


A novel technique in varicose vein surgery: Grasp-all-first

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ABSTRACT

Many surgeons remove the varicose veins one by one. However, this technique is time-consuming with considerable blood loss, particularly in severely affected limbs. In advanced cases, varicose veins have a continuous structure and a chain-like appearance under the skin, and the use of this technique is associated with bleeding from the veins to which the extracted vein is connected. Herein, the Grasp-all-first technique (sequential extraction) which was developed for particularly advanced cases by the author of this manuscript was presented.

Keywords: Ambulatory surgery, varices, varicose veins.

Traditionally, varicose veins (VVs) are removed surgically or closed off using different techniques.^[1,2] Removal of these veins usually does not affect the venous blood flow of the lower limb, as because healthy veins carry the re-directed blood. Treatment also prevents complications such as the development of thrombosis and venous ulcers, and disability.^[3]

Removal of VVs, via very small incisions of just a few millimeters, is called phlebectomy.^[1] A small hook or mosquito clamp is used to pull the vein out and the vein is exteriorized from the wound (Figure 1).

Many surgeons remove the VVs one by one: incision to remove VV, providing hemostasis followed by another incision to remove another VV and hemostasis. However, this technique is time-consuming with considerable blood loss especially in severely affected limbs. Particularly in advanced cases, VVs have a continuous structure and a chain-like appearance under the skin and the use of this technique is associated with bleeding from the veins to which the extracted vein is connected.

Herein, the Grasp-all-first technique (sequential extraction) which was developed for particularly



Figure 1. Pulling VVs out. Hooks or mosquito clamps are used to pull vein out.

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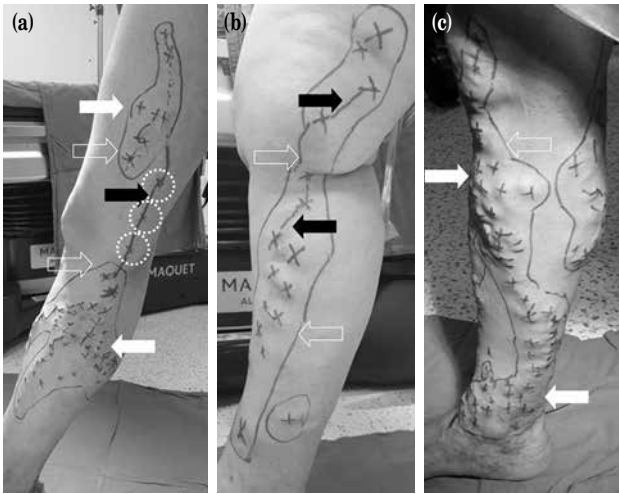


Figure 2. Marking VVs. (a, b and c) Small and large marking symbols (Filled white arrows). Connecting lines (Filled black arrows). Additional marks on vein (Dotted white circles). Border lines around VVs (Hollow white arrows).

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GRASP-ALL-FIRST TECHNIQUE

a) Preoperative preparation

The preparation of the patient for the operation is of utmost importance and it includes the followings:

Preoperative Doppler ultrasound:

Always perform a preoperative Doppler ultrasound for the identification of the sources of VVs, as VVs originate from different sources and the source influences the treatment plan. During the Doppler ultrasound examination, venous mapping is performed and the followings are considered:

1. Diameters of great, small, and accessory saphenous veins at proximal, middle, and distal positions with local dilatations
2. Tortuosity of veins
3. Connecting side branches
4. Perforating veins
5. Vein wall properties (thickening), intraluminal adhesion bands, and thrombus formations attached to the vein wall (previous phlebitis)
6. Anatomical variations of the saphenofemoral and saphenopopliteal junctions
7. Locations of the VVs
8. Venous insufficiencies and grading.

b) Marking VVs

When marking the VVs preoperatively, it is the best way to mark the vein at its most bulging location, while the patient is standing. Mark the larger VVs with larger symbols and smaller VVs with smaller symbols. This approach is very helpful to remember the size of the VVs during surgery. Use of an "X" as the symbol helps you to find the exact incision location (intersection of two lines forming the letter X) (Figure 2a). If a normal or dilated vein connecting the VVs is palpable, drawing a connecting line between two VVs also would be helpful to see the route the vein continues (Figure 2b). If the line is long, placing additional marks on the vein in a palpable position would be useful in finding the vein again via a new incision in case of any problem during the removal of the connecting vein at both ends (Figure 2c). It is also useful to define the boundaries of the lesion with a border line to separate the healthy area (Figure 2d).

