

INTRODUCTION

CHRONIC VENOUS  
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# CLOSUREFAST™ AND VENASEAL™ CLOSURE SYSTEM

## INNOVATION IN THE TREATMENT OF CHRONIC VENOUS DISEASE

ClosureFast™  
Endovenous Radiofrequency  
Ablation Catheter



VenaSeal™  
Closure System



**Medtronic**  
Further, Together

# VALUE SUMMARY

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## WHAT IS A VALUE SUMMARY?

A Value Summary is an evidence-based review of published data on a particular disease and therapy area presented in a succinct format.

The aim of this Value Summary is to clearly demonstrate the inherent value proposition of Medtronic's endovenous products.

## HOW WAS THIS VALUE SUMMARY CONDUCTED?

A comprehensive literature search was conducted in February 2019 using the PubMed, Embase and MEDLINE databases to identify evidence on the clinical need, epidemiology, disease burden and other issues related to Chronic Venous Insufficiency.

## HOW DO I USE THIS VALUE SUMMARY?

A Value Summary is intended to be used as a communication and educational tool to internal and external stakeholders important to Medtronic.



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# CHRONIC VENOUS INSUFFICIENCY IS A MAJOR PROBLEM, ESPECIALLY IN DEVELOPED COUNTRIES

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**Chronic Venous Insufficiency** represents the most advanced stage of **Chronic Venous Disease**.

The symptoms of Chronic Venous Insufficiency range from pain, swelling, edema, skin discoloration and inflammation to skin ulcers in the most severe cases, resulting in significant burden for patients, health systems and wider society<sup>1,2,3</sup>.

## PREVALENCE OF CHRONIC VENOUS DISEASE (VEIN CONSULT PROGRAM)<sup>4</sup>

### Total prevalence

CVD (C1–C6)	CVI (C3–C6)
63.69%	25.95%

### Western Europe

CVD (C1–C6)	CVI (C3–C6)
61.65%	24.88%

### Eastern Europe

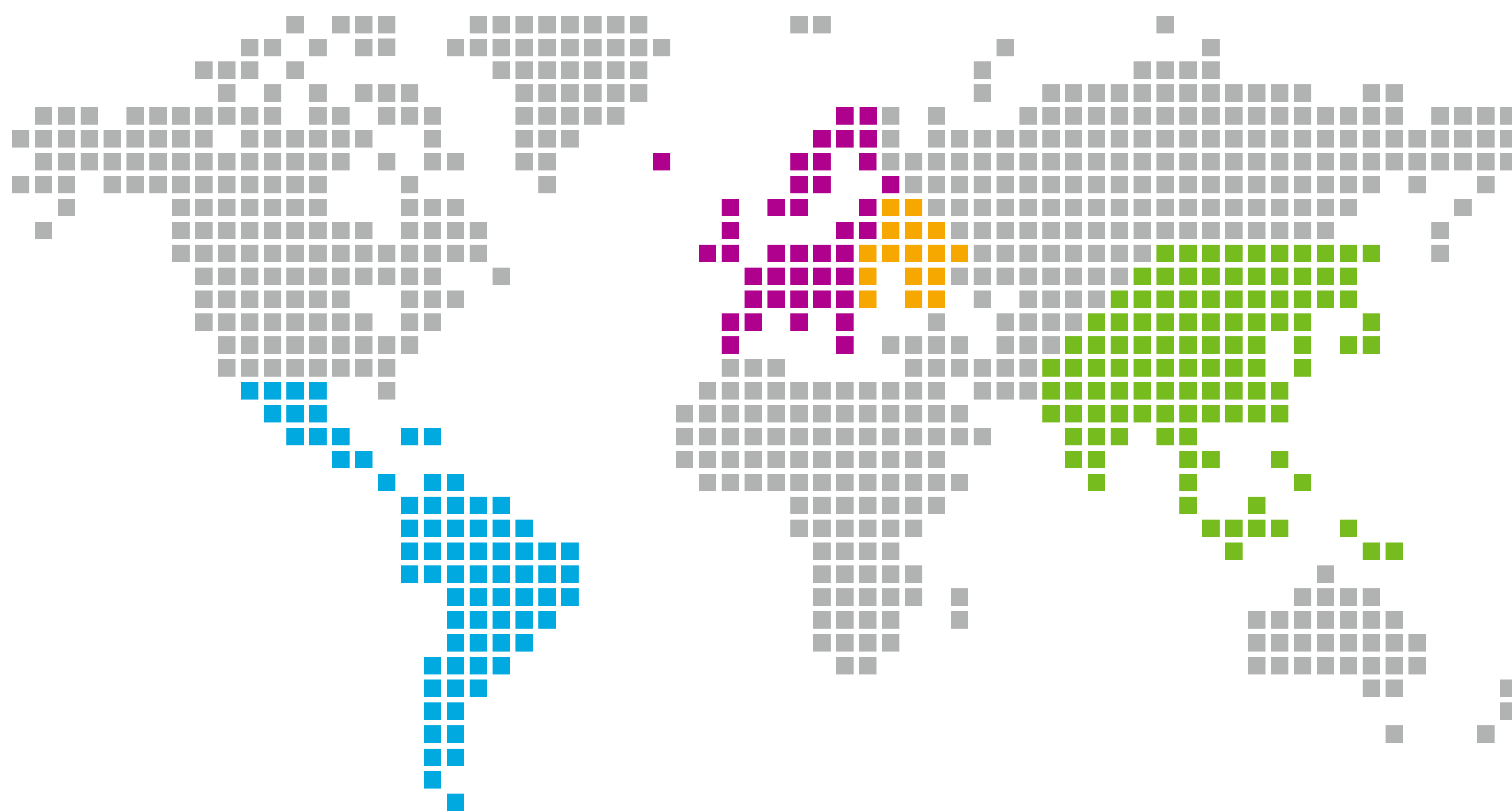
CVD (C1–C6)	CVI (C3–C6)
61.65%	24.88%

### Latin America

CVD (C1–C6)	CVI (C3–C6)
68.11%	26.62%

### Asia

CVD (C1–C6)	CVI (C3–C6)
51.93%	19.84%



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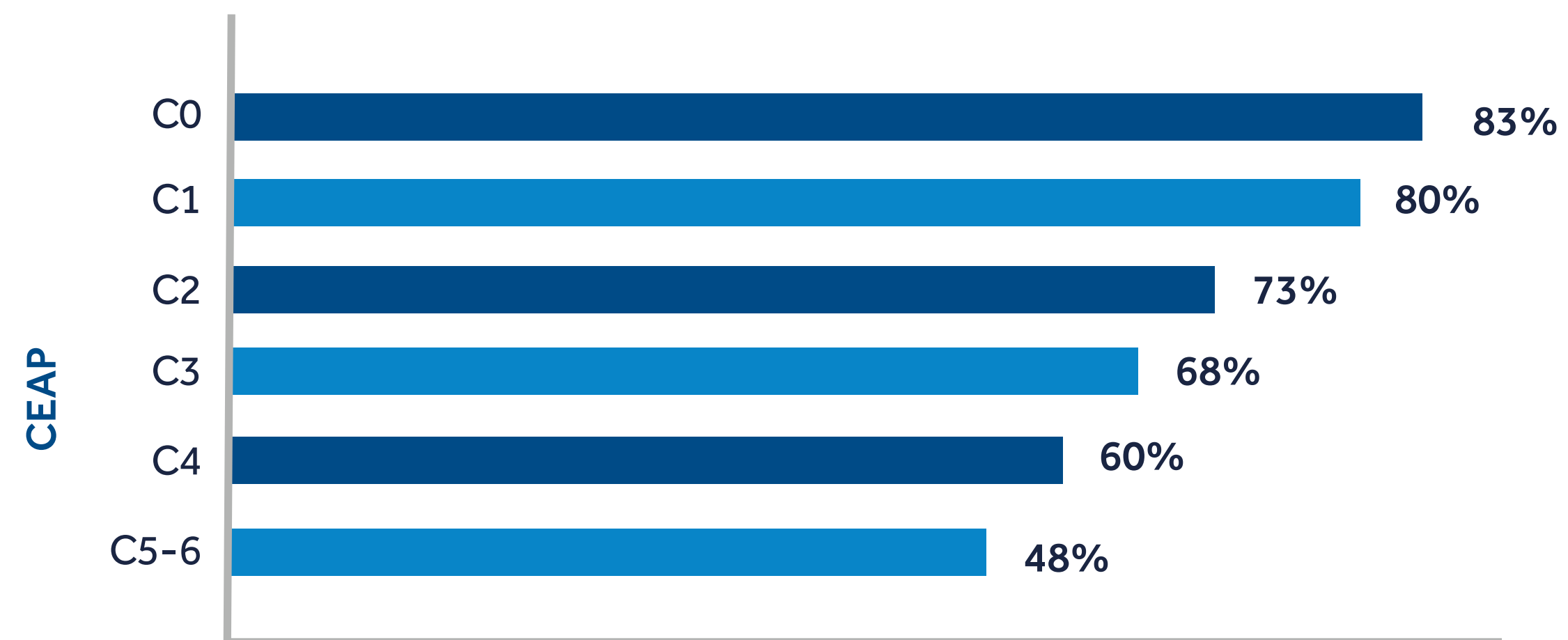


# CHRONIC VENOUS INSUFFICIENCY HAS A GREAT IMPACT ON PATIENTS' QUALITY OF LIFE

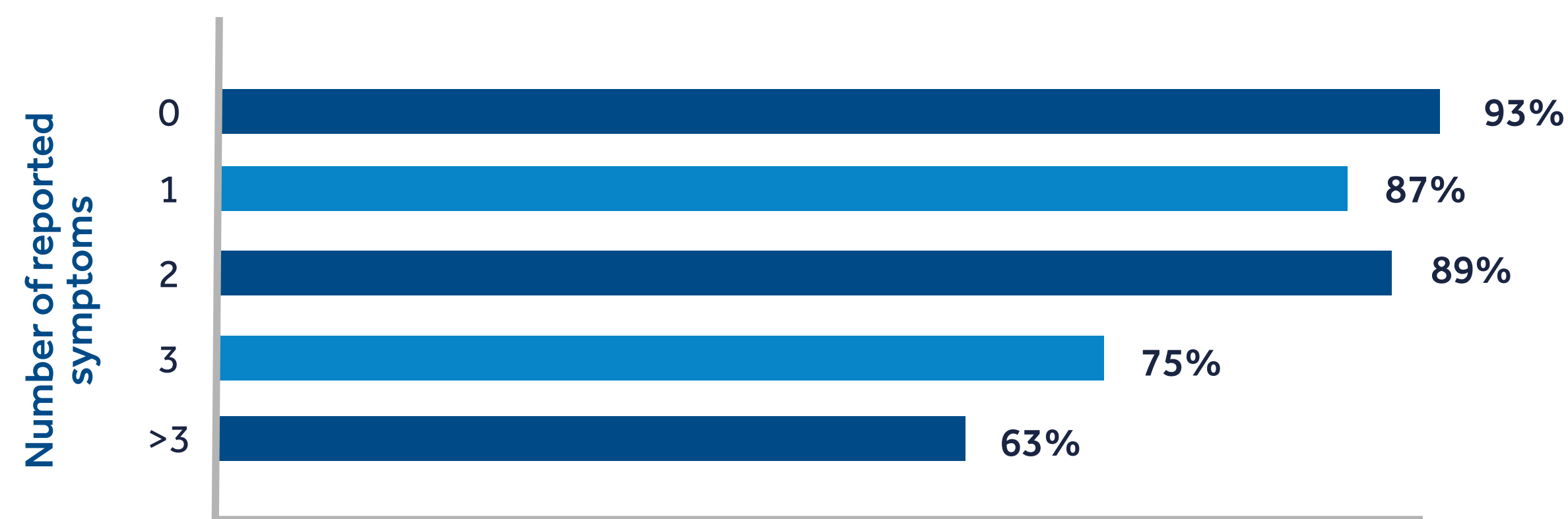
The high prevalence of Chronic Venous Disease, together with its under-diagnosis and the rapid progression of the disease to more severe stages, negatively affect patients' Quality of Life and increase care burden.

