CLINICAL STUDY

Real-World Assessment of Interventional Treatment Timing and Outcomes for Varicose Veins: A Retrospective Claims Analysis

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ABSTRACT

Purpose: To evaluate the impact of delaying interventional treatment on varicose vein disease progression, complications, and health care costs in a real-world setting.

Materials and Methods: This was a retrospective analysis of adults diagnosed with varicose veins between January 2008 and June 2010. Patients were followed for 2 years after diagnosis and categorized into three cohorts based on the timing of interventional therapy: early ($\leq$ 2 mo), intermediate ($>$ 2 mo but $\leq$ 6 mo), and late ($>$ 6 mo). Disease progression and all-cause health care costs were evaluated.

Results: A total of 44,206 patients were included, with 43% classified as receiving early interventional therapy, 33% as intermediate, and 24% as late. Early interventional treatment was associated with lower disease progression rates (29.2%) compared with intermediate (42.5%; $P < .0001$) and late treatment (52.2%; $P < .0001$). Also, early interventional treatment was associated with lower costs ($17,564) than intermediate ($17,923; $P > .05$) and late treatment ($18,399; $P < .05$). Each 30-day delay in treatment initiation was associated with a 7% higher risk of disease progression ($P < .0001$) and a 1% increase in costs ($P < .0001$).

Conclusions: Findings suggest that early initiation of interventional varicose vein treatment was significantly associated with a decreased risk of disease progression and costs.

ABBREVIATIONS

CCI = Charlson comorbidity index, CEAP = clinical, etiologic, anatomic, pathologic [classification], CVI = chronic venous insufficiency, DVT = deep vein thrombosis, ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification, QOL = quality of life, TIIT = time to initial interventional treatment, TRD = Thomson Reuters disease [classification]

Varicose veins and venous ulcers are part of a spectrum of manifestations of chronic venous disorders that affect a significant proportion of the population worldwide (1).

In the United States, varicose veins are fairly common, with approximately 11 million men and 22 million women older than 40 years of age affected by the disease (2). The incidence of varicose veins is approximately 2% per annum (3) and is frequently associated with pregnancy. In addition, the prevalence of varicose veins has been shown to increase with age and obesity (4).

Varicose veins may be asymptomatic or cause only mild symptoms, but some cases cause more severe symptoms that have a significant impact on quality of life (QOL), work productivity, and disability (2,5). Additionally, the annual direct medical cost of chronic venous disorders in the United States has been estimated to be as high as $1 billion (6,7).

Management of varicose veins includes conservative measures (eg, compression hosiery, avoidance of long periods without movement) and interventional treatments

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(eg, surgery, chemical ablation, thermal ablation). Current clinical guidelines recommend chemical or thermal (laser or radiofrequency) saphenous vein ablation over compression therapy for primary treatment of symptomatic varicose veins in patients who are candidates for interventional therapy (2,8). However, despite these guidelines, the perception that varicose veins are primarily a cosmetic issue may delay appropriate therapy (9).

Over time, untreated varicose veins may worsen and lead to hemorrhage, superficial thrombophlebitis, deep vein thrombosis (DVT), and, ultimately, leg ulcers (10–12). One study by Kaplan et al (13) found that nearly 30% of patients with visible varicose veins experienced a progression to more serious disease, and other authors (14–16) have shown that increasing venous disease severity is associated with lower QOL. Consequently, studies have also shown interventional treatment as being highly cost-effective relative to conservative therapy in improving QOL (17).

With the increasing emphasis on cost savings and quality of care within the US accountable care organization model, the value of elective interventional procedures is likely to be analyzed further based on the ability to reduce the cost of care over time. Given the availability of many treatment options for varicose veins and the well-documented consequences of disease progression, the objective of the present study was to evaluate the impact of delaying interventional treatment on varicose vein disease progression, complications, and health care costs in a real-world setting.

MATERIALS AND METHODS

Study Design, Data Source, and Sample

This study was a retrospective cohort analysis of claims data from the Truven Health MarketScan Commercial Claims and Encounters Database and the Truven Health MarketScan Medicare Supplemental and Coordination of Benefits Database. The study period was from January 1, 2007, through June 30, 2012. Details of the study design are shown in Figure 1.

The index diagnosis was defined as the first medical claim with a diagnosis of varicose veins during the enrollment period of January 1, 2008, through June 30, 2010. The date of the first interventional procedure was defined as the index treatment date and was used to compute the time to initial interventional treatment (TIIT). Inclusion criteria for the study were as follows: (*i*) at least one primary or secondary diagnosis code of 454 for varicose veins of the lower extremities per International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM); (*ii*) age $\geq$ 18 years at index diagnosis; and (*iii*) continuous eligibility to receive medical and pharmacy services during the 12-month preindex period through the 24-month postindex period. Patients were excluded if (*i*) they received an interventional treatment during the preindex period or (*ii*) if their first varicose vein diagnosis did not occur during the enrollment period. The primary study population consisted of patients who received an interventional procedure; an exploratory analysis was conducted on a secondary population that did not receive interventional treatment (ie, surveillance group).

Study data were accessed by procedures compliant with the Health Insurance Portability and Accountability Act of 1996; therefore, informed consent or institutional review board approval was not required.

Treatment Timing Characterization

Patients who received interventional treatment were categorized into three cohorts based on the TIIT, defined as the time interval between the index diagnosis date and the date of the first interventional treatment: early (TIIT $\leq$ 2 mo), intermediate (TIIT $>$ 2 mo but $\leq$ 6 mo), and delayed (TIIT $>$ 6 mo but $\leq$ 24 mo; Fig 2).

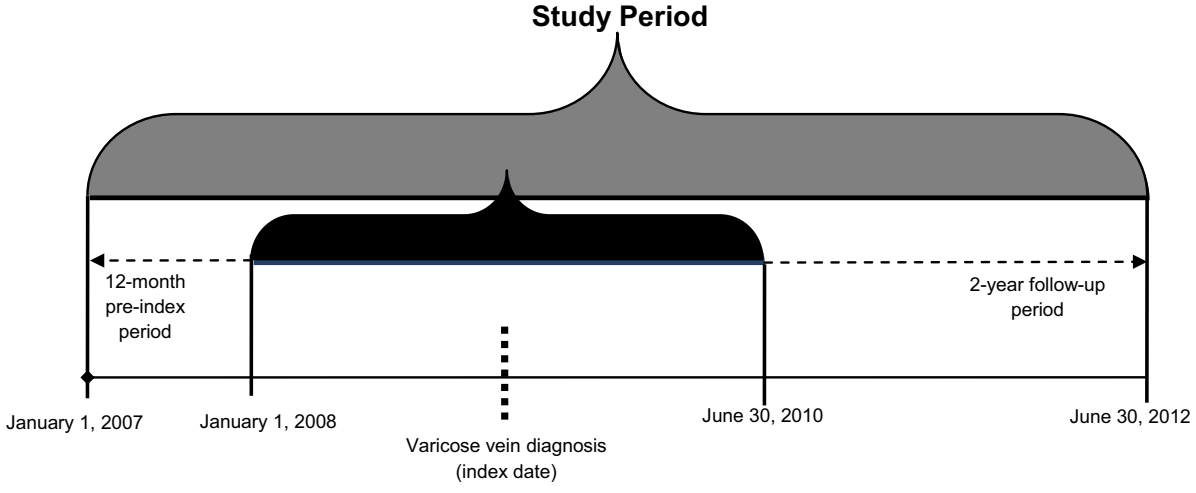

Figure 1. Study design.