



# Fidji® Lumbar Cages

Surgical Technique



Lumbar Interbody Fusion System



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## Indications

Fidji Cages, a system developed for four indications



The *Fidji Lumbar Cages* interbody fusion system consists of PEEK cages, which have novel elastic characteristics. There are *Fidji lumbar cages* of various shapes, sizes, and designs for the posterior, anterior, lateral and anterolateral approaches.

*Fidji Lumbar Cages*, in conjunction with systems of posterior fixation such as the minimal invasive pedicle screw system *Pathfinder*®, pedicle screw systems such as *Sequoia*®, *Java*® or *InCompass*® are the foundation of successful fusion with long-term

stability, frontal balance, and enhancement of lordosis in the treated segments.

## Patient positioning

The patient is placed in the prone (fig. 1) or knee-chest position (fig. 2).

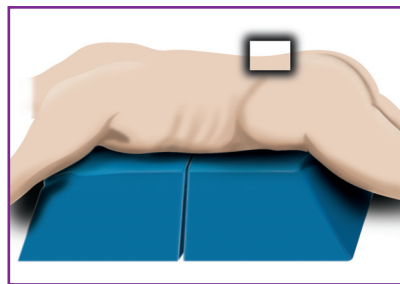


Figure 1

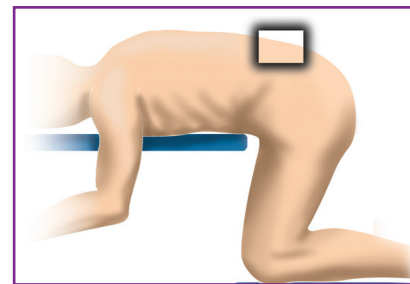


Figure 2

## Incision & approach

Depending on the surgeon's preference, a midline or bilateral (Wiltse) approach is performed (fig. 3).

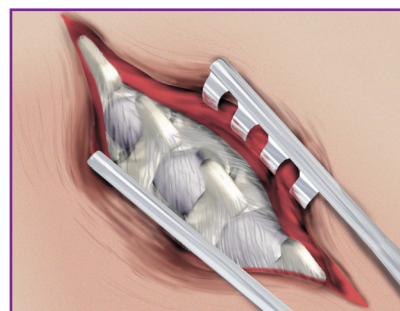


Figure 3



According to the circumstances, partial laminectomy and decompression of the spinal canal may be advisable for optimal access to the intervertebral disc space (fig. 4). It is recommended to resect the bone laterally until reaching the upper level of the disc below the pedicle to facilitate cage insertion (fig. 5).

## Exposure & discectomy

After identification of the superior and inferior nerve roots, bleeding from the epidural venous complex can be arrested with bipolar cautery (instrument not provided). The dura and nerve root are carefully retracted laterally to access the intervertebral disc (fig. 6).

Discectomy is then performed bilaterally using appropriate rongeurs (fig. 7) and various instruments available in *Fidji Lumbar*, *Harmony™* Posterior and *Mergence®* Posterior instrumentation sets.

## Preparation of the disc space

In order to safely increase the disc space height, the distractors should be introduced flat between the vertebral bodies (fig. 8), then gently turned 90° while protecting the dura and nerve roots with nerve hook retractors (fig. 9). One should start with the smallest distractor on one side, alternating on the right and left sides with the next largest distractor each time until the desired height is obtained.

During the distraction maneuver it is recommended to use a nerve root retractor to protect the dura and nerve root (fig. 10).

