Predicting and Preventing Varicose Vein Recurrence

Evaluating the data to better predict and prevent varicose vein recurrence.

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Recurrence of varicose veins remains a challenge to the management of chronic venous disease. Despite the advancements in diagnosis and minimally invasive therapies, recurrence after treatment for varicose veins has been reported in up to 80% of patients.[1-4] One review found no difference in great saphenous vein (GSV) reflux recurrence after ablative surgery and endovenous thermal tumescent treatment.[5] Another study found low-quality evidence favoring laser ablation over ablative surgery for the treatment of short saphenous vein reflux at 1-year follow-up (odds ratio [OR] for recurrence, 0.24)[6]; however, further analysis at 5-year follow-up is necessary for proper comparison among different techniques.[6]

The factors that lead to recurrence of chronic venous disease are difficult to pinpoint and manage. Recurrence of varicose veins at the saphenofemoral and saphenopopliteal junction can become bothersome, with patient satisfaction reported to be poorer than after primary interventions.[7] Three types of recurrence have been identified: (1) residual varices, which are veins that are present but have not been treated in a procedure performed as late as 1 month earlier; (2) true recurrent varices, which are recanalized veins beginning to reflux 1 month after a previously performed procedure; and (3) new refluxing veins, which are veins developing in an anatomic region where there were previously no vessels.[2]

Recurrence was initially thought to be associated with inadequate surgery, such as procedures performed by inexperienced surgeons who left residual varicosities untreated. However, recent literature shows that technical (ie, an inadequate procedure) and tactical (ie, an inadequate choice of procedure) mistakes can cause recurrence.[2] Neovascularization, which is characterized by incomplete venous wall formation with a decreased elastic component and a lack of valves, has also been considered as a possible trigger for recurrence.[8-11] Neovascularization has been reported more frequently following surgery than after endovenous procedures; however, the recurrence rate is similar among the different techniques.[10]

Moreover, the pathogenetic role of neovascularization must be better differentiated from the possible dilation of microvessels not previously visible, a phenomenon called *vascular remodeling*.[12,13] Finally, venous reflux is weakly associated with unsatisfactory clinical outcomes, emphasizing the need to differentiate clinical recurrence from hemodynamic changes. Indeed, reflux found during ultrasound scanning is not always related to a symptomatology and does not lead to a clinical recurrence for the patient.[14,15]

Predicting and preventing recurrence is not an easy task, but evidence suggests some fundamentals to guide the approach of everyday practice and future research.

PREDICTING VARICOSE VEIN RECURRENCE

Deep venous chronic obstruction/reflux can be a significant contributor to chronic venous disease and should be taken into consideration as a potential trigger for recurrence.[16] A recent investigation by our group at the University of Ferrara in Italy reported a significant increase in the risk of saphenofemoral junction recurrence following surgical high ligation in cases of iliofemoral vein tract incompetence (OR, 4.8; 95% confidence interval [CI], 1.8–12.6; $P < .003$).[17] Muhlberger et al reported anatomic evidence that valves exist inside the femoral vein above the saphenofemoral junction in

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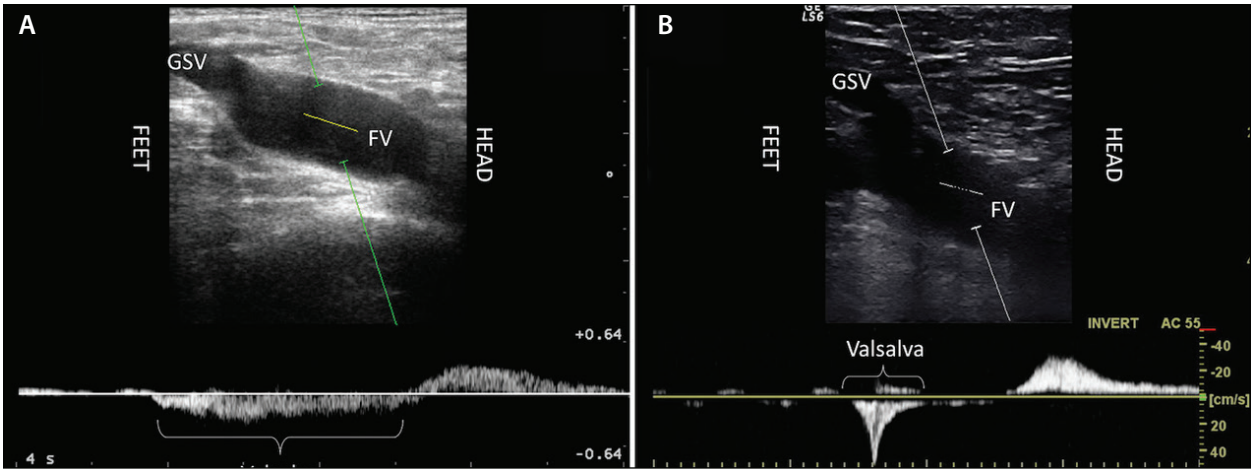

