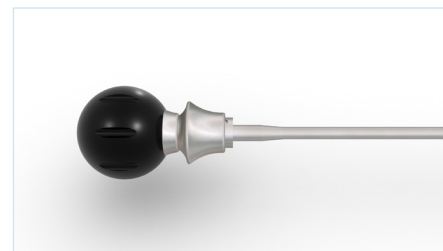
Insert the screw into the pedicles using the tube and the monobloc screwdriver.



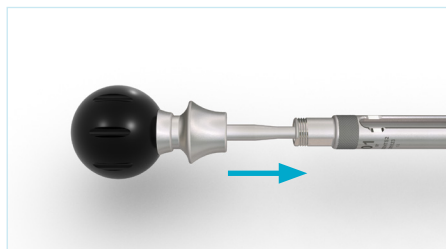
Set as many tubes as vertebrae along the deformation. Set monoaxial screws on the convex side and polyaxial screws and the concave side.



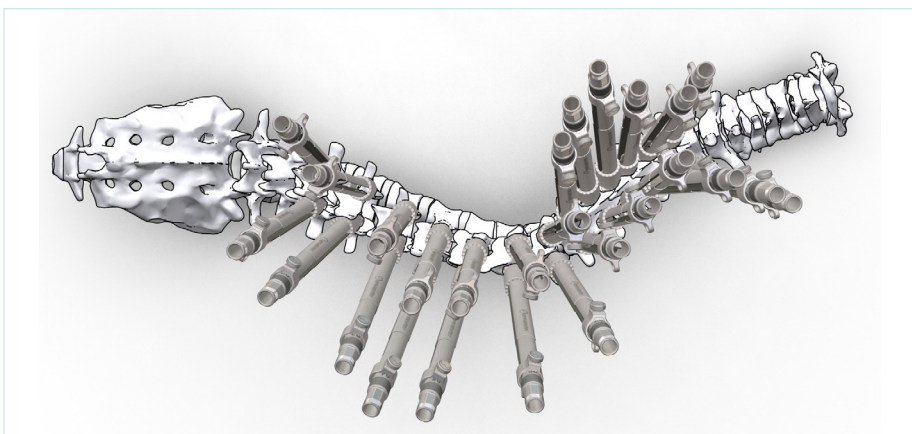
To set the polyaxial screws, it is necessary to use the polyaxial screwdriver in order to block the polyaxiality of the screw during insertion.



Insert the polyaxial screwdriver into the round handle.

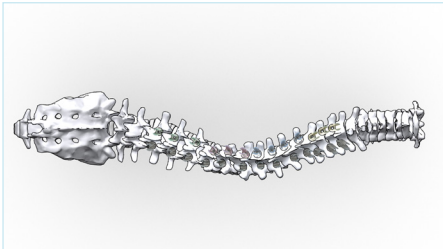


Insert the polyaxial screwdriver into the tube. All the steps which will follow, have to be done on both convex and concave sides.



Setting the tubes

option 2



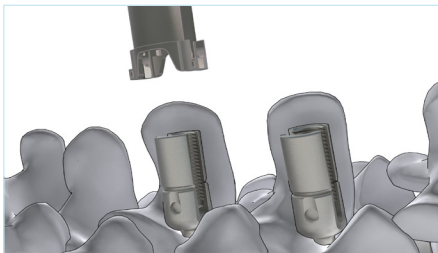
First set all the screws with the appropriate screwdriver. In this method, the tubes can be inserted in situ, after the setting of the screws.



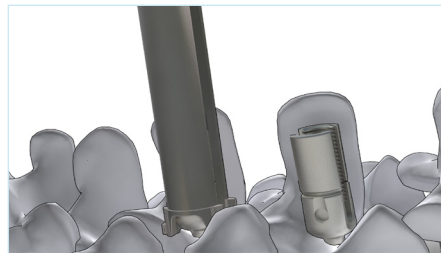
Bring the female part and insert it into the male part as shown in blue on the picture.



Put the nut for tubes on the top part of the tubes. To be able to proceed to the next step, it is essential to not screw the nut yet.



Bring the assembled tube onto the implantation site.

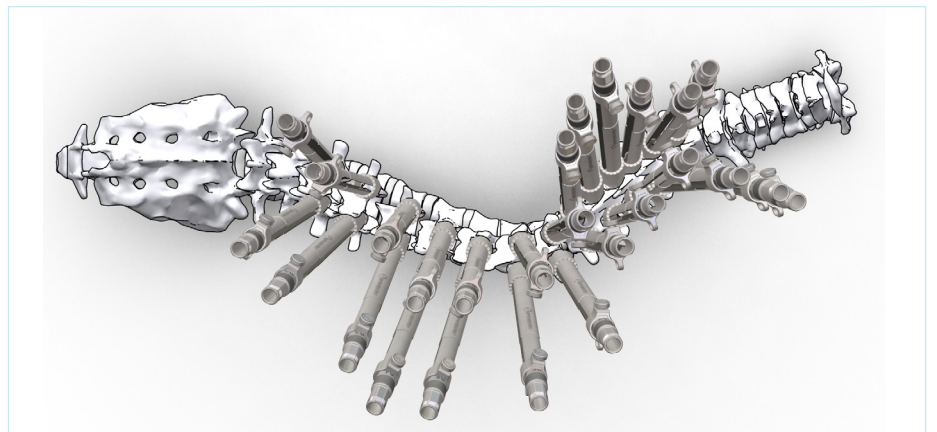


Insert the tube onto the screw. This is possible because the two parts are not tighten as the nut for tube is not screwed.



The nut for tubes can now be screwed to fix the tube on the screw.

Proceed equally for all the tubes. All the steps which will follow, have to be done on both convex and concave sides.



Setting the rings



A vertical spacer is added onto each tube. These cylinders will help later on to equally spread the forces onto the implantable rod.



A lateral ring is added to complete the tubes. Set these rings onto the top of each tube. They will help to maintain the alignment at the top using the alignment rod.



Setting reduction rod



First insert a rod into the tubes. Although they are not aligned at the bottom, their height allows the alignment of the top of the tubes. Insert the rod into the tube at the lumbar extremity.

The reduction rod can be in Chrome-Cobalt to allow a better rigidity and thus provide a better correction. However if the scoliosis is too rigid, it is necessary to use a titanium rod to avoid too strong constraints on the pedicles.

