Aesculap® CASPARevolution

Anterior Cervical Plating System
Surgical Technique

Aesculap Spine

B BRAUN
SHARING EXPERTISE

Aesculap® CASPARevolution

Content

[1] Nabhan A, Pape D, Pitzen T, Steudel WI, Bachelier F, Jung J, Ahlhelm F. Radiographic analysis of fusion progression following one-level cervical fusion with or without plate fixation. Zentralbl Neurochir. 2007 Aug;68(3):133-8. PubMed PMID: 17665339

[2] Bohlman HH, Emery SE, Goodfellow DB, Jones PK. Robinson anterior cervical discectomy and arthrodesis for cervical radiculopathy. J Bone Joint Surg Am. 1993 Sep;75(9):1298-307. Pub Med PMID: 8408151

[3] Caspar W, Geisler FH, Pitzen T, Johnson TA. Anterior cervical plate stabilization in one- and two-level degenerative disease: overtreatment or benefit? J Spinal Disord. 1998 Feb;11(1):1-11. Pub Med PMID: 9493763

[4] Cloward RD. Treatment of acute fractures and fracture-dislocations of the cervical spine by vertebral-body fusion. A report of eleven cases. J Neurosurg. 1961;18:201-9. Pub Med PMID: 13694141

[5] Zhou J, Li X, Dong J, Zhou X, Fang T, Lin H, Ma Y. Three-level anterior cervical discectomy and fusion with self-locking stand-alone polyetheretherketone cages. J Clin Neurosci. 2011 Nov;18(11):1505-9. PubMed PMID: 21924914

A | Preface

Cervical degenerative disc disease is commonly treated by anterior cervical discectomy and fusion using bone graft or a cage with plate fixation.[1,2,3,4] The success of this surgical procedure which is also considered as the golden standard, relies on decompression and development of a solid osseous fusion.[5]

Traditional interbody fusion using tricortical bone graft can maintain disc height as well as foraminal height at the intervertebral segment.[5]

Anterior plate osteosynthesis with a bone graft support or with an interbody fusion device cannot only be applied to degenerative instability but also to

- traumatic
- tumorous
- rheumatoid
- infectious instability (spondylodiscitis)

in cases involving both single and multi-level procedures.

The following brochure describes the surgical steps needed to perform an anterior cervical fusion. The cervical plating procedure corresponds to the classical procedure as originally described by Wolfhard Caspar.

B | System Overview

The CASPARevolution System is characterized by its semi-rigid plate and screw interface.

- It provides stability and adapts to changes in height due to graft resorption or cage settling and micromotions.
- The implant construct allows the graft / cage to share the load.[1] This provides enhanced preconditions for bone healing and fusion by keeping the graft / cage loaded and preventing motion.[2]
- Therefore, it reduces the risk of screw breakage and possibility of inferior plate and screw pullout.

Brochure

For futher information regarding the special instrumentation mentioned in this surgical technique please refer to the following brochure.

O43202
Special instruments for anterior cervical approach

[1] Yang S, Wang LW. Biomechanical comparison of the stable efficacy of two anterior plating systems. Clin Biomech (Bristol, Avon). 2003 Jul;18(6):S59-66.

[2] Steinmetz MP, Benzel EC, Apfelbaum RI. Axially dynamic implants for stabilization of the cervical spine. Neurosurgery. 2006 Oct;59(4 Suppl2):ONS378-88; discussion ONS388-9. Review.

CASPARevolution

- Anchorage of choice: unicortical or bicortical screw fixation – or both in combination.
- Reliable unicortical screw fixation by selftapping profile, roughened surface and conical core shape.
- Easy bicortical screw insertion into posterior cortex due to roughened and blunt screw tip incorporating self-cutting distal feature.
- Resists screw backout – Proximal screw design without locking mechanism: smooth screw shank at plate interface.
- Oversized 4.5 mm screws allow firm anchoring in osteoporotic bone or serves as a revision screw.
- Provides flexibility of screw placement with variable angle options (±35° screw angulation).
- Lordotic plate radius facilitates restoration of cervical lordosis; furthermore, individual plate contouring possible.
- Very low profile: Small screw head volume and flat plate height avoids soft tissue irritations.
- Bicompatibility and improved postoperative imaging options with Titanium material.
- Proven instrumentation for easy implant insertion such as temporary fixation pins to keep the plate in position for screw insertion.
- Long market experience and proven clinical success.[1,2]

Clinical example

pre-operative

post-operative (6 months)

Anterior cervical autologous bone graft fusion and plating with monocortical screws C 5/6 in a 35 years old female: ap and lateral.

[1] Caspar W, Geisler FH, Pitzen T, Johnson TA. Anterior Cervical Plate Stabilization in One- and Two-Level Degenerative Disease: Overtreatment or Benefit?. J of Spinal Disorders. 1998;Vol.11,No.1,1-11.

[2] Pitzen T, Wilke HJ, Caspar W, Claes L, Steudel WI. Evaluation of a new monocortical screw for anterior cervical fusion and plating by a combined biomechanical and clinical study. European Spine Journal. 1999;8.

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Patient positioning

- Supine
- Lying on the CASPAR® Neck and Head Rest with lordotic support, slight distraction and external stabilisation by means of skull traction and fixation of the head with elastic band.

Practical hint:
To prevent pressure marks, gauze compresses or similar should be placed under the elastic band.

- To obtain better X-ray exposure of the affected segments, padding is placed under the shoulders, which is held in place by an arm strap.
- For surgery to the C6/7 and C7/Th1 segments, it is better for the cervical spine to be in a neutral position rather than under lordosis, since this improves X-ray exposure.
- Introduction of the C-arm.
- Locate the skin incision with X-ray fluoroscopy.
- Optional: Mark the iliac skin incision (1 cm dorsal to the anterosuperior iliac spine).
- Sterile covering of the operating area including the C-arm.
- Muscle relaxation.

Patient positioning showing skin incision marking.

