

BARRICAID® PROSTHESIS
for Partial Anulus Replacement

Optimizing discectomy outcomes
in high-risk patients

Prevent Reherniation. Preserve Disc.

“Today’s standard discectomy is performed in such manner that an opening almost always remains in the outer structure of the disc at the end of the surgery. The clinical literature reports a 2-18% reherniation rate at two years in the general discectomy population⁷. Reherniation rates in patients with defects >6mm have been reported up to 27%”.⁸

Univ.-Prof. Dr. med. Claudius Thomé

Chairman, Department of Neurosurgery
Medical University Innsbruck, Austria

Overcome the surgical dilemma...

THE REALITY OF LUMBAR DISCECTOMY

While widely perceived as a successful procedure, discectomy surgery has a high failure rate over time. Patient satisfaction in larger studies is only about 75% at 1 year¹, and roughly 20% of patients are re-operated by 10 years^{2,3,4}.

Failure results from one of two primary causes:

- Recurrence of symptoms associated with reherniation
- Chronic or worsening back pain

REHERNIATION

The overall risk of recurrent disc herniation varies between 2-18% in reported literature^{5,6,7}. There is strong evidence that reherniation rate is influenced by the size of the defect in the annulus. Patients with small or slit-type defects in the annulus have as low as 1% risk of recurrence while those with larger defects have between 18-27% risk^{8,9}.

| | ALL PATIENTS | FRAGMENT-FISSURE GROUP | FRAGMENT-DEFECT GROUP | FRAGMENT-CONTAINED GROUP | NO FRAGMENT-CONTAINED GROUP |
|-----------------------------------------------|--------------|------------------------|-----------------------|--------------------------|-----------------------------|
| | 180 | 29 | 55 | 42 | 16 |
| Duration of post-operative sick leave* † (wk) | 1.2 (0-8) | 1.2 (0-8) | 1.3 (0-4) | 1.0 (0-4) | 1.7 (0-4) |
| Postoperative Oswestry score * (points) | 12.7 (0-69) | 11.6 (0-28) | 16.4\$ (2-48) | 9.2 (0-19) | 20.1# (0-69) |
| Standard score * (points) | 8.5 (2.8-10) | 9.0\$ (4.1-10) | 8.0 (3.9-10) | 8.8 (6.0-10) | 6.0# (2.8-9.5) |
| Rate of recurrent / persistent sciatica † | 11.7% (21) | 1.1% (1) | 27.3% (9) | 11.9% (5) | 37.5% (6) |
| Rate of documented reherniation † | 8.9% (16) | 1.1%\$ (1) | 27.3%\$ (9) | 9.5% (4) | 12.5% (2) |
| Rate of reoperation † | 6.1% (11) | 1.1% (1) | 21.2%# (7) | 4.8% (2) | 6.3% (1) |

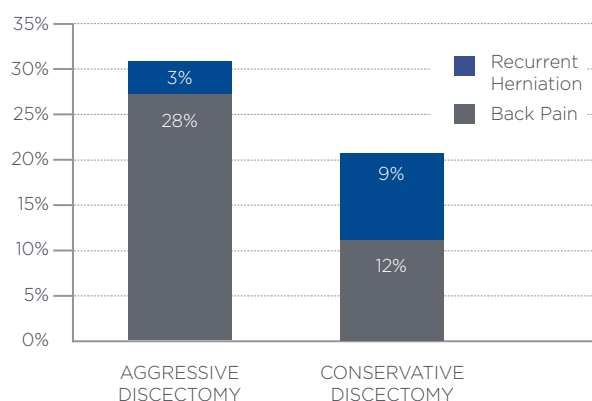
J Bone Joint Surg Am. 2003 Jan;85-A(1):102-8. Clinical Outcomes After Lumbar Discectomy for Sciatica: The Effects of Fragment Type and Anular Compliance. Carragee, et al.

Until the availability of anular closure technologies, surgeons had only one option to reduce the risk of recurrence in these larger defect patients – aggressive removal of the remaining nucleus. This technique is effective at decreasing the risk of reherniation, but at the cost of disc collapse and significantly worse clinical outcomes and lower patient satisfaction^{10,13}.

Chronic or worsening back pain following discectomy has been reported in the literature as another frequent failure mode, with rates between 7-37%^{10,11}.

