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Economic implications of endovenous great saphenous ablation in a public health care system

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ABSTRACT

Background: In mid-2007, endovenous ablation (EVA) of the great saphenous vein was introduced into the publicly funded health care system in Saskatchewan, Canada. We hypothesize that the introduction of EVA resulted in a decrease in use of high ligation and stripping (HL/S), decreased costs to the health care system, and increased demand of patients for great saphenous vein ablative procedures.

Methods: We retrospectively reviewed administrative data to capture cases of HL/S between 2003 and 2014 and cases of EVA of the great saphenous vein (endovenous laser treatment and radiofrequency ablation) between 2007 and 2014. Accounting for the change in practice pattern that occurred slowly between 2007 and 2009, we divided our patients into the pre-EVA era (2003-2006) and the post-EVA era (2010-2014). Procedure costs were determined with models used by our health region for this purpose.

Results: Utilization rates for great saphenous vein intervention remained similar in the pre-EVA (90 procedures per year) and post-EVA (92 procedures per year; $P = .83$) eras. Case costs of HL/S ($1965.12/case) were higher than those of EVA (endovenous laser treatment, $1295.08/case; radiofrequency ablation, $1410.54/case). The total annual costs of great saphenous vein intervention decreased from $176,861 in the pre-EVA era to $134,525 ($P = .02$).

Conclusions: Introduction of publicly funded EVA has reduced rates of HL/S and reduced costs to our health system by approximately $42,000 per year, without increasing great saphenous vein intervention rates. (J Vasc Surg: Venous and Lym Dis 2018;■:1-6.)

Symptomatic varicose veins associated with great saphenous venous incompetence are typically treated with great saphenous vein ablation to prevent reflux from the common femoral vein into the superficial venous system. High ligation and stripping (HL/S) of the great saphenous vein is an effective treatment of lower extremity varices associated with this anatomy, but less invasive methods of eliminating great saphenous vein reflux, using endovenous laser (EVL) or radiofrequency ablation (RFA), also demonstrate good outcomes and may be preferable to patients compared with the open surgical option.[1]

Both EVL and RFA procedures require costly equipment and disposables. A previously published randomized, controlled trial comparing HL/S of the great saphenous vein with EVL demonstrated higher procedural costs with EVL.[2] When indirect costs of lost productivity of the patient were included, the total cost associated with EVL remained higher than for HL/S. Within this study, however, both HL/S and EVL were performed as outpatient office-based procedures under tumescent anesthesia. In many institutions, including ours, HL/S is performed as a day-surgery procedure under general or regional anesthesia.

A second randomized, controlled trial comparing RFA with HL/S demonstrated that RFA had higher procedural costs but lower total cost because of reduced convalescent time and productivity loss with the RFA procedure.[3] In this study, both RFA and HL/S were performed in operating rooms under general anesthesia, but our center, like many others, offers RFA and EVL under tumescent anesthesia as an ambulatory care procedure. Therefore, the cost differential to the health care system associated with switching from HL/S as a day-surgery procedure to EVL or RFA as an ambulatory care procedure remains to be documented.

Before 2007, patients in our practice who required elimination of great saphenous vein reflux underwent HL/S in an operating room under general or spinal

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anesthesia. In 2007, we initiated a program of publicly funded EVL as a hospital-based, ambulatory care procedure with the expectation that the demand for HL/S procedures would decrease, freeing time in operating rooms and achieving cost savings. In 2014, our program switched from EVL to RFA as the ambulatory care procedure of choice.

We hypothesize that the introduction of endovenous ablation (EVL or RFA) in a publicly funded health care system is associated with decreased use of HL/S and results in cost savings. Because of the patients' preference for EVL and RFA over HL/S, we further hypothesize that the introduction of publicly funded EVL and RFA is associated with an increased demand of patients for great saphenous vein ablation as a treatment of varicose veins. Increased service utilization could outweigh any cost savings.

ARTICLE HIGHLIGHTS

- **Type of Research:** Retrospective cohort study
- **Take Home Message:** Publicly funded endovenous saphenous vein ablations in Saskatchewan, Canada, were associated with no increase in saphenous ablations and a 23.9% cost savings by decreasing utilization of operating room and day-surgery resources for high ligation and stripping.
- **Recommendation:** The authors suggest that in the Canadian health system, it is cost effective to fund endovenous saphenous ablation procedures.

METHODS

Within the Canadian health care system, necessary medical procedures are insured by provincial government health plans. Within our jurisdiction, as with most locations in Canada, treatment of symptomatic (but not cosmetic) varicose veins is an insured service to which residents are entitled. Two hospitals in our city serve a population of approximately 230,000 people and provide tertiary referral services for a wider population of approximately 450,000. The population of our health region has remained stable through the study period.

The discharge abstract database is an electronic data set that captures *International Classification of Diseases*-coded diagnostic and procedural information for all inpatients and day-surgery patients in our health region. The data are submitted to the Canadian Institute for Health Information for administrative and research purposes. The health region is accountable for the quality of data submitted from our hospitals.[4]

We undertook a retrospective review of patients who underwent treatment of great saphenous reflux with HL/S, EVL, or RFA between January 1, 2003, and December 31, 2014, at our center. All patients undergoing HL/S during the study period were identified through a computerized search of the hospital discharge abstract database, and all cases with procedure codes for HL/S performed at both hospitals in our city were included. Patients undergoing small saphenous vein interventions were excluded from this study. All patients who underwent EVL or RFA during the study period were identified in a database of cases maintained by the single ambulatory care department of the hospital in which all these cases were performed. Indications for intervention were the same for HL/S, EVL, and RFA. All patients had great saphenous vein incompetence causing symptoms or skin changes, including ulceration, caused by superficial venous hypertension (C2S-6S).[5] Our data captured all patients who underwent great saphenous vein intervention in our health region during the study period. Identifiable patient data were not available in the discharge abstract database or in the ambulatory care database.

Private vein clinics in our geographic area do not provide any great saphenous vein interventions. Private clinics provide sclerotherapy for cosmetic varicose veins and transcutaneous laser treatment of telangiectasias. The nearest city with a private vein clinic providing great saphenous vein interventions is located 394 km from our center, across the international border, within the United States. The nearest Canadian cities with private vein clinics that provide great saphenous vein interventions are at a distance of 783 km, 760 km, and 571 km, respectively. Most of our patients who require great saphenous vein intervention are currently able to receive a treatment date, within our local public health care system, that is within 1 to 2 weeks after presentation with symptomatic great saphenous vein incompetence. Therefore, there is little waitlist-related incentive to travel for private treatments. Because of these factors, we believe the number of patients traveling out of our region to receive privately funded EVL or RFA is low.

Patients who underwent HL/S during the study period were offered a day-surgery procedure. This consisted of admission to a day-surgery unit; the surgical procedure was then performed in an operating room, with general or regional anesthesia performed by an anesthetist. The patient was admitted postoperatively to a postanesthesia care unit for a period of observation (typically about 1 hour), then discharged later in the day from the day-surgery unit. All patients who underwent HL/S had phlebectomies of calf or thigh varices performed as part of the index procedure, and the associated costs were included.

In contrast, patients who underwent EVL or RFA presented to the ambulatory care area of our hospital and underwent the procedure in the ambulatory surgery center of the hospital, under tumescent anesthesia administered by the surgeon. All patients undergoing EVL or RFA had foam sclerotherapy of calf varices at the initial procedure, and the cost was included. There were no phlebectomies performed on patients undergoing EVL or RFA. Patients were discharged immediately after the procedure.