Approach and exposure

The chosen approach follows the CLOWARD standard approach to the anterior cervical spine, but a collar incision on the left side is preferred by the authors, since this substantially reduces the risk of damaging the laryngeal recurrent nerve from C5/6 downwards. For cosmetic reasons, the authors recommend a diagonal incision along the Langer's lines. However, a longitudinal incision can also be chosen along the anterior edge of the sterno-cleidomastoid muscle. (This is preferable in tri-segmental and multi-segmental approaches and also in the upper cervical spine area (C2/3) and the cervicothoracic transition region).

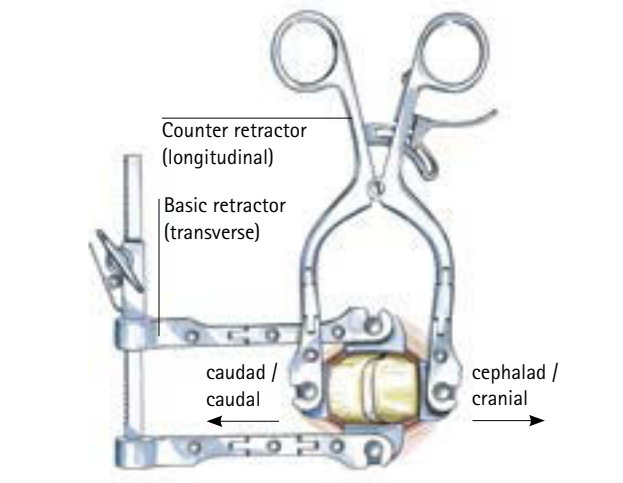
Soft tissue retraction

After exposure of the anterior aspect of the spine and detachment of the medial insertions of the longus colli muscle on both sides, the CCR (CASPAR® Cervical Retractor) System is used for soft tissue retraction.

The teeth of the retractor blades must be placed underneath the right and left long cervical muscle, in order to protect both the pressure-sensitive cervical organs (oesophagus, trachea etc.) and also the neurovascular structures (carotid artery, jugular vein, vagus nerve).

This procedure also enables that the retractor is firmly fixed in the operating site.

Note:
There are two different CCR systems available: CCR Titanium and CCR-XX. The CCR Titanium System has a fenestration on the titanium blades to assist semi-radiolucency and to prevent the retractors slipping out of place in the operating site. In case the radiolucent CCR-XX blades are used, the instrumentation and the spinal column will be clearly seen on the X-ray image. The retractors of the different systems as well as the titanium and CCR-XX blades are 100 % compatible with each other.



CCR System Titanium in position.

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Normally the double hinge retractor BW049R (or respectively the radiolucent retractor BW139R) is used for transverse retraction and the counter retractor BW047R (or BW137R, radiolucent) for longitudinal retraction. BW048R (or BW138R, radiolucent) is ideally suited for multi-level retraction.

In combination with the modular handles (BW010R) the blades could be used as hand-held retractors. In a second step the retractors are side loaded onto the already placed blades.

Practical hint:
Where extensive osteosynthesis requires to retract a larger area, two BW049R (or respectively two radiolucent BW139R) retractors can be used together (instead of BW047R and BW048R or respectively instead of the radiolucent BW137R and BW138R).

Caution:
Each of the following surgical steps must be monitored and performed individually using an image intensifier. This is especially important when working in the intervertebral and epidural space.

CCR System Titanium in position, the teeth of the retractor blades are placed under the longus colli muscle.

Distraction

After the intervertebral disc space has been cleaned out as much as possible, the drill guide (FF907R / FF897R) is used to position the drill hole for the first distraction screw in the middle of the inferior vertebral body. The drilling depth of the drill (FF908R) is fixed at 8 mm, in order to exclude the possibility of inadvertant penetration into the spinal canal. The drilling direction usually is orientated approximately parallel to the line of the adjacent vertebral endplates.

Distraction screws are available in various thread lengths (i.e. penetration depths): 12, 14, 16 and 18 mm. They have a self-cutting thread. The correct choice of thread length is determined by the anteroposterior diameter of the vertebral body. The screw should not penetrate the posterior cortex.

Practical hint:
Determine the screw length by holding a distraction screw in the cleaned-out intervertebral space and checking it with the image intensifier.

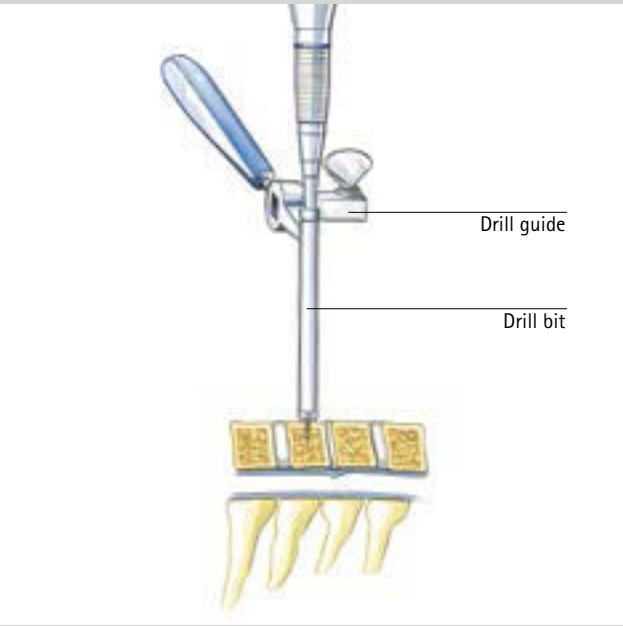
The distraction screw is inserted through the drill guide with the screwdriver (FF906R). For easier orientation, it is a good idea to leave the drill guide mounted on the vertebral body until the distraction screw is placed. Moreover, care must be taken to place the distraction screw right up to its base plate, in order to embed it firmly in the vertebral body, to prevent screw pull-out during the distraction process.