## VEIN CONSULT PROGRAM: RESULTS OF QUALITY OF LIFE<sup>5</sup>

### Clinical Etiology Anatomy Pathophysiology (CEAP)



Global index score (GIS) with CIVIQ-14



Global index score (GIS) with CIVIQ-14

**QUALITY OF LIFE DECREASES AS THE CEAP CLASSIFICATION INCREASES**

CEAP 1



CEAP 6

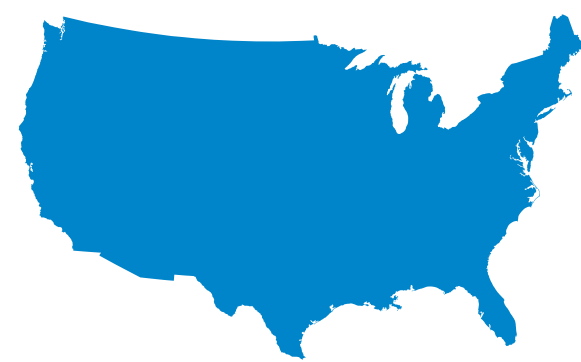


**CHRONIC VENOUS INSUFFICIENCY SYMPTOMS WORSE PATIENTS' QUALITY OF LIFE**



# THE TOTAL COST OF THE DISEASE IS EXPECTED TO INCREASE EVEN MORE IN THE FUTURE

The high prevalence, diagnosis, treatment and more severe consequences of Chronic Venous Insufficiency have a **high socio-economic impact worldwide**, in terms of direct healthcare costs and loss of productivity.

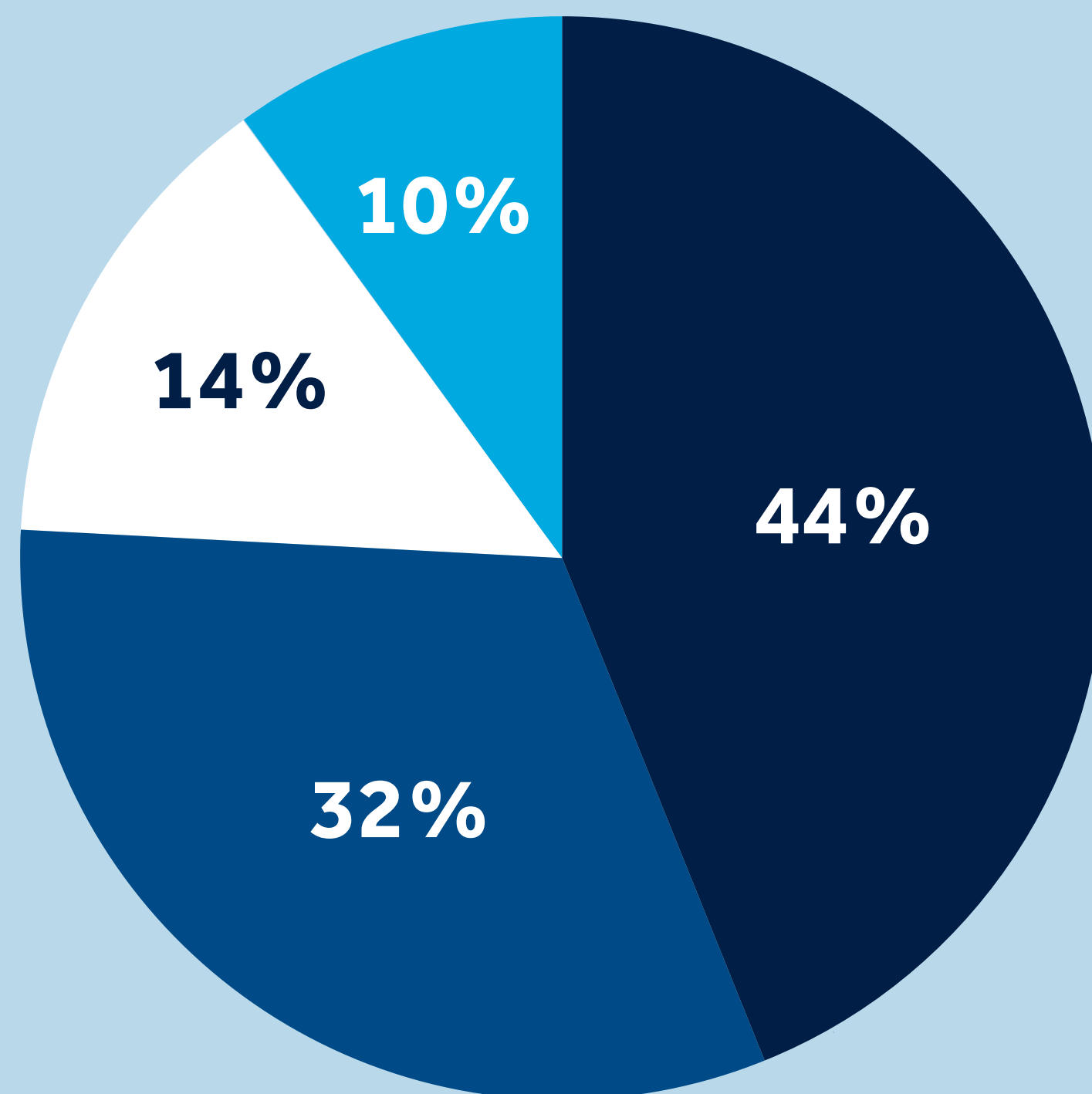


Annual medical cost of **Chronic Venous Disease** is estimated to be close to **\$150K-\$1M in USA** and up to **€600M-€900M in Western European countries**.<sup>6,7</sup>



In Western European countries, the average cost of **treating a venous leg ulcer is estimated to be €9K**. 90% of the total cost is associated with direct costs, while the remaining 10% is associated with indirect costs.<sup>7</sup>

## NUMBER OF TIMES PATIENTS LOSE WORK DAYS (IN 5 YEARS)<sup>5</sup>



- ONCE
- TWICE
- THRICE
- MORE THAN THRICE

### 15%

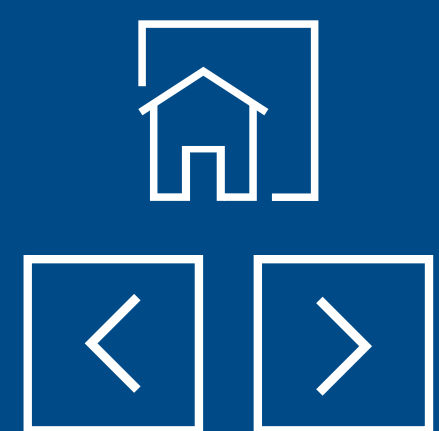
OF THE 25,821 PATIENTS WITH CHRONIC VENOUS INSUFFICIENCY HAD LOST WORK DAYS<sup>5</sup>

### 30%

OF THESE PATIENTS LOST MORE THAN 1 WEEK OF WORK DAYS<sup>5</sup>

### 12%

LOST MORE THAN 1 MONTH OF WORK DAYS<sup>5</sup>



# CONVENTIONAL SURGERY IS THE MOST WIDELY USED TECHNIQUE

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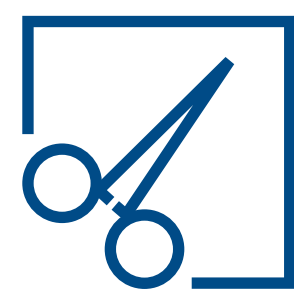
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## HOWEVER, IT IS NOT FREE OF COMPLICATIONS...



High clinical recurrence rates:  
Clinical **recurrence rates** for  
patients undergoing vein stripping  
was **25–60%** in five years<sup>8,9,10</sup>



High **complications** rates<sup>8</sup>

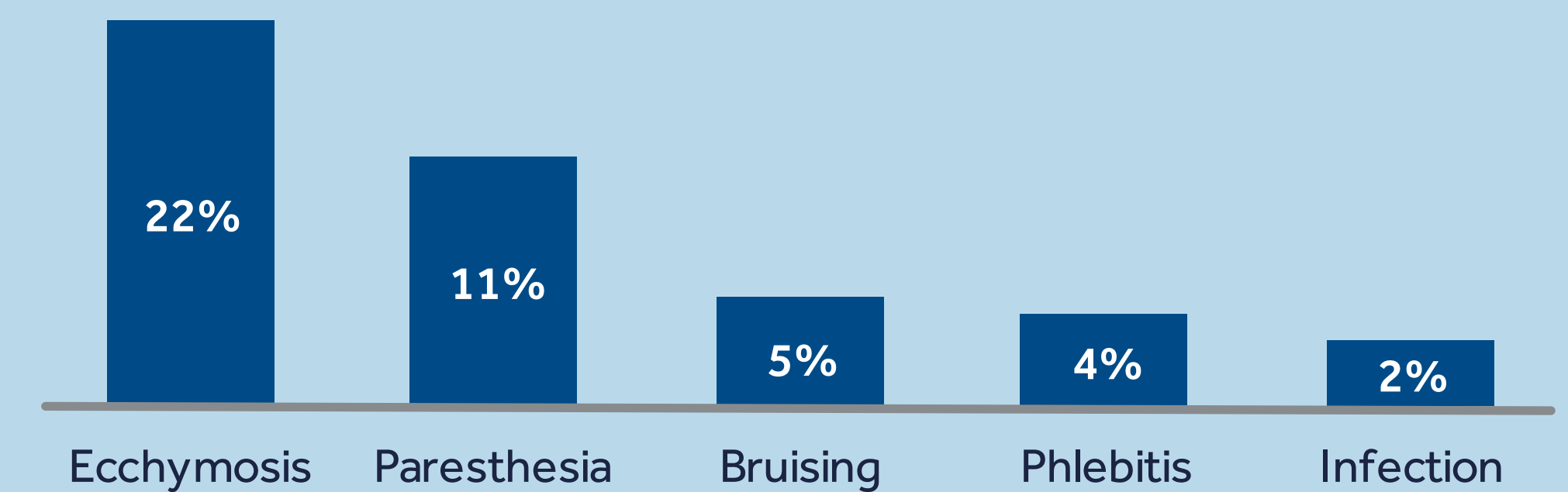


High **recovery time**<sup>11</sup>



High **postoperative pain**<sup>12</sup>

## COMPLICATION RATES RELATED TO STRIPPING OF VARICOSE VEINS<sup>8</sup>



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# CLOSUREFAST™ APPEARS AS THE ALTERNATIVE OPTION TO CONVENTIONAL SURGERY AND ENDOLASER FOR THE TREATMENT OF CHRONIC VENOUS INSUFFICIENCY

