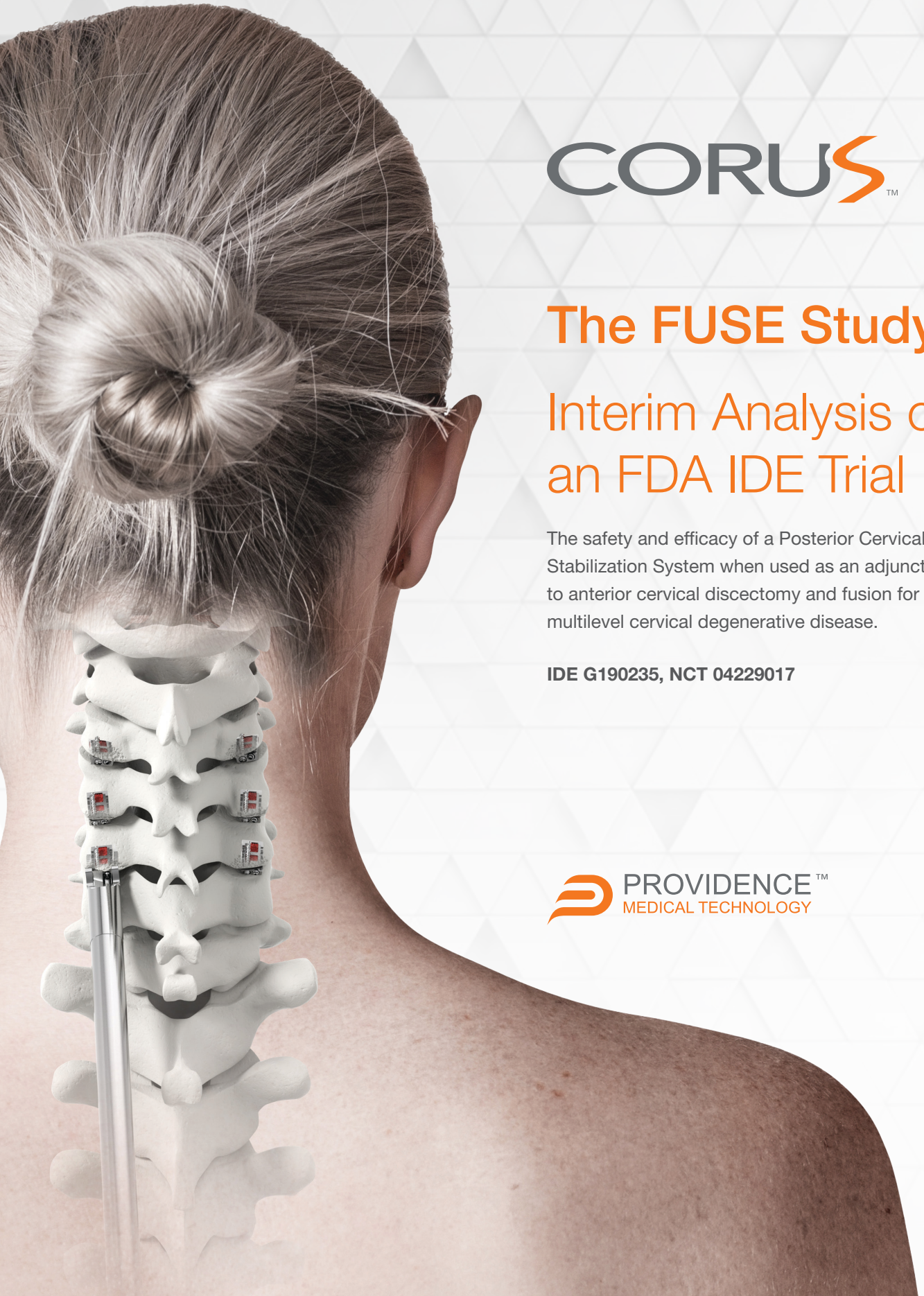


CORUS™

The FUSE Study:

Interim Analysis of an FDA IDE Trial

The safety and efficacy of a Posterior Cervical Stabilization System when used as an adjunct to anterior cervical discectomy and fusion for multilevel cervical degenerative disease.