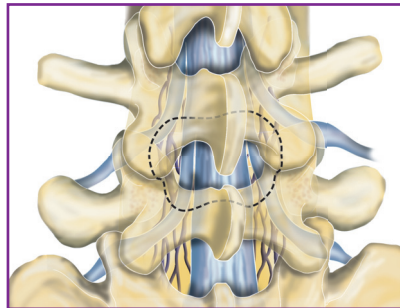


Figure 4

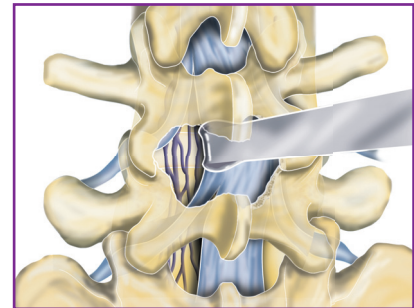


Figure 5

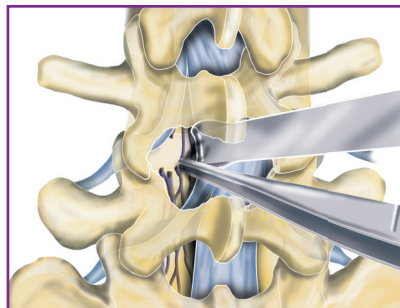


Figure 6

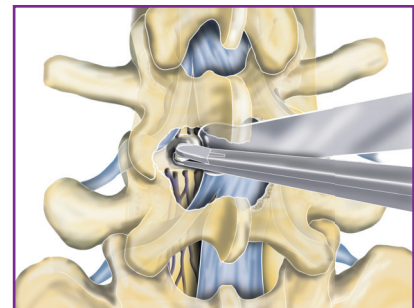


Figure 7

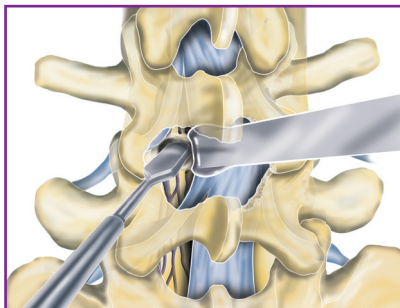


Figure 8

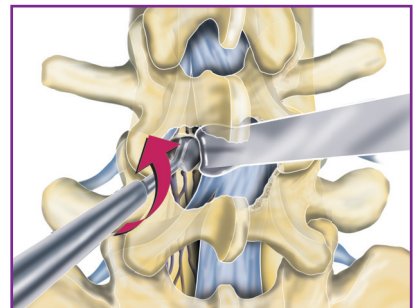


Figure 9

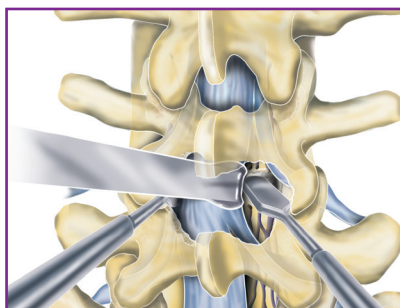


Figure 10



Distractor

## Preparation of the endplates

Once the desired disc height is achieved, the reamers and cutting distractors can be used to clean spare disc cartilage from the vertebral endplates (fig. 11). The appropriate choice of reamer and distractor depends upon the cage size. The reamer is carefully inserted on one side of the intervertebral disc space and turned clockwise while the disc height is maintained on the contralateral side with a distractor (fig. 12). During reamer and distractor insertion, the nerve hook retractor should be used to protect surrounding tissue.

Additionally, the vertebral endplates can be freshened by using a posterior curette (fig. 13). Various instruments from the *Fidji Lumbar, Harmony™ Posterior* instrumentation and *Mergence® Posterior* instrumentation sets are available.

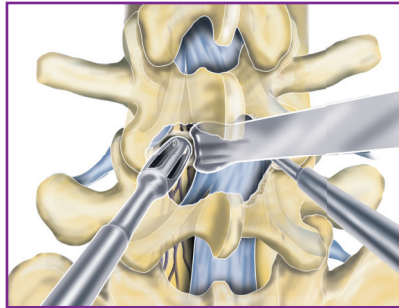


Figure 11

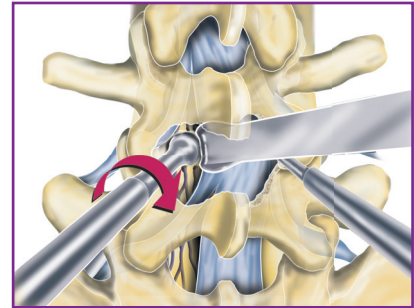


Figure 12

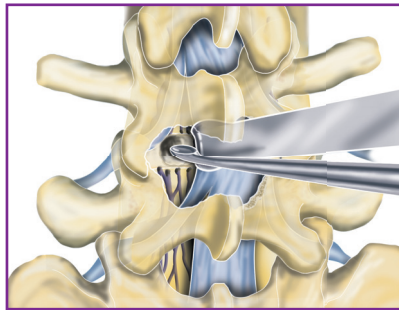


Figure 13



Reamer

Curette

## Preparation of the implants

Before the cages are introduced into the disc space, they should be filled with autograft, allograft, or a suitable bone substitute.

Before filling the cages with bone graft material, they should be threaded onto the impactor shaft (fig. 14) and placed in the cage holder (fig. 15).

There, the cages can be packed with the graft material, which is compressed using the small or large graft tamper (fig. 16).