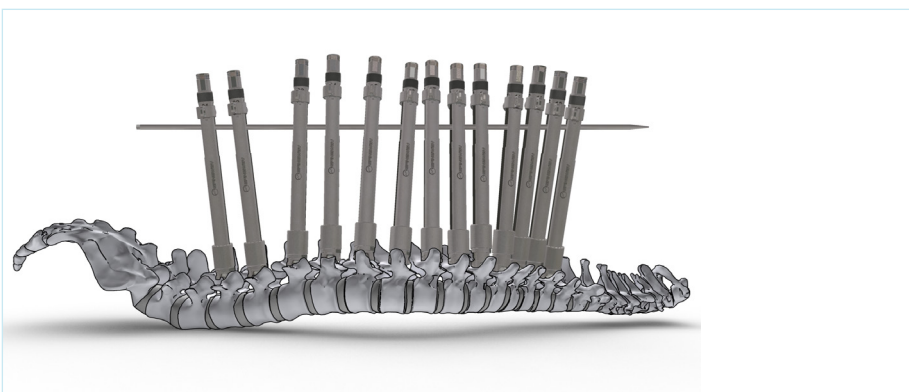
| References | Mat. | Diam. | Lengths |
|------------|------|-------|---------|
| 274H200R1 | Ti | 5.5mm | 200mm |
| 306H200CR1 | CrCo | 5.5mm | 200mm |
| 275H300R1 | Ti | 5.5mm | 300mm |
| 307H300CR1 | CrCo | 5.5mm | 300mm |
| 276H400R1 | Ti | 5.5mm | 400mm |
| 308H400CR1 | CrCo | 5.5mm | 400mm |
| 277H500R1 | Ti | 5.5mm | 500mm |
| 299H500CR1 | CrCo | 5.5mm | 500mm |

Ti: Titanium
CrCo: Chrome Cobalt

Choose the appropriate size of reduction rod.



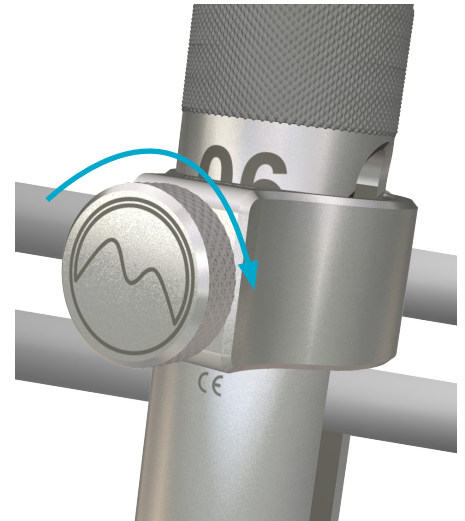
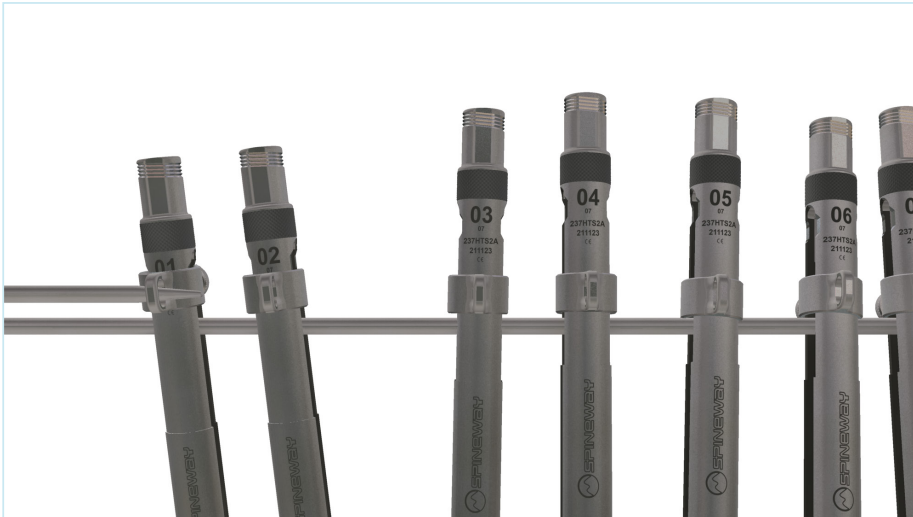
Then take the second tube and pull its top toward the center to allow the insertion of the rod. Proceed equally for the other tubes. Use the offset bender and a hammer when the insertion is too difficult. Use the rod clamp if you need to take the rod out.



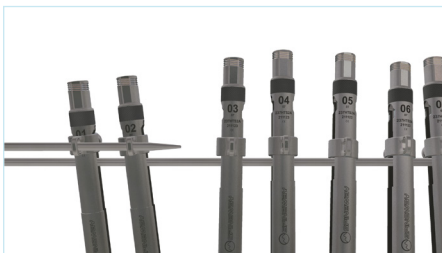
Once the rod is inserted into all the tubes, they are aligned at their top, but still not at their bottom.



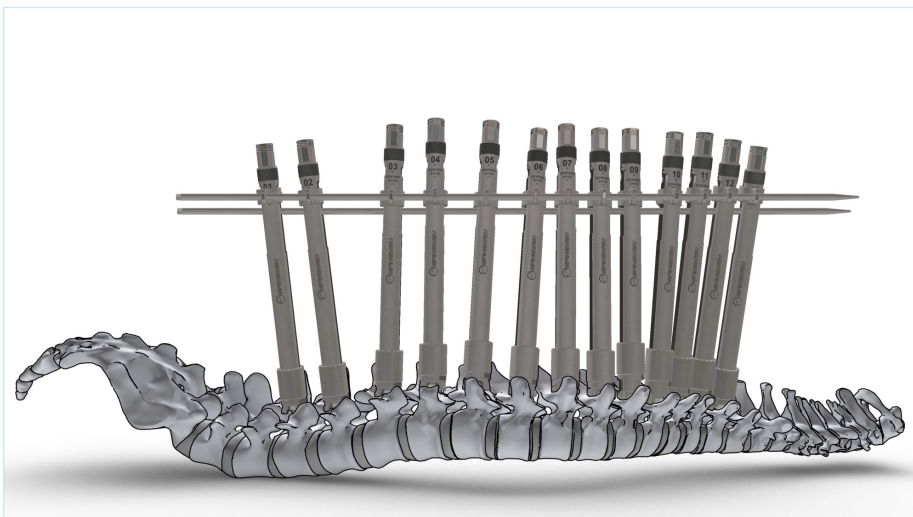
Setting alignment rod



In order to keep this alignment during correction, set another rod into the lateral rings. First make sure the lateral rings are unscrewed to be able to adjust them vertically. Once the rod is inserted, screw the wheels of the lateral rings to tighten them to the tubes.



Insert the rod into all the rings proceeding step by step as for the first rod. Be careful to not miss one ring. Use the offset bender and a hammer when the insertion is too difficult. Use the rod clamp if you need to take the rod out.