IDE G190235, NCT 04229017

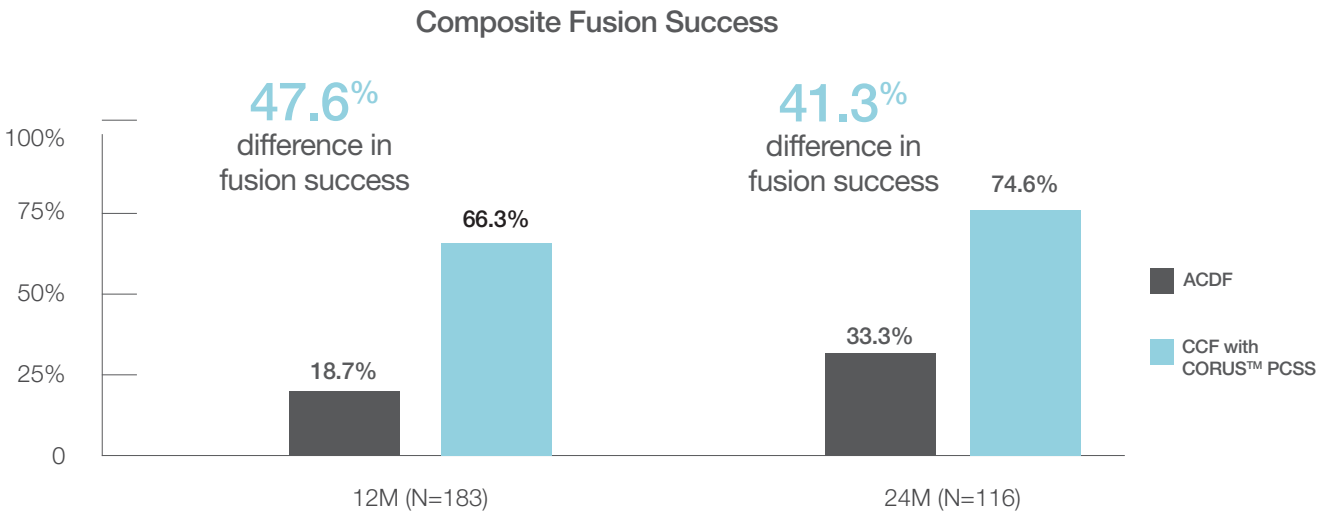
PROVIDENCE™
MEDICAL TECHNOLOGY

Table of Contents

Key Trial Results

Interim analysis of the FUSE Study shows that compared to anterior cervical discectomy and fusion alone, circumferential cervical fusion (CCF) with CORUS™ Posterior Cervical Stabilization System (PCSS) demonstrates:

Superiority in fusion at 12 months



Key Trial Results

Statistically significant difference in Composite Safety Endpoint at 24 months

	24-Month Composite Safety Endpoint	Fusion Success	NDI Success	Neurological Success	Absence of SSI
CCF (N=59)	**50.8% (30)**	**74.6% (44)**	**69.6% (39)**	**93.0% (53)**	**96.6% (57)**
ACDF (N=57)	22.8% (13)	33.3% (19)	57.7% (30)	96.1% (49)	77.2% (44)
p-value	0.002	<0.001	0.196	0.682	0.002

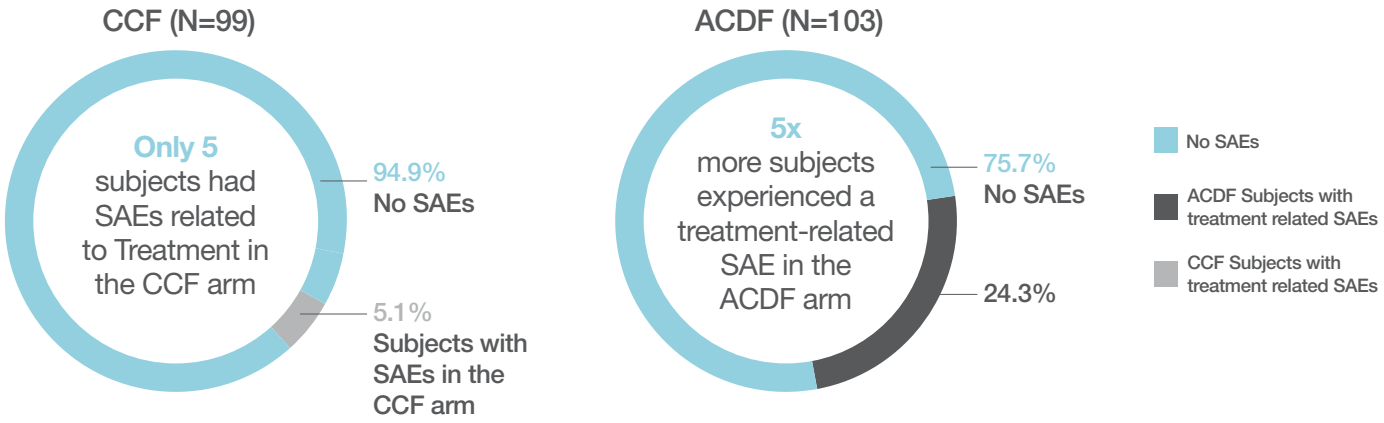
21.6% of the 12-month ACDF cohort required a second surgery

	Total SSIs	Revision	Removal	Supplemental Fixation
CCF	**1**	**0**	**1**	**0**
ACDF	**23**	1	0	22

21.6% of all ACDF patients at interim analysis required a second surgery

No increase in length of stay or device/procedure-related adverse events

	ACDF	CCF w/ PCSS
Median length of stay	**1 night**	**1 night**



Study Overview
Trial Design

The FUSE Study is a randomized, prospective, multicenter, controlled FDA IDE trial comparing an investigational treatment, tissue-sparing **CCF performed with CORUS™ PCSS** in conjunction with plated anterior cervical discectomy and fusion (ACDF), with the current standard of care (ACDF alone).