After removing the moveable distractor arm, the drill guide is fitted onto the toothed distractor bar (from FF901R / FF891R), and this assembly is positioned over the distraction screw which is already in place. This procedure facilitates parallel insertion of the second or any further subsequent (superior) distraction screw.

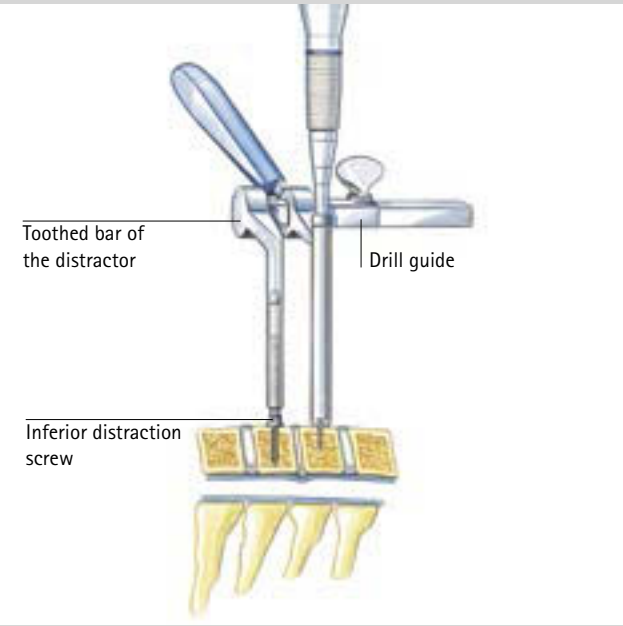
After drilling in the centre of the vertebral body, the second (superior) distraction screw is placed and the drill guide assembly is removed. The drill guide is subsequently taken off the distractor bar and replaced by the moveable distractor arm.

Practical hint:
In multi-segmental operations, it is advisable to insert a distraction screw in each vertebra, in order to be able to work on the individual segments step by step. By 'jumping over' individual distraction screws, it is possible to distract two or more segments simultaneously (e.g. in vertebral resections).

In special cases it may be useful to place the distraction screws not in the centre of the vertebral body, but closer to the endplates in order to obtain more maneuvering space for partial vertebral body resection.



Positioning the first drill hole in the inferior vertebra with the drill guide.



Siting the second (superior) distraction screw.

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The distractor is pushed onto the two distraction screws as far as possible up to the screw base plates. Under distraction, the intervertebral space is now stepwise expanded according to surgical requirements, or restored to the desired height for inserting the fusion graft.

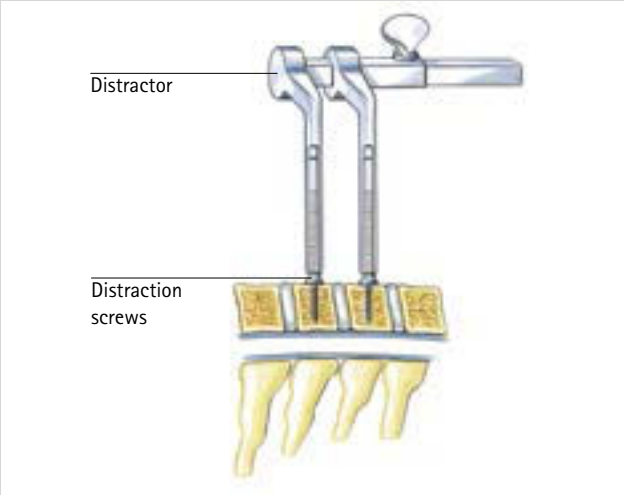
Note:
A CASPAR® lockable distractor is also available. The sleeves have an integrated locking mechanism to interlock the distraction screw. For more information please refer to the brochure 043202 "Special instruments for anterior cervical approach".

Decompression, discectomy

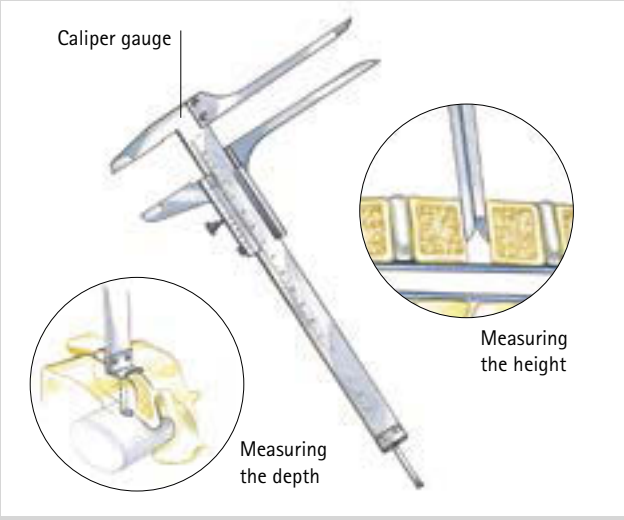
Discectomy is now completed under distraction, and decompression of the neural structures is performed. The posterior longitudinal ligament is normally retrieved and detached with the longitudinal ligament dissector (FF917R / FF918R) as far as is necessary in order to remove osteophytes. In special cases, where intervertebral disc or bone fragments are present in the spinal canal, or where extensive osteophyte resection is necessary (e.g. in myelopathy patients), the posterior longitudinal ligament must be resected.

OPTIONAL:
Preparation of the bone graft site

The bone graft site is prepared with curettes and burrs, as far as possible plan-parallel. The height and a.p. depth of the intervertebral space are then measured with the caliper gauge (AA845R).



The distraction procedure.



Measuring the intervertebral space.