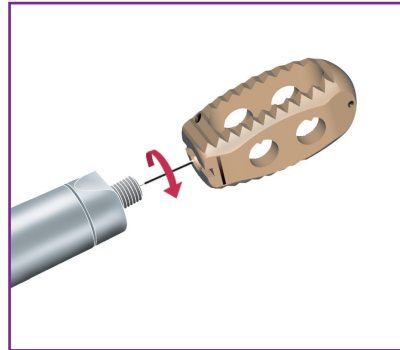


Figure 14

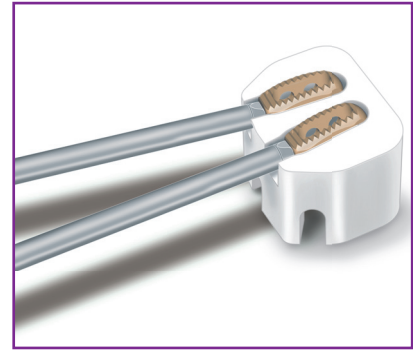


Figure 15



Figure 16



Impactor shaft

## Insertion of the implants

Depending on the segment and the anatomical circumstances, parallel or lordotic cages can be used. Prior to insertion of the implants into the intervertebral disc space, the surgeon should verify that it is sufficiently high. To ensure safe cage insertion, distraction has to be maintained, either with the intervertebral distractor on the contralateral side or by distraction of the pedicle screws. The appropriate use of the instruments and implants of the pedicle screw system can be found in the surgical technique provided with that system.

The small laser etched line near the posterior edge of the cage indicates the position of the vertical radiopaque marker. It must be oriented laterally in the disc space.

The sliding mallet is placed on the impactor shaft with the laser etched arrows on the sides facing towards the cage (fig. 17). The sliding mallet contains a shock absorbing layer which highly reduces stress onto the cage during insertion into the intervertebral disc space; additionally the instrument prevents divergence during the insertion maneuver.

Extraction of the cage can be facilitated by pulling the sliding mallet towards the hexagonal nut (fig. 18).

**1<sup>st</sup> remark:** We advise against striking the impactor shaft with a mallet or hammer to avoid damaging the threaded portion of the cage.

**2<sup>nd</sup> remark:** In case of spondylolisthesis it is recommended to perform reduction of the affected vertebral body before placing the cage. The corresponding surgical steps are described in the surgical technique of the posterior fixation system.

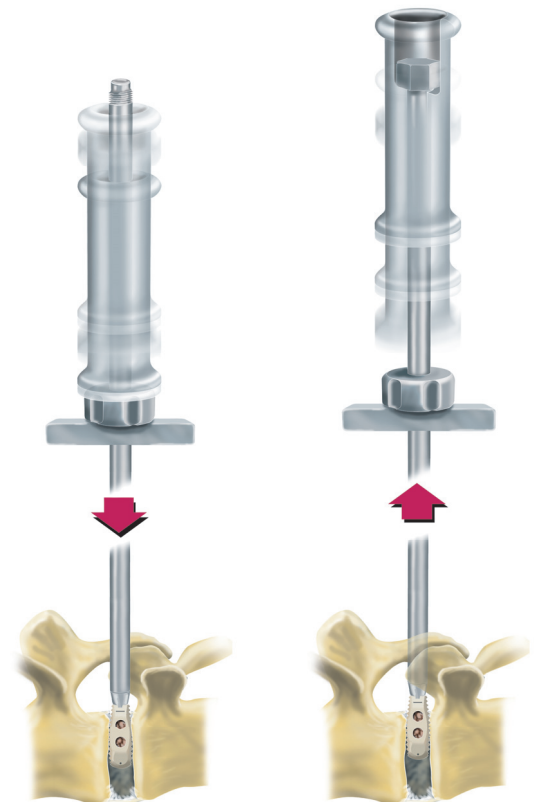


Figure 17

Figure 18

## Final positioning of the implants

Final positioning of the cage is performed by using the final impactor. The bolt on the lower end of the final impactor is inserted into the threaded hole of the cage; additionally a groove close to the bolt gives the surgeon a visual indication of the cage position (fig. 19).

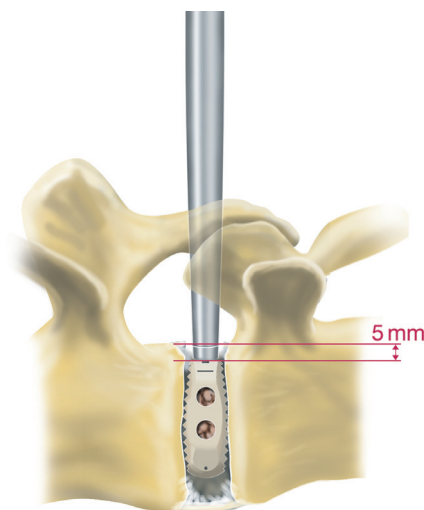


Figure 19



Final impactor



## Compression in optimal position

### Verification

The cage is optimally situated approximately 2 to 3 mm inward from the posterior edge of the vertebral body. The precise position can be verified with an image intensifier thanks to the radiopaque markers (fig. 20 & 21).

