

## PANEL DISCUSSION

# Successful Bailout: Key Decisions and Techniques to Master

Experts discuss when to pivot, how to escalate, and which bailout strategies deliver success in complex CTO interventions.

With Yolanda Bryce, MD, RPVI; Edward T.C. Choke, MBBS, FRCS, PhD;  
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### How do you know when it's time to abandon your primary strategy and move to a bailout approach? Are there specific angiographic/hemodynamic results or tactile feedback that would be an indication for you to pivot?

**Dr. Bryce:** I don't think of bailout as failure—it is often part of the procedure in chronic limb-threatening ischemia (CLTI). I pivot when I lose control of the wire or stop making meaningful progress. If the wire is prolapsing, I cannot direct it, or I am repeatedly entering the same subintimal plane, that is my signal.

Angiographically, if I am not creating inline flow to the foot or I am causing more vessel injury than benefit, I move on. At that point, continuing the same approach rarely improves the outcome.

**Dr. Choke:** My primary strategy is antegrade intraluminal crossing. When this is clearly failing, it is time for bailout approach. These are the common signs that suggest a move toward bailout techniques: (1) persistent antegrade knuckling of the wire with persistent antegrade dissection into the chronic total occlusion (CTO) and (2) vessel perforation by the wire, with inability to engage in another plane and consistent entry of wire into the perforation plane despite attempts otherwise. Tactile feedback that indicates a need to pivot includes loss of the ability to control the direction of the guide-wire and loss of the ability to spin the wire to look for microchannels.

**Dr. Holden:** Prior to performing an intervention, it is important to have planned a bailout strategy should the need arise. The specific bailout strategy is influenced by a number of factors, including above- (ATK) or below-the-knee (BTK) intervention and quality of potential retrograde access sites. As a general principle, my initial approach to both ATK and BTK arterial occlusive disease is an antegrade approach with the intention of remaining intraluminal with a guidewire. The most common situations where I consider a bailout strategy are where a chronic occlusion proximal cap cannot be crossed (despite different specialty guidewires being used) or the guidewire has crossed into the subintimal space without true lumen reentry at a satisfactory location.

**Dr. Migliara:** When we are treating patients affected by peripheral artery disease (PAD), those with intermittent claudication (Rutherford 2-3) and CLTI (Rutherford 4-6) need to be considered differently. At the same time, even CLTI patients need to be differentiated depending on whether they have rest pain, a small wound, or an extensive and/or deep wound.

The aggressiveness of the procedure is directly related to the baseline clinical presentation. There are three steps in our endovascular treatment: crossing, prepping, and delivering the definitive treatment. Every step has a primary strategy, but in case of failure, you must have a second or third option in mind. During crossing, we start with an antegrade approach, shifting quickly to a retrograde access in some cases, such as issues on crossing intraluminally, flash occlusion and difficulty in finding the origin of the occluded vessels, or perforation during an antegrade approach. During vessel preparation, there different devices based on the features of the arterial lesion, escalating from the easiest and cheapest, such as a noncompliant balloon, to the most complex and expensive, such as atherectomy. While delivering definitive treatment, we shift from the concept “leave nothing behind” to the concept “what we leave behind” based on the results of the vessel prep.

### After failed antegrade crossing in a tibial or femoropopliteal CTO, what's your next step? What anatomic or patient factors most influence your decision?

**Dr. Migliara:** As I noted previously, in cases of antegrade crossing failure, I shift directly to the retrograde approach, spending no more than 10 minutes in antegrade. In case of good collaterals or communication between the arteries, my first choice is to navigate these, avoiding a distal puncture; in the other cases, I do

a distal retrograde puncture. The site of the retrograde puncture is based on the location of the CTO.

The baseline clinical presentation is the most important element for our decision-making, avoiding strategies in claudicant patients that are too risky and being more aggressive in CLTI patients, especially in the presence of extensive wounds.

**Dr. Bryce:** I move to retrograde access relatively early, especially in CLTI. If there is a good distal target or a more favorable distal cap, I do not spend excessive time antegrade.

Patient condition also matters—if the patient has tissue loss or cannot tolerate a long case, efficiency becomes important. Calcification, long lesions, and poor support all lower my threshold to switch strategies.

**Dr. Holden:** The next step after failed antegrade crossing of CTOs differs for ATK and BTK disease. For femoropopliteal interventions, after attempts with hydrophilic and CTO crossing guidewires have failed to reenter the lumen, I frequently utilize reentry devices to facilitate reentry in an ideal location, away from important collaterals and hopefully the P2/3 segments of the popliteal artery. Such is the success of these technologies that I switch to a reentry device relatively early as extensive guidewire dissection of the false lumen can make reentry more challenging. In cases where reentry has failed or is not technically feasible (eg, no healthy reentry site, thrombus, severe calcification), I will use retrograde access via a popliteal or proximal tibial artery approach.