OPTIONAL:
Bone graft harvesting

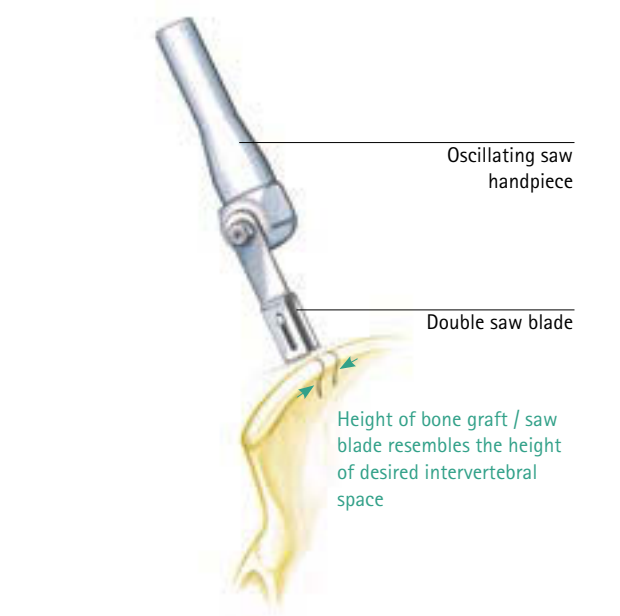
A skin incision and muscular detachment (preferably monopolar) is performed over the iliac crest. Using an oscillating saw (GB129) a tricortical bone graft with parallel cut edges is removed. To do this, a double sawblade of the appropriate size for the height of the graft is selected (the graft should be cut 1 mm higher than necessary, to compensate for height loss during fine preparation).

The graft cutter (FF927R / FF928R) is set to the measured depth of the intervertebral space and the correctly sized bone graft is then cut from the iliac crest. The average depth is around 15 mm.

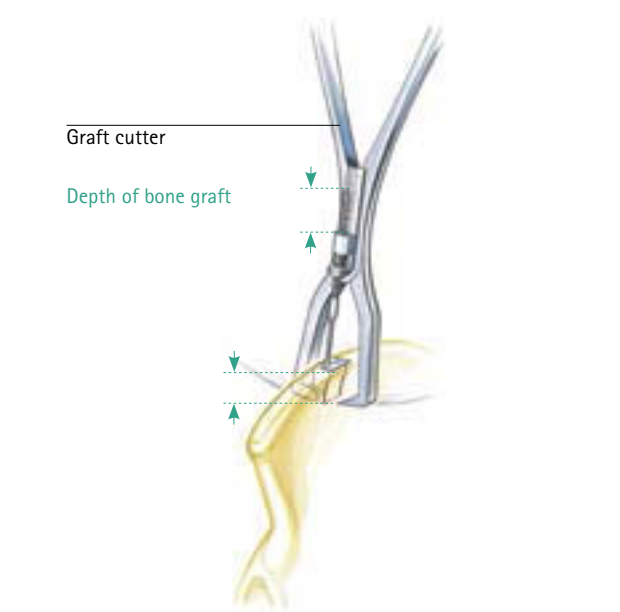
The graft cutter is available in two sizes: 7 and 10 mm jaw width.

Practical hint:
For sizes in between and above these jaw widths, the graft is removed by making two 'bites' with the graft cutter, turning the cutter through 180° for the second bite.

This procedure produces a bone graft with the following advantages: the large cancellous bone contact areas provide a good fusion surface for the cleaned vertebral endplates; the three load-bearing cortical edges provide a high degree of stability.



Bone graft harvesting from the iliac crest with the appropriately sized double saw blade.



Bone graft harvesting from the iliac crest.

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OPTIONAL:
Impacting the bone graft

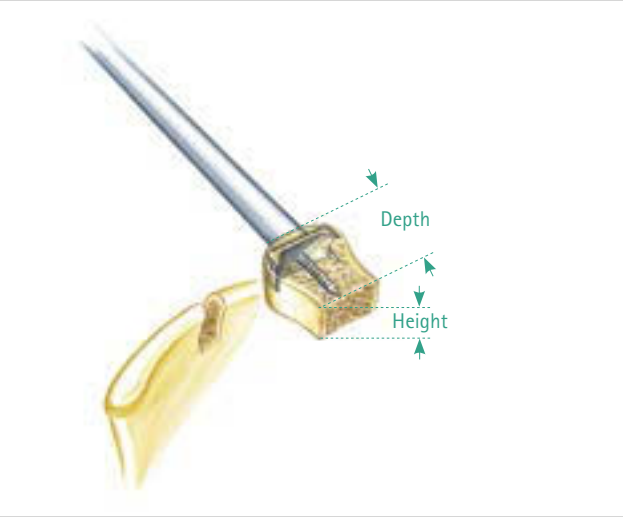
The bone graft is drilled with the FF908R drill and then screwed onto the graft holder (FF911R).

If the fine preparation to bring the bone graft to its final dimensions is adequately performed, the results are:

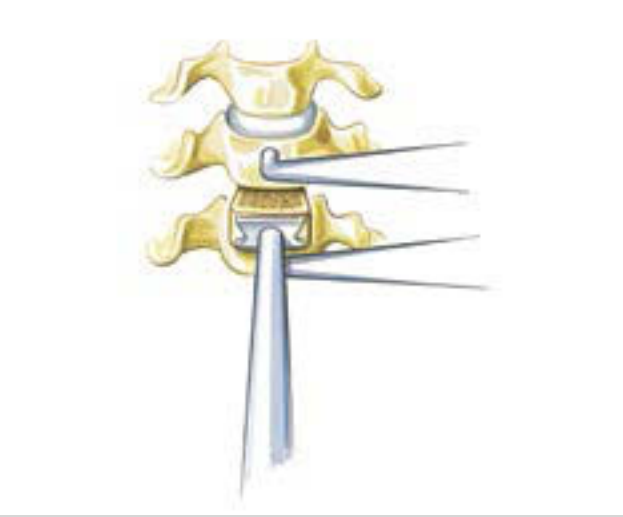
- the required height of the intervertebral disc space is restored,
- the graft lies flush with the front edges of the vertebrae,
- there is a distance of about 2 mm dorsally between the graft and the spinal canal,
- the graft is impacted with slight pressfit under image intensifier guidance.

