Oh Groin: What to do with thou?

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The field (art?) of electrophysiology (EP) has progressed exponentially over the last 3 decades. The delivery of ablative energy through transvenous catheters has revolutionized our ability to treat cardiac arrhythmia. At the time that this text is being put on paper, there are 3 remaining challenges in our field, namely, durable ablation for atrial fibrillation, ablation of non-focal non-ischemic ventricular tachycardia, and last but not the least, management of the pesky inguinal access region. The oral history of electrophysiology trainees is riddled with the litany of post-operative complaints from both patients and nurses, prolonged repeated compressions and late-night vascular imaging. Those of our ilk who have been unfortunate enough to deal with pseudoaneurysms and arteriovenous fistulae can never forget the resultant prolonged patient agony and depression. Thankfully, these have decreased significantly with the advent of ultrasound-guided vascular access.

The ideal modality of post-ablation venous hemostasis should have each of the following characteristics: simple, fast, 100% effective, allow rapid patient mobility, and above all, cheap. This combination, however, has been surprisingly elusive. As opposed to the multitude of arterial closure options for our interventional colleagues, the electrophysiology field for long relied upon the old and non-tested method of plain manual compression (MC). As most of us have experienced, MC is unreliable and messy especially in procedures on uninterrupted anticoagulation. The degree and efficiency of MC is almost completely operator dependent. Luckily, the femoral veins are easily compressible and usually quite forgiving in the majority of cases. However, as we started to recognize the advantage of both uninterrupted anticoagulation and deep sedation (preferably general anesthesia) in left atrial ablation procedures, particularly atrial fibrillation (AF), MC became even more unreliable in ensuring venous haemostasis.

The Figure-of-Eight (Fo8) suture was a handy replacement for MC. The goal of Fo8 is simple: create a compression zone of subcutaneous fat to allow healing of the venous puncture track. Fo8 seems to work well for all venous access procedures, allowing haemostasis even for large venous sheaths such as cryoablation, left atrial appendage closure systems and leadless pacemaker delivery sheaths. The Fo8 was a particular godsend for electrophysiologists without the luxury of MC by willing trainees or reliable lab staff. We and others also showed that it resulted in shorter lab recovery time after AF ablation and was reliable in presence of systemic anticoagulation. However, there remained a few drawbacks. The ideal duration of suture compression remains unknown and is variable by practice, from 2 to 4 hours, sometimes longer for larger or multiple sheaths. The degree of venous compression is lesser compared with MC, as evidenced by persistent oozing in some patients after Fo8 removal necessitating prolonged compression or administration of subcutaneous Lidocaine with Epinephrine. The requirement for 'suture cutting' also meant that nursing

staff were uncomfortable removing it. The last and greatest drawback was that Fo8 is irreversible, that is, the suture could not be reapplied when cut, for patients with persistent oozing.

The above drawbacks led to the development of the stopcock (SC) technique. This was being used by some vascular surgeons, called the 'Woggle technique' for suture closure of hemodialysis access catheterization sites (1). Sam Aznaurov first described this technique on 'X' (then Twitter) for femoral venous haemostasis (2). I and others tried it on a few patients and were impressed by the ease and sophistication of the technique. We published the first detailed description of this technique in 2018 showing it to be equivalent to Fo8 in achieving access site haemostasis in AF ablation patients (3). The SC technique, which is essentially using a simple 3-way stopcock to lock a tightened 0-Ethibond or 0-silk suture, has 2 major advantages over Fo8. It is easier to teach and apply, can be removed by nursing personnel and can be reapplied (the stopcock can simply be locked again) if haemostasis is incomplete. The technique is also inexpensive, as the stopcocks can simply be cut from the side arm of the venous sheaths. We also further showed that Heparin reversal with Protamine was not required for haemostasis with SC.

As expected, Fo8 and SC have been widely taken up in EP labs around the world. In other centers, MC remains king. Many centers in the US have graduated to specialized venous closure devices which afford faster ambulation but are considerably more expensive. The time is ripe for the SC system to be commercialized and a few of these are being tested now in the EP community.

In the present use of JCE, Katapadi and colleagues present a single-center retrospective observational analysis of 102 patient who underwent venous hemostasis with the LockeT vascular compression device (4). They report complete hemostasis in 97.8% of vascular access without major complications, mean time to ambulation 3.93 ± 1.10 hrs. The LockeT device is a commercial apparatus which uses a screw with 90 degrees rotation to lock or unlock the suture, with a flat round endplate (base) to provide uniform compression. Theoretically, the flat base would avoid one prior complaint with SC, namely skin pressure/ ulceration. Truly speaking, operators have long developed methods to avoid skin ulceration, including shorter SC retention times, use of an intervening gauze roll, and gentler compression in non-obese individuals. In this relatively small study, the authors have shown 98% complete hemostasis (likely prolonged compression in 2 patients), a stable mean ambulation time of 4 hours and mean time to discharge 8 hours (which could potentially be shortened with increased operator experience). The study has the usual drawbacks of retrospective observational studies, as acknowledged by the authors, as well as the lack of any comparative analysis to SC technique. We also do not have information about the financial implications of adding to the technical costs of EP studies or appendage closure. In the current reimbursement climate, especially with steadily rising healthcare costs, this would be important information.

The LockeT device and other similar commercial devices that duplicate SC would be potentially useful if a) they add negligible incremental cost to the EP procedure and b) if they lead to further shortening of bedrest and time to discharge which would offset the device expenditure. One might argue against their use for simple EP procedures without systemic anticoagulation where MC has historically been simple and effective. These methods would be expected to hold an advantage over invasive venous closure devices of not requiring multiple devices (one for each access site), thus being less expensive, especially if the patient could be discharged within 2 hours as practiced by some operators with the venous closure devices. We need more larger volume studies on these issues to convince the greater the EP community.

We could thus be finally reaching closer to a solution of the waxing problem: what to do with the groin?

References:

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4. (*Attach reference for the LockeT manuscript*)