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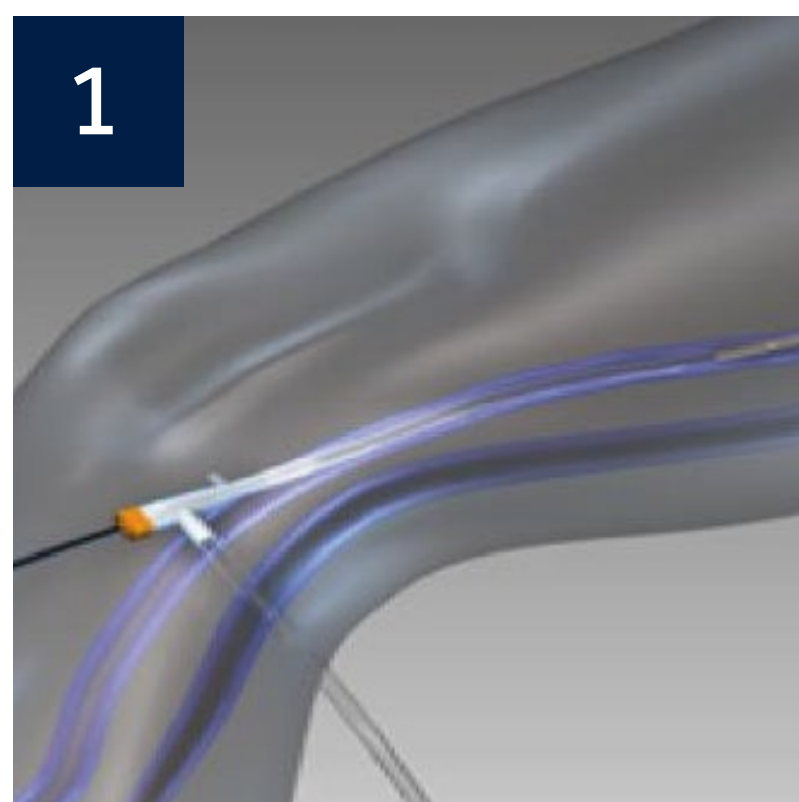
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## CLOSUREFAST™ PROCEDURE



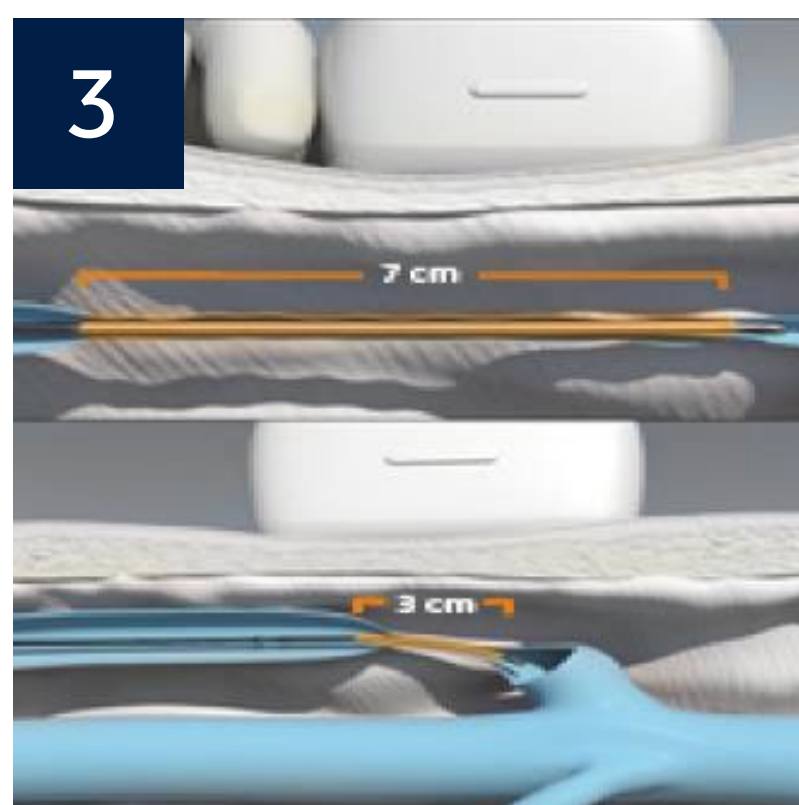
### Catheter insertion

Under **ultrasound guidance**, the ClosureFast™ catheter is **inserted into the vein** with final placement of the tip 2cm from the sapheno-femoral junction.



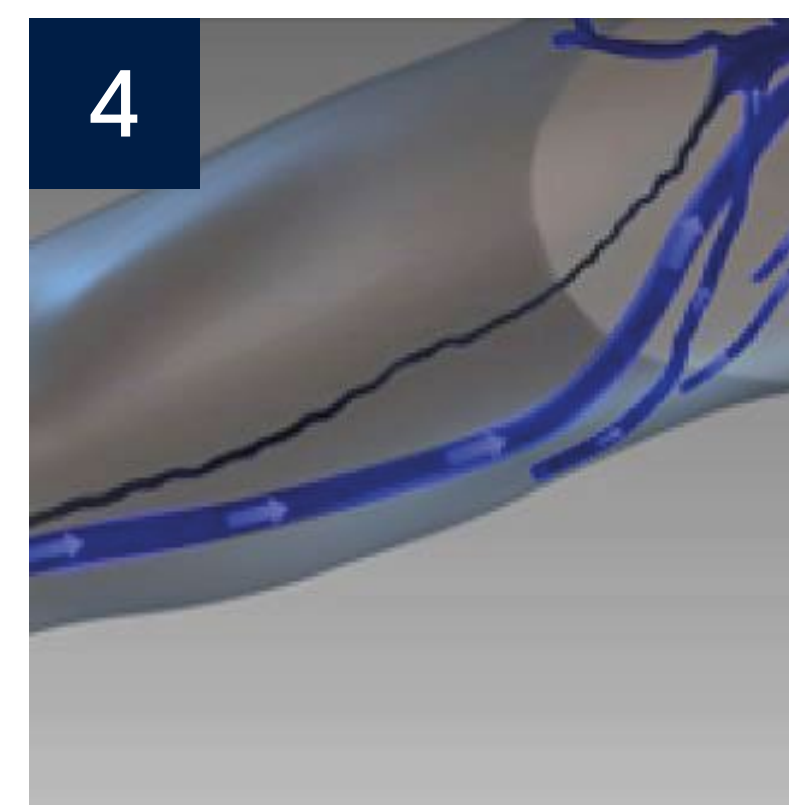
### Vessel preparation

Under ultrasound guidance, **perivenous anesthesia** is delivered to the saphenous compartment surrounding the vein.



### Segmental ablation

Veins are heated in **3cm or 7cm segment** lengths. When treatment cycle is complete, **shaft markings on ClosureFast™ aid correct repositioning** to the next segment.



### Fibrotic occlusion

Heat shrinks and collapses the vein, creating a **fibrotic seal and vein occlusion**, enabling blood flow to be redirected to healthy veins.



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# STUDIES ON CLOSUREFAST™ CONFIRM THE HIGH SAFETY AND EFFICACY PROFILE

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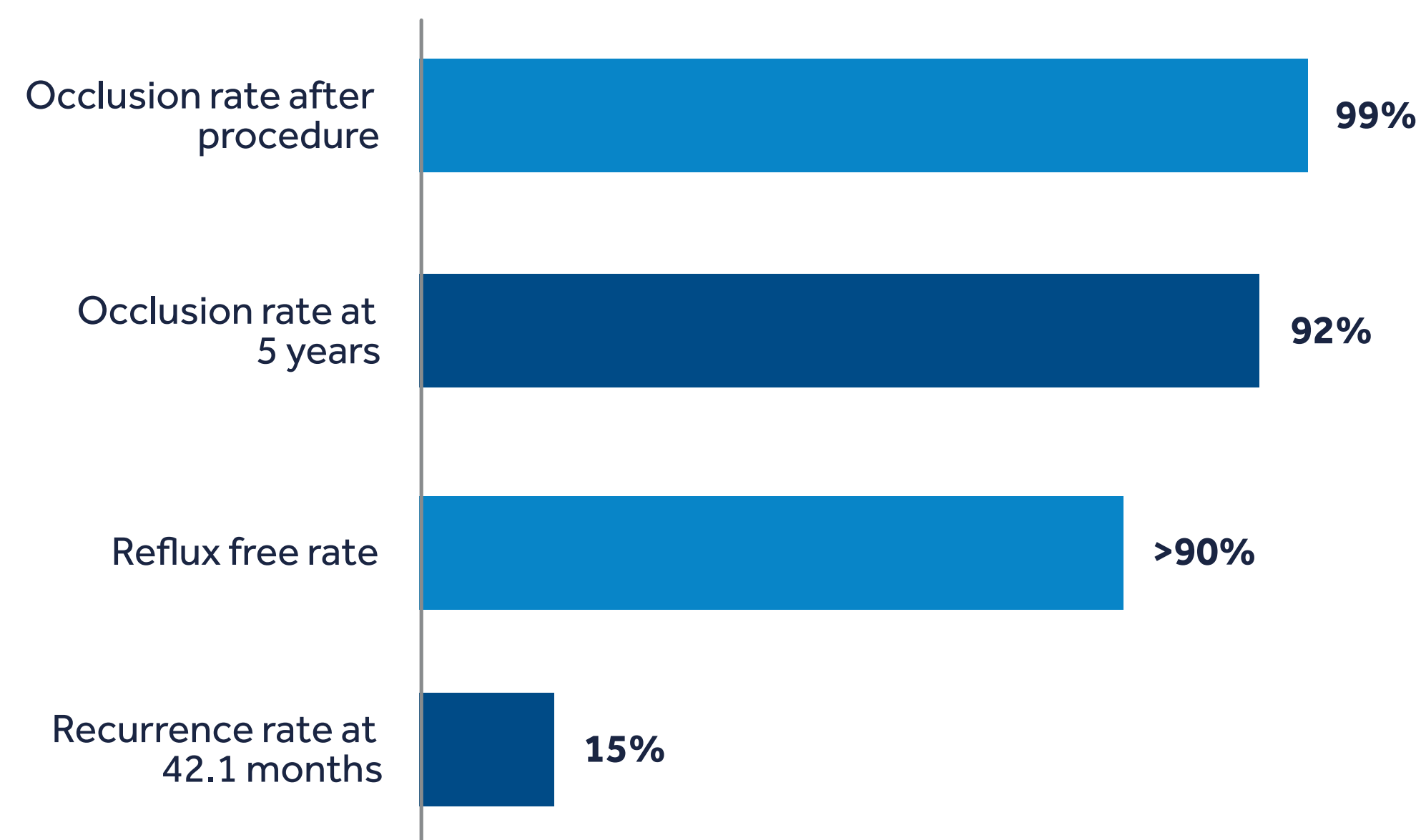
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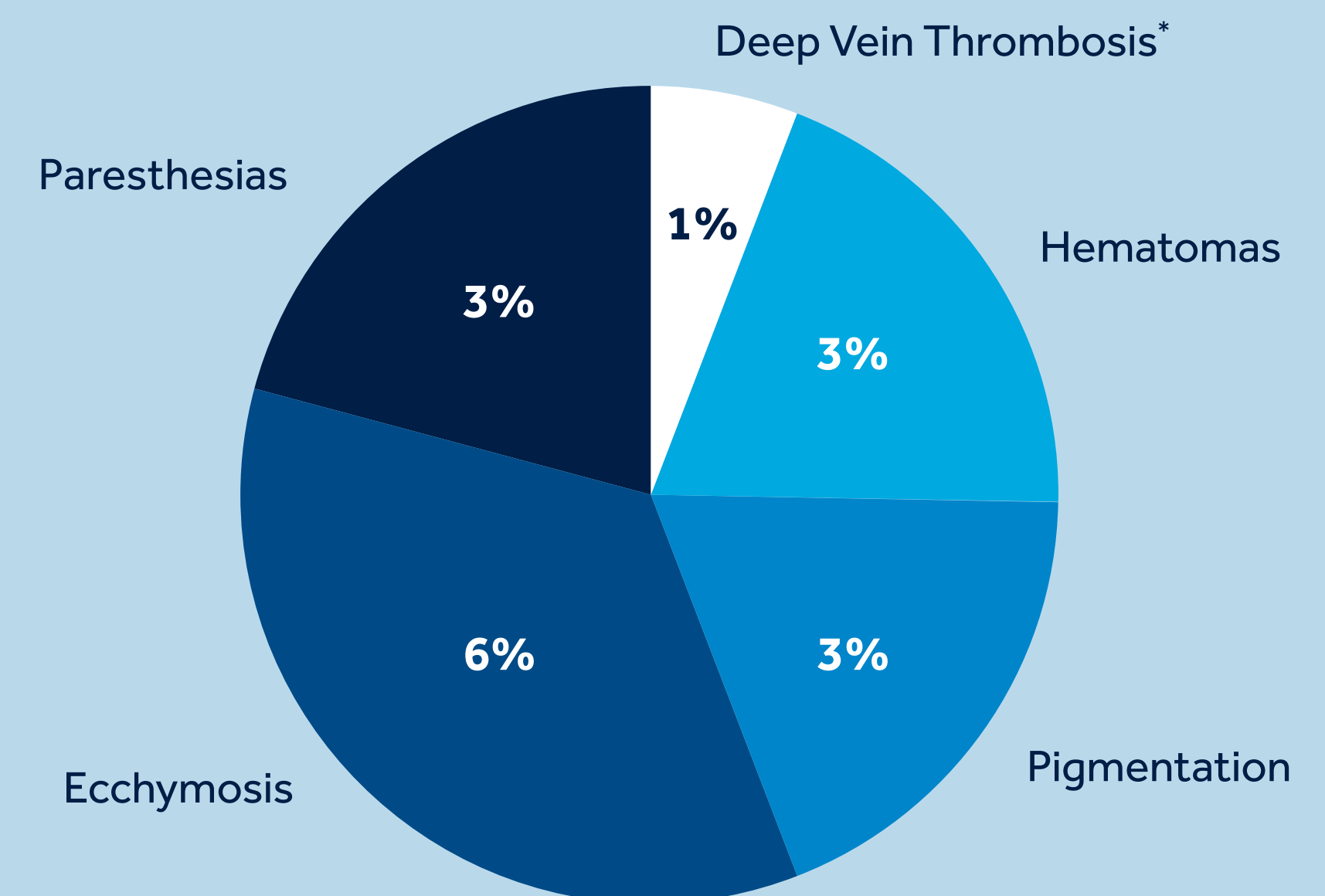
REFERENCES