Practical hint:
Before removing the distractor, we recommend that it is operated in reverse, thus practising a brief compression on the fusion graft to enhance its positioning, i.e. its fit.

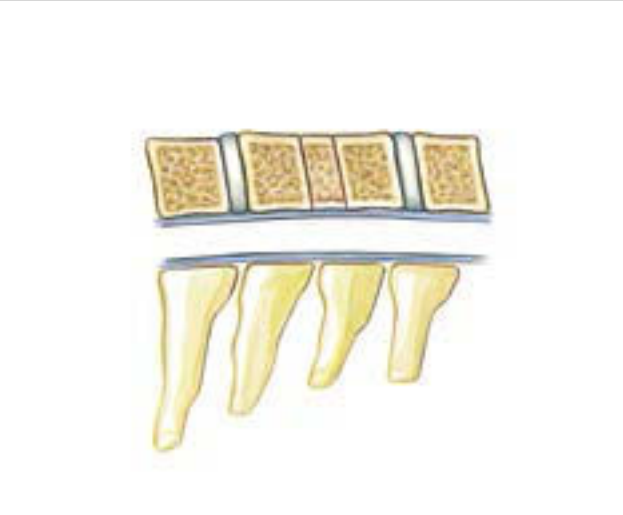
The distractor can then be taken away and the distraction screws removed.
To provide a good surface for the plate, it is advisable to smooth the anterior aspect of the spine (remove osteophytic growth).



Screwing the graft onto the graft holder.


Impacting the bone graft.

Alternatively to bone from the iliac crest allograft or an interbody fusion device, such as CeSPACE®XP can be used.

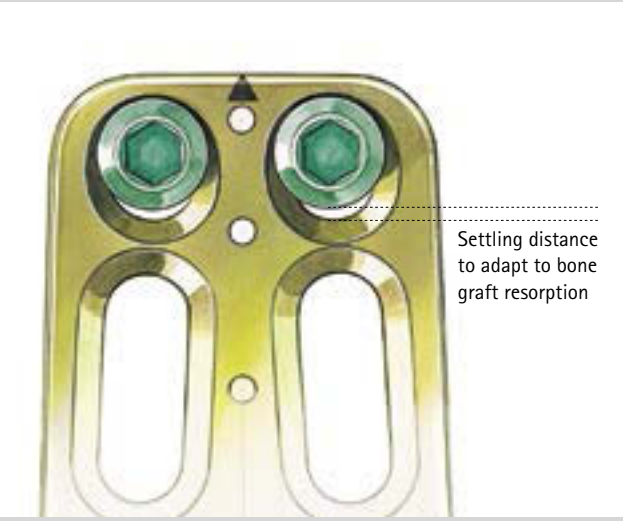


Inserted bone graft after removal of distractor and distraction screws.

Positioning the plate

When choosing the plate length, care must be taken that sufficient distance (approx. 2 mm) is left between the rim of the plate and the adjoining intervertebral discs both caudally and cranially.

In doing so, this allows for any possible decrease in height of the bone graft (up to 1 mm). The CASPARevolution implant system with its semi-rigid plate-screw interface allows for the adaptation of the intervertebral space to a decrease in the height of the bone graft, allograft or cage. This is enabled on the one hand through the screw heads not being fixed in the plate holes, and on the other hand by the oval shape of the plate holes (slide holes).



Semi-rigid screw and plate interface.

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The plate is put into position with the plate holding forceps (FF969R), and the length and contour of the implant is checked by lateral image intensifier.

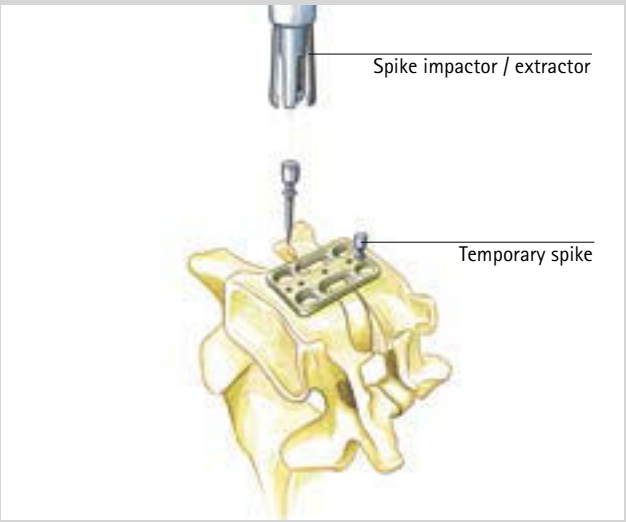
It is easy to alter the lordotic profile of the plate with the contouring forceps. The plate design adapts the implant to the surface of the individual vertebra, both longitudinally (contouring forceps FF956R) and transversely ('Ear bender' contouring forceps FF966R).

The plate may be temporarily fixed onto the spine with the help of so-called 'spikes' (FG310R). These spikes (see X-ray) hold the plate better in position for the subsequent steps (drilling, tapping, measuring and inserting screws).

The temporary spikes also offer the advantage of a completely unobstructed view and unhindered access. They are inserted and removed with the spike impactor / extractor (FG315R).

Practical hint:
When impacting the second spike, an instrument (e.g. tamper) should be used to keep the first spike pressed against the plate and thus prevent loosening of the spike already set. (Seesaw effect)

Putting the plate into position with the plate holding forceps.



Temporary plate fixation (under X-ray monitoring).