Subject Participation Criteria

Subjects who meet the following criteria are considered eligible for the trial*:

- Age **18-80 years** (skeletally mature)
- Indicated for ACDF treatment of degenerative disc disease (DDD) between and including **C3-C7 at 3 contiguous levels**
- A **Neck Disability Index (NDI) Score of ≥15/50**
- **Unresponsive to non-operative, conservative treatment** (rest, heat, electrotherapy, physical therapy, chiropractic care, and/or analgesics)

**See appendix for the full list of inclusion and exclusion criteria.*

Endpoint Definitions

Subjects were followed at protocol-defined intervals for 24 months, with the primary endpoint being fusion success determined at 12 months and the secondary endpoint being composite safety success determined from clinical and radiographic data collected through 24 months following index treatment.

A subject was considered a fusion success if there was:

- Evidence of bridging trabecular bone across endplates
- <2° total angular motion (from flexion to extension) for all levels treated

Safety success was based on a combination of:

- Fusion success at 24 months
- NDI success
- Neurological success
- The absence of secondary surgical intervention (SSI)

CCF procedure is performed using CORUS™ PCSS

Study Overview

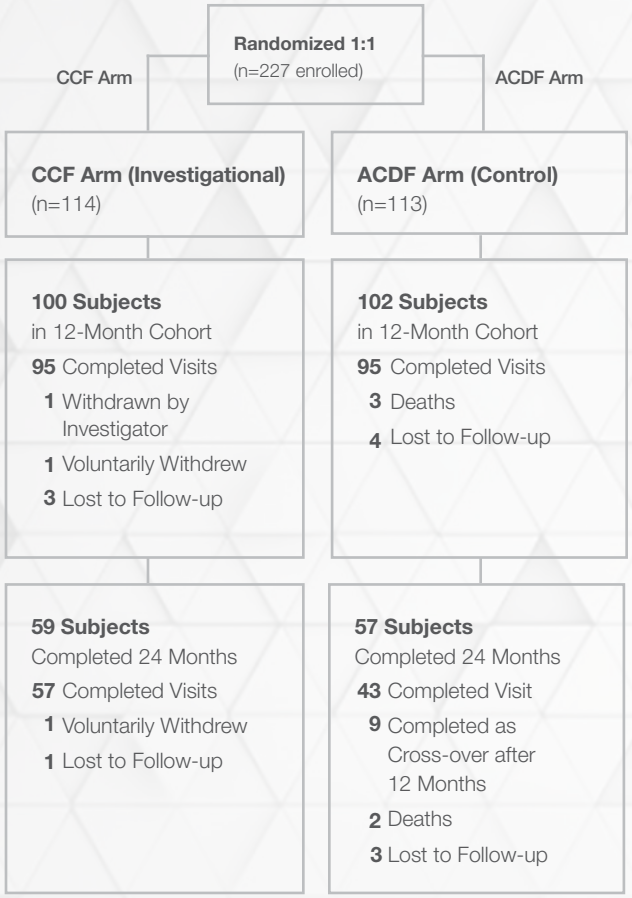
By the Numbers

1:1 randomization

227 subjects

114 in the CCF arm

113 in the ACDF arm



Subject status as of the December 29th, 2023 Interim Analysis.

Subject Demographics

No statistically significant differences in patient demographics are present between arms.

		CCF (N=114)	ACDF (N=113)	*p*-value
Age Group	Age <65 Years	**85 (74.6%)**	83 (73.5%)	0.849
	Age >65 Years	**29 (25.4%)**	30 (26.5%)	
BMI Group (vs Median)	BMI <30.5 kg/m^2	**57 (50.0%)**	57 (50.4%)	0.947
	BMI >30.5 kg/m^2	**57 (50.0%)**	56 (49.6%)	
Smoking Status	Smoker	**19 (16.7%)**	17 (15.0%)	0.738
	Nonsmoker	**95 (83.3%)**	96 (85.0%)	
Diabetes	Yes	**15 (13.2%)**	17 (15.0%)	0.683
	No	**99 (86.8%)**	96 (85.0%)	
Sex	Male	**44 (38.6%)**	53 (46.9%)	0.206
	Female	**70 (61.4%)**	60 (53.1%)	