## CLOSUREFAST™<sup>13-17</sup>



**CLOSUREFAST™ PROVIDES**  
HIGH RATES OF VENOUS OCCLUSION  
AND LOW RECURRENCE RATES

## INCIDENCE OF COMPLICATIONS<sup>18</sup>



\*The patient who developed Deep Vein Thrombosis (DVT) was later on diagnosed with thrombophilia. DVT was associated to this diagnostic and not with the procedure.



**CLOSUREFAST™ IS**  
ASSOCIATED WITH  
LOW COMPLICATION RATES

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# CLOSUREFAST™ HAS SHOWN BETTER RESULTS VS. CONVENTIONAL SURGERY IN THE FOLLOWING THREE ASPECTS:

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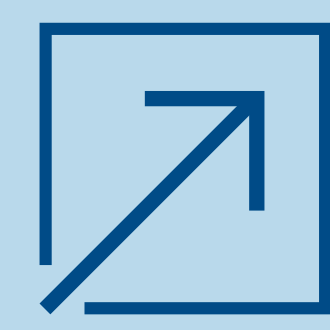
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**LESS**  
POSTOPERATIVE  
PAIN

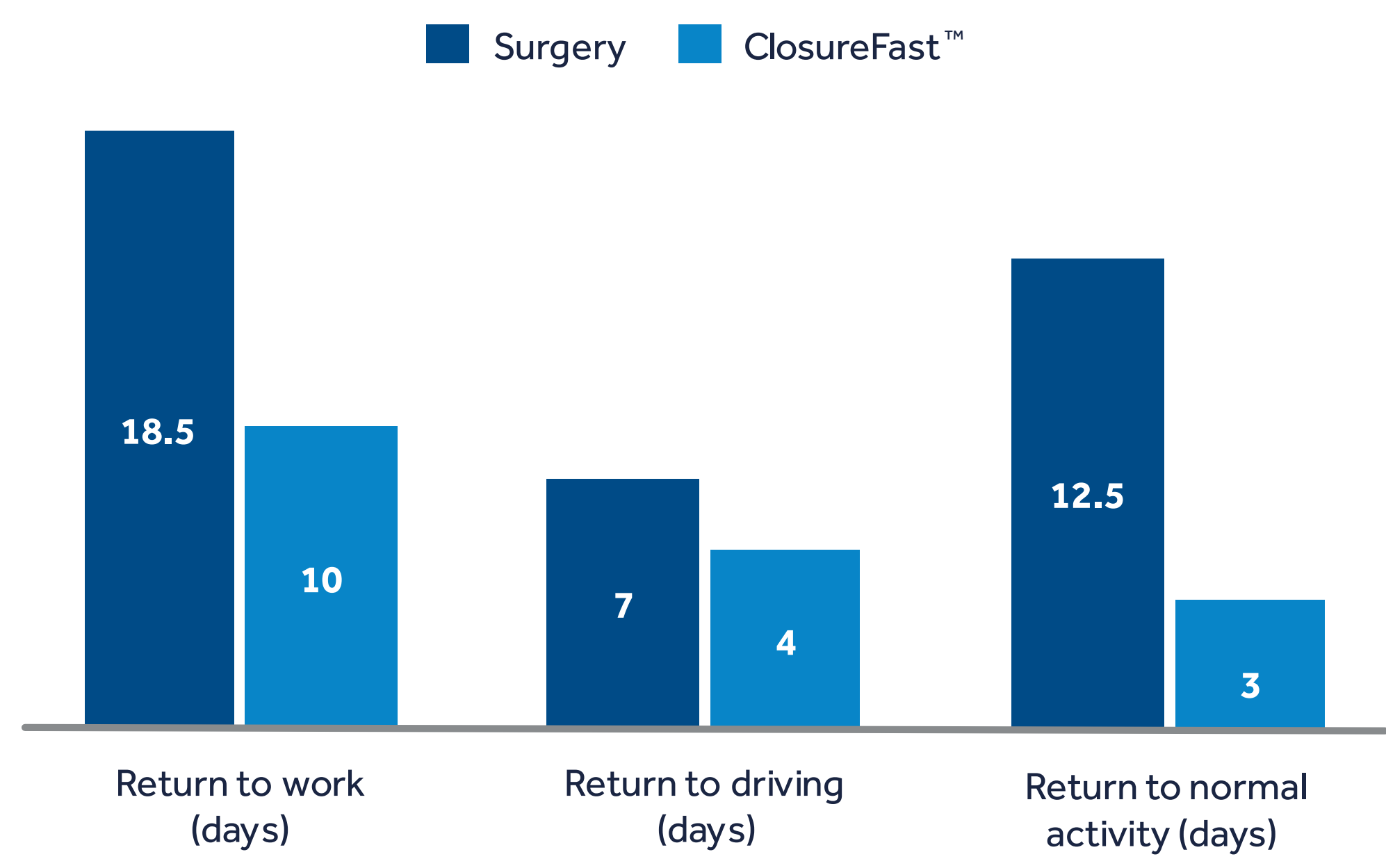


**IMPROVED**  
QUALITY  
OF LIFE

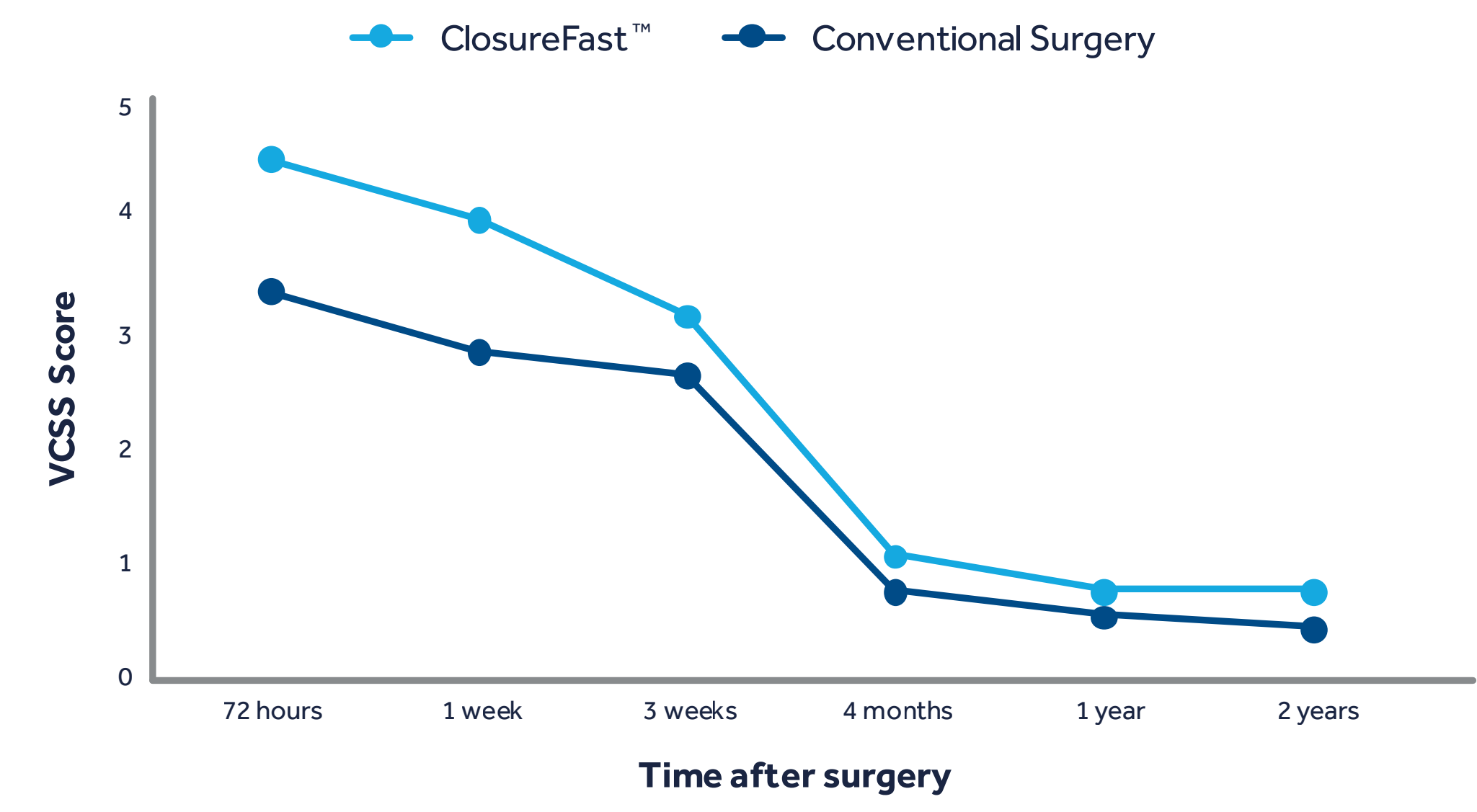


**FASTER**  
POSTOPERATIVE  
RECOVERY

## FASTER POSTOPERATIVE RECOVERY<sup>19</sup>



## IMPROVED QUALITY OF LIFE<sup>20</sup>



Reduction of up to 55% in postoperative pain compared to conventional surgery.<sup>21</sup>