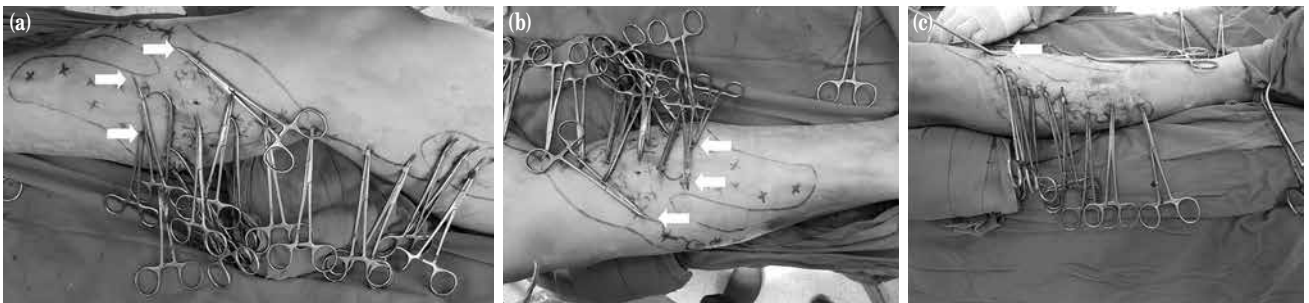


Figure 3. Grasp-all-first technique. Multiple clamps grasping VVs in a sequential order (Images on the left, the middle and the right are the same patient at different stages of the operation). (a, b and c) Clamps marked with white arrows are used to block side chains at their origins (Same clamps in all three images). (a, b and c) If you do not have enough number of clamps to grasp all VVs at the same time, remove the previously grasped VVs and use these clamps again to grasp side chains. (c) Caution: DO NOT remove blocking clamps, until grasping side chains.

c) Incisions

Vertical incisions tend to heal better, as circumferentially placed compression bandages help the wound edge to close perfectly. Horizontal incisions are preferred around the knees and ankles, as they are less affected by the tension caused by joint movement. Use small incision vertical or horizontal depending to the location of VVs.

d) Removal of VVs

Instead of removing the VVs one by one, grasp as much as VVs in an sequential order before removal, which is named as the Grasp-all-first technique (Figure 3a). Medium size clamps are most optimal alternatives for this purpose, as small ones are not strong enough to remove the vein and large ones are not useful for gentle maneuvers.

The surgeon should keep in mind that the veins are elastic and the connective tissue is inelastic. With growing experience, it would become easier to make this distinction. In addition, a gentle manipulation is needed to avoid unnecessary trauma to the wound margins, as widening of incisions with clamps may cause increased scar formation and pigmentation in the postoperative period. Do not accidentally grasp the skin with the clamp, as this would results in skin necrosis and scar formation. When grasping the vein, you can use the tip of the clamp first, although, using the middle part of the jaws is better for a stronger grasping later (Figure 4a).

Dissection of the vein from its perivascular tissue facilitates its extraction and removal; otherwise, the vein may rupture before total extraction. Dissection of the vein can be performed before or after you grasp it. If needed, the grasped vein can be gently pulled in the proximal or distal directions to find the position of the next vein located proximally or distally (Figure 5).

Sometimes, the VV chain spreads distally without branching, but in most of the cases, it has branches spreading to other territories. If you do not have enough clamps to grasp all these VVs, it is better to block the side chains with clamps at their origins and hold this clamp in position until grasping the distal part of this side chain. Otherwise, these branches would bleed backward (Figure 3b).

Pull the two sequential clamps to the opposite directions and palpate the vein between two VVs. If you can easily palpate all the course of vein like a string, this means you can easily remove the vein (Figure 6).

It is important to grasp all the VVs in full thickness at the beginning, as possible, to avoid back bleeding from connected veins (Figure 4b).

If the vein is deep under the skin and not palpable, you can use Doppler ultrasound to grasp the vein. For this purpose, find the vein using the probe, place the tip of a mosquito clamp under the probe, and move it to the left or right, as needed. When the

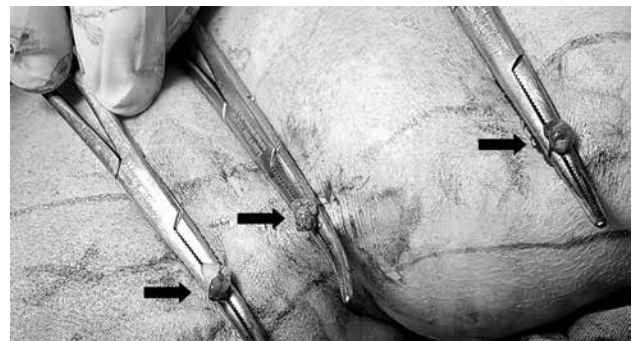


Figure 4. Grasping technique. Middle part of jaws is more optimal for stronger grasping. Grasp all VVs in full thickness at the beginning to avoid back bleeding from connected veins.

