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Preserving the conduit: a case of CHIVA1 saphenous vein sparing and its later use for aorto-coronary bypass

Ilaria Manfrini, Gabriele Fanciulli, Giulia Baldazzi

Vascular Disease Center, University of Ferrara, Italy

Abstract

This case report discusses a 68-year-old male patient who underwent in 1997 a saphenous vein sparing CHIVA procedure as a treatment for chronic venous insufficiency and later required a Coronary Artery Bypass Grafting (CABG). During the CABG procedure in 2015, the patient's spared saphenous vein was harvested and used as an autologous graft. At ten years follow-up the CAGB was demonstrated to be patent. Therefore, the decision to preserve the Great Saphenous Vein (GSV) during the initial surgery, despite the common belief that this kind of treatment is not a useful approach to chronic venous insufficiency, allowed for its later use in a life-saving procedure. This case highlights the importance of sparing one's venous reserves and it demonstrates the value of preserving the saphenous vein's integrity as key for its potential use in surgical procedures, especially in patients who have a moderate to high cardiovascular risk.

Key words: venous insufficiency, CHIVA, saphenous, chronic venous disease.

Correspondence: Ilaria Manfrini, Vascular Disease Center, University of Ferrara,

via Aldo Moro 8, Ferrara, Italy.

E-mail: mnflri@unife.it

Introduction

CHIVA is the French acronym for *Cure conservatrice et Hemodynamique de l'Insuffisance Veineuse en Ambulatoire* (conservative and hemodynamic treatment of venous insufficiency in the office). It is a saphenous-sparing therapeutic approach to lower limb Chronic Venous Disease (CVD) based on an accurate hemodynamic evaluation of the venous system. The CHIVA strategy aims to restore near-normal physiological flow with no destruction or ablation of the involved veins. In recent years, this minimally invasive technique is attracting the attention of those interested in pursuing a more conservative approach to CVD compared to the traditional surgical procedures, especially to venous stripping. A mandatory requirement in this kind of approach is a correct pre-operative hemodynamic evaluation which must be assessed via a complete duplex scan of the venous axis. After an exhaustive and accurate mapping, the surgical strategy consists of performing targeted ligatures to interrupt escape points and fractionate hydrostatic pressure. The number and position of these ligatures depend on duplex scan findings and every operation is tailored to each patient.[1]

Although haemodynamic correction of venous insufficiency requires a much more complex training curve, focused on understanding and estimating properly the type of intervention required to achieve an efficient result, this group of procedures has proven to be superior to more invasive interventions. In fact, this kind of surgical approach guarantees not only a less intraoperative and post-operative complication as well as a faster recovery but also allows the sparing of the treated veins, granting for a possible future arterial substitution. This proves to be crucial, given that the Great Saphenous Vein (GSV) remains the most commonly used bypass conduit for coronary grafting in cardiac surgery. In fact, in certain patient populations, like those at very high risk of wound infections and octogenarians, GSV grafts have proven to be superior even to arterial graft.[2,3]

Unfortunately, in contemporary phlebological practice, less invasive approaches such as CHIVA are still regarded as “niche” techniques rather than as structured conservative treatment strategies. This perception is still largely influenced by methodological biases in the available guideline recommendations that tend to limit its application only to “selected experts”. Consequently, a key ethical issue is presented: the systematic sacrifice of the GSV in the treatment of a benign condition such as CVI is still suggested, or worse recommended, to the vast majority of phlebology practitioners. The prevailing emphasis on procedural simplicity and standardization over anatomical preservation may compromise long-term patient interests. A reassessment of CHIVA should therefore acknowledge venous preservation not merely as a technical choice, but as an ethical obligation in the management of superficial venous disease, focusing on the patient’s long-term interests and future clinical needs.[4]

Case Report

The patient, 68 years old, was admitted in 2015 to the cardiology department to undergo a coronary angiography, following a stress test that was positive for signs and symptoms of reduced coronary reserve, in the context of a previous angioplasty of the right coronary artery to treat an NSTEMI in 2013. The coronary angiography showed good outcomes of the previous PTA on the right coronary artery, but signs of significant disease progression involving the Left Main - Left Anterior Descending - Left Circumflex (LCX-LAD-LM) axis which usually requires an aorto-coronary bypass as treatment. The patient was therefore transferred to the cardiac surgery unit to undergo surgical myocardial revascularization.