Screw fixation

Various drill guides and drills may be used to drill the screwholes:

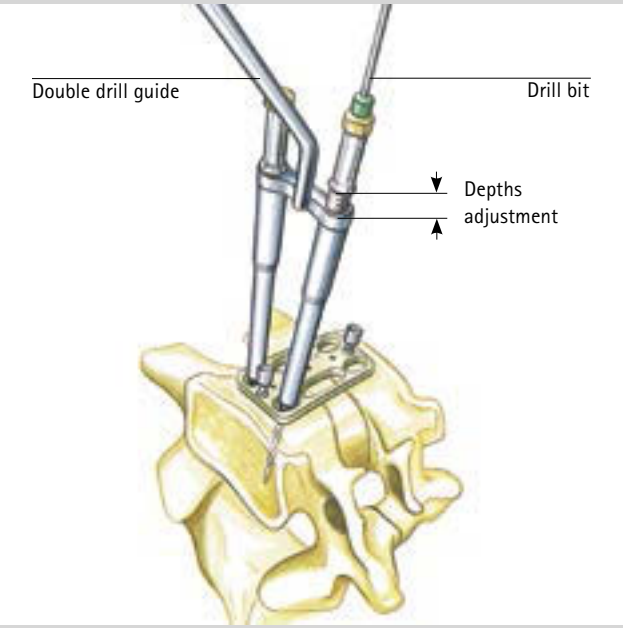
- double drill guides for unicortical and bicortical screws (FF886R / FG415R),
- a single drill guide (for universal application, FF885R), and
- drill bits for unicortical (FG414R) or bicortical screws (FG412R).

The drilling is performed with the micro-Line handpiece GD450M (with intra-connection).

All drill guides have a fine depth adjustment, which can be easily re-adjusted while the drill guide is in operating position and without removing the drill bit.

The double drill guide provides the optimum convergence of screw positions for stability, and prevent the screws crossing or coming out through the side of the vertebral body. If necessary, the single drill guide can be used to position the screws in all directions with an individual feeding-in angle of +/- 35° (important if additional screws have to be put in).

Caution:
The indicated screw lengths specify the overall length including the screw head (2.2 mm)! Example: a 20 mm screw has a penetration depth of approx. 18 mm.



Positioning the drill guide and inserting the drill.

Bicortical screw fixation: penetration of the posterior cortex by maximum 1 thread turn.

Unicortical screw fixation: the screw length should not be less than 75 % of the a.p. diameter of the vertebra.

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Self cutting unicortical screws (external diameter 4.0 mm, with conical screw core) are available in 6 lengths from 14 mm to 19 mm.

Bicortical screws (external diameter 3.5 mm, with cylindrical screw core) are available in lengths from 10 mm to 28 mm. Not only does the flat end of the screw provide contact surface between thread and posterior cortex, but the enhanced thread profile also offers a large bone contact area across the entire antero-posterior diameter of the vertebra.

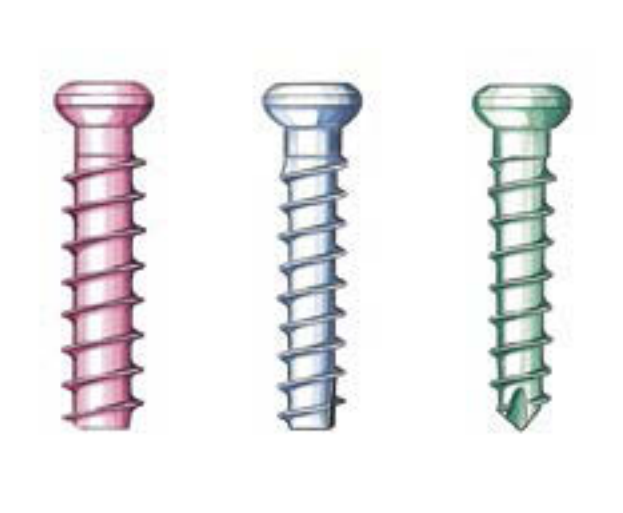
Caution:
Especially when fixing bicortical screws, all dynamic steps should be monitored with an image intensifier (i.e. C-Arm fluoroscope).

In addition, 4.5 mm screws are available for unicortical or bicortical application in osteoporotic bone or in cases where one of the standard screws does not provide a firm hold or has been over-tightened.

Different screw types can be used in one implant assembly as necessary (= mixed fixation / see page 18, clinical examples).

Practical hint:

- Bisegmental plating:
  Middle vertebra = Bicortical
  Top and bottom vertebrae = Unicortical
- If a screw has been over-tightened or insufficient torque is obtained, it has to be replaced by a 4.5 mm revision screw.



Revision or osteoporosis screw *bicortical screw* *unicortical screw*

The selection of drill guides and drills depends on the screw fixation technique. If unicortical screws are to be used (colour coded green) the FG414R drill (diameter 2.2 mm) should be used, with the corresponding double drill guide FG415R (green handle).

For the bicortical screws (colour coded blue), the FG412R drill (diameter 2.0 mm) and the double drill guide FF886R (blue handle) should be used.

The single drill guide can be used with both drills for both types of screw.

The drill diameter is determined by the core diameter of the corresponding screw type, and the drill bits carry a coloured plastic ring as additional identification
Green ring = Green, unicortical screw /
Grey ring = Blue, bicortical screw.

Before drilling, the desired positions and angles of the screw holes should be checked. Especially for bicortical screw fixation, continuous X-ray observation of the drilling procedure is essential.

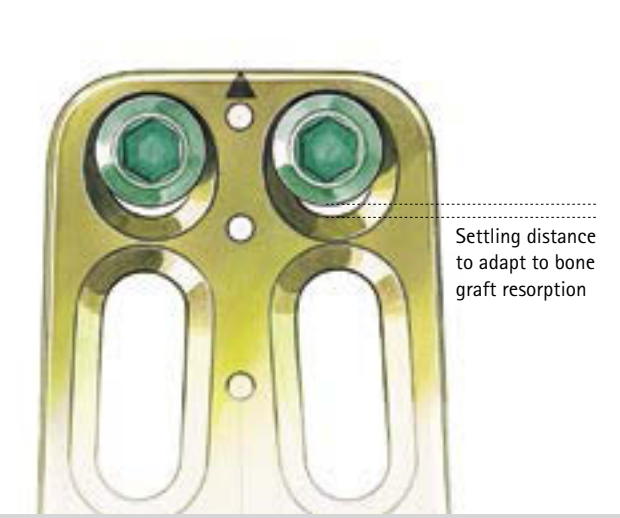
The cranio-caudal position of the screw entry point should be as close as possible to the upper or lower inside edge of the plate hole, to allow for the screw to sink inside the hole.