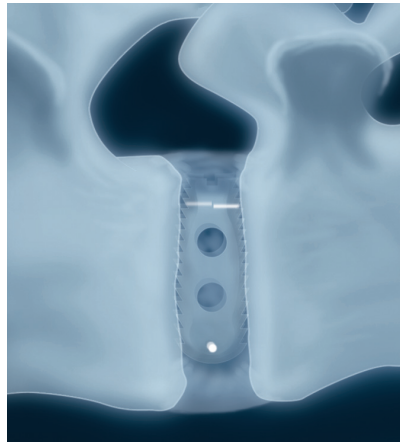


Figure 20

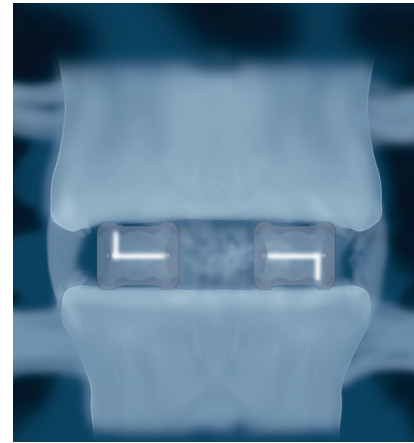


Figure 21

### Compression

After optimal cage placement, it is recommended to apply compression to the pedicle screws and tighten them to the fusion rod in a compressed position that maintains the cages tightly between the endplates to avoid any implant displacement.

## Anterior & anterolateral approach

**Anterior *Fidji Lumbar Cages* (ALIF)** are primarily used in the L5-S1 segment, whereas the anterolateral and lateral cages (ALIF AL & ALIF L) are generally used between the second and fifth lumbar vertebrae.

### Patient positioning

Depending on the desired approach, the patient is placed in a supine or lateral position.

### Incision & approach

Two approaches to the L5-S1 segment are recommended:

- Conventional transperitoneal approach
- Minimally invasive transperitoneal or retroperitoneal approach

Depending on the surgeon's preference, a midline or bilateral (Wiltse) approach is performed.

The retroperitoneal approach to the intervertebral segments between L2 and L5 is commonly used for anterolateral and lateral *Fidji Lumbar Cages*. The patient is placed in a decubitus lateral or half-lateral position and a conventional or minimally invasive lumbotomy is performed.

### Exposure & discectomy

After identification of the segment to be treated, various instruments of the *Fidji Lumbar* and *Mergence Anterior* systems can be used to remove the intervertebral disc (fig. 22 & 23).

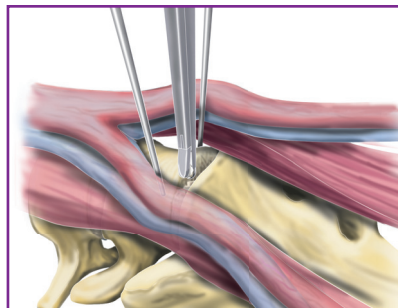


Figure 22

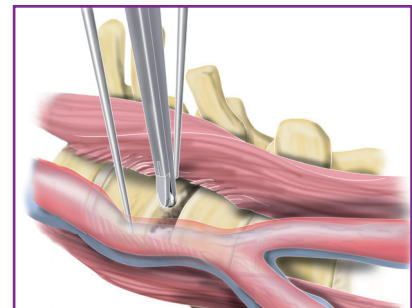


Figure 23

### Preparation of the disc space

After complete resection of the disc material, the intervertebral disc space is distracted using a succession of progressively larger distractors (fig. 24) available in the *Fidji Lumbar* and *Mergence Anterior* instrument sets.

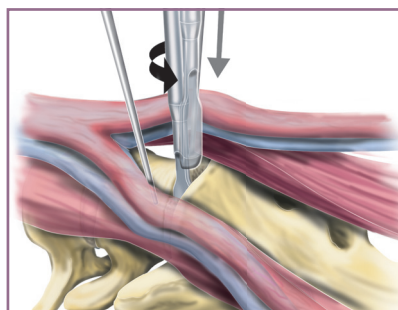


Figure 24

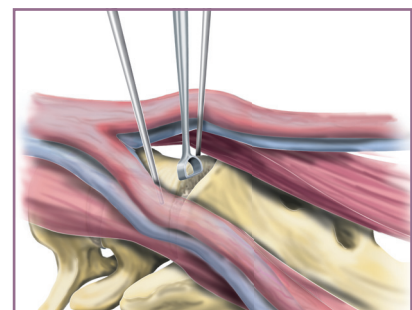


Figure 25

Once the desired intervertebral height is achieved, the endplates are carefully prepared with reamers, anterior curettes and rongeurs, preserving the subchondral bone to reduce the risk of subsidence (fig. 25).