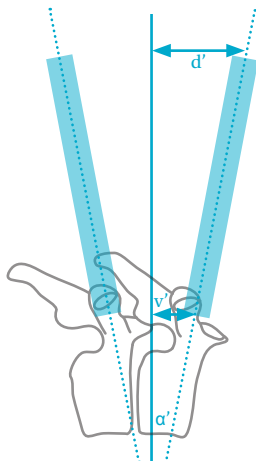
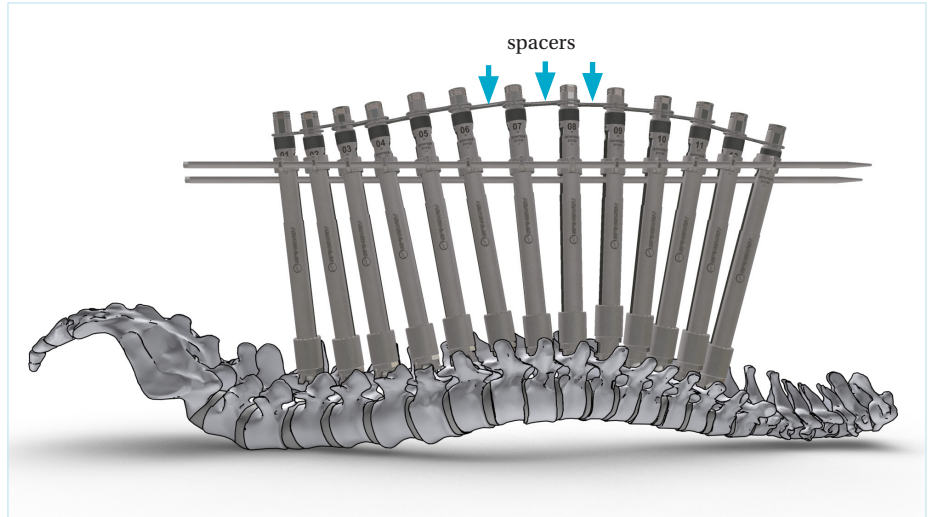
All the tubes are aligned at the top but we can notice a certain disorder. It is necessary to join them together using spacers to maintain their distance during correction. This way we will be able to give back to the spine a natural curve with lordosis in the lumbar segment and kyphosis in the thoracic segment.

Setting horizontal spacers

The Mont Blanc 3D+ is the only system allowing to set back kyphosis. Set longer spacers for kyphosis and smaller for lordosis.



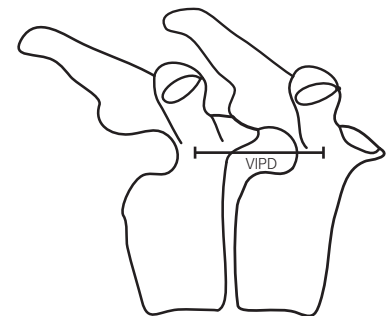
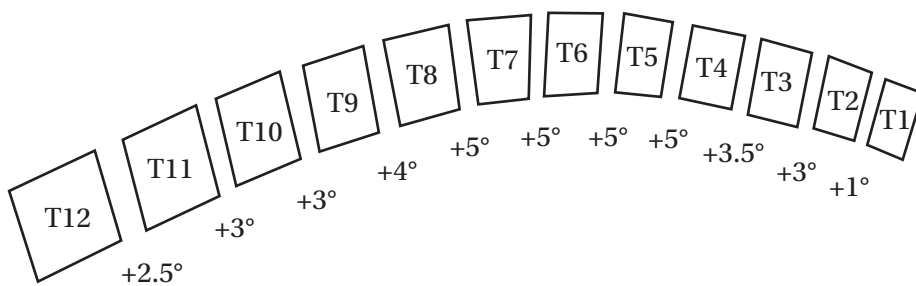
If you plan to do the rib prominence correction, spacers on the apex curve of the concave side must be 30% longer than those on convex side.



$$d' = 200 \sin \alpha' + v'$$

$$D = 2d' - \text{Ø tube}$$

| Thoracic level | Expected Kyphosis α | VIPD | Calculated Distance mm D | Spacer Size cm |
|----------------|----------------------------|------|--------------------------|----------------|
| 4-5 | 5° | 22 | 24.44 | 2.5 |
| 5-6 | 5° | 23 | 25.44 | 2.5 |
| 6-7 | 5° | 23 | 25.44 | 2.5 |
| 7-8 | 5° | 24 | 26.44 | 2.5 |
| 8-9 | 4° | 25 | 23.94 | 2.5 |
| 9-10 | 3° | 26 | 21.46 | 2.0 |
| 10-11 | 3° | 27 | 22.47 | 2.0 |
| 11-12 | 2.5° | 30 | 23.72 | 2.0 |



Bernhardt, Bridwell. Spine. 1989

Chaynes et al. Anatomic bases of medical, radiologic and surgical techniques. 2001.

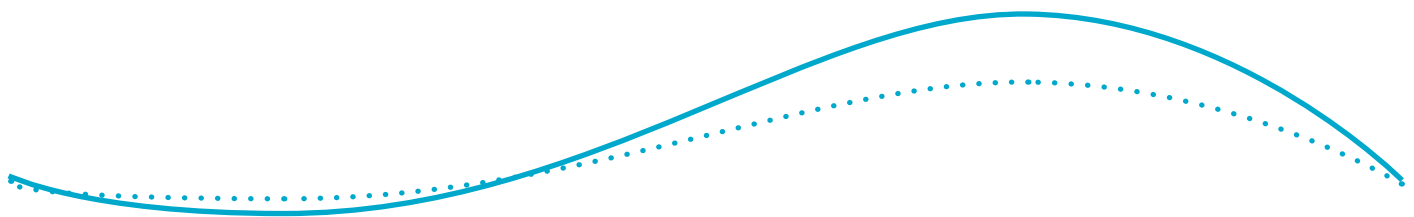
Preparing rods

The implantable rod is made of titanium. This rod is marked on its extremities, to help the surgeon to verify that the bending plan is respected while contouring the rod.



| References | Diameters | Lengths |
|------------|-----------|---------|
| MB1RB55250 | 5.5mm | 250mm |
| MB1RB55500 | 5.5mm | 500mm |
| MB1RB55550 | 5.5mm | 550mm |

Choose the appropriate size of implantable rods.