When treating patients at higher risk of reherniation and/or disc collapse, i.e. those patients that are presented with taller disc heights in combination with a large anular defect, the surgeon is confronted with a dilemma.

The surgeon can choose to remove as little nucleus as possible to maintain disc height and biomechanics, but this increases the risk of recurrent herniation. On the other hand, aggressively removing nucleus will reduce the risk of recurrence, but increase the risk of disc collapse and severe back pain^{5,6,7,10}.



Watters WC and McGirt MJ. An evidence-based review of the literature on the consequences of conservative versus aggressive discectomy for the treatment of primary disc herniation with radiculopathy. The Spine Journal 9: 240-57. 2009

“Our in-vitro study checked the reliability of Barricaid® under complex loading conditions. It emerged that the original intervertebral disc height, which had been significantly reduced by the prolapse, had to a large extent been restored thanks to the Barricaid® implant. The most important result, however, was that in no case did another herniated disc occur – even after 100,000 stress cycles. Barricaid® appears to close the defect and prevent reherniation.”¹²

Prof. Dr. Hans-Joachim Wilke

Head of Spine Research Group

Institute of Orthopaedic Research and Biomechanics, University of Ulm Germany

...by closing the anular defect in high risk patients.

BARRICAID® PROSTHESIS DESIGN RATIONALE

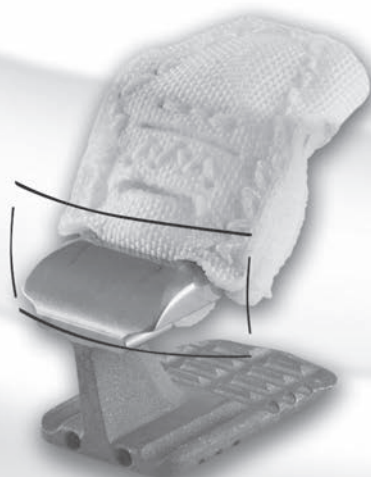
With more than 5 years of clinical experience and over 3,000 implantations worldwide, the Barricaid® device is trending to be a safe and effective treatment to prevent reherniation in patients at highest risk.

By replacing the defective region of the annulus, the Barricaid® prosthesis can significantly reduce the risk of recurrent herniation.

Patient Indication

- Active
- Tall disc ($\geq 5\text{mm}$)
- Large anular defect ($\geq 5\text{mm}$)
- L1-S1

Refer to IFU/labeling for complete cautions and indications.



Intelligent Design

- Multi-layer, flexible, woven polyester mesh
- Platinum-Iridium marker in mesh tip for visibility
- 8, 10, and 12mm size width covering most defects
- Titanium anchor securely fixed to proximal endplate. Does not interfere with MRI interpretation

Standardize Discectomy

- Enables a limited nucleotomy
- Maintain native nucleus to preserve the disc
- Fast and secured closure of the anular defect

“In particular, active patients with anular defect widths exceeding 5mm and a pre-operative intervertebral disc height of more than 5mm are most likely to benefit from Barricaid®”

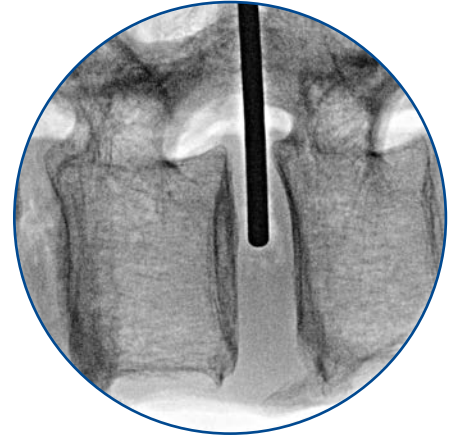
Dr. Peter Pál Varga

Director of the National Center for Spinal Disorders, Budapest Hungary

Adding only minutes to your discectomy

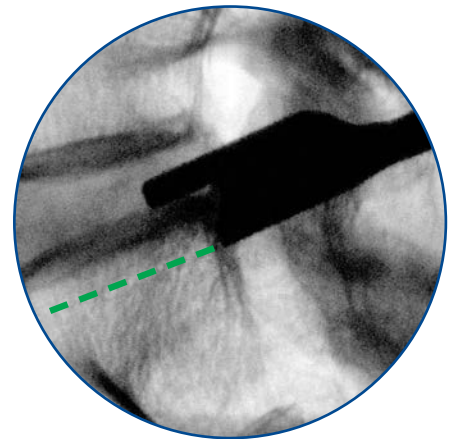
DEFECT MEASUREMENT

Measure size of anular defect following limited discectomy procedure. Patients with a large defect, i.e. 4-6mm in height and 5-12mm in width, are eligible for Barricaid®.