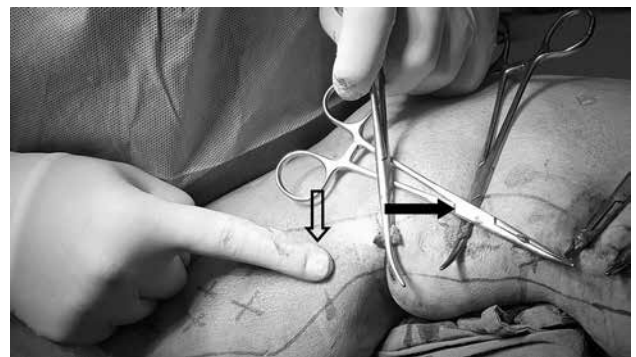


Figure 5. Pulling vein in the proximal or distal directions to find position of the next vein. If you pull vein in one direction (filled black arrow), you can feel where the next varicose vein is under your finger (hollow black arrow).

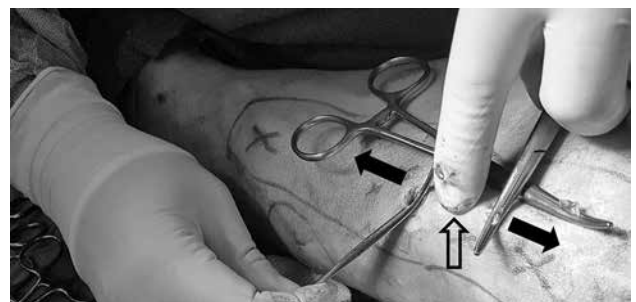


Figure 6. Pull two sequential clamps to opposite directions (filled black arrows) and palpate connecting vein between two varicose veins (hollow black arrow).

acoustic shadow of the clamp overlaps the vein, the tip of the clamp shows you the location of the incision (Figure 7). Then, you can easily grasp the vein through this incision using ultrasound assistance.

Sometimes, clamps at the tight can make probe placement difficult and probe overlaps with clamps, particularly if the clamps are too close to each other. This situation affects the probe signals and the image, creating difficulty in tumescent anesthesia applications, particularly when thermal ablation is performed. If you perform the ablation first, swollen tissues make the finding the VVs in their location after tumescent anesthesia difficult. In this case, grasp the VVs first and, then, tie these veins temporarily with silk stay sutures, perform the tumescent anesthesia and ablation, and grasp easily the previously tied VVs again (Figure 8).

Start removing the VVs from one end to the other. Thus, you can follow the correct order and no residual vein is left.

Most surgeons use gentle traction in a circular motion to remove the VVs. This method is particularly

favorable for VVs in small diameters. However, for large VVs, it is better to wrap the vein over the clamp by turning the clamp. Turn the grasping clamp on the opened jaws of a second clamp. This technique prevents skin folding over itself and also over the clamp (Figure 9). While removing the VV, slowly stretch the vein by turning the clamp and every time just wrap a small segment. Do not try to remove the vein in the first attempt, always stretch and wrap the vein many times until totally remove it. Whenever you feel the vein is likely to rupture before total removal, grasp the vein again at a new position. Use the second clamp, which is supporting the skin, to grasp the vein again and place the first one under this clamp to support the skin.

During the procedure, splitting the VVs into proximal and distal parts between two clamps facilitates their removal, particularly for long vein segments. Grasp (full thickness) the proximal and distal parts of the VV with two separate clamps and cut the vein along the middle part using a blade or scissor (Figure 10).

Always remove the varicose and connecting veins totally for a better outcome. Do not leave any residual VV behind. If a vein is bleeding for a long time after removal, this means incomplete removal of the vein. As VVs do not have the ability of vasoconstriction, particularly after partial removal, you must find the vein again and remove the residual part totally.

It is better to tie the distal connections at the ankle position to avoid any bleeding from the distal venous system. The Vicryl (polyglactin) suture ties would be a better choice, instead of silk ties, to avoid any suture reaction.