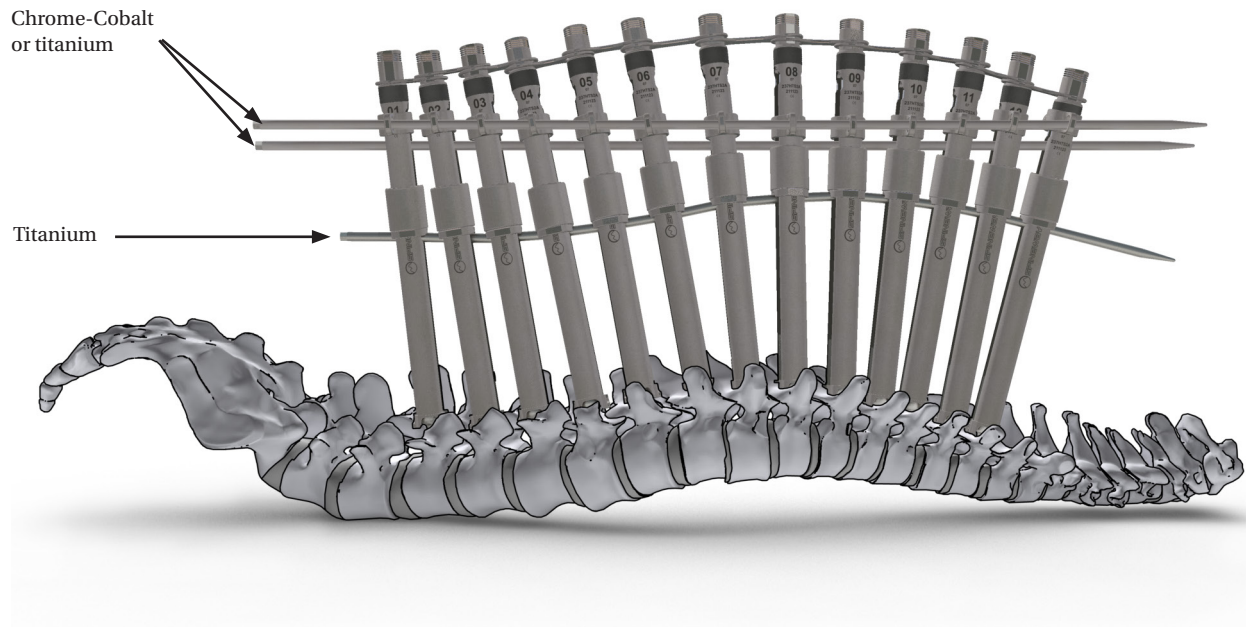
— rod on concave side
 rod on convex side

The rod on the concave side shows extra kyphosis than the rod on convex side, to allow the traction of the vertebrae. See page 20 for more information.

Contour the rod with the rod bender according to the required curvature. Choose a higher number to obtain a higher curvature angle. The wheel allows then multiple curvatures with a single instrument. Proceed to the bending step by step to evenly distribute load and avoid stress concentration.

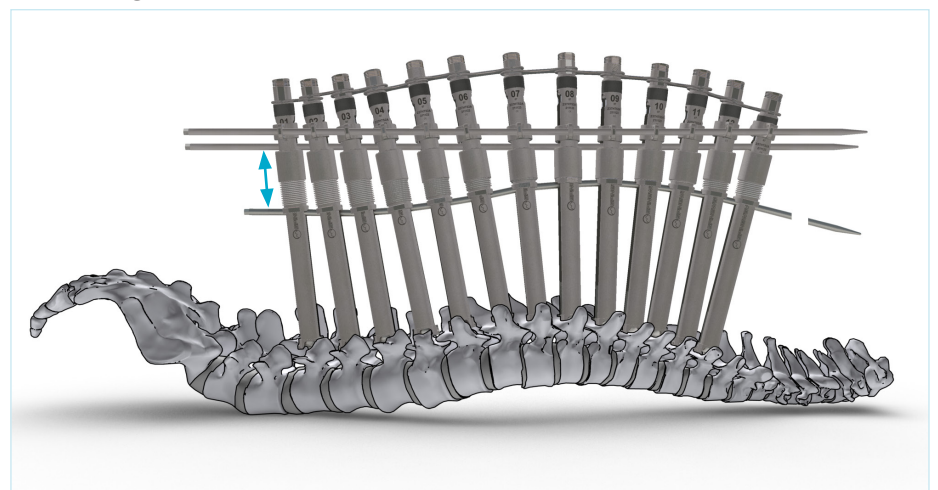


Setting Implantable rod

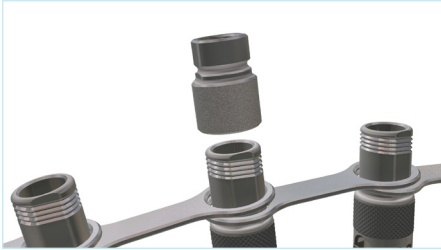


Insert the implantable rod into the tubes with the offset bender and a hammer, being sure to previously bring up the vertical spacers as high as possible to make this step easier and reduce constraints on screws and pedicles. Then cut the sharp extremity of the implantable rod.

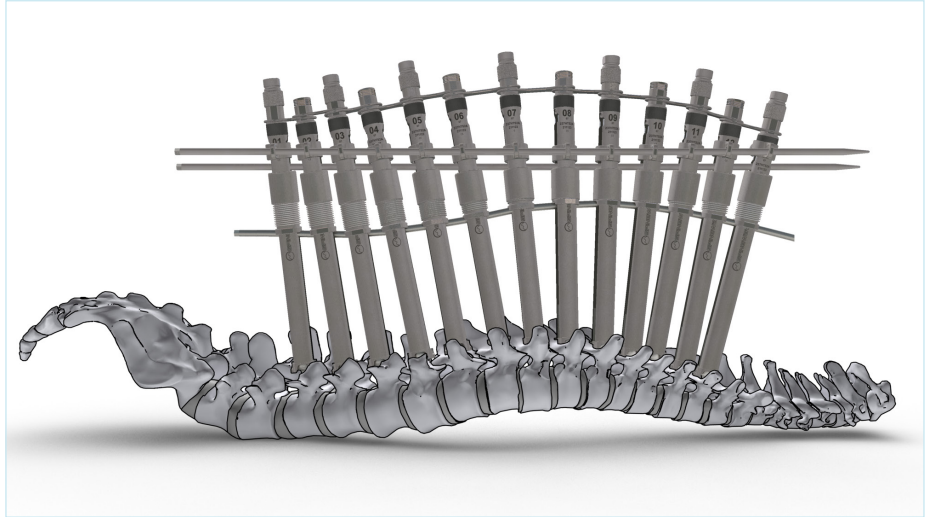
Once the implantable rod is set, it is necessary to adjust the height of the vertical spacers so that each of them touches both the reduction rod and the implantable rod. This will allow a better spreading of the charge while descending the rods.