## Sizing

Before inserting an implant, the surgeon determines the size to use with trial cages, which correspond to the approach being used (anterior, anterolateral or lateral). The threaded bolt on the impactor shaft is inserted into the threaded hole of the trial cage (fig. 26 & 27).

Care must be taken to insert the ridges next to the threaded bolt into the slots next to the threaded holes when fixing the trial cage on the impactor.

It is recommended to start with a small trial implant to avoid over-distraction. Progressively greater trial cages should be tested until finding the size that fits firmly between the endplates.

The shock absorbing layer (fig. 28) of the sliding mallet should always be oriented toward the cages (arrows toward them have been etched on the mallet as a reminder), because it is designed to reduce stress transmitted to trial cages during impaction (fig. 29 & 30).

To facilitate extraction of tightly fitted trial cages, a nut can be added above the sliding mallet to permit the surgeon to tap upward and outward (fig. 31).

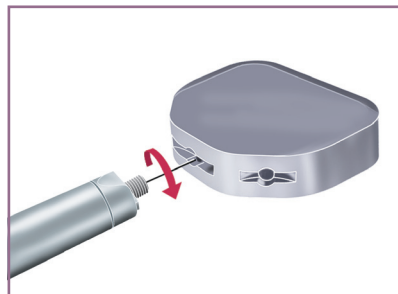


Figure 26

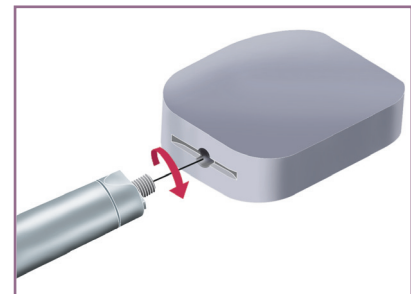


Figure 27



Figure 28

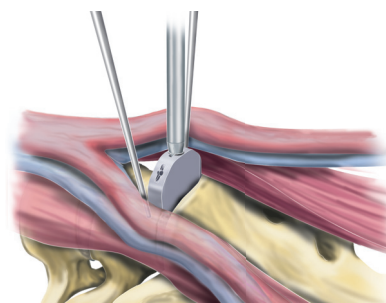


Figure 29 - Anterior approach

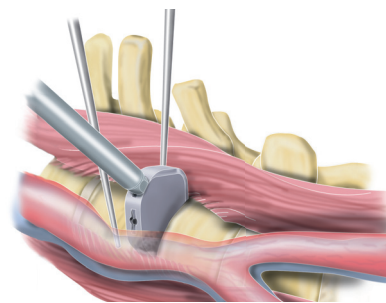


Figure 30 - Anterolateral approach

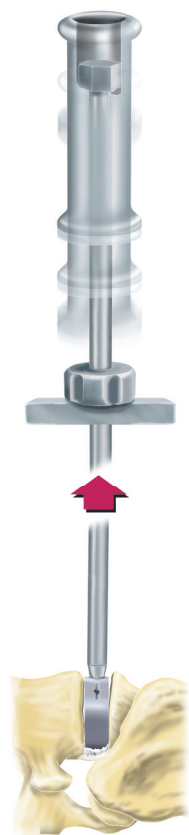


Figure 31

## Preparation of the implants

Before the cages are introduced into the disc space, they should be filled with autograft, allograft, or a suitable bone substitute. Before filling the cages with bone graft material, they should be threaded onto the impactor shaft and placed in the cage holder (fig. 32, 33 & 34).

There, the cages can be packed with the graft material, which is compressed using the small or large graft tamper (fig. 35).

