Regarding "Treatment of postoperative high-volume lymphatic complications using isosulfan blue"

In the recent manuscript by Drs Bounds and Endean,[1] "Treatment of postoperative high-volume lymphatic complications using isosulfan blue," the authors highlight the use of isosulfan blue for identification of lymphatic injuries in postoperative patients. The authors evaluated 32 patients with 33 complications including high-output lymphocele formation (n = 11 [33%]) and lymphocutaneous fistulas (n = 22 [66%]). Most patients underwent femoral or saphenous vein harvests (n = 17 [52%]) or femoral artery exposure (n = 13 [41%]). All 33 lymphatic complications were treated with isosulfan blue-directed ligation.

In addition to surgical identification and ligation, several complementary approaches may allow the identification and correction of lymphatic injuries without requiring a return to the operating room.[2-4] Early percutaneous therapies used to treat lymphoceles include drainage and sclerotherapy.[2] While percutaneous drainage alone provides clinical success rates ranging from 70% to 100%, instillation of a sclerosing agent has shown sustained rates as high as 98% in larger cohort studies, which are comparable to the rates seen with surgical management.[2]

More recent advances in the treatment of lymphoceles and lymphocutaneous fistulas include direct percutaneous lymph node access with subsequent embolization.[3,4] Endolymphatic embolization for the treatment of thoracic duct injury[3] has grown to include lymphatic injuries in multiple other territories.[4] The technique involves the placement of a small-gauge needle into local lymph nodes under ultrasound guidance.[4] Ethiodized oil is then injected, under periodic fluoroscopic imaging, to identify extravasation of oil from the lymphatic system.[4] After identification of the site of injury, the lymphatic node or duct closest to the area of injury is accessed, followed by embolization with a liquid embolic agent.[4] Ethiodized oil itself may incite a fibrotic response, leading to lymphatic occlusion rates of 35% in high-output leaks and 75% in low-output leaks. The addition of embolization with a liquid embolic agent has demonstrated 100% occlusion rates in several iatrogenic scenarios ranging from cannulation injury in heart transplantation to chylous ascites after tumor resection to pelvic laparoscopy,[4] all with immediate improvement in symptoms and drain outputs. The output from high-output lymphatic leaks has been shown to decrease by 88% within the first postprocedure day following embolization. Furthermore, a recent case series showed a sustained response out to 4 months (mean of 134 days) after prostatectomy.[4] While further studies are needed to validate these techniques, initial studies have shown good efficacy in the management of these injuries.

All patients in the authors' study[1] returned to the operating room for exploration under general anesthesia. Intranodal lymphangiography and embolization may be performed under local anesthesia or moderate sedation.[3,4] This may facilitate treatment in those who have deteriorated from comorbid medical conditions, complications, or prolonged hospital stays after the initial operation. Establishment of a multidisciplinary team, including surgeons and interventional radiologists, is beneficial for the management of lymphatic injuries.

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Reply

We would like to thank Fisher et al for their comments in response to our article regarding the use of isosulfan blue for treatment of lymphatic complications.[1] Dr Fisher et al have correctly pointed out that there are other techniques used for treatment of lymphatic complications. They have highlighted two endovascular procedures for treatment of lymphatic complications: aspiration or drainage of a lymphocele with injection of a sclerosing agent into the cavity[2] and cannulation and embolization of the lymphatic vessel.[3,4] Both would potentially avoid an operative intervention and general anesthesia. In responding to these comments, we would make the following observations.

The authors note that the majority of lymphatic complications cited in our original paper occurred after femoral or saphenous vein harvests or femoral artery exposure. A key difference between our population of patients and that cited by the authors is the anatomic location of the index intervention. The lymphatic complications treated in our study were peripheral, primarily involving the groin, whereas those in the three studies they cite all involve what may be described as central lymphatic complications, located in the pelvis, abdomen, or thorax. Thus, the endovascular approaches cited target intracavitary lymphatic complications, whereas our report is limited to extremity lymphatic complications.

The techniques and treatment options for central lymphatic complications, although they appear promising in the series and case reports cited, may not necessarily apply to peripheral wound complications and may not confer the same advantages over operative intervention. Intranodal injection of dye, as described, involves injection of dye into groin lymph nodes to visualize more centrally located lymphatic vessels that are then subsequently cannulated for embolization. The lymphatic complications that we treated were located at or distal to the groin, and it is doubtful that injection of a groin lymph node would visualize the culprit lymphatic vessel caudal to the groin. Therefore, this technique would require injection of methylene blue or isosulfan blue between the toes to identify a lymphatic, followed by a cutdown on the dorsum of the foot to cannulate the identified lymph vessel,[3] an approach similar to the technique we described except we did not create a foot incision.

As noted, our cases were performed in the operating room under general anesthesia. Because the technique we describe involves opening the skin over the lymphatic complication, we continue to believe that an operating room environment is important to maintain sterility, especially since a vessel or graft could be exposed at the base of the wound. We chose to use general anesthesia primarily for the patient's comfort but think that the procedure could be done under regional or local anesthesia. The authors also suggest that one argument for avoiding the operating room is the associated cost. As we highlighted in our report, the identification of the disrupted lymphatics usually occurs quickly, thus limiting the operative time. Based on review of the studies referenced for endovascular treatment, it would appear that intranodal injection of ethiodized oil—done to identify the abdominal or thoracic lymphatic channels—takes significant time (intranodal injection of ethiodized oil every 5 minutes or pedal injection, followed by spot images every 10 to 30 minutes).[3] Although the procedure duration is not specifically recorded, additional time is then needed to cannulate the intra-abdominal or intrathoracic duct.

There are other factors that we think favor the technique we have employed. The majority (two-thirds) of our patients had lymphocutaneous fistulas. As such, we think that the technique of aspiration and sclerotherapy in these cases would not be applicable. The reported success rate for the cited procedures was 92% for aspiration and sclerotherapy and 79% for embolization. This compares with the 94% success rate we report. Finally, the technique that we describe is not associated with radiation exposure to the patient.

Treatment of lymphatic complications can be challenging, and we would agree with Fisher et al that a multidisciplinary approach is valuable. The technique we describe is simple, safe, and effective for extremity lymphatic complications, and as such, we believe it to be the preferred approach. Whereas isosulfan blue could potentially identify an intracavitary injured lymphatic, we have no experience with this application of the technique. We would concur that intracavitary lymphatic complications may be better treated with an endovascular approach. Percutaneous methods clearly provide a less invasive intervention than open thoracic, abdominal, or pelvic surgery and would be similar to percutaneous drainage of abdominal abscesses or seromas that obviates the need for potentially morbid and high-risk operative interventions in reoperative fields. We appreciate the comments and issues raised and thank the *Journal* for giving us the opportunity to respond to this letter.

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