Setting rod pushers

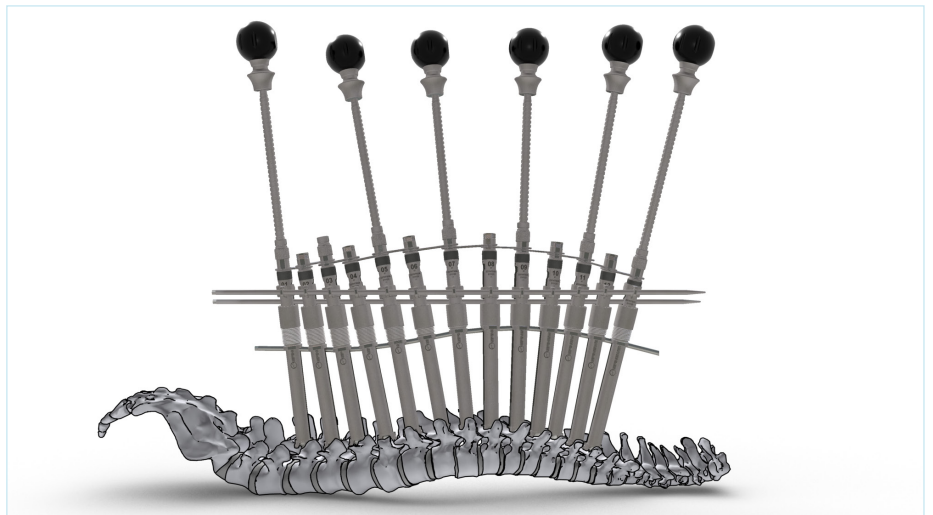


Set the nuts for rod pushers by screwing them on the top of every 2 tubes, starting and ending with the extremities.

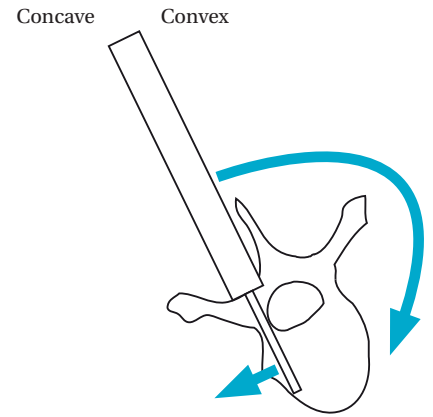
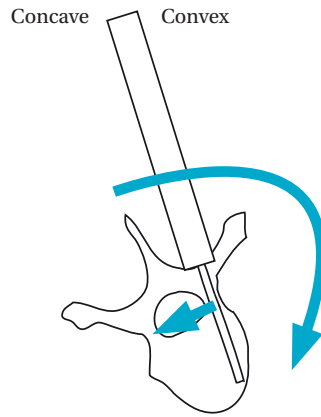


Set the rod pushers into the round handles.

Set the rod pushers into their nuts. You can set up to 6 rod pushers at the same time.

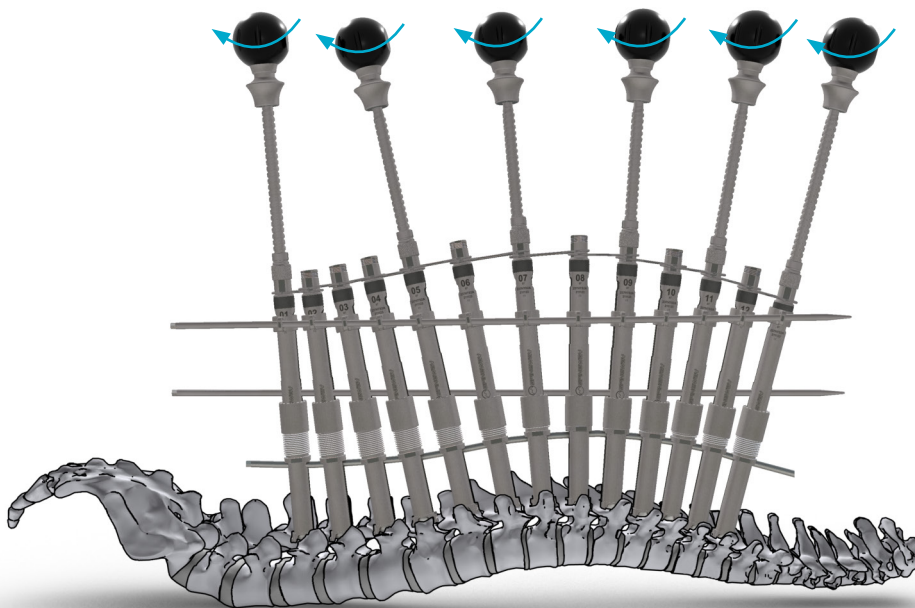


Coplanar alignment manoeuvres



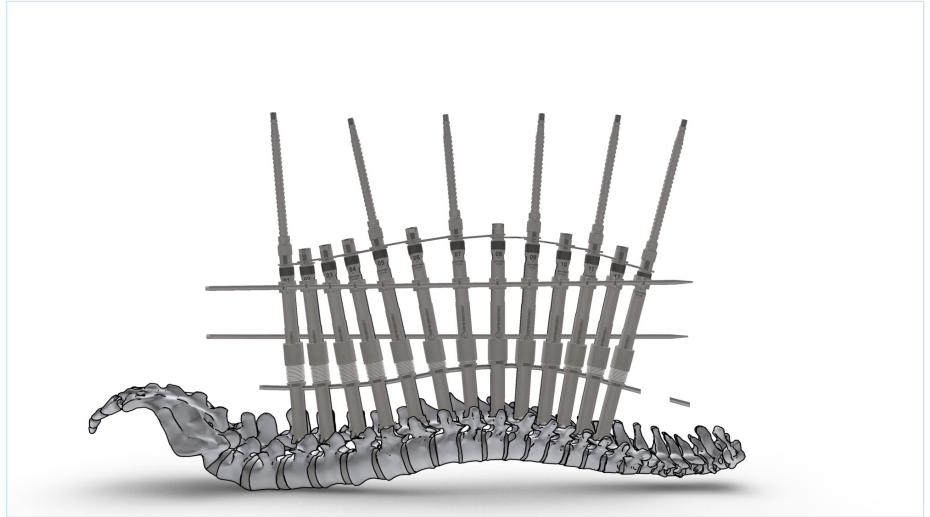
First proceed to the correction on the convex side as it is neurologically and mechanically safer.

Screw the handles to start the correction. This action must be achieved very slowly. Activate one handle at a time. When the descent of the rod starts to become difficult, take out the round handles but leave the rod pushers in place.