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# BENEFITS OF CLOSUREFAST™ HAVE BEEN SHOWN COMPARED TO EVLA TOO

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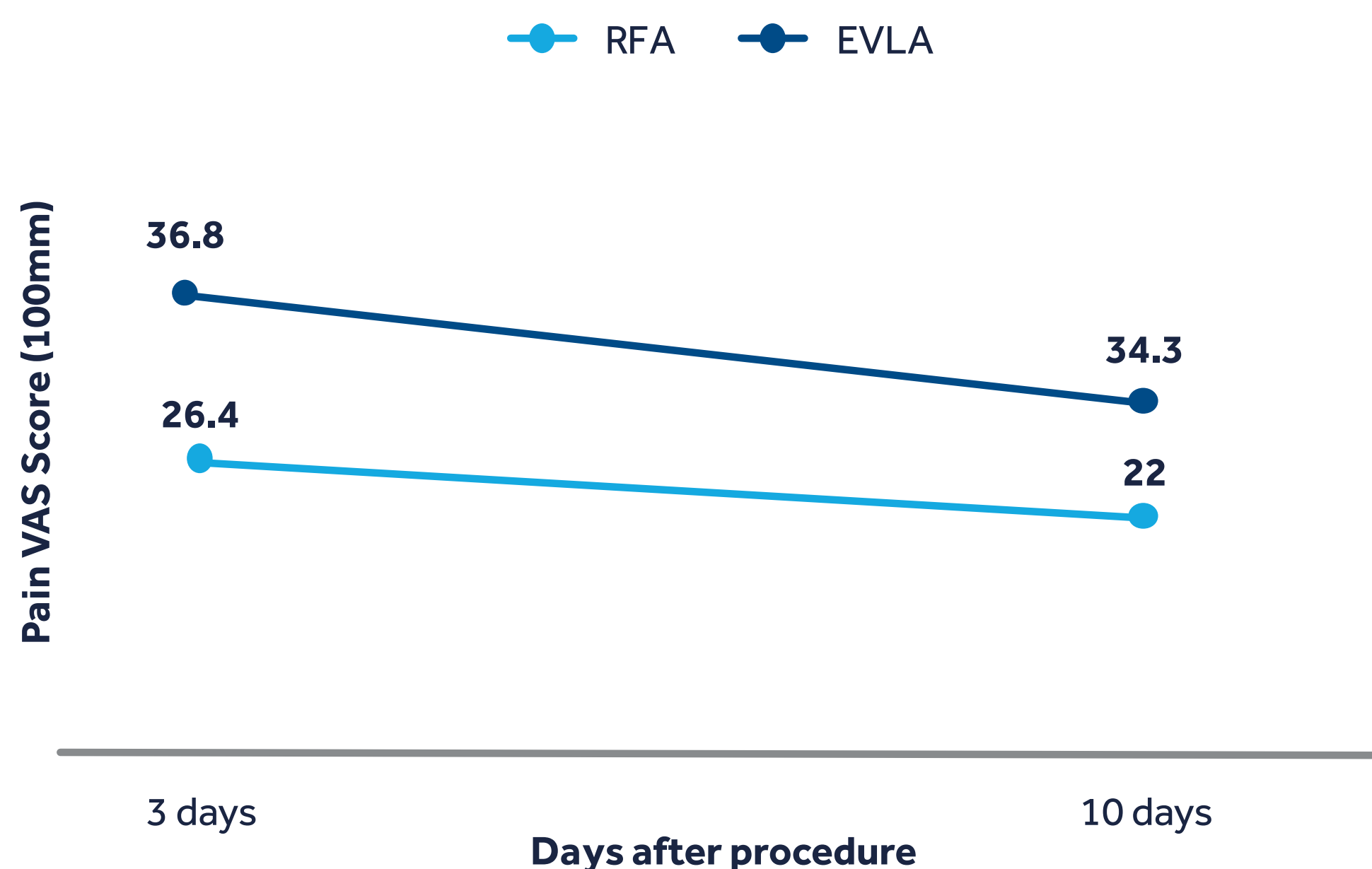
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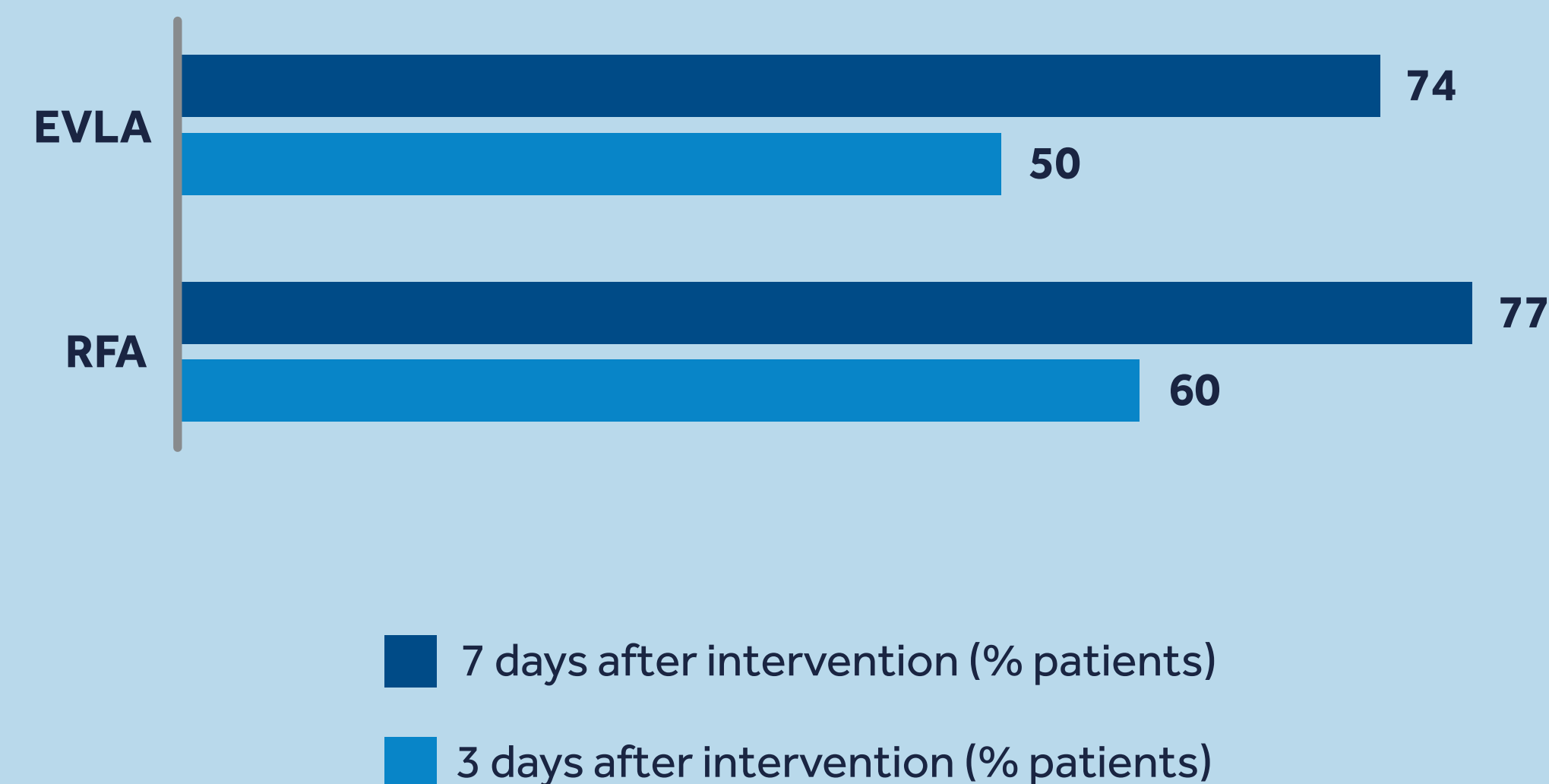
## LESS POSTOPERATIVE PAIN<sup>22</sup>



**REDUCED ANALGESICS  
CONSUMPTION**  
UP TO 40%<sup>22</sup>

## FASTER POSTOPERATIVE RECOVERY<sup>22</sup>

Return to normal activity after intervention



**3 OF 5 PATIENTS  
RETURN TO NORMAL  
ACTIVITY AFTER 3 DAYS<sup>22</sup>**

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# THE CLINICAL BENEFITS OF RADIOFREQUENCY ARE TRANSLATED INTO MONETARY SAVINGS FOR THE HEALTHCARE SYSTEM

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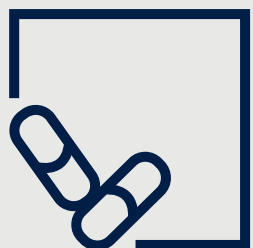








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BENEFICIAL FOR PATIENTS	REDUCTION IN DIRECT HEALTHCARE COSTS	REDUCTION IN INDIRECT COSTS
 <p>40% analgesics use (vs. EVLA)<sup>22</sup></p>	 <p>50% length of hospital stay (vs. stripping)<sup>23</sup></p>	 <p>8.5 sick leave days (vs. stripping)<sup>19</sup></p>
 <p>Return to normal activity after 3 days<sup>19</sup></p>	 <p>50% total number of complications (vs. stripping)<sup>19</sup></p>	 <p>Improved management of waiting lists<sup>24</sup></p>
	 <p>Procedure time reduction (vs. stripping)<sup>24</sup></p>	 <p>Cost-saving from moving procedure out of the OR<sup>25</sup></p>
	 <p>Freed-up space/ time in OR for other procedures<sup>25,26</sup></p>	

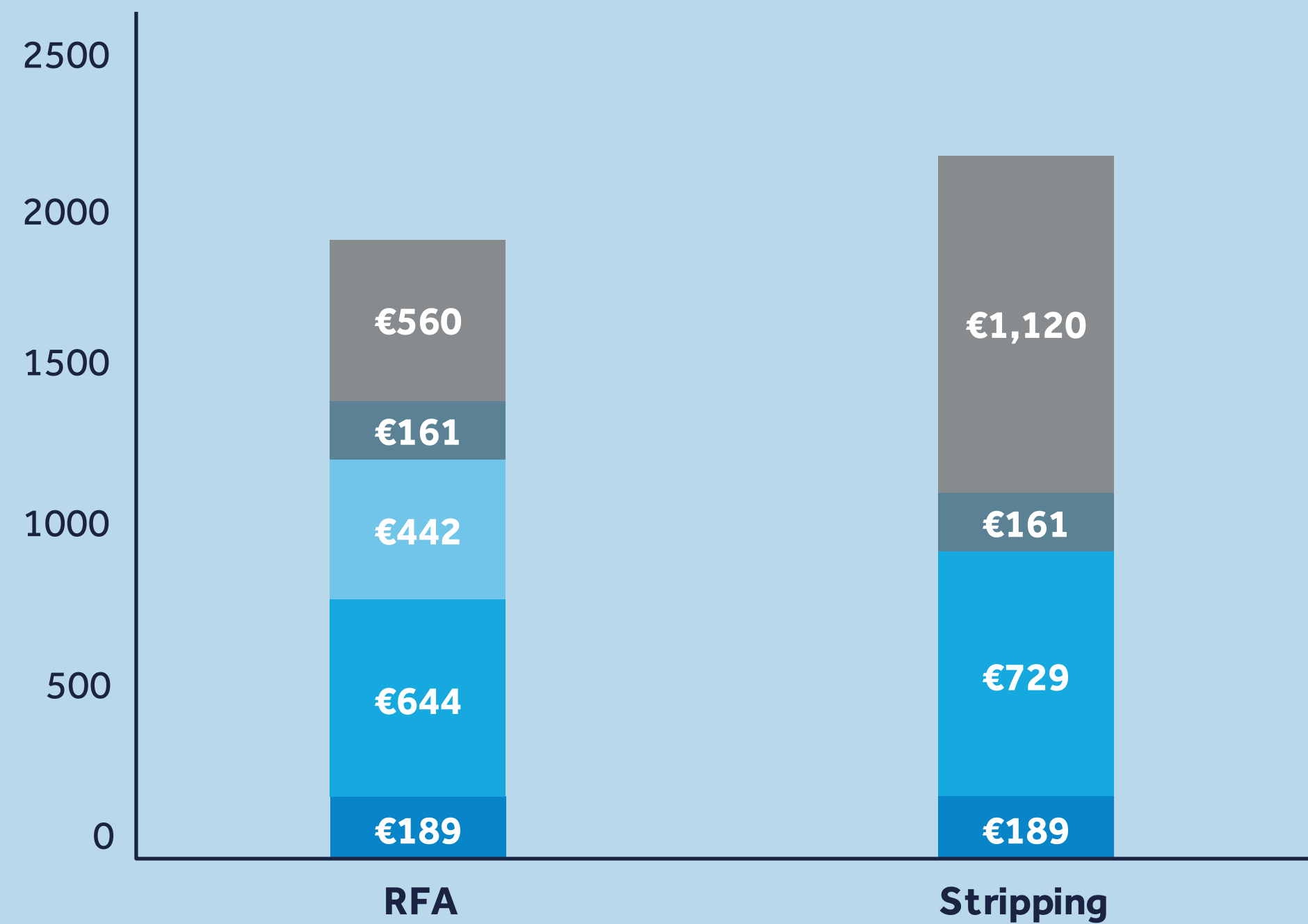




# RADIOFREQUENCY ABLATION HAS DEMONSTRATED TO BE THE THERAPY OF CHOICE IN THE TREATMENT OF CHRONIC VENOUS INSUFFICIENCY IN SEVERAL STUDIES