Interim Analysis Results

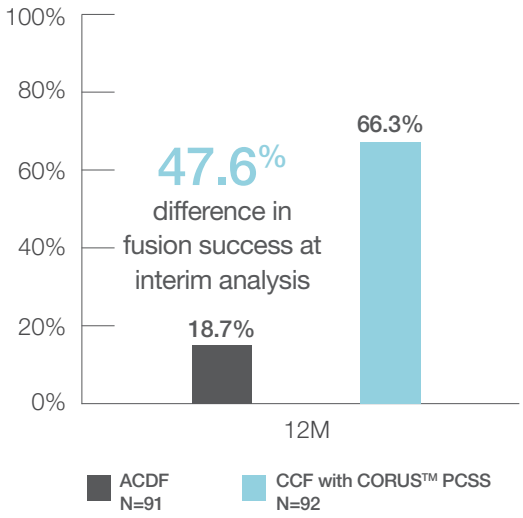
Study Endpoints

Primary Endpoint: Fusion Success at 12M

Success Criteria

Range of motion (ROM) and bridging bone are both assessed at each of the 3 index levels, with all assessments needing to be successful for a subject to be considered a composite fusion success.

Determination of fusion success is made by an independent 3rd party core imaging lab, on CT scan, confirmed by 2 independent radiologists, based on evidence of bridging trabecular bone across interbody endplates and <2° segmental angular motion (range of motion, measured between flexion to extension) for all levels treated.



Results

CCF demonstrates superior fusion results at 12 months.

	ACDF (N=91)	CCF (N=92)	*p*-value	Difference
Composite Fusion Success	18.7% (17)	**66.3% (61)**	<0.001	+47.6%
Bridging Bone at all levels (N)	25.3% (23)	**68.5% (63)**	<0.001	+43.2%
ROM <2° at all levels (N)	51.6% (47)	**80.4% (74)**	<0.001	+28.8%
Fusion Failure at 1 level (N)	46.2% (42)	**22.8% (21)**	<0.001	-23.4%
Fusion Failure at 2 levels (N)	19.8% (18)‡	**9.8% (9)**	<0.001	-10.0%
Fusion Failure at 3 levels (N)	14.3% (13)	**1.1% (1)**	<0.001	-13.2%

‡One ACDF subject failed primary endpoint due to a revision where anterior plate was extended as part of treatment for ASD, however all index levels were fused at month 12 follow-up.

Interim Analysis Results

Study Endpoints

Secondary Endpoint: Composite Safety Success at 24M

	24-Month Composite Endpoint	Fusion Success	NDI Success	Neurological Success	Absence of SSI
CCF (N=59)	**50.8% (40.7%)**	**74.6% (44)**	**69.6% (39)**	**93.0% (53)**	**96.6% (57)**
ACDF (N=57)	22.8% (8.5%)	33.3% (19)	57.7% (30)	96.1% (49)	77.2% (44)
***p*-value**	0.002	<0.001	0.196	0.682	0.002

24-month data was collected as part of an interim analysis and does not represent all data from the ongoing FUSE Study.

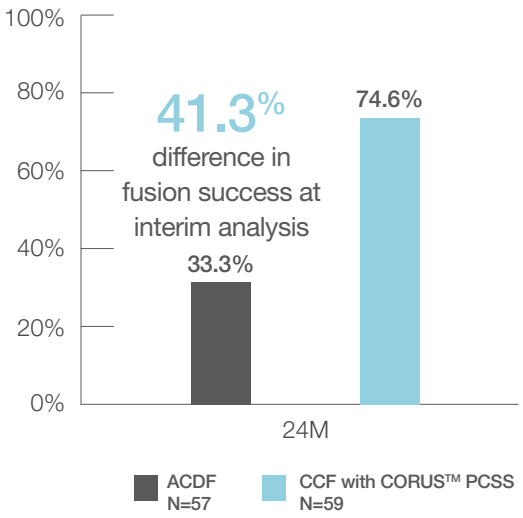
Metric: Fusion Success

Success Criteria

ROM and bridging bone are both assessed at each of the 3 index levels after 24 months, with all assessments needing to be successful for a subject to be considered a composite fusion success.

Results

With more than 100 subjects followed through 24 months in this interim analysis, the difference in the fusion rates was still 41.3% in favor of the CCF group over ACDF alone (74.6% vs 33.3%).



Metric: Neck Disability Index

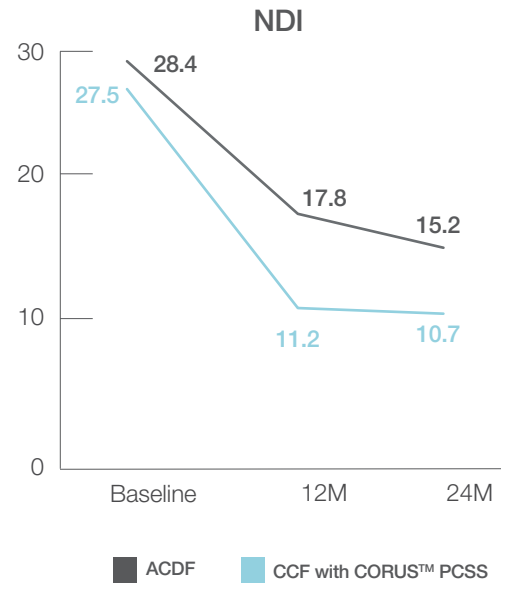
Success Criteria

NDI is measured using a subject-answered questionnaire, which assessed the effect of pain on daily life. Each of the 10 assessed criteria[§] receives a score from 0 to 5; the highest score (50 points) represents the most disabled. The final score can be converted to a percentage.