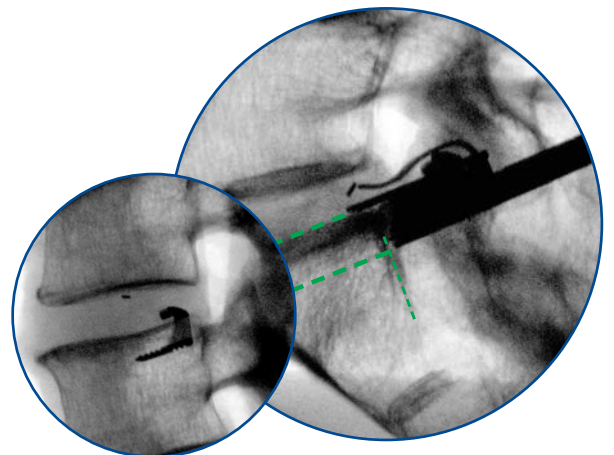
ALIGNMENT TRIAL

Use of Alignment Trial to validate adequate access to the disc space and confirm correct angle for Barricaid® implantation.



IMPLANTATION

Position of Barricaid® is confirmed under fluoroscopy.



Please refer to Barricaid® Surgeon Manual (SM009-EU-EN) for complete information on surgical implantation of Barricaid®.

A science driven approach

The Barricaid® was evaluated in two prospective, multicenter studies throughout Europe. Results of 75 implanted patients enrolled in these studies have been the subject of various scientific publications in peer-reviewed journals, including clinical and radiographic results up to two years.

Eur Spine J (2013) 22:1030–1036;

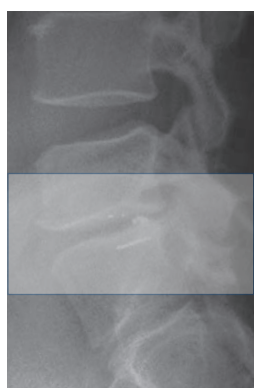
The High-Risk Discectomy Patient: Prevention Of Reherniation In Patients With Large Anular Defects Using An Anular Closure Device.

GJ Bouma, M Barth, D Ledic, M Vilendecic

- Prospective, Non-Randomised, Single Arm
- 75 Barricaid patients
- Up to 24 months follow-up

SAFETY

X-Ray and MRI images two years after implantation of Barricaid® Prosthesis demonstrate secured positioning of implant.



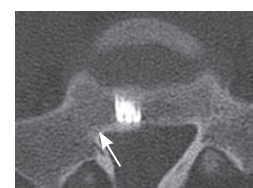
Lateral X-Ray at 2 years



Pre-Op



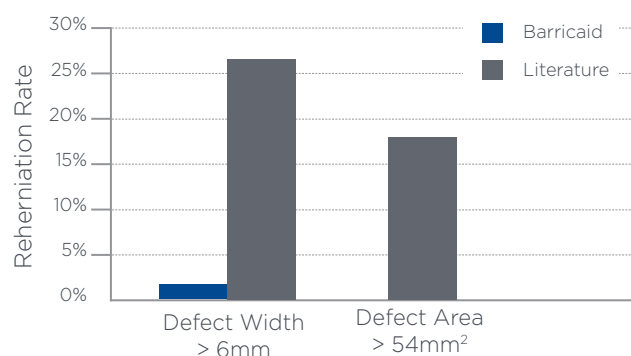
MRI at 2 years



Bone growth covers anchor insertion path

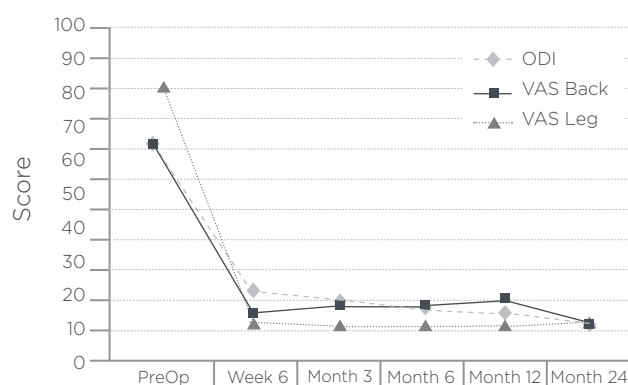
EFFICACY

One (1.4%) reported symptomatic reherniation at mean follow up of 18.7m.