ClosureFast™ resulted in cost savings compared to conventional surgery from a society perspective

Cost difference per patient<sup>27</sup>



- Indirect costs
- Control duplex imaging
- Laser equipment
- Reimbursement
- Pre-treatment examination

Radiofrequency Ablation has shown to be an **efficient alternative** to **EVLA** in various studies

STUDY	ICER (RFA VS EVLA)
Epstein <sup>28</sup>	RFA dominant
Gohel <sup>27</sup>	17,350 €/QALY

The higher cost of **Radiofrequency Ablation** catheters is offset by **lower consumption of healthcare resources and lower loss of labour productivity.**



# VENASEAL™ SHOULD BE THE NON-TUMESCENT TREATMENT OF CHOICE FOR CHRONIC VENOUS INSUFFICIENCY

## **DUE TO ITS EASE-OF-USE, RELIABILITY AND CONSISTENT OUTCOMES**

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## VENASEAL™ CLOSURE SYSTEM



1

### Catheter insertion

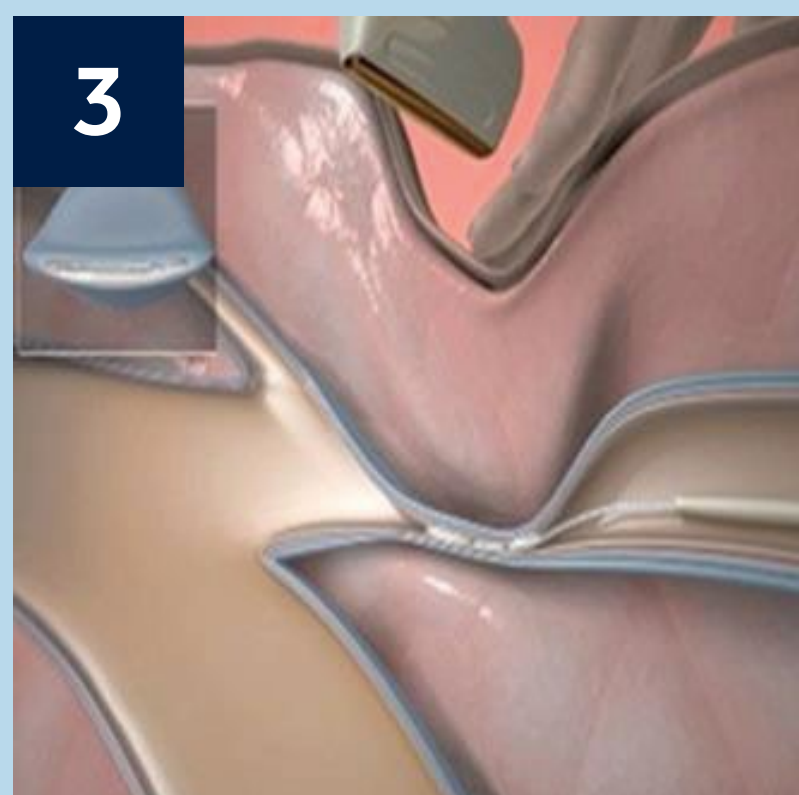
Under ultrasound guidance, the VenaSeal™ catheter is inserted into the vein through a small access site in the leg.



2

### Adhesive Injection

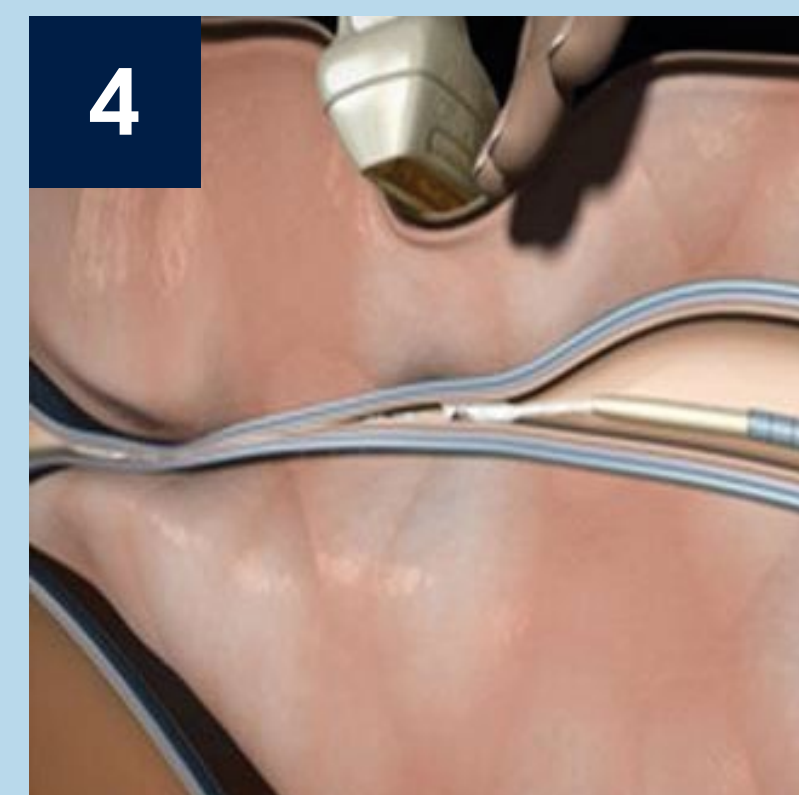
Medical adhesive is carefully injected into the vein.



3

### Compression

The catheter is withdrawn, leaving a bead of adhesive. Mild compression to the exterior leg during treatment allows the adhesive to seal the vein.



4

### Occlusion

The adhesive closes the diseased vein, diverting blood flow to healthy veins. Over time, the occluded vein will be absorbed by the body.



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# VENASEAL™ CLOSURE SYSTEM IS AN INNOVATIVE AND EFFECTIVE TREATMENT OPTION TO CONVENTIONAL TREATMENT AND PROVIDES **MINIMAL INCONVENIENCE TO PATIENTS**

## VECLOSE EXTENSION STUDY 5-YEAR SNAPSHOT<sup>29</sup>

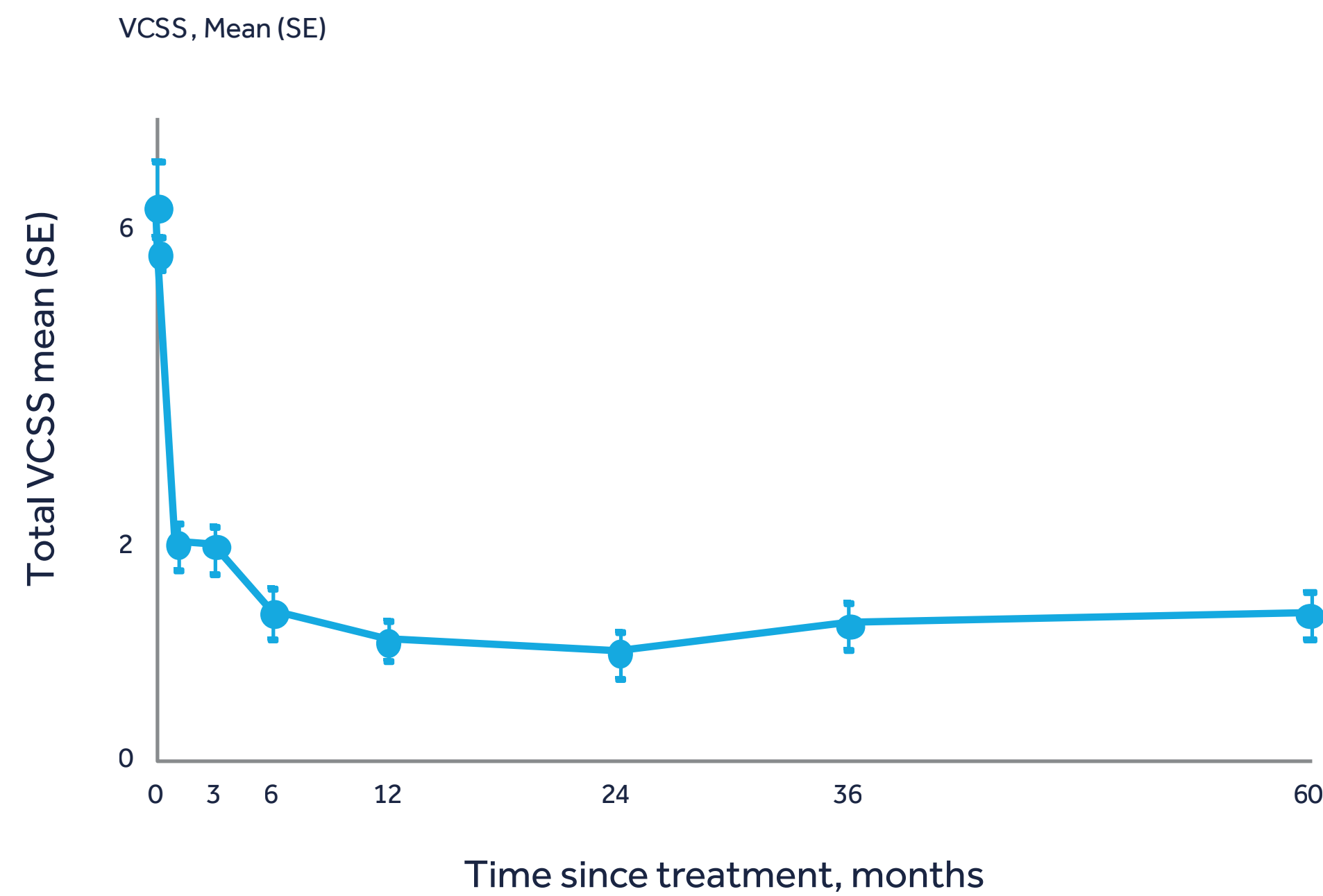
	VenaSeal™ closure system
5-year closure rates (> 5cm Segment)	94.6% (53/56)