During the medical history collection, the patient reported having undergone treatment for chronic venous insufficiency of the GSV bilaterally - specifically, a CHIVA type 1 procedure on the right side in 1997, and both CHIVA types 1 and 2 on the left side in 1999. The patient’s venous reserve was thus preserved and available for use in grafting.

The surgical team decided to perform a double Coronary Artery Bypass Graft (CABG), using the autologous right GSV for the first graft to the obtuse marginal branch, and the internal mammary artery for the second graft to the left anterior descending artery.

The procedural outcome of both grafts was excellent, with an adequate restoration of the patient's coronary reserve.

In the following years, the patient adhered to regular cardiology follow-up programs. In 2018 the patient underwent a maximal exercise stress test, which was negative for symptoms but considered positive for Electrocardiogram (ECG) changes. Consequently, further evaluation was indicated with myocardial scintigraphy, which revealed reduced coronary reserve affecting an extensive area including the entire apex, as well as the lateral, inferior, and anterior regions—corresponding to approximately 18-20% of the total cardiac mass. No fixed perfusion defects suggestive of prior myocardial necrosis were observed.

He was electively admitted to the cardiology department in 2018, to undergo coronary angiography due to the inducible ischemia detected on myocardial scintigraphy. The coronary angiographic study was performed, showing good outcomes of the previous CABG.

Following the revascularization procedure performed in 2018, the patient has continued to adhere to the follow-up programs. In June 2024, the most recent cardiological assessment showed a negative result on the maximal exercise stress test and normal cardiac kinetics parameters on both ECG and echocardiogram.

The patient has also been regularly followed within the venous Doppler ultrasound surveillance program. The most recent vascular surgery evaluation, conducted in July 2024, documented the absence of chronic venous disease in the right lower limb and the presence of CEAP class 1 chronic venous disorder in the left lower limb, effectively managed with first-class compression stockings.

The patient reports currently leading an active lifestyle, with full compliance to medical therapy.

Discussion

The present case highlights a unique and clinically relevant scenario in which the CHIVA technique, designed to preserve venous anatomy while correcting hemodynamic dysfunction, played a central role in maintaining the structural integrity of the vein, ultimately allowing its use as a conduit for the aorto-coronary bypass. This outcome raises important questions regarding the broader implications of vein-sparing procedures.

Notably the GSV remains one of the most commonly used conduits for CABG surgery, especially in certain scenarios. While the arterial grafts, such as the internal mammary artery, offer superior long-term patency rates, Saphenous Vein Grafts (SVGs) are often required to supplement arterial conduits or to revascularize less critical vessels. Autologous vein grafts also perform better than synthetic grafts in many settings because of superior biocompatibility, lower infection risk and adaptability. So, it becomes clear that the existence of a spared saphenous vein may allow more flexible grafting options in cardiac surgery. It is also notable that after a CHIVA procedure, inflammatory cytokines are significantly reduced, and the vein appears to return to a healthy, physiological state (*restitutio ad integrum*). In fact, studies conducted in cohorts of patients who underwent CHIVA-type interventions that performed a histological examination of the vein one-year post-surgery, revealed that the histoarchitecture of the GSV was perfectly maintained. In particular, the endothelial layer was intact, the medium layer showed mild hypertrophy and hyperplasia of smooth muscle cells, which is indicative of healthy vascular remodelling and the adventitia was also well-preserved, including nerves and small vessels, further contributing to the integrity of the vein. The overall findings indicate that the GSV, after CHIVA treatment, appears even more robust than before, regaining its normal parietal structural properties is therefore perfectly eligible for arterial bypass surgery. The advantages in terms of venous structure preservation provided by CHIVA techniques can be combined with other conservative vein-harvesting methods to obtain a graft with optimal characteristics. For instance, in the "no-touch technique", which was introduced starting from the 1990s, the vein can be harvested along with its surrounding perivascular adipose tissue. These interventions help maintain the integrity of the vein, reducing endothelial damage, and minimizing stress on the vessel, ensuring better outcomes in terms of graft patency, efficacy, and overall clinical success.[5,6]