PAIN AND FUNCTION

Clinical outcomes for pain and function at 1 and 2 years post-operative compared favorably with other reports from literature.



Peer-reviewed Publications

1. Eur Spine J (2013) 22:1030-1036
The High-Risk Discectomy Patient: Prevention Of Reherniation In Patients With Large Anular Defects Using An Anular Closure Device
GJ Bouma, M Barth, D Ledic, M Vilendecic
2. Spine (2013) 38(10) E587-E593
Can Prevention Of A Re-Herniation Be Investigated?: Establishment Of A Herniation Model And Experiments With An Anular Closure Device
HJ Wilke, L Widmann, F Heuer, N Graf, S Rath
3. Korean J Spine (2012) 9(4):340-347
Primary Limited Lumbar Discectomy with an Annulus Closure Device: One-Year Clinical and Radiographic Results from a Prospective, Multi-Center Study
M Lequin, M Barth, C Thomé, GJ Bouma
4. Clin Neurol Neurosurg. (2013) DOI: 10.1016/j.clineuro.2013.01.007
Protecting Facet Joints Post-Lumbar Discectomy: Barricaid Annular Closure Device Reduces Risk of Facet Degeneration
M Trummer, S Eustacchio, M Barth, PD Klassen, S Stein
5. J Neurol Surg A Cent Eur Neurosurg. 2013 May 13, DOI: 10.1055/s-0033-134116
Cost Savings Associated with Prevention of Recurrent Lumbar Disc Herniation: A Multi-Center Prospective Cohort Study
SL Parker, G Grahovac, D Vukas, D Ledic, M Vilendecic, MJ McGirt
6. BSD Journal of Spinal Disorders and Techniques Publish Ahead of Print; DOI:10.1097/ BSD.0b013e3182956ec5
Effect Of A Novel Annular Closure Device (Barricaid) On Same Level Recurrent Disc Herniation And Disc Height Loss After Primary Lumbar Discectomy: Two-Year Results Of A Multi-Center Prospective Cohort Study
SL Parker, G Grahovac, D Vukas, M Vilendecic, D Ledic, MJ McGirt, EJ Carragee
7. Acta Clinica Croatica (2013) Vol.52. No.1. Siječanj
Clinical Outcomes In Patients After Lumbar Disk Surgery With Annular Reinforcement Device: Two-Year Follow Up
D Vukas, D Ledić, G Grahovac, Z Kolić, K Rotim, M Vilendečić
8. J Neurol Surg A 2014;00:1-8.
Effect of Anular Closure on Disk Height Maintenance and Reoperated Recurrent Herniation Following Lumbar Discectomy: Two-Year Data
D Ledic, D Vukas, G Grahovac, M Barth, GJ Bouma, M Vilendecic



Level I Randomized Controlled Trial

In December 2010, Intrinsic Therapeutics, Inc. initiated what will be one of the largest prospective spine studies ever run to demonstrate the clear benefit of using the Barricaid® in limited discectomy patients.

CONTRIBUTING CENTERS

21 clinical centers have contributed to the trial, including leading spine centers from Germany, The Netherlands, Belgium, Austria, Switzerland and France.

PATIENT POPULATION

In this superiority trial, patients are randomized intra-operatively 1:1 to receive either Barricaid® or limited discectomy alone. Patient enrollment has been concluded per the prospective statistical plan with 554 patients included in the trial.

ENDPOINTS

To be judged a success, the Barricaid® group will need to demonstrate statistical superiority in the study's two co-primary endpoints:

1. Reherniation free survival
2. A composite endpoint of patient safety and effectiveness outcomes including improvement in leg pain, and Oswestry Disability Index (ODI), maintenance of disc height, maintenance of device integrity, reherniation free survival and lack of a reoperation at the target level.