When asked at 5 years,

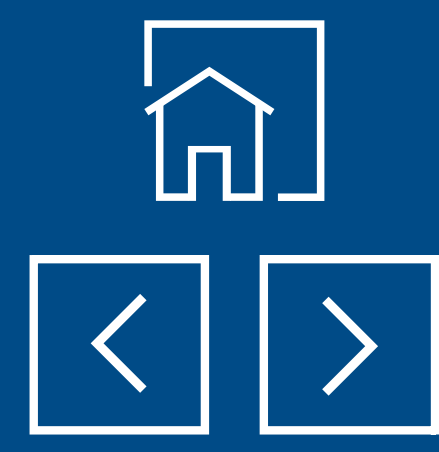
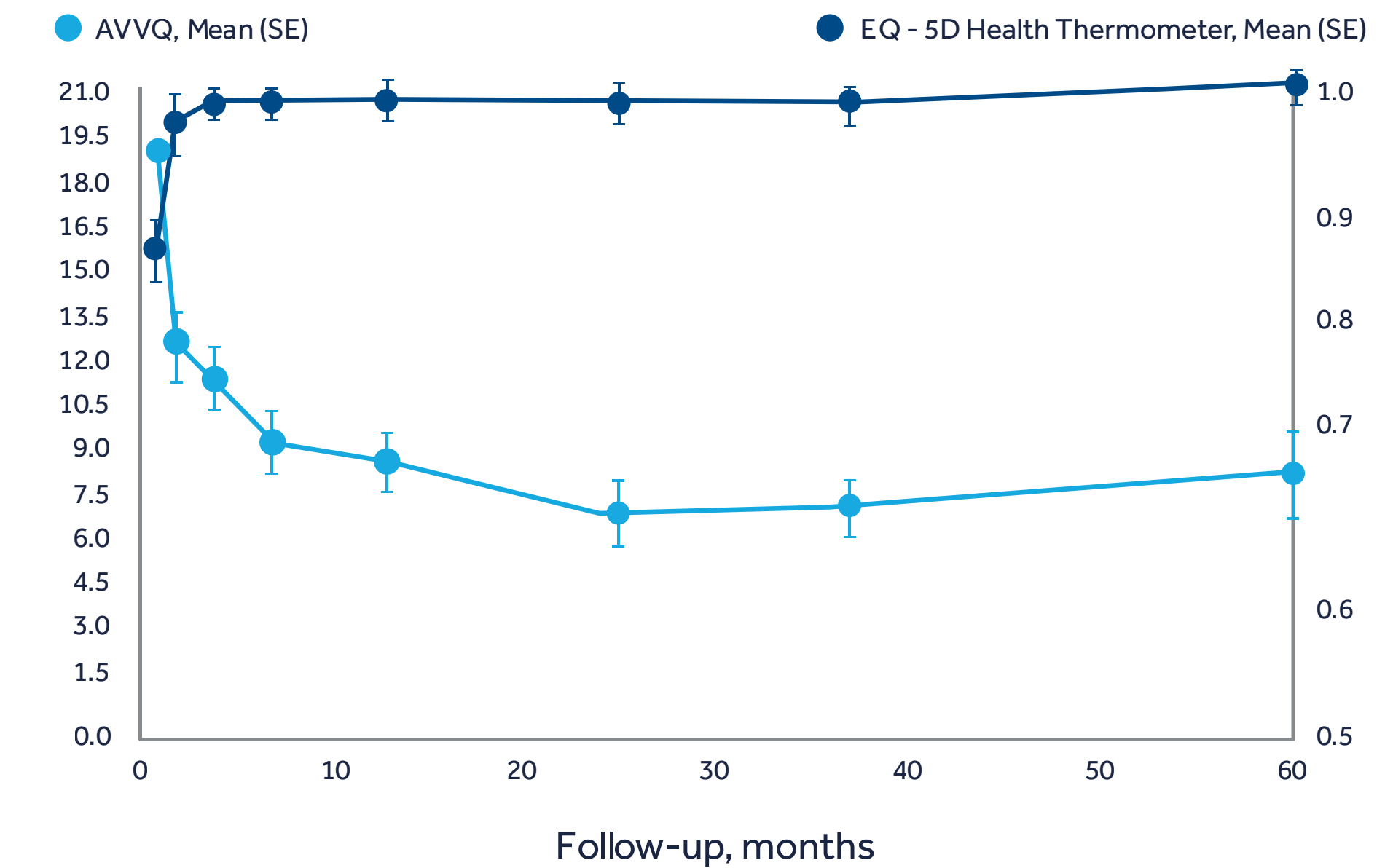
**9 out of 10**

VenaSeal™ closure system treated patients would choose the VenaSeal™ procedure again.<sup>29</sup>

## VENOUS CLINICAL SEVERITY SCORE (VCSS) AFTER VENASEAL™ CLOSURE SYSTEM<sup>30</sup>



## QUALITY OF LIFE OF PATIENTS TREATED WITH VENASEAL™ CLOSURE SYSTEM<sup>29</sup>



**VENASEAL™ CLOSURE SYSTEM PROVIDES HIGH RATES OF VENOUS OCCLUSION, AN IMPROVEMENT IN QUALITY OF LIFE AND IN PATIENTS' SYMPTOMS**

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# THE CLINICAL EVIDENCE SUPPORTS THE SAFETY OF VENASEAL™ CLOSURE SYSTEM, PROVIDING A CLINICAL IMPROVEMENT COMPARED TO RADIOFREQUENCY ABLATION

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## KAPLAN-MEIER ESTIMATES FOR FREEDOM FROM RECANALIZATION†

Non-inferiority demonstrated.\*

KAPLAN-MEIER ESTIMATES	VENASEAL™	RFA
Month 1	100%	94.6%
Month 3	99.0%	94.6%
Month 6	99.0%	91.7%
Month 12	97.0%	90.7%
Month 24	94.6%	89.5%
Month 36	91.4%	85.2%
Month 60	91.4%	85.2%

- Higher occlusion rates at 60 months<sup>29</sup>
- Improvement in Quality of Life, similar to that provided by ClosureFast™
- Relatively low rate of complications

## FASTER POSTOPERATIVE RECOVERY††

VenaSeal™: **75%**  
RFA: **72%**  
Improvement from baseline

**VenaSeal™:** Signs/symptoms associated with venous reflux disease improved over time and was maintained through 60 months.

VenaSeal™: **55%**  
RFA: **67%**  
Improvement from baseline

**AVVQ:** Subjects experienced improvement decreasing total AVVQ score over time through 60 months.

VenaSeal™: **22%**  
RFA: **15%**  
Improvement from baseline

**EQ-5D VAS:** Subjects reported slight improvement in their current health state over time through 60 months.

† Projected rates over the life of follow-up, retaining the memory of subjects until they have reached failure or last point of follow-up.

\* Non-inferiority based on one-sided 97.5% confidence interval with lower limit = -3.5%, and margin of -10%.

†† VenaSeal closure system randomized data only, roll-in data excluded.

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# THE HIGHER INITIAL INVESTMENT IS OFFSET BY THE BENEFITS PROVIDED

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## BENEFICIAL FOR PATIENTS



No bandages,  
no compression  
therapy<sup>31</sup>



Return to normal  
activity  
after 2.4 days<sup>32</sup>

## REDUCTION IN DIRECT HEALTHCARE COSTS



No hospitalization  
or prolonged  
postoperative<sup>31</sup>



Lower number of  
complementary  
procedures and  
medical visits<sup>31</sup>



Procedure time  
reduction  
(vs. EVLA)<sup>33</sup>

## REDUCTION IN INDIRECT COSTS



23.5 sick leave days  
(vs. stripping)<sup>34</sup>



Improved  
management  
of waiting lists<sup>33</sup>

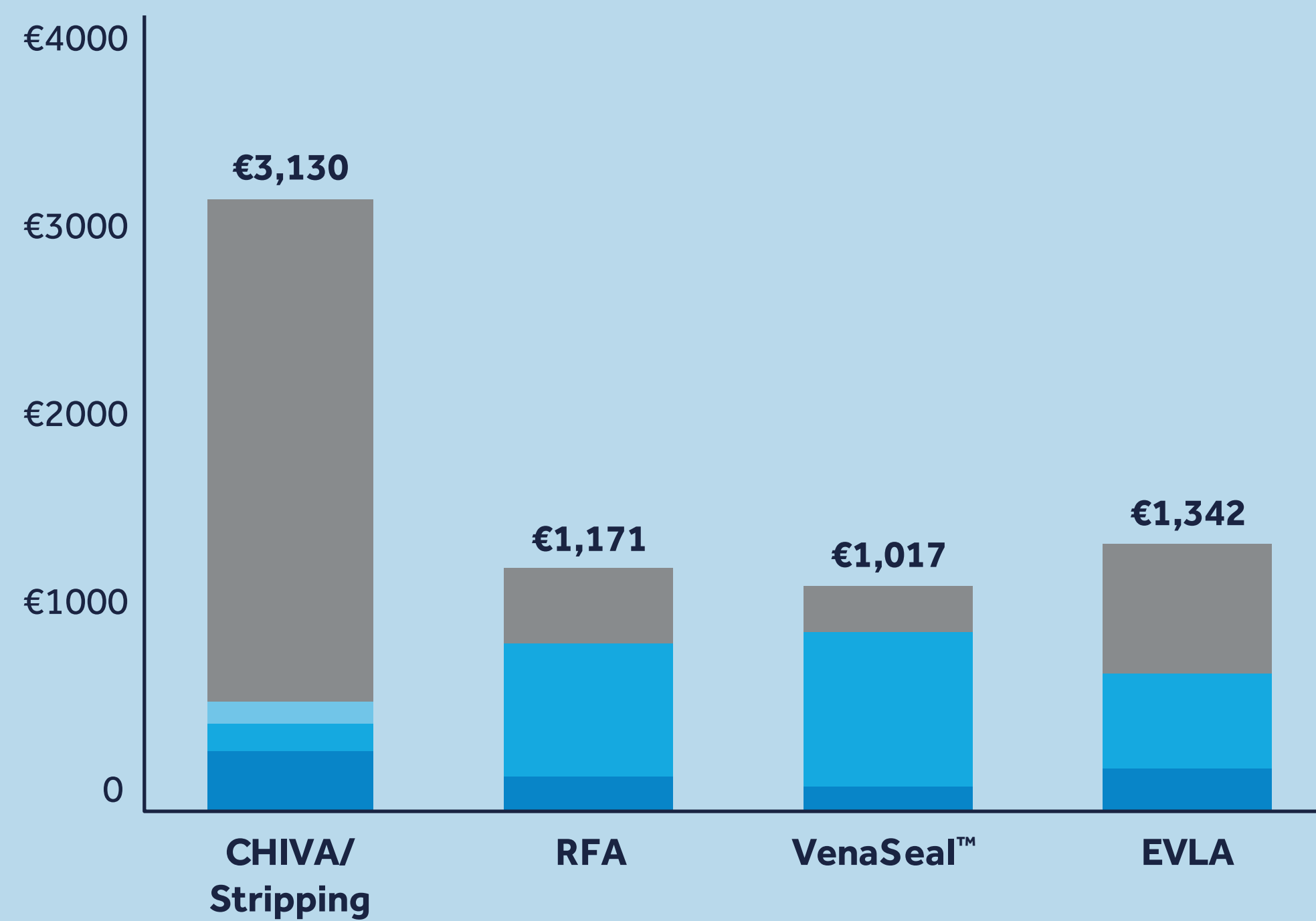


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# VENASEAL™ CLOSURE SYSTEM HAS SHOWN TO BE AN EFFICIENT AND THE LEAST EXPENSIVE TREATMENT COMPARED TO OTHER MODALITIES

VenaSeal™ Closure System provides **monetary savings** compared to other treatments

Cost difference per patient<sup>34</sup>



- Indirect costs
- Hospitalization
- Surgical intervention
- Personnel

## MEAN SICK LEAVE DAYS<sup>32</sup>

Stripping	25.5
RFA	5
VenaSeal™	2
EVLA	6

The results of the cost analysis carried out in the **University Hospital San Cecilio of Granada** showed that **medical adhesive was the least expensive alternative** because of reduction in resource consumption and patients' faster return to work.