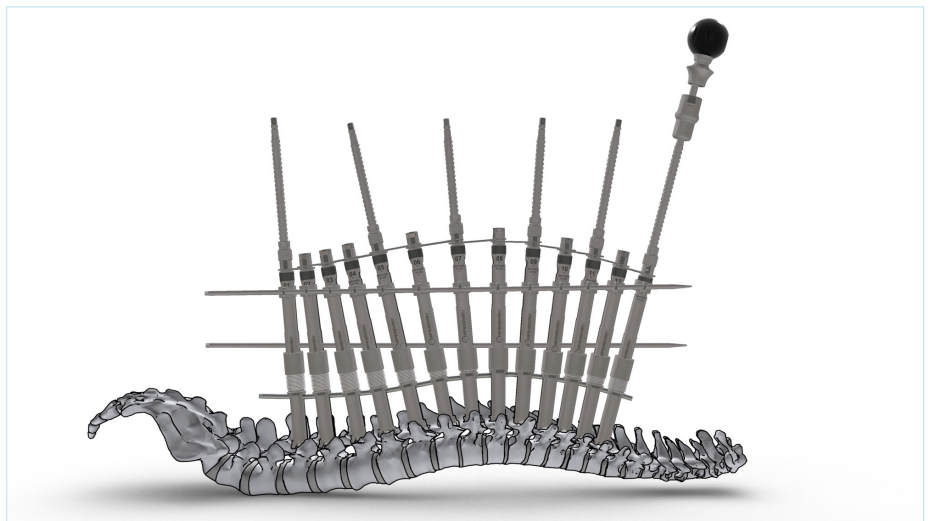


Coplanar alignment manoeuvres

If necessary, cut once again the rod so that its length fits to the mounting.

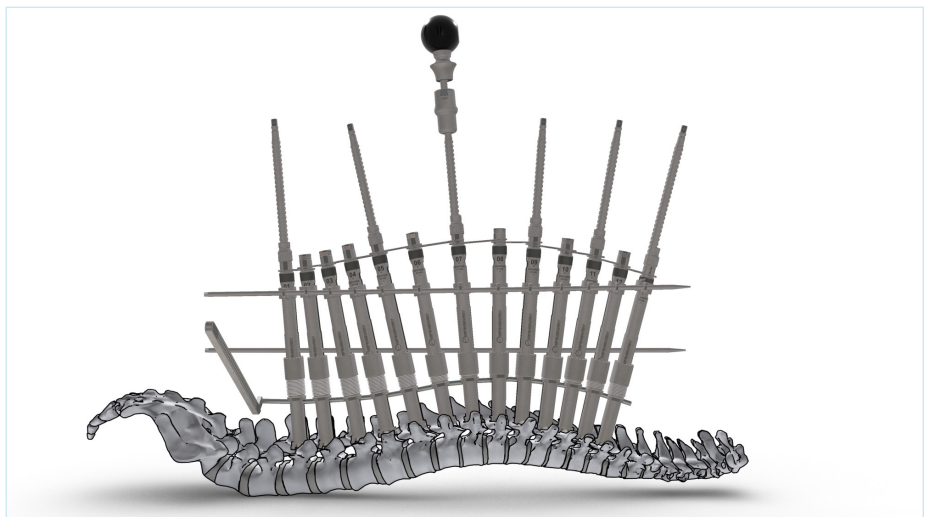


Set the dedicated torque limiter on one of the rod pusher and continue screwing until the «click» is felt. At this step, wait a moment for the tissues to relax to avoid wrenching the screws.



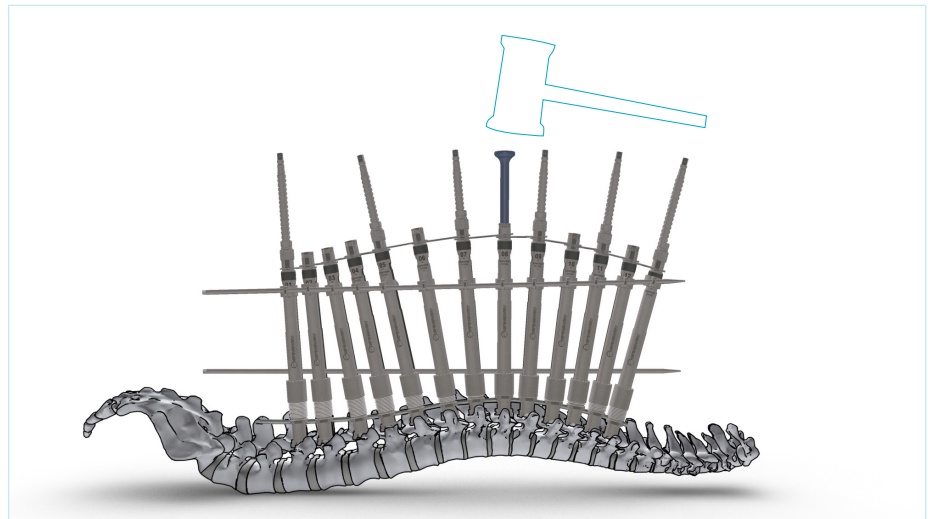
Use then the torque limiter on another rod pusher and so on.

While descending the rod, it is possible to check and adjust its orientation using the offset bender.



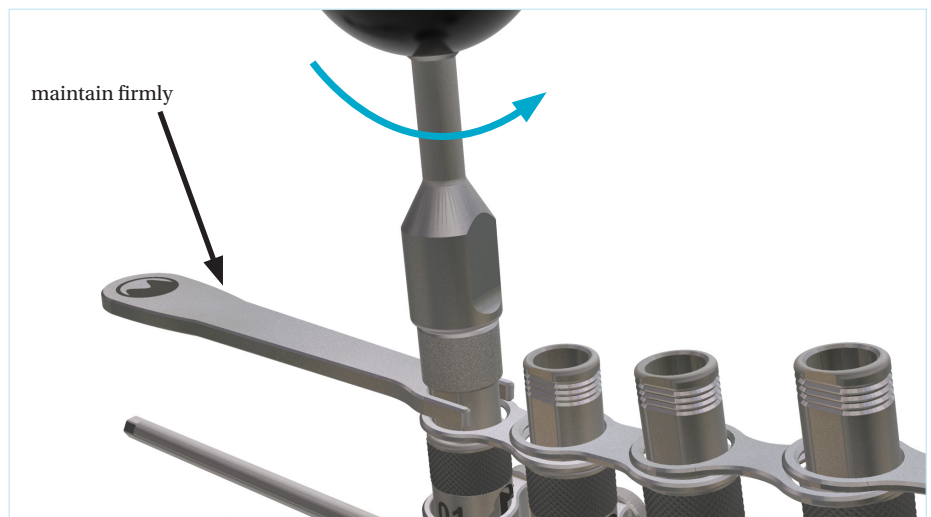
Coplanar alignment manoeuvres

When the rod does not go down anymore, stop trying with the rod pushers and use the smooth rod pusher and a hammer instead to finish the insertion of the rod without risking wrenching the screws.