FOLLOW-UP

This trial will be the most comprehensive study on discectomy patients ever performed, collecting all relevant clinical as well as radiographic data. The resulting data set should serve not only to demonstrate the superiority of the Barricaid®, but to analyze the impact of pre-operative data and intra-operative technique on the outcomes of discectomy.

| PRE-OPERATIVE | PRE-OP | INTRA-OP | 6 WEEKS | 3 MONTHS | 6 MONTHS | 1 YEAR | 2 YEARS |
|-----------------|--------|----------|---------|----------|----------|--------|---------|
| VAS Leg | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| VAS Back | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| ODI | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| SF-36 | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Defect Size | | ✓ | | | | | |
| Nucleus Removed | | ✓ | | | | | |
| X-Ray | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| MRI | ✓ | | | | | ✓ | ✓ |
| Low-Dose CT | ✓ | | | | | ✓ | ✓ |

Clinical Cases

CASE 1

Gender: Male

Age: 33 years

Level/side herniation: L4/L5, Left

Defect size: 5 x 9mm

Pre-op VAS leg: left: 97, right: 4

2Y Post-op VAS leg: left: 0, right: 0

Pre-op VAS back: 14

2Y Post-op VAS back: 0

ODI: Pre-op: 62, 2Y post-op: 0



Pre-Op MRI



2YR X-Ray



2YR Post-Op MRI

CASE 2

Gender: Male

Age: 52 years

Level/side herniation: L5/S1, Left

Defect size: 5 x 8 mm

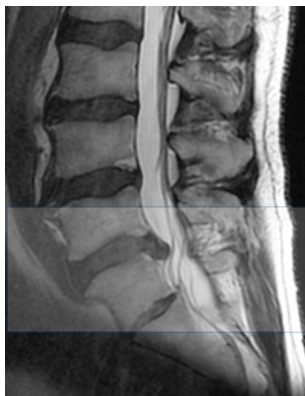
Pre-op VAS leg: left: 73, right: 1

2Y Post-op VAS leg: left: 0, right: 0

Pre-op VAS back: 74

2Y Post-op VAS back: 0

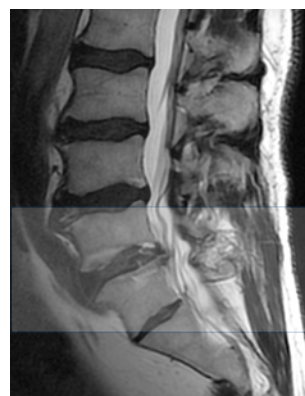
ODI: Pre-op: 54, 2Y post-op: 4



Pre-Op MRI



2YR X-Ray



2YR Post-Op MRI

CASE 3

Gender: Female

Age: 53 years

Level/side herniation: L5/S1, Left

Defect size: 5 x 6 mm

Pre-op VAS leg: left: 94, right: 1

2Y Post-op VAS leg: left: 2, right: 2

Pre-op VAS back: 21

2Y Post-op VAS back: 2

ODI: Pre-op: 54, 2Y post-op: 4



Pre-Op MRI



2YR X-Ray



2YR Post-Op MRI

Patient Selection Criteria

PATIENT SELECTION

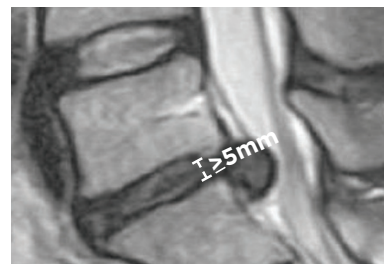
- Skeletally mature patients with disc herniations (primary or recurrent) between L1 and S1 with radiographic confirmation of neural compression using MRI.
- Radiculopathy (with or without back pain) with a positive Straight Leg Raise (L4-5, L5-S1) or Femoral Stretch Test (L1-2, L2-3, L3-4).
- At least six (6) weeks of failed, conservative treatment prior to surgery, in case of no neurological deficit, including physical therapy, use of anti-inflammatory medications at maximum specified dosage and/or administration of epidural/facet injections. In case of neurological deficit, surgery may be considered at earlier time point.
- Minimum posterior disc height of 5mm at the index level.
- Intra-operative confirmation of an anular defect that is between 4mm – 6mm in height and between 5mm – 12mm in width.

WARNINGS

- Do not implant the Barricaid prosthesis in case of spondylolisthesis and/or instability requiring stabilization.
- Do not use the Barricaid prosthesis in anular defects wider than 12mm or taller than 6mm.
- Do not implant the Barricaid prosthesis if subject has clinically compromised vertebral bodies in the lumbosacral region due to any traumatic, neoplastic, metabolic, or infectious pathology.
- Do not implant the Barricaid prosthesis in case of osteoporosis.
- Do not implant the Barricaid prosthesis in case of extra-foraminal herniations and any defect you cannot completely visualize.