# CONCLUSIONS

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- It is estimated that **70% of the global population** has some stage of Chronic Venous Disease
- Due to the ageing of the population, it is estimated that **incidence of the disease will increase** dramatically in the coming decades
- This will lead to an **increase in the direct healthcare costs and loss of productivity** associated with Chronic Venous Insufficiency
- Therefore, **new therapies** meeting the necessary characteristics for the adequate treatment of Chronic Venous Insufficiency **are required**
- **ClosureFast™ and VenaSeal™ Closure System** are alternative therapies to conventional treatment, effective and provide minimal inconvenience to patients suffering from this disease
- ClosureFast™ has shown **less postoperative pain, higher Quality of Life, and faster patient's recovery** compared to conventional surgery
- VenaSeal™ Closure System represents a new generation of techniques for the management of Chronic Venous Insufficiency, which is performed **without tumescent anaesthesia, and does not require postoperative analgesia or compression therapy**

**ClosureFast™**  
Endovenous Radiofrequency  
Ablation Catheter



**VenaSeal™**  
Closure System



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<b>AVVQ</b>	Aberdeen Varicose Vein Questionnaire
<b>CEAP</b>	Clinical Etiology Anatomy Pathophysiology
<b>CIVIQ-14</b>	Chronic Venous Insufficiency Questionnaire-14
<b>CVD</b>	Chronic Venous Disease
<b>CVI</b>	Chronic Venous Insufficiency
<b>DVT</b>	Deep Vein Thrombosis
<b>EQ-5D</b>	EuroQol-5D
<b>EVLA</b>	EndoVenous Laser Ablation
<b>GIS</b>	Global Index Score
<b>ICER</b>	Incremental Cost-Effectiveness Ratio
<b>QALY</b>	Quality-Adjusted Life Year
<b>RFA</b>	Radio Frequency Ablation
<b>VAS</b>	Visual Analogue Scale
<b>VCSS</b>	Venous Clinical Severity Score





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1. Azcona L. Insuficiencia venosa: Prevención y tratamiento. *Farmacia comunitaria*. 2008;22(10).
2. Khilnani NM, Kundu S, D'Agostino HR, Khan AA, McGraw JK, et al. Multi-society Consensus Quality Improvement Guidelines for the Treatment of Lower-extremity Superficial Venous Insufficiency with Endovenous Thermal Ablation from the Society of Interventional Radiology, Cardiovascular Interventional Radiological Society of Europe American College of Phlebology, and Canadian Interventional Radiology Association." *J Vasc Interv Radiol*. 2010;21:14-31.
3. Palomino-Medina MA, Tárraga-López PJ, García-Olmo D, Rodríguez-Montesf JA, Robayna- Elvira AV, LópezCara M. Factores epidemiológicos de la insuficiencia venosa crónica en una zona básica de salud. *Angiología*. 2004; 56: 445-457.
4. Escudero Rodríguez JR, Fernández Quesada F, Bellmunt Montoya S. Prevalencia y características clínicas de la enfermedad venosa crónica en pacientes atendidos en Atención Primaria en España: resultados del estudio internacional Vein Consult Program. *Cir Esp*. 2014 ;92:539-46.
5. Pitsch, F. VEIN CONSULT Program: interim results from the first 70 000 screened patients in 13 countries. *Phlebology*. 2012;19(3):132-137. <https://www.phlebology.org/wp-content/uploads/2014/09/Phlebology75.pdf>
6. Gloviczki P, Comerota AJ, Dalsing MC, Eklof BG, Gillespie DL, Gloviczki ML, et al. The care of patients with varicose veins and associated chronic venous diseases: Clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *J Vasc Surg*. 2011;53(5 Suppl):2S-48S.
7. Miquel Abbad C, Rial Horcajo R, Ballesteros Ortega Mª D, García Madrid C. Guía de Práctica Clínica de la Enfermedad Venosa Crónica. *IdMédica*, 2015.
8. Pan Y, Zhao J, Mei J, Shao M, Zhang J. Comparison of endovenous laser ablation and high ligation and stripping for varicose vein treatment: a meta-analysis. *Phlebology*. 2014 Mar;29(2):109-19.
9. Allegra C, Antignani PL, Carlizza A. Recurrent varicose veins following surgical treatment: our experience with five years follow-up. *Eur J Vasc Endovasc Surg*. 2007 Jun;33(6):751-6
10. Ostler AE, Holdstock JM, Harrison CC, Price BA, Whiteley MS. Strip-tract revascularization as a source of recurrent venous reflux following high saphenous tie and stripping: results at 5-8 years after surgery. *Phlebology*. 2015 Sep;30(8):569-72.
11. Rasmussen LH, Lawaetz M, Bjoern L, Vennits B, Blemings A, Eklof B. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy and surgical stripping for great saphenous varicose veins. *Br J Surg*. 2011 Aug;98(8):1079-87.
12. Biswas S, Clark A, Shields DA. Randomised clinical trial of the duration of compression therapy after varicose vein surgery. *Eur J Vasc Endovasc Surg*. 2007 May;33(5):631-7.
13. Rodriguez-Acevedo O, Elstner KE, Martinic K, Ibrahim RI, Tomazini Martins R, Arduini F, Ibrahim N. ClosureFast endovenous radiofrequency ablation for great saphenous vein and small saphenous vein incompetence. Efficacy and anatomical failure patterns. *Phlebology*. 2019;34:266-271.
14. Marsden G, Perry M, Kelley K, Davies AH, Guideline Development Group Diagnosis and management of varicose veins in the legs: summary of NICE guidance. *BMJ*. 2013;347:f4279.
15. European Venous Forum. Management of Chronic Venous Disorders of the Lower Limbs. *International Angiology*. 2014; 33: 87-208.
16. García-Madrid C, Pastor Manrique JO, Gómez Blasco F. Nuevos avances en el tratamiento de las varices: radiofrecuencia endovenosa VNUS Closure® . *Cir Esp*. 2011; 89:420-426.
17. O'Donnell T, Passman M, Marston W, Ennis W, Dalsing M, Kistner R, Lurie F et al. Management of venous leg ulcers: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *Journal of Vascular Surgery*. 2014.60:35-59S.
18. Creton D, Pichot O, Sessa C, Proebstle TM; ClosureFast Europe Group. Radiofrequency-powered segmental thermal obliteration carried out with the ClosureFast procedure: results at 1 year. *Ann Vasc Surg*. 2010;24:360-6.
19. Subramonia S, Lees T. Randomized clinical trial of radiofrequency ablation or conventional high ligation and stripping for great saphenous varicose veins. *Br J Surg*. 2010;97:328-336.
20. Lurie, F, Creton D, Eklof B, Kabnick LS, Kistner RL, Pichot O, Sessa C, Schuller-Petrovic S. Prospective Randomised Study of Endovenous Radiofrequency Obliteration (Closure) Versus Ligation and Vein Stripping (EVOLVE): Two-year Follow-up. *European Journal of Vascular and Endovascular Surgery*. 2005; 29: 67-73.
21. Hinchliffe RJ, Ubhi J, Beech A, Ellison J, Braithwaite BD. A prospective randomised controlled trial of VNUS closure versus surgery for the treatment of recurrent long saphenous varicose veins. *European Journal and Vascular and Endovascular Surgery*. 2006; 31:212-8.
22. Shepherd AC, Gohel MS, Brown LC, Metcalfe MJ, Hamish M, Davies AH. Randomized clinical trial of VNUS ClosureFAST radiofrequency ablation versus laser for varicose veins. *Br J Surg*. 2010; 97:810-8.
23. Sincos IR, Baptista APW, Coelho Neto F, Labropoulos N, Alledi LB, Marins EM, Puggina J, Belczak SQ, Cardoso MG, Aun R. Prospective randomized trial comparing radiofrequency ablation and complete saphenous vein stripping in patients with mild to moderate chronic venous disease with a 3-year follow-up. *Einstein (Sao Paulo)*. 2019 May 2;17(2):eAO4526.
24. Poder TG, Fisette JF, Bédard SK, Despatis MA. Is radiofrequency ablation of varicose veins a valuable option? A systematic review of the literature with a cost analysis. *Can J Surg*. 2018;61:128-138.
25. J. Leigh Eidson, Marvin D. Atkins, W. Todd Bohannon, Christopher J. Marrocco, Clifford J. Buckley, Ruth L. Bush, Economic and Outcomes-Based Analysis of the Care of Symptomatic Varicose Veins1, *Journal of Surgical Research*, Volume 168, Issue 1, 2011, Pages 5-8 <https://www.sciencedirect.com/science/article/abs/pii/S0022480410018913>
26. Somasundaram SK, Weerasekera A, Worku D, Balasubramanian RK, Lister D, Valenti D, Rashid H, Singh Gambhir RP. Office Based Endovenous Radiofrequency Ablation of Truncal Veins: A Case for Moving Varicose Vein Treatment out of Operating Theatres. *Eur J Vasc Endovasc Surg*. 2019 Sep;58(3):410-414. doi: 10.1016/j.ejvs.2019.05.020. Epub 2019 Jul 24. <https://pubmed.ncbi.nlm.nih.gov/31351830/>
27. Rasmussen L, Lawaetz M, Serup J, Bjoern L, Vennits B, Blemings A, Eklof B. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy, and surgical stripping for great saphenous varicose veins with 3-year follow-up. *J Vasc Surg Venous Lymphat Disord*. 2013;1:349-56.
28. Epstein D, Onida S, Bootun R, Ortega-Ortega M, Davies AH. Cost-Effectiveness of Current and Emerging Treatments of Varicose Veins. *Value Health*. 2018;21:911-920.
29. Morrison N, Gibson K, Vasquez M, Weiss R, Jones A. Five-year extension study of patients from a randomized clinical trial (VeClose) comparing cyanoacrylate closure versus radiofrequency ablation for the treatment of incompetent great saphenous veins [published online ahead of print, 2020 Mar 20]. *J Vasc Surg Venous Lymphat Disord*. 2020;S2213-333X(20)30105-0. doi:10.1016/j.jvsv.2019.12.080
30. Almeida JI, Javier JJ, Mackay EG, Bautista C, Cher DJ, Proebstle TM. Thirty-sixth-month followup of firstinhuman use of cyanoacrylate adhesive for treatment of saphenous vein incompetence. *J Vasc Surg Venous Lymphat Disord*. 2017;5:658-66.
31. Carr J, Jennifer W. The VenaSeal™ System in clinical practice. *Evtoday*. 2016;15:30-31.
32. Gibson K, Ferris B. Cyanoacrylate closure of incompetent great, small and accessory saphenous veins without the use of post-procedure compression: initial outcomes of a post-market evaluation of the VenaSeal system (the Waves study). *Vascular*. 2017;25:149-156.
33. Bozkurt AK, Yilmaz MF. A prospective comparison of a new cyanoacrylate glue and laser ablation for the treatment of venous insufficiency. *Phlebology*. 2016. Mar;31(1 Suppl):106-13.
34. Salmerón LM. 27 Congreso Nacional del Capitulo de Flebología y Linfología de la SEACV – Sevilla. 2 y 3 de mayo de 2019.



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INTRODUCTION

CHRONIC VENOUS  
INSUFFICIENCY

CLOSUREFAST™

VENASEAL™  
CLOSURE SYSTEM

CONCLUSIONS

ABBREVIATIONS

REFERENCES

See the device manual for detailed information regarding the instructions for use, indications, contraindications, warnings, precautions, and potential adverse events. For further information, contact your local Medtronic representative and/or consult the Medtronic website at [medtronic.eu](https://www.medtronic.eu).

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