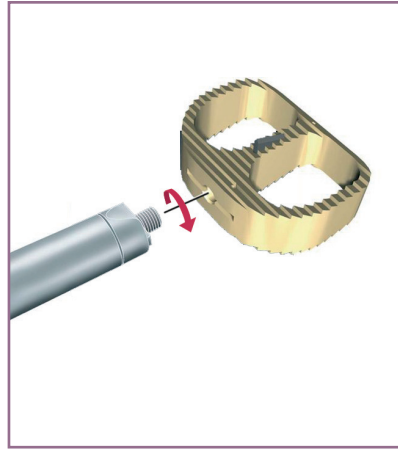


Figure 32 - Anterior approach

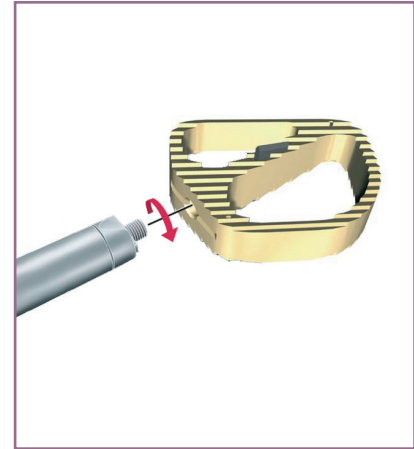


Figure 33 - Anterolateral approach

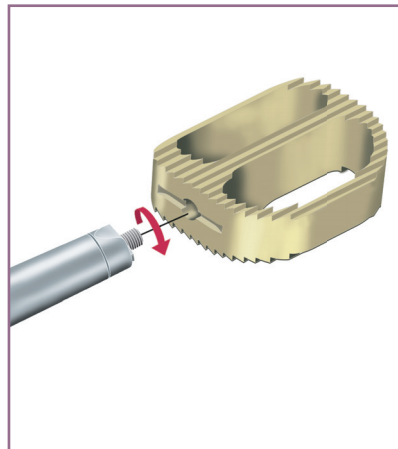


Figure 34 - Lateral approach



Figure 35

## Insertion of the implants

The implants are impacted in the same manner as the trial cages (fig. 36 & 37).

To obtain optimal cage positioning, the front edge of the implant should be situated approximately 1 to 2 mm deeper than the anterior border of the vertebral body.

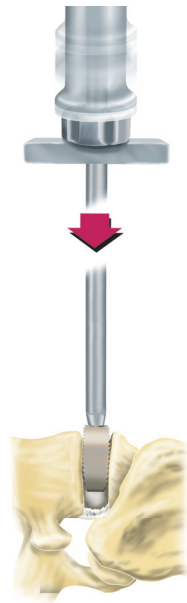


Figure 36

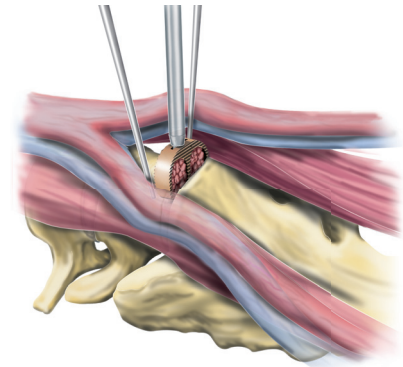


Figure 37 - Anterior approach

## Final positioning of the implants

Final positioning of the cages is obtained using the final impactor. The surgeon slips the small tip on the lower end of the final impactor into the threaded hole of the cage and gently strikes the final impactor to push the cage slightly deeper, if necessary. In addition, a circumferential groove 5 mm from the end of the final impactor gives the surgeon a visual indication of the cage position (fig. 38).



Figure 38



## Compression in optimal position

### Verification

The cage is optimally situated approximately 1 to 2 mm inward from the anterior edge of the vertebral body. The precise position can be verified with an image intensifier thanks to the radiopaque markers (fig. 39, 40 & 41).

### Compression

After optimal cage placement, it is recommended to apply compression to the pedicle screws and tighten them to the fusion rod in a compressed position that maintains the cages tightly between the endplates to avoid any implant displacement. However, excessive compression should not be used to avoid subsidence of cages through the vertebral endplates. An anterior or anterolateral plate can be used instead of pedicle screw fixation for prevention of secondary cage displacement.