The rod is now inside the screws and the rod pushers can be taken out.

While unscrewing the nuts for rod pushers, it may happen that the tube unscrews itself too. You can then use the maintaining wrench to maintain the tube.



Coplanar alignment manoeuvres

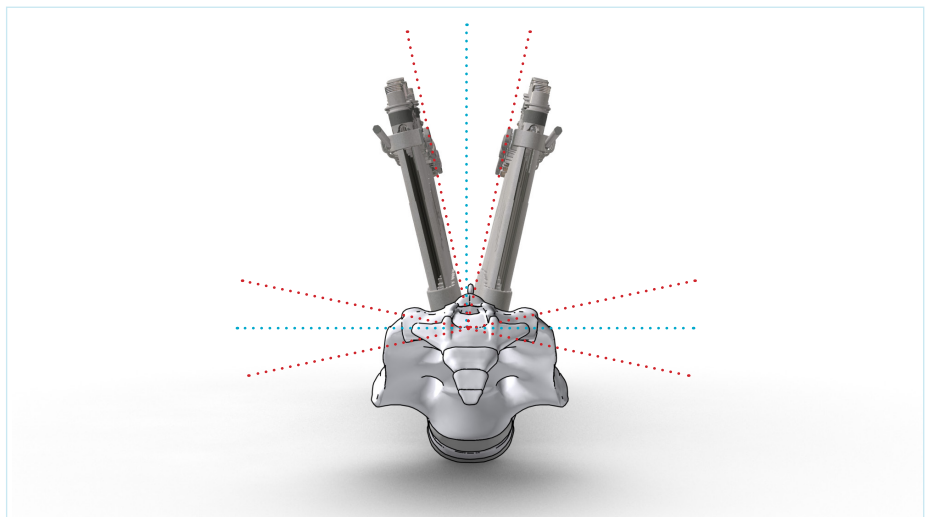
The nuts are set using the screwdriver shaft T30 retaining and the T-handle.

A round handle can also be used at this step with a second screwdriver shaft T30 retaining.

Insert the screwdriver into the tubes.



Do not tighten the nuts at this step.



To verify the alignment, make sure the 4 tubes at the extremities are symmetric to the vertical plan.

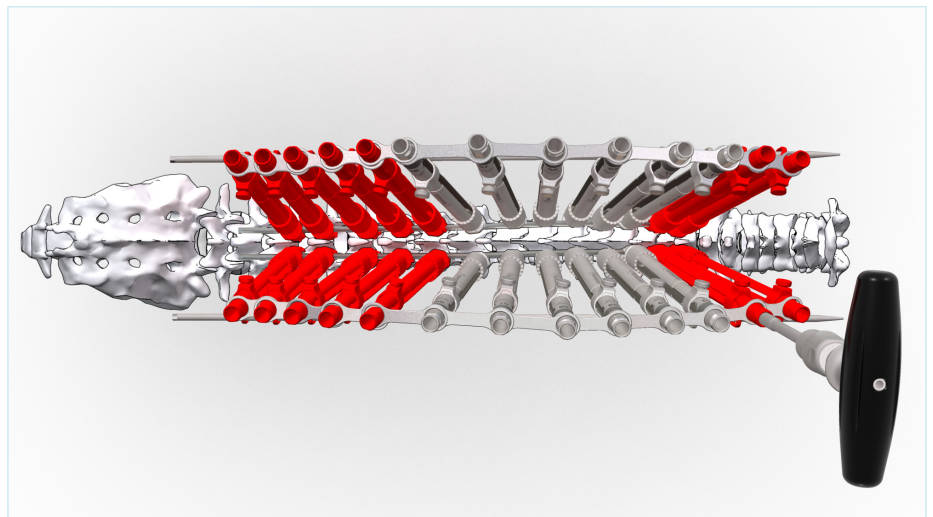
Rib prominence correction

The Mont Blanc 3D+ system also allows the treatment of the rib prominence which remains after the scoliosis correction by overcorrecting the vertebral segment.

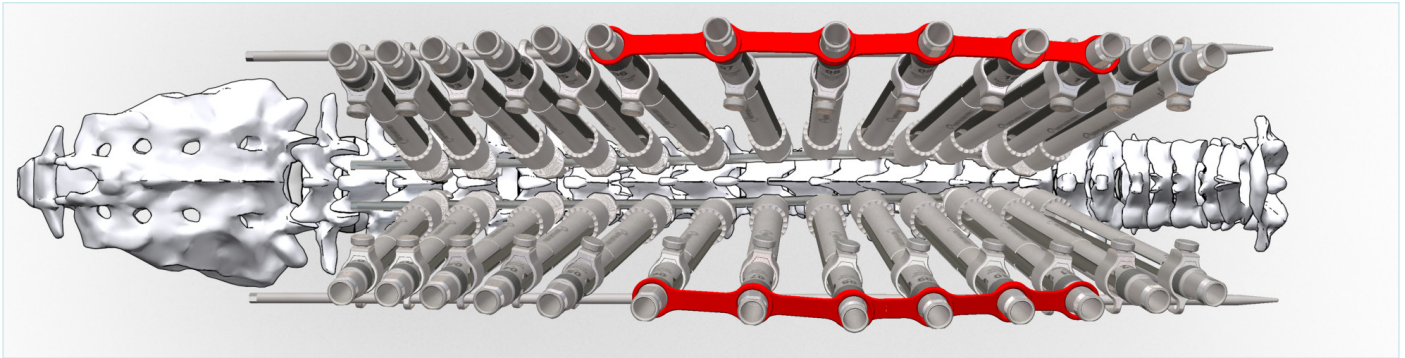


Only lock the nuts at the extremities with the T-handle, letting free those corresponding to the vertebrae where the correction of the gibbosity has to be made.

You can also use the optional torque limiter 13Nm from the Mont Blanc instrumentation kit.