[§]NDI-assessed criteria includes pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation.

Results

Subjects in both groups reported improvement to NDI at 12 and 24 months at interim analysis.



Interim Analysis Results

Study Endpoints

Secondary Endpoint: Composite Safety Success at 24M

Metric: Neurological Success

CCF (N=59)	**93.0% (53)**
ACDF (N=57)	96.1% (49)
***p*-value**	0.682

Success Criteria

Neurological success is defined as maintenance or improvement of neurological status.

Results

CCF resulted in no difference in negative neurological outcomes relative to ACDF alone.

Metric: Subsequent Surgical Interventions (SSIs)

Success Criteria

Subjects treated with CORUS™ PCSS are compared to control subjects on the following metrics: revision, removal, supplemental fixation, and reoperation following surgery. Any related SSIs were deemed failures.

Results

Over 22% of ACDF subjects (21.6% in the 12-month cohort and 22.8% in the 24-month cohort) required a second surgery vs 1.7% in the CCF group at 24 months.

	Total SSIs	Revision	Removal	Supplemental Fixation
CCF	**1**	**0**	**1**	**0**
ACDF	**23**	1	0	22

21.6% of all ACDF patients at interim analysis required a second surgery

Interim Analysis Results

Additional Clinical Data

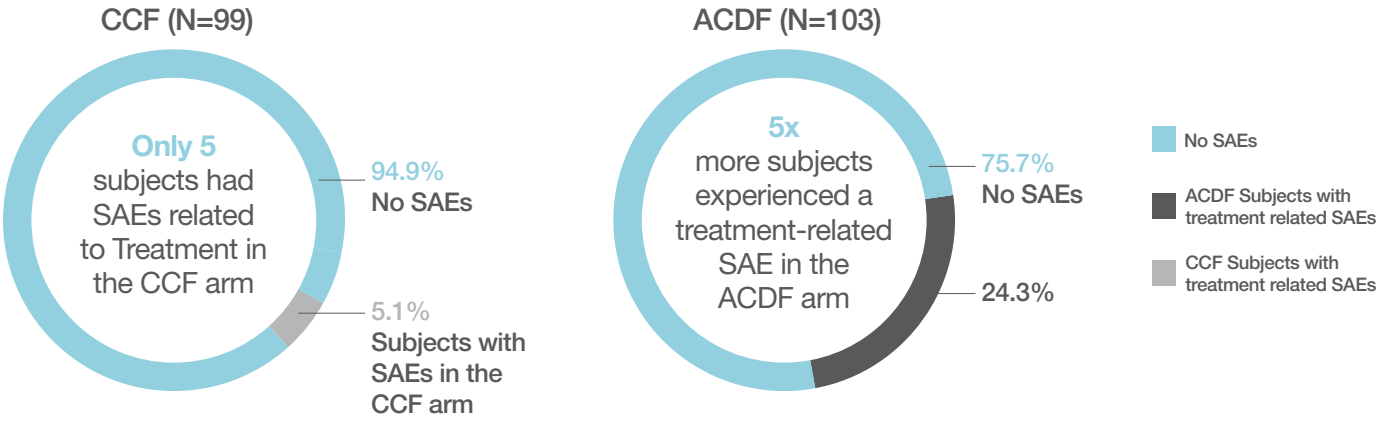
Metric: Adverse Events

Success Criteria

Adverse events are logged at every point during the study. Event details, along with subject medical charts are presented to the Clinical Events Committee (CEC, independent, non-investigators) to adjudicate relationship to either ACDF and/or posterior cervical fusion (PCF) procedures and devices.

Results

Approximately 95% of subjects treated with CORUS™ PCSS experience ZERO serious device/procedure-related adverse events (SAEs).



Metric: Osteolysis

Success Criteria

Osteolysis is assessed at month 12 and month 24 in both CCF and ACDF subjects.

Results

After 12 months, 8 subjects in the CCF arm have at least one level of suspected osteolysis compared to 41 in the ACDF arm. At month 24, results still indicate higher rates of osteolysis in the ACDF arm.