THE IMPORTANCE OF DISC HEIGHT IN PATIENT SELECTION

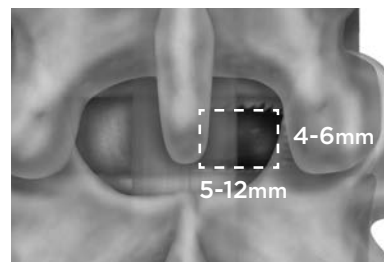
- Patients with taller discs and more nucleus are more likely to benefit from the Barricaid®'s potential to maintain disc height.
- Taller discs are likely to exhibit improved ranges of motion and less low back pain¹¹ over collapsed discs.



Pre-Op




THE EFFECT OF DEFECT SIZE ON PATIENT SELECTION


Potential Barricaid® patients are intraoperatively screened for defect size and only those with larger defects are selected for Barricaid® implantation.



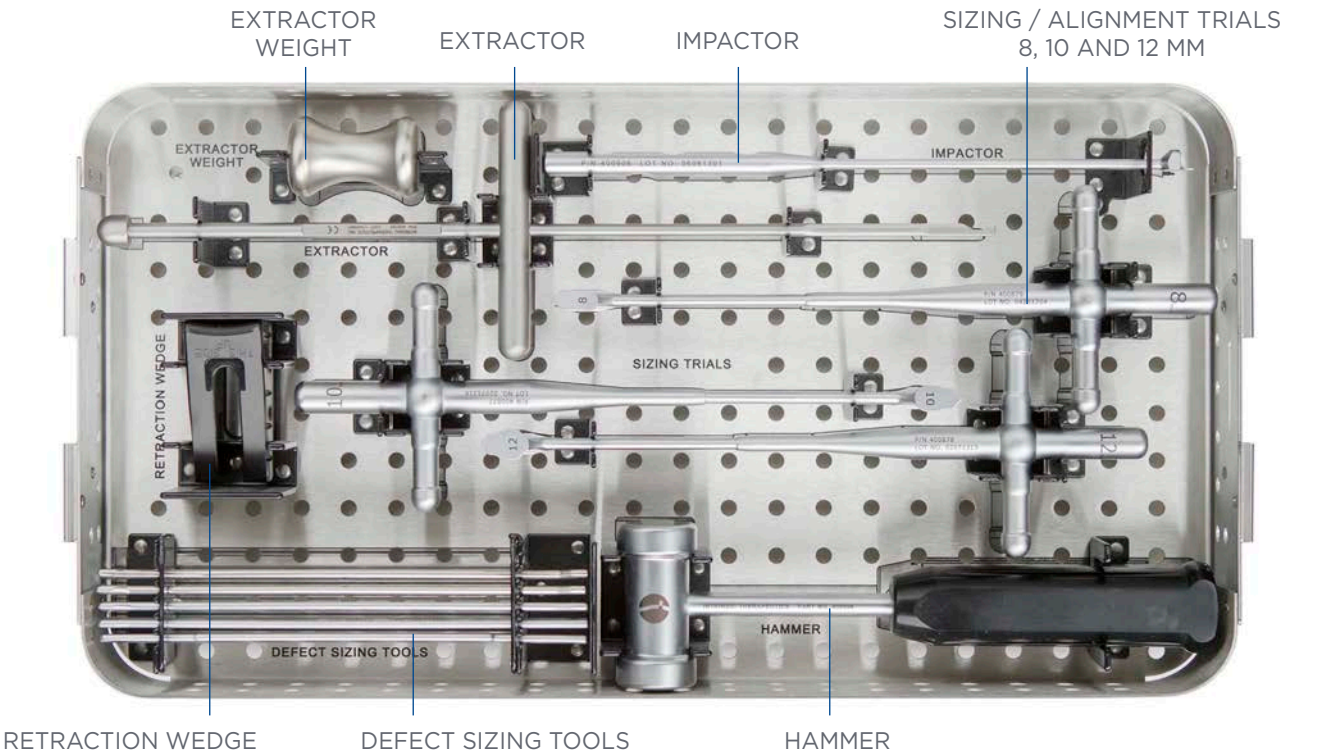
Intra-Op

Barricaid® System

| REF. NR. | DESCRIPTION |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| <div data-bbox="23 336 399 470">  </div> BAR-D8-8X14 | Barricaid® Prosthesis, 8mm wide mesh, sterile, pre-loaded on delivery tool |
| <div data-bbox="23 470 399 604">  </div> BAR-D8-10X14 | Barricaid® Prosthesis, 10mm wide mesh, sterile, pre-loaded on delivery tool |
| <div data-bbox="23 604 399 739">  </div> BAR-D8-12X14 | Barricaid® Prosthesis, 12mm wide mesh, sterile, pre-loaded on delivery tool |