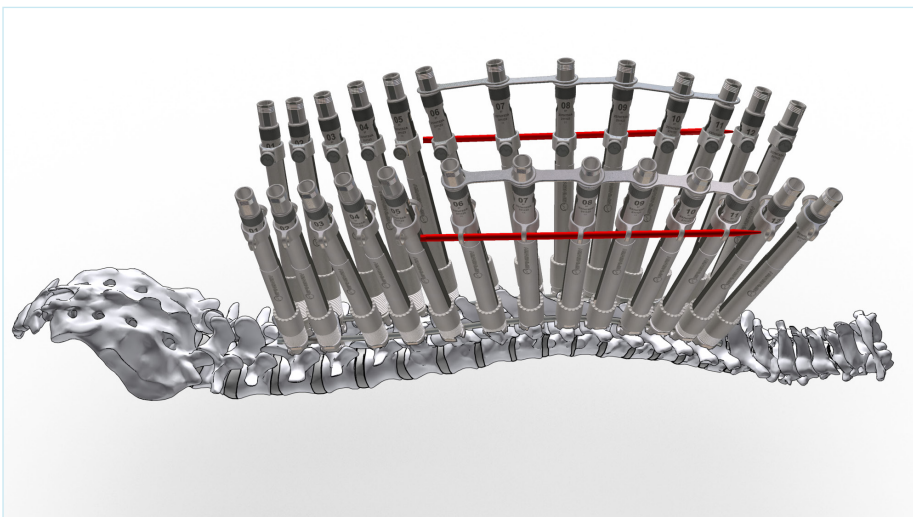


Rib prominence correction



Leave spacers on the apex curve only. Spacers on concave side must be 30% longer than those on convex side.

Polyaxial screws allow the inclination of the tubes without modifying the kyphosis.

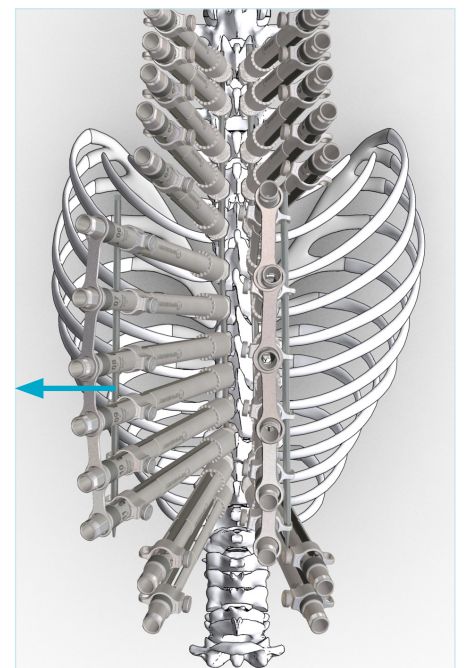
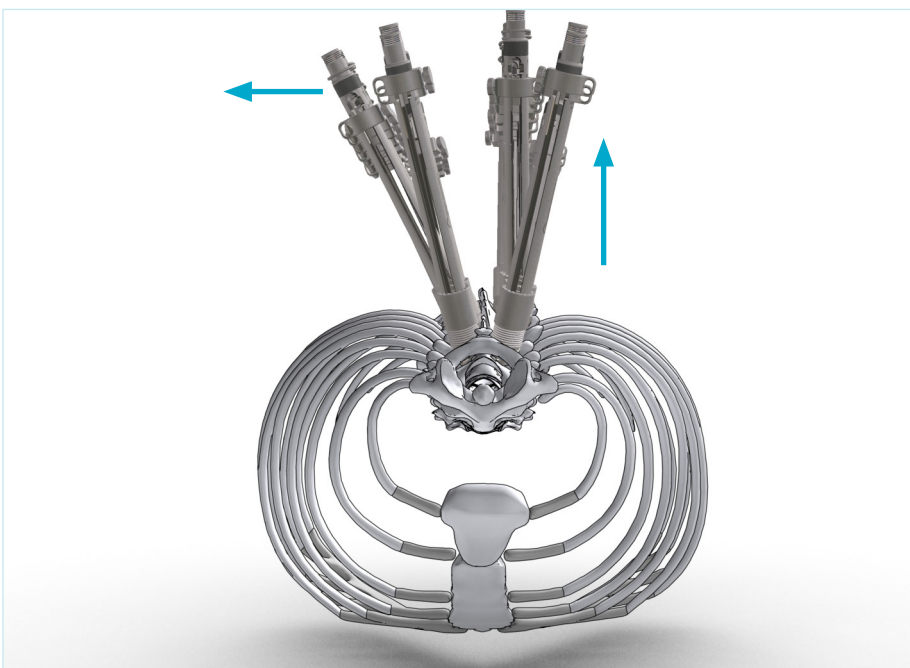


Place smaller alignment rods on the derotated segment. Place rods 200mm or 300mm long.

Rib prominence correction



The ribs position is corrected by over rotating the vertebral segment. One hand pushes on the hump, while the concave segment is pulled up by screwing the nuts as the concave rod has a higher curvature.



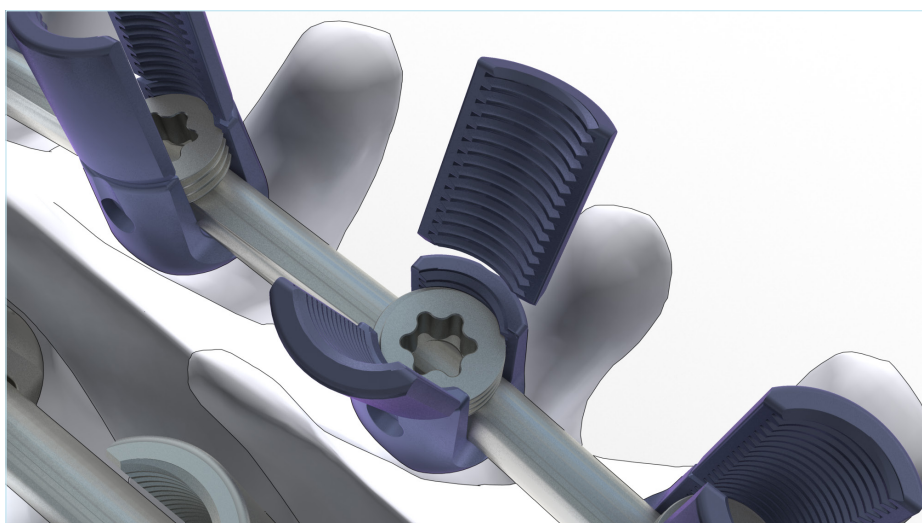
Final tightening and dismantling



Use the T-handle, the torque limiter 13Nm and the screwdriver shaft T30 retaining to lock the screws nuts on the rod and thus fix the correction.



To dismantle a tube, unscrew its nut and pull its two parts away to set them free.



Take out the wings of the traction screws. At this step, it is possible to double check the screwing using the counter torque lever from the Mont Blanc instrumentation kit.

Implants references

To be completed

Instruments references

To be completed