Practical hint:
It is easier to position the second drill hole in the same vertebra if two drills are used: after making the first hole, the drill bit can be left in the drill guide, and therefore in the drill hole, to fix the position and at the same time to serve as an orientation for drilling the second hole. Instead of a second drill bit, a blunt K-wire can also be used.

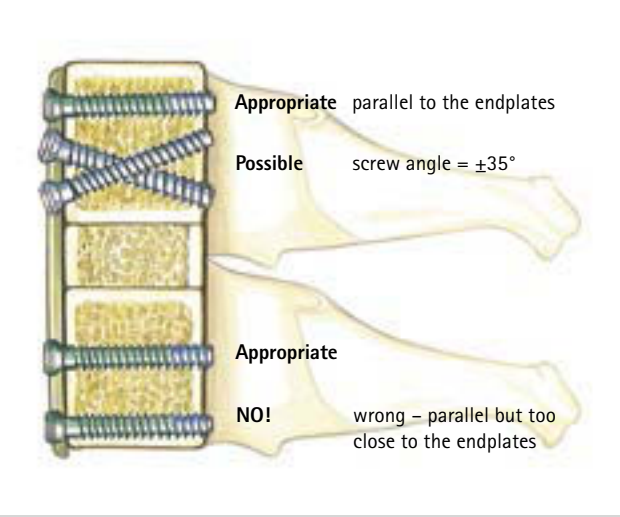
If bicortical screws are being used, it is recommendable to pre-cut the thread, setting the depth adjustment on the tap (FG413R) to the drill depth. It is normally sufficient just to cut a thread in the anterior cortex, to give the correct orientation for the screw. Threading all the way through, including the posterior cortex, reduces the risk of screw mal-placement for instance up- or downwards or in lateral directions.

The necessary screw length can be taken from the depth setting on the drill guide.

Practical hint:
A depth gauge (FF965R) is also available to give a reading of the necessary screw length, and its use is highly recommended by the author.



The screws are placed as far as possible towards the top or bottom of the plate hole to allow for some movement ('setting' i.e. constant pressure on the fusion graft or cage).



Possible screw positions.

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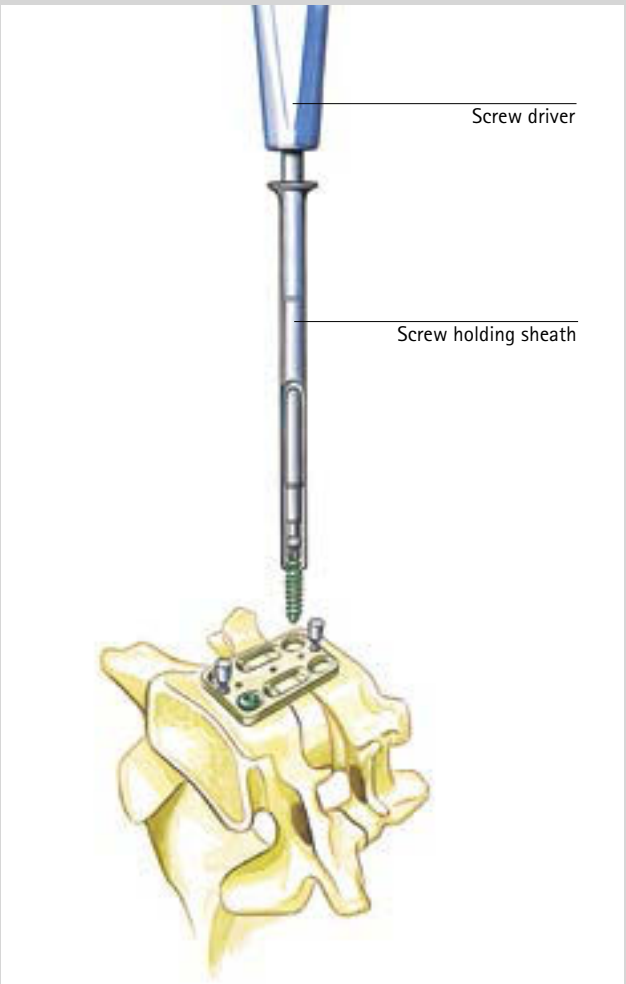
When selecting the length of a bicortical screw, it should be borne in mind that the screw is anchored, or penetrates the posterior cortex by approx. 1 thread turn (i.e. = 1 mm).

When using unicortical screws, it is important that the screw is long enough in order to achieve sufficient anchorage, respectively stability.

In choosing the screw length, the possibility must also be taken into account that screwing in the screws presses the plate further down onto the vertebra and thus reduces the distance, i.e. the required screw length by 1 - 2 mm.

Practical hint:
If a screw has been over-tightened through excessive torque or poor bone quality, it must be exchanged for an appropriate revision screw. This is also valid for screws when the applied torque is insufficient. A reliable method is to tighten the screws '2 fingers tight'. (or three fingers in cases of high bone density) ('oak bone').

The screws can be taken directly out of their storage tray using the screw-holding sheath (FF964R) placed over the screwdriver (FF954R).



Placing the screws.

After placing the screw, we recommend to tighten them in a crosswise sequence ('2 fingers tight'), while pressing the plate evenly onto the surface of the vertebrae.

Practical hint:
A proven method in the screw tightening process is, using two screw drivers simultaneously in a crosswise order, thereby pressing the plate evenly onto the surface of the vertebrae.

If it is not possible to align the screwdriver exactly onto the screw head, the 'ball tip' screwdriver (FF957R) may be used. It can be set on the screw head obliquely from approx. 30° in any direction. This is particularly helpful in the upper cervical spine area and in the cervico-thoracic transition area.

The temporary spikes are subsequently removed.