Figure 1. The Valsalva maneuver produces a long-lasting reversed flow because the iliofemoral valve is incompetent/absent (A). The Valsalva maneuver produces a short reversed flow due to the closing of a competent iliofemoral valve (B).

71% of cases. However, further investigation on the real function of this valve is needed.[18] Gomes et al demonstrated that valvular anomalies of the iliac and femoral tract are significantly correlated with the severity of primary saphenous insufficiency.[19] Neovascularization may also be caused by pressure gradients postoperatively.[20] Following this observation, an accurate investigation of the saphenofemoral junction hemodynamics should include the deep venous system, with particular attention to the iliofemoral tract. Incompetence in this segment will predict a higher risk of recurrence (Figure 1).[17]

A body mass index (BMI) > 30 kg/m^2 has been identified as a potential risk factor for surgical recurrence.[21] In addition, inadequate draining of a saphenous system is also a poor prognosis for long-term results of surgery for GSV recurrence. Conversely, recurrence rates were not significantly different when considering sex, age, the interventionalist's level of experience, perioperative difficulties (ie, bleeding, technical problems), and postoperative complications (ie, hematoma, thrombophlebitis, infection, lymph exudate) after surgical intervention.[22] At 5-year follow-up, recurrent varicose veins have been shown to be significantly associated with the absence of residual saphenous trunk and the presence of diffuse varicose veins (P = .015).[23] Moreover, in the case of redo surgery, recurrence correlated with the number of phlebectomy incisions (P = .02).[23] These data are in line with other research that has found a significant decrease in recurrence rates after saphenous-sparing procedures compared with traditional vein stripping.[24] The satisfying recurrence rate associated with the saphenous-sparing strategies, together with minimally invasive modern endovenous techniques, has stimulated investigations regarding GSV competence restoration with endovenous devices.[25]

PREVENTING VARICOSE VEIN RECURRENCE

In addition to the previously described strategies, technical details must be considered to prevent recurrence. The saphenofemoral junction must be a particular focus, because studies indicate that nearly 50% of recurrences occur in that region.[2] With high ligation, the convention is to avoid long femoral stumps by performing a ligation flush on the femoral side. Geier et al reported the presence of long stumps in 65% of observed recurrences.[26] Winterborn et al found no statistical difference in the recurrence rate following a high ligation performed using a running suture versus a transfixion suture at 2-year follow-up.[27] However, the use of a silicone patch to prevent repeat recurrence after surgery for saphenofemoral reflux represents a valid alternative at 1-year follow-up.[28]

Research has found that closing the cribriform fascia during high ligation is effective in reducing neovascularization at 1-year follow-up.[29] According to Frings et al, oversewing the femoral stump in a high ligation using a nonabsorbable suture significantly reduces recurrence compared with oversewing the stump with an absorbable suture or by avoiding oversewing.[30] In contrast, Heim et al questioned the role of endothelial exposure in neovascularization triggering and reported no statistical difference in the recurrence rate following a simple high ligation versus a high ligation with oversewing of the femoral stump.[31] A meticulous dissection of the saphenofemoral junction is mandatory considering that junctional tributaries on the femoral plane are present in 49% of cases, representing sites of possible reflux reappearance.[32]

A recent study found that meticulous dissection can be made through a 2-cm-long incision, exposing the saphenofemoral junction, and then high ligation can be performed using a titanium clip application flush on the femoral vein.