Rates of Reported Osteolysis

	CCF WITH CORUS™ PCSS	ACDF Alone	p-value
Month 12	**8.7%**	45.1%	<0.001
Month 24	**11.1%**	35.7%	0.004

Interim Analysis Results

Additional Clinical Data

Metric: Visual Analog Scale (VAS)

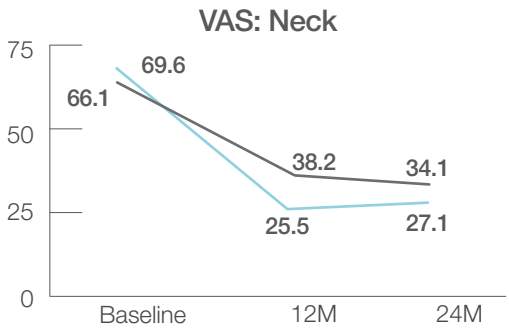
Success Criteria

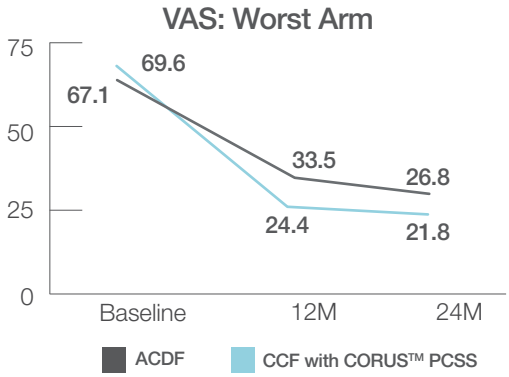
Subjects are asked to separately rate their neck and left and right arm pain. The VAS score is measured on a 100mm line with 'No Pain' on the left and 'Worst Possible Pain' on the right. The subject marks a point on the line that best represents their pain.

Note: The combined arm score was based on the most symptomatic arm at baseline carried forward.

Results

Subjects in both groups reported significant pain improvement in both arm and neck pain at 12 and 24 months.





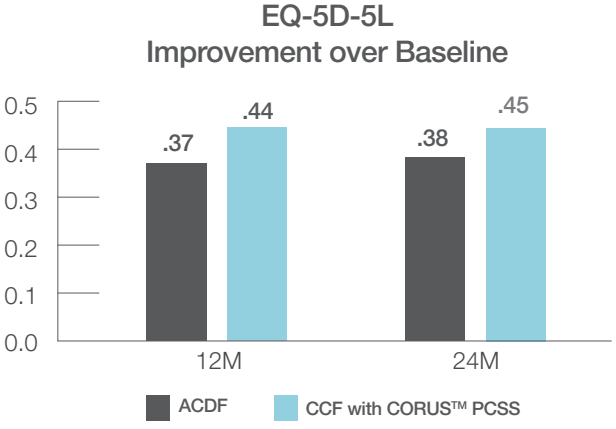
Metric: Patient Quality of Life (QoL) & Satisfaction

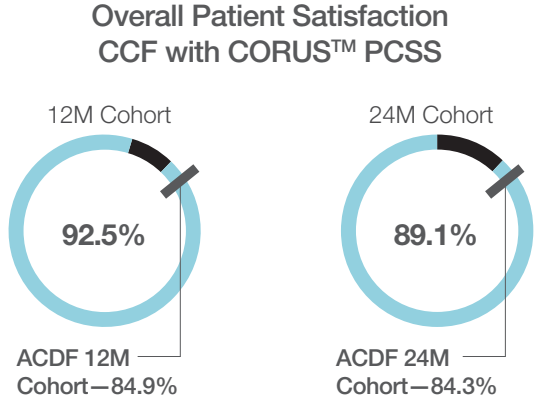
Success Criteria

The 5-level EQ-5D version (EQ-5D-5L) QoL questionnaire is administered at every study visit. Satisfaction questionnaires are completed at month 12 and month 24 visits.

Results

Subjects in the CCF arm reported significant improvements in EQ-5D-5L over baseline that were maintained at 24 months and reported on overall satisfaction rate of approximately 90%.





Interim Analysis Results

Additional Clinical Data

Metric: Fusion Across Facet Joints

Success Criteria

For subjects returning for imaging visits at month 12 and month 24, CT-based evidence of bridging bone is assessed at the left and right facets for all CCF and Cross-over subjects confirmed by a 3rd party lab and 2 independent radiologists.

Results

At month 12, 82.2% of levels exhibit contiguous bridging bone across the left facet, and 78.5% of levels exhibit contiguous bridging bone across the right facet. At month 24, these rates are 93.2% for both the left and the right.

Among the subjects treated with crossover procedures who have imaging at study conclusion, outcomes are available for 21 levels, with 95.2% of levels exhibiting bridging bone across both the left and the right facet.

	Left Side	Right Side
Month 12	**82.2%**	78.5%
Month 24	**93.2%**	93.2%
Crossover Patients	**95.2%**	95.2%

Metric: Perioperative Data

Success Criteria

CCF with CORUS™ PCSS is compared to traditional ACDF on health economics and resource use outcomes including blood loss, procedure duration, and length of stay (LOS).

