DISCUSSION

Dr Peter H. Lin (Houston, Tex). Dr Knowles and colleagues should be congratulated for a well-designed study in which they analyzed the outcome of upper extremity access in patients who underwent fenestrated endovascular aortic aneurysm repair. In this study, which spanned over a 5-year period, the authors reported that 148 patients underwent fenestrated aortic aneurysm repair, and 98 patients, or 66%, had upper extremity access. Among them, 88% underwent open brachial artery cutdown, while 12% underwent percutaneous access. Access-related complications occurred in four patients, resulting in an overall complication rate of 4%, which included three hematomas and one stroke. The authors concluded that upper extremity access is a safe and feasible approach in patients undergoing fenestrated endovascular repair. Furthermore, the authors noted that open exposure may be safer than percutaneous access in these patient cohorts.

I have three questions for the author. First, the reported complication rate in the literature on upper extremity access using the snorkel or chimney technique in juxtapenal aorta is as high as 9%. In most of these reported series, the brachial sheath typically ranged from 5F to 7F in size. In your study, you reported that 12F brachial sheath was utilized in the majority of your patients, with a remarkably low complication rate of 4%. Can you explain this difference in outcomes in terms of using larger brachial sheath with lower complications rates compared with published reports?

Second, the operative time of fenestrated endovascular aortic aneurysm repair in patients with brachial artery access is over 300 minutes, or more than 5 hours, in your series. Since you used a 12F brachial introducer sheath in the majority of your patients, are there technical tips or tricks you can share in terms of minimizing the complication rate given the prolonged procedural time with a 12F brachial sheath?

Third, open brachial artery cutdown was utilized in nearly 90% of your patients who had upper extremity artery access, while percutaneous technique was used in femoral artery access whereby the introducer sheath ranged from 18F to 22F in size. Your group has certainly demonstrated the expertise in previous publications in managing introducer sheath of 22F in size percutaneously. Given that you use a much smaller introducer sheath in the brachial artery, why can’t you perform brachial artery access percutaneously under ultrasound guidance without a surgical cutdown?

I want thank Dr Knowles for an excellent presentation and providing me with a well-written manuscript well ahead of time. I also want to thank the Association for the opportunity to discuss this paper.

Dr Martyn Knowles. Thank you very much for your thoughtful questions and comments. The reason we found a decreased complication rate with these 12F sheaths from the upper extremity is likely multifactorial. Preoperative meticulous evaluation of the computed tomography angiogram and identification of patients at high-risk for complications is prudent. Additionally, careful intraoperative evaluation using ultrasound imaging ensures that the vessel will tolerate the large sheath and avoids issues such as a small brachial artery and a high radial artery take off. This allows the practitioner the choice to select the contralateral side or decide upper extremity access is too high-risk. Prior to accessing the brachial artery, we fully heparinize, keeping the activated clotting time above 300 for the whole case. We also feel very strongly about using a micropuncture kit for vessel access, despite the open access, which we feel decreases the local complication rate; namely, dissection.

Most importantly, however, the reason we likely have a lower rate than that in chimney and snorkel cases is the avoidance of multiple passes of wires and catheters for multiple vessels across the arch that those cases require. Our careful single pass into the descending aorta with placement of the 12F sheath limits arch manipulation and protects any further wire and catheter exchanges. Up to four 0.035-inch wires can be placed simultaneously within the 12F sheath, allowing sequential cannulation and stent placement, all with protection within the sheath. I really believe this is the reason that the cerebrovascular complication rate in this study was so low.

Referring to your second question, I have already mentioned a few of the tips for what we feel decreases the complication rate. Additionally, aggressive heparinization and primary closure of the vessel, with the ability to back-bleed, is paramount. Enough cannot be said for careful planning on the preoperative computed tomography and ultrasound, prior to accessing the vessel, to identify those with treacherous arch disease or anatomy. Choosing a separate access site or avoidance overall is important in the prevention of cerebrovascular complications. Furthermore, having open access with the ability to primarily repair and flush the vessel cuts down on local complications.

To answer your last question, we do use predominantly percutaneous access for the groin access during fenestrated endovascular aortic repair; however, we have been very hesitant to use percutaneous access for upper extremity access for a multitude of reasons. We have performed percutaneous axillary access with 12F sheaths in three patients with good results and no complications. However, the concern is a very small amount of blood is needed to cause brachial sheath hematoma and median nerve injury, which concerns us greatly given its morbidity. Another reason is that with the extensive operative times in this group, pulling a large sheath without the ability to back-bleed and remove any debris or carefully repair the vessel is concerning. Overall, our results are good with open exposure and in our experience does not add significant time to the operation.