Spiral vein graft: a historical vignette

Ray C.-J. Chiu, MD*

In early 1973, my colleague, Peter Blundell, was forced to resect the superior vena cava (SVC) during removal of a malignant thymoma, replacing this vessel with a Dacron graft. When the patient was readmitted several months later with graft occlusion and signs of SVC syndrome, I lamented on the lack of a suitable conduit for SVC replacement, since numerous earlier efforts, including creation of an AV fistula, had been futile.[1] It was evident that an endothelialized vein graft would be the ideal substitute, but there is no autogenous donor vein of that diameter available in the body. Inspired by the ease and adaptability in matching size when wrapping an extremity with an ace bandage, we devised a new way to construct a composite vein graft, custom made for the SVC, using as the donor a smaller calibre saphenous vein. A segment of saphenous vein was opened longitudinally and wrapped in a spiral fashion around a temporary tubular stent such as a chest tube, selecting a size that exactly matched the diameter of the recipient vein. This technique, which we called "spiral vein grafting" was tested in 10 canine experiments with a 1-year follow-up. Venography showed that they remained patent without any anticoagulation.[2] The first patient we selected for this technique interestingly suffered from SVC syndrome secondary to idiopathic fibrosing mediastinitis, similar to the patient reported by Baslaim and deVarennes in this issue (page 68). Our patient, however, improved spontaneously with the development of venous collaterals and eventually the surgical intervention was deemed unnecesary. Later, others with this condition did undergo successful SVC bypass using a spiral vein graft.[3]

In subsequent years, the use of a spiral vein graft for SVC replacement was popularized clinically by Doty and Baker,[4] and by 1993 when we reviewed this subject, several hundred patients who underwent this procedure had been reported in the English literature.[5] The versatility of this technique is reflected in its application for replacing the internal jugular vein after radical neck dissection.[6] and to substitute other veins of various sizes ranging from the portal vein,[7] and the renal vein,[8] to the common femoral vein.[9] Successful use of this composite vein graft in contaminated[10] or irradiated fields had also been described. Although sporadic reports of successful outcome using polytetrafluoroethylene grafts to replace major veins had appeared over the years, the report of Baslaim and deVarennes indicates that in suitable cases, the spiral vein graft is still a good option.

The complication of anastomotic narrowing described by Baslaim and deVarennes was also seen in our experimental study.[2] When using running sutures to perform a vein-to-vein anastomosis, excessive tension needs to be avoided to prevent the purse-string effect of the running stitches. The length of composite vein graft constructed cannot be readjusted easily, so it should be carefully matched to the length of vein defect to be replaced in order to avoid buckling or undue tension. There had been concern that the long suture line required to construct the spiral vein graft may be thrombogenic, but the experience has shown this not to be the case when fine 6-0 Prolene sutures are used for this purpose, as explanted specimens revealed endothelialization over the suture line within a few days. Finally, operating time can be shortened by a 2-team approach. It is always rewarding to be able to take a clinical problem to the laboratory, bring it back to the patient and to see it withstand the test of time.[11]

References

1. Skinner DB, Salzman EW, Scanell JG. The challenge of superior vena cava obstruction. *J Thorac Cardiovasc Surg* 1965;49:824-30.
2. Chiu CJ, Terzis J, MacRae ML. Replacement of superior vena cava with the spiral composite vein graft: a versatile technique. *Ann Thorac Surg* 1974;17:555-60.
3. Levitt RG, Glazer HS, Gutierrez F, Moran J. Magnetic resonance imaging of spiral vein graft bypass of superior vena cava in fibrosing mediastinitis.

Professor and Chairman, Division of Cardiothoracic Surgery, McGill University, The Montreal General Hospital, Montreal, Que. Member, Editorial Board, Canadian Journal of Surgery

Correspondence to: Dr. Ray C.-J. Chiu, Suite C9-169, The Montreal General Hospital, 1650 Cedar Ave., Montreal QC H3G 1A4

Chest 1986;90:676-80.

4. Doty DB, Baker WH. Bypass of superior vena cava with spiral vein graft. *Ann Thorac Surg* 1976;22;490-3.
5. Chiu RCJ, Greentree D. Versatility of spiral vein grafts: applications in the past two decades. In: Wang Z-G, Becker H-M, Mishima Y, Chang JB, editors. *Vascular surgery. Proceedings of the International Conference on Vascular Surgery.* Vol 1. Beijing (PRC): International Academic Publishers; 1993. p. 18-24.
6. Citrin P, Dasmahapatra KS. Interposition spiral saphenous vein graft bypass in bilateral simultaneous radical neck dissection. *Surg Gynecol Obstet* 1988; 167:79-80.
7. Kaufman BH, Puga FG, Perrault J, Gilchrist GS, Johnson CM. Drapanas shunt using a spiral saphenous vein graft. *J Pediatr Surg* 1987;22:3-7.
8. Nghiem DD. Spiral gonadal vein graft extension of right renal vein in living renal transplantation. *J Urol* 1989;142: 1525.
9. Hobson RW 2d, Yeager RA, Lynch TG, Lee BC, Jain K, Jamil Z, et al. Femoral venous trauma: techniques for surgical management and early results. *Am J Surg* 1983;146:220-4.
10. Fowl RJ, Martin KD, Sax HC, Kempczinski RF. Use of autologous spiral vein grafts for vascular reconstructions in contaminated fields. *J Vasc Surg* 1988;8:442-6.
11. Doty DB, Doty JR, Jones KW. Bypass of superior vena cava. *J Thorac Cardiovasc Surg* 1990;99:889-96.

Laparoscopic splenectomy — not for the faint of heart

John K. MacFarlane, MD

This issue of the Journal (page 28) contains another in a series of articles by Dr. Eric Poulin and his colleagues on the laparoscopic approach to splenectomy. This excellent report details the results of laparoscopic splenectomy in 51 consecutive patients and reminds us of the lessons that have been learned along a rather protracted learning curve.

The forthright report by Poulin and Mamazza on the development of the current technique for splenectomy is a welcome addition to an increasing literature on this procedure, which challenges those of us operating on the spleen, especially for the management of idiopathic thrombocytopenic purpura in which the spleen is usually close to normal size.

Recent reports from Belgium, and Arizona, Missouri and Ohio in the United States[1–4] attest to the fact that this procedure is being increasingly applied. Furthermore, with access to the Internet, a significant number of patients will likely be requesting or demanding a laparoscopic approach to their disease in the future.

The lessons that Poulin and Mamazza underline for us are, in summary, that the procedure is best performed in spleens no longer than 30 cm and that the lateral approach with the patient in a steep right lateral decubitus position has made the procedure much easier. The do not recommend, as they did in an early publication,[5] the uniform use of prior splenic artery embolization.

For those colleagues who wish to learn this technique, careful adoption of the technical aspects of positioning and the steps along the way will be essential to the development of their abilities in this difficult but "do-able" procedure. I have attempted 9 laparoscopic splenectomies, 5 of which were completed laparoscopically. I encountered a number of difficulties, which I believe will be useful to share with readers of the Journal.

Because I have been in close contact with Dr. Poulin since he began doing this operation in Canada, my approach to laparoscopic splenectomy has developed along the same lines. The change

**Department of Surgery, St. Paul's Hospital, University of British Columbia, Vancouver, BC. Member, Editorial Board,* Canadian Journal of Surgery

Correspondence to: *Dr. John K. MacFarlane, Department of Surgery, St. Paul's Hospital, 1081 Burrard St., Vancouver BC V6Z 1Y6*