Results

As expected, CCF with CORUS™ PCSS adds operative time and minor blood loss. However, adding PCF does not increase LOS.

	ACDF	CCF w/ PCSS	*Difference*
Operative time (minutes)	129.0	**175.5**	+46.5 minutes
Estimated blood loss	50 cc	**60 cc**	+10 cc
Median length of stay	1 night	**1 night**	-

Conclusion

CORUS™ PCSS is a safe and effective surgical option indicated for 3-level ACDF for 3-level DDD, C3-C7

At 12 months, CCF with CORUS™ PCSS demonstrated:

- Superior rates of fusion at 12 months compared to ACDF
- Lower rate of secondary surgical intervention compared to ACDF
- Meaningful reduction in neck and arm pain compared to baseline
- Significant improvement in quality of life

Indications for Use, CORUS™ PCSS

CORUS™ Posterior Cervical Stabilization System (PCSS) is posterior spinal instrumentation with integrated screw fixation intended to provide immobilization and stabilization of spinal segments.

CORUS™ PCSS is placed through a posterior surgical approach in up to 3 consecutive levels of the cervical spine (C3-C7) and achieves bilateral facet fixation by spanning the facet interspace at each level with points of fixation at each end of the construct.

CORUS™ PCSS is intended as an adjunct to posterior cervical fusion (PCF) and is only intended to be used in combination with an anterior cervical discectomy and fusion (ACDF) at the same level(s).

CORUS™ PCSS is indicated for skeletally mature patients with degenerative disc disease (DDD). DDD is defined as radiculopathy and/or myelopathy, neck and/or arm pain of discogenic origin as confirmed by radiographic studies.

CORUS™ PCSS is to be used with autogenous bone and/or allogenic bone graft.

Appendix

Inclusion Criteria

1. Age 18-80 years (skeletally mature)
2. Indicated for ACDF treatment of degenerative disc disease (DDD) between and including C3-C7 at 3 contiguous levels as determined by the following:
    a. Diagnosis of radiculopathy, myelopathy, or myeloradiculopathy of the cervical spine, with pain, including at least one of the following:
        i. Neck and/or arm pain
        ii. Decreased muscle strength
        iii. Abnormal sensation including hyperesthesia or hypoesthesia; and/or abnormal reflexes
    b. Radiographically determined pathology at the levels to be treated correlating to primary symptoms including at least one of the following:
        i. Decreased disc height on radiography, computed tomography (CT), or magnetic resonance imaging (MRI) in comparison to a normal adjacent disc
        ii. Degenerative spondylosis on MRI
        iii. Disc herniation on MRI
3. NDI Score of ≥15/50
4. Unresponsive to non-operative, conservative treatment (rest, heat, electrotherapy, physical therapy, chiropractic care, and/or analgesics) for:
    a. At least 6 weeks from radiculopathy or myeloradiculopathy symptom onset; or
    b. Have the presence of progressive symptoms or signs of nerve root/spinal cord compression despite continued non-operative conservative treatment
5. Reported to be medically cleared for surgery
6. Physically and mentally able and willing to comply with the Protocol, including the ability to read and complete required forms and willing and able to adhere to the scheduled follow-up visits and requirements of the Protocol
7. Written informed consent provided by subject

Appendix

Exclusion Criteria

1. Has, in the investigator's opinion, any disease or condition that would preclude accurate radiographic evaluation of any treated vertebrae (eg, morbid obesity)
2. Active systemic infection or infection at the operative site
3. History of, or anticipated treatment for, active systemic infection, including HIV or Hepatitis C
4. Previous trauma to the C3 to C7 levels resulting in significant bony or disco-ligamentous cervical spine injury that may prevent device placements
5. A prior spine surgery or pseudoarthrosis at the operative levels
6. Axial neck pain in the absence of other symptoms of radiculopathy or myeloradiculopathy justifying the need for surgical intervention
7. Symptomatic DDD or significant cervical spondylosis at more than 3 levels
8. Diagnosis of spondylolisthesis, grade >2
9. Overt (Segmental) instability measured as a movement on dynamic flex/ext X-rays >3.5 mm
10. Congenital bony and/or spinal cord abnormalities that affect spinal stability
11. Diagnosis of Paget's disease, osteomalacia, or any other metabolic bone disease other than osteopenia
12. Osteoporosis, defined as either the SCORE or MORES ≥6 and a DEXA bone density measured T-score of ≤-2.5
13. Active malignancy or a history of any invasive malignancy (except non-melanoma skin cancer), unless treated with curative intent and without clinical signs or symptoms of the malignancy for at least 5 years
14. Has an uncontrolled seizure disorder
15. Use of epidural steroids within 14 days prior to surgery
16. A concomitant condition requiring daily, high-dose oral and/or inhaled steroids
    High-dose steroid use is defined as:
    a. Daily, chronic use of oral steroids of 5 mg/day or greater
    b. Use of short-term (less than 10 days) oral steroids at a daily dose greater than 40 mg within one month of the study procedure
17. Known allergy to titanium (Ti)
18. Fixed or permanent neurologic deficit related to the target treatment levels that cannot be improved with surgical decompression
19. Has, in the Investigator's opinion, any disease or condition that would preclude accurate clinical evaluation (eg, neuromuscular disorders)
20. Is pregnant or nursing at time of screening, or with plans to become pregnant within the next 3 years
21. A current or recent history (≤1 year prior to screening) of substance abuse (alcoholism and/or narcotic addiction) that required treatment
22. Long-term use (>6 months) of opioids (max. daily amount=120 mg morphine equivalents)