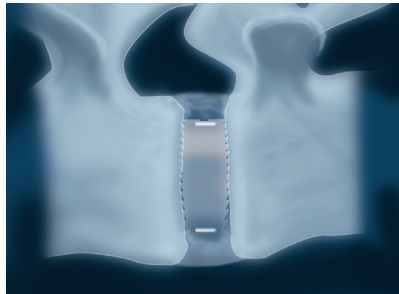


Figure 39

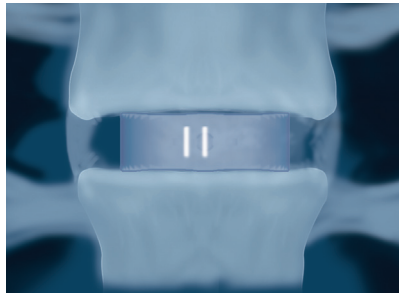


Figure 40

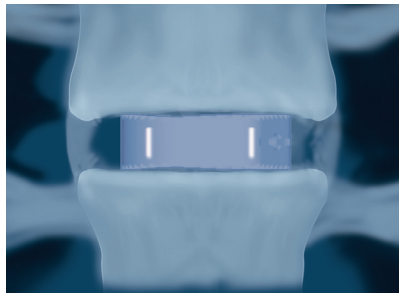


Figure 41

## References

### Posterior *Fidji Lumbar Cages (PLIF)*

Reference No.	Length (mm)	Height (mm)	Angle
SN3001-0-40800	20	8	0°
SN3001-0-40904	20	9	4°
SN3001-0-41004	20	10	4°
SN3001-0-41008	20	10	8°
SN3001-0-41104	20	11	4°
SN3001-0-41108	20	11	8°
SN3001-0-41204	20	12	4°
SN3001-0-41208	20	12	8°
SN3001-0-30800	25	8	0°
SN3001-0-30900	25	9	0°
SN3001-0-30904	25	9	4°
SN3001-0-31000	25	10	0°
SN3001-0-31004	25	10	4°
SN3001-0-31008	25	10	8°
SN3001-0-31100	25	11	0°
SN3001-0-31104	25	11	4°
SN3001-0-31108	25	11	8°
SN3001-0-31200	25	12	0°
SN3001-0-31204	25	12	4°
SN3001-0-31208	25	12	8°
SN3001-0-31304	25	13	4°
SN3001-0-31308	25	13	8°
SN3001-0-31404	25	14	4°
SN3001-0-31408	25	14	8°

**Anterior *Fidji Lumbar Cages (ALIF)***

Reference No.	Width (mm)	Length (mm)	Height (mm)	Angle
SN3001-0-51000	31	23	10	0°
SN3001-0-51004	31	23	10	4°
SN3001-0-51100	31	23	11	0°
SN3001-0-51104	31	23	11	4°
SN3001-0-51108	31	23	11	8°
SN3001-0-51200	31	23	12	0°
SN3001-0-51204	31	23	12	4°
SN3001-0-51208	31	23	12	8°
SN3001-0-51404	31	23	14	4°
SN3001-0-51408	31	23	14	8°
SN3001-0-51604	31	23	16	4°
SN3001-0-51608	31	23	16	8°
SN3001-0-11000	35	27	10	0°
SN3001-0-11004	35	27	10	4°
SN3001-0-11100	35	27	11	0°
SN3001-0-11104	35	27	11	4°
SN3001-0-11108	35	27	11	8°
SN3001-0-11200	35	27	12	0°
SN3001-0-11204	35	27	12	4°
SN3001-0-11208	35	27	12	8°
SN3001-0-11404	35	27	14	4°
SN3001-0-11408	35	27	14	8°
SN3001-0-11604	35	27	16	4°
SN3001-0-11608	35	27	16	8°

**Anterolateral *Fidji Lumbar Cages (ALIF AL)***

Reference No.	Width (mm)	Length (mm)	Height (mm)	Angle
SN3001-0-61000	31	23	10	0°
SN3001-0-61004	31	23	10	4°
SN3001-0-61100	31	23	11	0°
SN3001-0-61104	31	23	11	4°
SN3001-0-61108	31	23	11	8°
SN3001-0-61200	31	23	12	0°
SN3001-0-61204	31	23	12	4°
SN3001-0-61208	31	23	12	8°
SN3001-0-21000	35	27	10	0°
SN3001-0-21004	35	27	10	4°
SN3001-0-21100	35	27	11	0°
SN3001-0-21104	35	27	11	4°
SN3001-0-21108	35	27	11	8°
SN3001-0-21200	35	27	12	0°
SN3001-0-21204	35	27	12	4°
SN3001-0-21208	35	27	12	8°
SN3001-0-21404	35	27	14	4°
SN3001-0-21408	35	27	14	8°
SN3001-0-21604	35	27	16	4°
SN3001-0-21608	35	27	16	8°

Note: Anterior and Anterolateral stand-alone *Fidji Lumbar Cages* - with fin - are available on request except for 31x23x14-4°, 31x23x14-8°, 31x23x16-4° and 31x23x16-8°