| REF. NR. | DESCRIPTION |
|----------|-----------------------------------------------------------------|
| KIT-D4 | Instrument set for use with the Barricaid® system, non-sterile. |



References

- ¹ Strömqvist, B, et al: One-Year Report from the Swedish National Spine Register. Acta Orthopaedica Supplementum No. 319, VOL. 76, 2005.
- ² Keskimäki I, et al. Reoperations After Lumbar Disc Surgery: A Population-Based Study of Regional and Interspecialty Variations. Spine 25: 1500-8. 2000.
- ³ Malter AD, et al. 5-Year Reoperation Rates After Different Types of Lumbar Spine Surgery. Spine 23: 814-20. 1998.
- ⁴ Martin B, et al; Repeat Surgery After Lumbar Decompression For Herniated Disc: The Quality Implications Of Hospital And Surgeon Variation. Spine J. 2012 Feb;12(2):89-97. doi: 10.1016/j.spinee.2011.11.010. Epub Dec 21, 2011.
- ⁵ Atlas, S, et al: Long-Term Outcomes of Surgical and Nonsurgical Management of Sciatica Secondary to a Lumbar Disc Herniation: 10 Year Results from the Maine Lumbar Spine Study. Spine: 30(8): 927-935. 2005.
- ⁶ Weinstein, J, et al: Surgical Versus Nonoperative Treatment for Lumbar Disc Herniation: Four-Year Results for the Spine Patient Outcomes Research Trial (SPORT). Spine: 33(25):2789-2800.2008
- ⁷ Watters WC and McGirt MJ. An Evidence-Based Review Of The Literature On The Consequences Of Conservative Versus Aggressive Discectomy For The Treatment Of Primary Disc Herniation With Radiculopathy. The Spine Journal 9: 240-57. 2009
- ⁸ Carragee, E, et al. Clinical Outcomes After Lumbar Discectomy for Sciatica: The Effects of Fragment Type and Anular Competence. JBJS: 85-A (1): 102-108. 2003.
- ⁹ McGirt MJ et al. A Prospective Cohort Study of Close Interval Computed Tomography and Magnetic Resonance Imaging After Primary Lumbar Discectomy: Factors Associated With Recurrent Disc Herniation and Disc Height Loss. Spine 34: 2044-51. 2009
- ¹⁰ McGirt MJ et al. Recurrent Disc Herniation and Long-Term Back Pain After Primary Lumbar Discectomy: Review of Outcomes Reported for Limited Versus Aggressive Disc Removal. Neurosurgery 64: 338-45. 2009.
- ¹¹ Parker SL, et al. Long-Term Back Pain After A Single-Level Discectomy For Radiculopathy: Incidence And Health Care Cost Analysis. Journal of Neurosurgery: Spine 12: 178-82. 2010.
- ¹² Wilke HJ, et al. Can Prevention Of A Re-Herniation Be Investigated?: Establishment Of A Herniation Model And Experiments With An Anular Closure Device. Spine, 38(10) pp E587-E593. 2013.
- ¹³ Carragee, et al. A Prospective Controlled Study Of Limited Versus Subtotal Posterior Discectomy: Short-Term Outcomes In Patients With Herniated Lumbar Intervertebral Discs And Large Posterior Anular Defect. Spine, Mar 15;31(6):653-7. 2006.

About Intrinsic Therapeutics

Intrinsic Therapeutics is dedicated to the science of spinal care with a focused mission: To offer surgeons and patients better options for treating painful disc herniations that cause sciatica and low back pain for millions of people worldwide.

Under the direction and guidance of our experienced management team and scientific advisory board, including renowned neuro and orthopedic surgeons from around the world, Intrinsic Therapeutics has developed the next generation of innovative disc closure solutions designed to improve patient outcomes.



Intrinsic
THERAPEUTICS

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