However, even in recent years, the widespread use of thermal ablation, vein stripping, or foam sclerotherapy in the management of superficial venous insufficiency still too frequently leads to partial or complete obliteration of the GSV, rendering it unavailable for future surgical use.

In this context, the CHIVA method has the distinct advantage not only of offering a comparable symptomatic relief and recurrence rates to traditional ablative methods but also of preserving venous anatomy and function while promoting a para-physiological remodelling of the venous system.

Specifically, this interesting case report perfectly exemplifies a long-term benefit of such a conservative approach in which the vein spared not only remained patent but retained sufficient wall integrity and diameter to be harvested and used successfully for bypass surgery years later. This outcome suggests a paradigm shift might be warranted in the way we approach the management of superficial venous disease, particularly in patients with risk factors for Coronary Artery Disease (CAD).

The implications of this case extend into the concept of preventive vascular surgery. As the global population ages, and as CAD remains a leading cause of morbidity and mortality, it becomes increasingly important to adopt a forward-looking approach in the treatment of CVD. Minimally invasive, vein-sparing procedures like CHIVA are not merely alternatives to invasive techniques, on the contrary they may represent strategic decisions that preserve future therapeutic options.[7]

From a cost-effectiveness evaluation, this approach may also prove to be beneficial in the long-term perspective. Reintervention rates following CHIVA are similar to those following thermal ablation, but the added advantage of conduit preservation may reduce future cardiovascular intervention costs, especially in health systems where CABG remains a common procedure.

However, the success of such an approach depends heavily on the quality of pre-operative assessment and surgical expertise. As stated before, CHIVA requires a precise understanding of venous hemodynamics, Doppler ultrasound interpretation and patient-specific planning. This necessitates a significant investment in training, time, and resources. As previously stated, the learning curve is steep, and, especially in low-volume centers or in systems driven by procedural efficiency, the incentive to invest in such training may be low.[8]

In summary, this case confirms that CHIVA and similar vein preserving approaches are not merely alternatives in the treatment of superficial venous disease, but may have concrete long term benefits. While substantial investments in training, haemodynamic assessment, and intraoperative technique are required for techniques like CHIVA, the potential gains in patient flexibility, graft quality, long term outcomes, and healthcare resource allocation suggest these are worthwhile.[9]

As the population ages and the burden of cardiovascular disease grows, so adopting a more integrated and preventive approach to “vascular care” as a whole is essential. CVD is not merely a localized disorder of the peripheral veins, but it represents a systemic vascular condition. It has been proven that CVD is strongly associated with increased cardiovascular morbidity and mortality, particularly in patients with moderate to severe manifestations. This relationship underscores that CVD may act as a visible indicator of underlying systemic endothelial and vascular dysfunction. Recognizing CVD as a marker of broader vascular pathology reinforces the need to integrate its evaluation into comprehensive cardiovascular risk assessment models, rather than viewing it in isolation as a purely venous disorder.[10,11]

Conclusions

For the field of phlebo-lymphology more broadly, the clinical case described in this report highlights the importance of implementing a modern vision in which vein surgery is not just symptom oriented, but forward looking, allowing a conservation of one's venous "potential" for future procedural demands. In contemporary vascular practice, the treatment of chronic venous insufficiency, especially through these rising minimally invasive techniques, must be regarded as a fundamental element of an integrated, patient-centered approach to systemic vascular pathology as a whole.

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