**Fidji Lumbar Anterior & Anterolateral Trial Cages**

Reference No.	Width (mm)	Length (mm)	Height (mm)	Angle
SN3001-1-00650	31	23	10	0°
SN3001-1-00651	31	23	10	4°
SN3001-1-00652	31	23	11	0°
SN3001-1-00653	31	23	11	4°
SN3001-1-00654	31	23	11	8°
SN3001-1-00655	31	23	12	0°
SN3001-1-00656	31	23	12	4°
SN3001-1-00657	31	23	12	8°
SN3001-1-00658	31	23	14	4°
SN3001-1-00659	31	23	14	8°
SN3001-1-00660	31	23	16	4°
SN3001-1-00661	31	23	16	8°
SN3001-1-00609	35	27	10	0°
SN3001-1-00600	35	27	10	4°
SN3001-1-00610	35	27	11	0°
SN3001-1-00601	35	27	11	4°
SN3001-1-00602	35	27	11	8°
SN3001-1-00611	35	27	12	0°
SN3001-1-00603	35	27	12	4°
SN3001-1-00604	35	27	12	8°
SN3001-1-00605	35	27	14	4°
SN3001-1-00606	35	27	14	8°
SN3001-1-00607	35	27	16	4°
SN3001-1-00608	35	27	16	8°

**Lateral Fidji Lumbar Cages (ALIF L)****Fidji Lumbar Lateral Trial Cages**

Reference No.	Width (mm)	Length (mm)	Height (mm)	Angle	Reference No.	Width (mm)	Length (mm)	Height (mm)	Angle
SN3001-0-71000	31	21	10	0°	SN3001-1-71000	31	21	10	0°
SN3001-0-71004	31	21	10	4°	SN3001-1-71004	31	21	10	4°
SN3001-0-71100	31	21	11	0°	SN3001-1-71100	31	21	11	0°
SN3001-0-71104	31	21	11	4°	SN3001-1-71104	31	21	11	4°
SN3001-0-71108	31	21	11	8°	SN3001-1-71108	31	21	11	8°
SN3001-0-71200	31	21	12	0°	SN3001-1-71200	31	21	12	0°
SN3001-0-71204	31	21	12	4°	SN3001-1-71204	31	21	12	4°
SN3001-0-71208	31	21	12	8°	SN3001-1-71208	31	21	12	8°
SN3001-0-81000	33	27	10	0°	SN3001-1-81000	33	27	10	0°
SN3001-0-81004	33	27	10	4°	SN3001-1-81004	33	27	10	4°
SN3001-0-81100	33	27	11	0°	SN3001-1-81100	33	27	11	0°
SN3001-0-81104	33	27	11	4°	SN3001-1-81104	33	27	11	4°
SN3001-0-81108	33	27	11	8°	SN3001-1-81108	33	27	11	8°
SN3001-0-81200	33	27	12	0°	SN3001-1-81200	33	27	12	0°
SN3001-0-81204	33	27	12	4°	SN3001-1-81204	33	27	12	4°
SN3001-0-81208	33	27	12	8°	SN3001-1-81208	33	27	12	8°
SN3001-0-81404	33	27	14	4°	SN3001-1-81404	33	27	14	4°
SN3001-0-81408	33	27	14	8°	SN3001-1-81408	33	27	14	8°
SN3001-0-81604	33	27	16	4°	SN3001-1-81604	33	27	16	4°
SN3001-0-81608	33	27	16	8°	SN3001-1-81608	33	27	16	8°

Note: Lateral stand-alone *Fidji Lumbar Cages* - with fin - are available on request.



**Fidji Lumbar Cages Instruments**

Reference No.	Description
SN3001-1-00523	Anterior Curette
SN3001-1-00524	Posterior curette
SN3001-1-00500	Reamer Size 8
SN3001-1-00501	Reamer Size 9
SN3001-1-00502	Reamer Size 10
SN3001-1-00503	Reamer Size 11
SN3001-1-00504	Reamer Size 12
SN3001-1-00505	Reamer Size 13
SN3001-1-00506	Reamer Size 14
SN3001-1-00520	Initial distractor
SN3001-1-00510	Distractor Size 9
SN3001-1-00511	Distractor Size 10
SN3001-1-00512	Distractor Size 11
SN3001-1-00513	Distractor Size 12
SN3001-1-00514	Distractor Size 13
SN3001-1-00515	Distractor Size 14
SN3001-1-00531	Small Retractor
SN3001-1-00532	Large Retractor
SN3001-1-00538	Sliding Mallet
SN3001-1-00541	Impactor Shaft
SN3001-1-00546	Large Graft Tamper
SN3001-1-00545	Small Graft Tamper
SN3001-1-00547	Cage Jig
SN3001-1-00550	Final Impactor
SN3001-1-00551	Extraction Blocker
SN3001-2-00003	Instrument Tray
SN3001-2-00004	Tray for Trial Implants

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