Tightening the screws in a crosswise sequence.

Retreat

The wound is closed in the usual way: single or double wound drainage in the prevertebral and pretracheal compartments, platysma, subcutaneous and skin suturing or stapling.

D | Clinical Examples

Monosegmental, unicortical screw fixation

Fusion with autologous bone graft and trapezoidal plate osteosynthesis with unicortical screw fixation in a patient with slipped disc and kyphosis in segment C5/6.

Pre-operative

Post-operative (6 months)

Bisegmental, bicortical screw fixation with vertebral body replacement of C3

Left side: carcinoma metastasis of C3 with extensive destruction and instability in the form of kyphosis (here already brought into a neutral position under skull traction) and severe pain.

Right side: condition after C3 resection, vertebral body replacement with an autologous bone graft and trapezoidal plate osteosynthesis with bicortical screw fixation. Note the restoration of the natural lordosis.

Pre-operative

Intra-operative

Bisegmental mixed screw fixation (uni-/bicortical)

Anterior trapezoidal plate osteosynthesis of C5/6 and C6/7 with mixed screw fixation in cervical radiculopathy.

Unicortical: C5 + C7
Bicortical: C6

Post-operative

E | Ordering Information

Screws

Screw material: ISOTAN®$_F$

Forged Titanium alloy (Ti6Al4V) in accordance with ISO 5832-3

3.5 mm / bicortical

Ref. No.	lengths*
LB450T	10 mm
LB452T	12 mm
LB454T	14 mm
LB456T	16 mm
LB457T	17 mm
LB458T	18 mm
LB459T	19 mm
LB460T	20 mm
LB461T	21 mm
LB462T	22 mm
LB463T	23 mm
LB464T	24 mm
LB465T	25 mm
LB466T	26 mm
LB467T	27 mm
LB468T	28 mm

Special instruments:

2.0 mm drill	FG412R
Twin drill guide (10 – 30 mm)	FF886R
Tap	FG413R

4.0 mm / unicortical

Ref. No.	lengths*
LB554T	14 mm
LB555T	15 mm
LB556T	16 mm
LB557T	17 mm
LB558T	18 mm
LB559T	19 mm

Special instruments:

2.2 mm drill	FG414R
Twin drill guide (13 – 19 mm)	FG415R

4.5 mm / Revision or osteoporosis screw

Ref. No.	lengths*
LA017T	17 mm
LA018T	18 mm
LA019T	19 mm
LA020T	20 mm
LA021T	21 mm
LA022T	22 mm
LA023T	23 mm
LA024T	24 mm
LA025T	25 mm
LA026T	26 mm
LA027T	27 mm
LA028T	28 mm

* **Please note:**
The indicated screw lengths specify the overall length including the screw head (2.2 mm)!
Example: a 16 mm screw has a penetration depth of 13.8 mm.

E | Ordering Information

Plates

Plate material: ISOTAN® P

Pure Titanium in accordance with ISO 5832-2

Ref. No.	lengths*
FG420T	20 mm
FG422T	22 mm
FG424T	24 mm
FG426T	26 mm
FG428T	28 mm
FG430T	30 mm
FG432T	32 mm
FG434T	34 mm
FG436T	36 mm
FG442T	42 mm
FG444T	44 mm
FG446T	46 mm
FG448T	48 mm

Ref. No.	lengths*
FG450T	50 mm
FG452T	52 mm
FG454T	54 mm
FG457T	57 mm
FG460T	60 mm
FG463T	63 mm
FG466T	66 mm
FG469T	69 mm
FG472T	72 mm
FG475T	75 mm
FG478T	78 mm
FG481T	81 mm
FG484T	84 mm
FG487T	87 mm
FG490T	90 mm

Special instruments:

Spikes for temporary plate fixation	FG310R
Spike-Impactor	FG315R
Plate holding forceps	FF969R
Plate bending pliers, cross and transverse contouring	FF956R
Plate bending pliers, bending of edges	FF966R
Single drill guide (10 – 30 mm)	FF885R
Screw driver	FF954R
Screw holding sheath	FF964R
Screw driver with ball tip	FF957R

Recommendation for basic CASPAR® uni- and bicortical Implants and Plating Instruments

Implants:

Amount	Ref. No.	Description
each 10 x	LB450T – LB468T	Bicortical screws 10 – 28 mm, range of lengths can be adapted
each 10 x	LB554T – LB559T	Unicortical screws 14 – 19 mm
each 5 x	LA017T – LA028T	Uni- or bicortical revision screws, 17 – 28 mm, range of lengths can be adapted
each 1 x	FG424T – FG490T	Plates, length of 24 – 90 mm, range of lengths can be adapted
1	FG064P	Rack for unicortical screws with lid (illustration see below)
1	FG061P	Implant tray with lid (illustration see below)

Plating instruments:

Amount	Ref. No.	Description
1	FF956R	Plate bending pliers, cross and transverse contouring
1	FF966R	Plate bending pliers, bending of edges
1	FF969R	Plate holding forceps
1	FG315R	Spike impactor
1	FG310R	Spikes (package with 10 pieces)
1	FF885R	Drill guide, depth adjustment 10 – 30 mm (unicortical and bicortical)
1	FF886R	Twin drill guide, depth adjustment 10 – 30 mm (bicortical)
1	FG415R	Twin drill guide, depth adjustment 13 – 19 mm (unicortical)
2	FG412R	Drill, 2.0 mm (bicortical)
2	FG414R	Drill, 2.2 mm (unicortical)
1	FG413R	Tap for bicortical screws
1	FF965R	Depth gauge
1	FF954R	Screw driver
1	FF964R	Screw holding sheath
1	FF957R	Screw driver with ball tip
1	LS040S	Screw grasping forceps
1	JF213R	Perforated basket 485 x 253 x 76 mm
2	JF945	Silicone pad

Optional:

Amount	Ref. No.	Description
1	GD450M	micro-Line handpiece

FG064P

FG061P

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