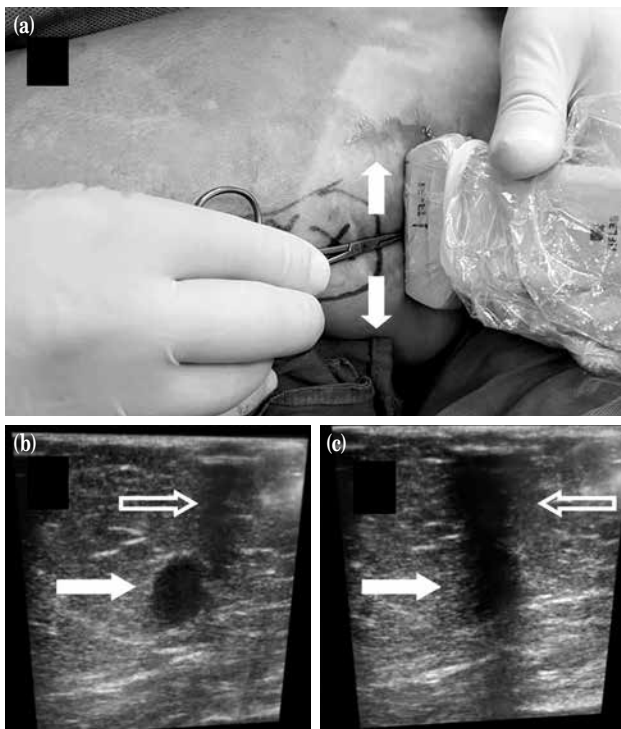


Figure 7. Grasping deep veins under the guidance of Doppler ultrasound. (a) Find vein using the probe and place the tip of a mosquito clamp under probe and move it to the left or right, as needed (filled white arrows in Figure a). (b, c) When acoustic shadow of clamp (hollow white arrows in Figure b and c) overlaps vein (filled white arrows in Figure b and c), tip of clamp shows location of incision.

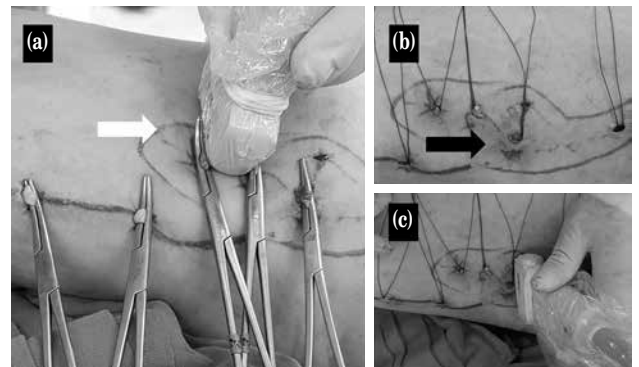


Figure 8. Probe versus clamp overlap problem. (a) Probe overlaps with clamps (filled white arrow). (b) Tie these veins temporarily with silk stay sutures (filled black arrow). (c) Now, probe moves easily over sutures.



Figure 9. Turning clamp. (a) Use of a single clamp causes skin folding over itself and also over clamp (filled white arrows). (b, c) Turning grasping clamp on opened jaws of a second clamp supporting skin and preventing skin from folding (hollow white arrows).

e) Closure of incision

Surgical sutures or adhesive tapes can be used to close the wound. During suture closure, do not use forceps; instead, stretch the two ends of the incision



Figure 10. Splitting VVs into proximal and distal parts.

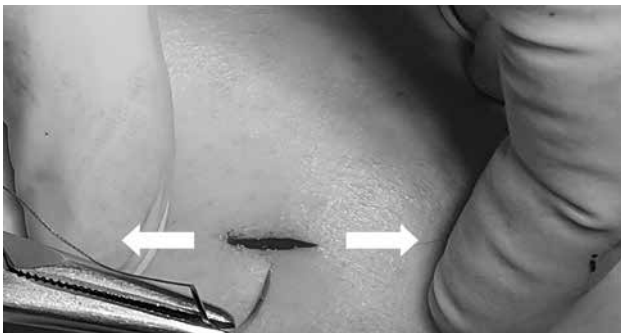


Figure 11. Closure of incision. Do not use forceps instead stretch two ends of incision to opposite directions (filled white arrows).



Figure 12. Minimal blood loss.

to opposite directions. This method would help you to take stitches from both sides of the incision at the same point and cause less scar formation (Figure 11).

In conclusion, complete surgical removal of VVs can be achieved in a single session or in separate sessions. However, if possible, a single session is a better way and the technique described above is helpful for this aim.

Based on my experience, these conclusions can be drawn:

1. Preoperative Doppler ultrasound and careful marking of the VVs improve the surgical success.
2. Grasp-all-first technique is a favorable method to avoid blood loss during VV surgery with minimal blood loss (Figure 12).
3. Sequential removal in an order also helps you to remove the veins totally. No residual VVs are associated with less recurrence and greater patient satisfaction.

As the author of this manuscript, I believe this technique would be a helpful guide for vascular surgeons.

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