Appendix

Exclusion Criteria

23. A mental illness or belongs to a vulnerable population, as determined by the investigator (eg, prisoner or developmentally disabled), that would compromise ability to provide informed consent or compliance with follow-up requirements
24. Any other condition or anatomy (eg, fused facet) that makes posterior fusion treatment infeasible
25. Use of any other investigational drug or medical device within the last 30 days prior to surgery
26. A pending personal litigation relating to spinal injury (worker's compensation is not exclusionary)
27. Anticipated or potential relocation greater than 50 miles that may interfere with completion of follow-up

Adverse Events: Detailed Summary

	ACDF (N=103)		CCF WITH PCSS (N=99)	
Any AE related to CCF or ACDF, *P*=0.005	65.0%	(67)	**45.5%**	(45)
Any Serious AE related to ACDF Procedure or Device	24.3%	(25)	**5.1%**	(5)
Any Serious AE related to CCF Procedure or Device	—	—	**5.1%**	(5)

CCF with PCSS did not increase the risk of Adverse Events (AE) compared to ACDF alone.

Subsequent Surgical Interventions at the Index Level: Procedure Details

Table 47: Summary of SSI classification by assignment

	Total SSIs	Revision	Removal	Supplemental Fixation	Reoperation
ACDF	23	1 (4.4%)	0 (0%)	22 (95.7%)	0 (0%)
CCF	**1**	**0 (0%)**	**1 (100%)**	**0 (0%)**	**0 (0%)**

Table 48: Summary of SSI indication by assignment

	Total SSIs	Pseudarthrosis	Adjacent Disc Disease	C5 Palsy	Other‖
ACDF	23	20** (87.0%)	1 (4.4%)	0	2 (8.7%)
CCF	**1**	**0 (0%)**	**0 (0%)**	**1 (100%)**	**0 (0%)**

‖*Correct kyphosis; provide additional decompression.*
**16 subjects treated according to protocol defined cross-over procedure.*

FUSE Study US Enrollment Sites

Enrollment Site	Investigator	Location
Strenge Spine Center	K. Brandon Strenge, MD	Paducah, KY
Inspira Health Network	Rahul Shah, MD, FAAOS	Vineland, NJ
Specialists Hospital Shreveport	Pierce Nunley, MD	Shreveport, LA
Pinehurst Surgical	Daniel Williams, MD & Alexander Lemons, MD	Pinehurst, NC
Lifebridge Health	Omar A. Zalatimo, MD, MPH, MHA, FAANS	Baltimore, MD
Spine Colorado	Ryan Martyn, MD and Doug Orndorff, MD	Durango, CO
Baylor College of Medicine	Alexander Ropper, MD and David Xu, MD	Houston, TX
UNC Hospitals Spine Center	Cheerag Upadhyaya, MD and Deb Bhowmick, MD	Chapel Hill, NC
Thomas Jefferson	Joshua Heller, MD, MBA	Philadelphia, PA
Rush University	Harel Deutsch, MD	Chicago, IL
Golden State Orthopaedics and Spine	Sandeep Gidvani, MD	Mountain View, CA
University Medical Center, New Orleans	Gabriel Tender, MD	New Orleans, LA
Scripps Memorial	Timothy Peppers, MD and Jamieson Glenn, MD	San Diego, CA
Beaumont Health	Daniel Fahim, MD	Royal Oak, MI
Atlantic Neurosurgical	Jeffrey Beecher, DO	Wilmington, NC
Barrow Neurological Institute	Juan Uribe, MD	Phoenix, AZ
The Bone and Joint Clinic of Baton Rouge	Kevin McCarthy, MD	Baton Rouge, LA
Kansas Spine & Specialty Hospital	Raymond Grundmeyer, MD	Wichita, KS

Important Safety Information

The FUSE Clinical Study aims to redefine the standard of care for this prevalent condition through rigorous scientific inquiry and innovative treatment approaches. https://clinicaltrials.gov/study/NCT04229017

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CORUS™ PCSS is to be used with autogenous bone and/or allogenic bone graft.

View safety information at providencemt.com/safety.

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