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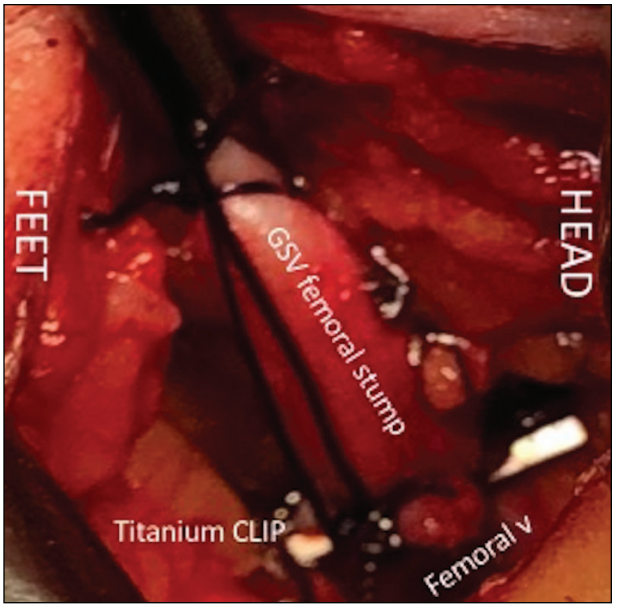

Figure 2. Titanium clip application flush on the femoral stump.

This technique has demonstrated a significant reduction in recurrence risk compared with a traditional high ligation by ligature (OR, 2.6; 95% CI, 1.1–6.1; $P = .04$) (Figure 2).[33]

Although junctional tributaries did not demonstrate a role in varicose vein recurrence after endovenous laser ablation,[34] Cappelli et al demonstrated that ligation of the junctional tributaries during a high tie is associated with a significant increase in risk of recurrence compared with high ligation performed sparing at least one junctional tributary (OR, 7.52; $P < .001$).[35] Unfortunately, most studies of endovenous ablations do not report potential risk factors for reflux recurrence, nor do they identify significant differences in recurrence rates of both endovenous and surgical ablations.[36,37]

Currently, the best way to prevent recanalization and potential reflux recurrence in a previously ablated GSV is to consider the predicting factors identified by Van der Velden et al.[38] This study reported a higher risk of GSV recanalization in cases of higher clinical class, caliber, saphenofemoral junction reflux, length of treated vein, type of device, and male sex.[38] In this study, patient weight was not found to correlate with the risk of recanalization, which differs from previous investigations.[39,40] This data discrepancy may be caused by the small number of patients presenting with a BMI > 30 kg/m^2.[38]

Certified graduated compression stockings demonstrated effectiveness in preventing postoperative recurrences long ago.[41] Although the original study may have been biased by lack of compliance measurement and dropouts, a significant difference was reported for the group wearing postoperative compression stockings, with 6% of recurrences versus 71% for the control group that did not wear compression stockings.[41]

Finally, to prevent recurrence, a detailed analysis of the pelvic venous system must be included to detect refluxes that could potentially trigger recurrence after intervention on the lower limb superficial venous network. These refluxes are the source of up to 17% of recurrences.[2] These aforementioned data support a clinical approach that includes early venous reflux detection and management, as well as choice of treatment strategy based on the patient's physical and hemodynamic characteristics.

CONCLUSION

Predicting and preventing varicose vein recurrence is a challenge in modern lower limb chronic venous disease management. Despite existing data, the lack of homogeneity in the hemodynamic inclusion criteria of the available studies leads to a bias related to comparing different reflux scenarios among varied populations—and thus, a comparison of apples to oranges. More recent studies point to similar outcomes of recurrence in the saphenous ablative strategy, independent of the surgical or endovenous approach. Hemodynamic approaches aimed to spare the saphenous drainage demonstrated a significant decrease in the recurrence risk and point to the difference between a strategic (ablative vs hemodynamic) and a technical (surgery vs endovenous devices) approach.

A detailed preoperative hemodynamic evaluation including analysis of the iliofemoral and pelvic network may help reduce varicose vein recurrence, in addition to techniques such as high ligation. Future investigations should focus on the hemodynamic and biologic basis of lower limb chronic venous disease to better understand the physiopathology of recurrence and the strategic steps to avoid it. ■

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