Conversely, for tibial artery CTOs, the strategy in most cases after failed antegrade crossing is a retrograde approach. This is partly because retrograde crossing is successful in the majority of cases (including strategies to manage subintimal entrapment such as the double balloon technique). However, it is also because my experience with tibial artery CTO crossing and reentry technologies have proved to be less successful and predictable than a retrograde approach. However, I do use these technologies in situations where retrograde access sites are not available (eg, due to wounds).

**Dr. Choke:** For femoropopliteal CTO, my first choice for antegrade crossing is in the intraluminal plane and to avoid subintimal antegrade crossing if possible. The reason for this is that subintimal antegrade crossing usually results in the sacrifice of the distal collateral feeding branches. For me, it is used only as a last resort, with great care never to dissect distally into the distal popliteal or tibial arteries, which can convert chronic ischemia into acute ischemia.

When it is ascertained that conventional antegrade intraluminal crossing has failed for femoropopliteal CTO, my usual algorithm is early retrograde puncture with a 21-gauge needle. The most common retrograde puncture site is the popliteal artery, with alternative second choice retrograde puncture sites being the anterior tibial (AT) or posterior tibial (PT) artery and, rarely, the peroneal artery. This is followed by retrograde crossing with V-18 Control Wire guidewire (Boston Scientific Corporation) (wire supported by a 2.6-F microcatheter [CXI, Cook Medical]), followed by snaring of the retrograde wire within the femoropopliteal CTO into either a 4-F Berenstein catheter or 2.6-F CXI catheter and then externalization via the groin. Retrograde crossing is similarly attempted in intraluminal fashion, but if this is not possible, then subintimal retrograde crossing is acceptable when the snaring is performed within the CTO, as this means that sacrifice of any collateral feeding branches proximal or distal to the CTO will be minimized.

If retrograde crossing is unsuccessful, a return to antegrade crossing is attempted using the knuckling technique and subintimal crossing, with care not to dissect too far past the distal limit of the CTO.

If this fails, then techniques such as PIERCE (percutaneous direct needle puncture of calcified plaque) are used, where needles are used to disrupt the calcium of the CTO to allow passage of guidewire in either direction. Fracking, described by Haraguchi et al, is another technique where a 20-gauge needle is inserted into calcified uncrossable plaque and insufflator hydraulic pressure is then used to create microfractures, facilitating guidewire crossing.<sup>1</sup> Alternatively, crossing and reentry devices such as BeBack (Bentley Innomed GmbH), GoBack (Bentley Innomed GmbH), or Wingman (Reflow Medical) devices can be used, although in my personal experience, these are rarely used.

For tibial CTOs, the algorithm differs slightly. The first choice is still intraluminal antegrade crossing. If this fails, then there are usually three scenarios as noted below.

1. If there is a good distal target, I will opt for early retrograde puncture of the distal target, with snaring of the wire performed within the CTO.
2. Frequently, tibial CTOs extend past the ankle into the foot, and distal targets may not be readily available for retrograde puncture. It is then necessary to carefully perform antegrade crossing in the subintimal plane using the knuckling technique with a 0.014-inch guidewire (or sometimes with a 0.018-inch wire in severely calcified lesions). During the subintimal crossing, I usually reassess at regular

intervals with small puffs of contrast to look for microchannels and the earliest possible site of reentry from the dissected plane into the true lumen.

3. If antegrade subintimal crossing fails to achieve reentry, it is then necessary to use a bidirectional technique to cross in the pedal plantar loop fashion from the opposite tibial artery.

Factors that I take into consideration include:

- Presence of good distal targets: Early retrograde approach is feasible and usually straightforward, and early switch to retrograde is my preference.
- Presence of calcium: Antegrade intraluminal crossing is harder to achieve, and a retrograde approach is usually necessary and can be facilitated by the easy visualization of calcium under fluoroscopy.
- Absence of calcium: Intraluminal crossing is usually feasible, and more time can be spent on probing for microchannels, if the first few attempts fail.
- Presence of large, infected wounds in the dorsum or medial ankle: These may preclude retrograde punctures.

### In BTK CTOs where luminal crossing fails, what is your preferred bailout technique and why? Does this differ between antegrade and retrograde failure?

**Dr. Migliara:** In case of antegrade crossing failure, the first choice is to perform retrograde crossing, with or without direct retrograde puncture of the distal arteries. In most cases using a bidirectional crossing technique, almost all CTOs are crossable. However, in case of both antegrade and retrograde crossing failure, I consider this patient as “no option” and shift to deep venous arterialization (DVA), getting flow into the foot through the healthy veins instead of through the diseased and uncrossable arteries.

**Dr. Choke:** Failure of intraluminal crossing for BTK CTOs is not an uncommon scenario. Personally, I prepare for such scenarios in every case by (1) allocating enough time for each case to ensure that escalation of complex techniques can be performed in a consistent and methodical algorithm and (2) always prepping the entire leg at the beginning of every case. For anticipated prolonged cases, the patient undergoes general anesthesia.

When luminal crossing has failed from both the antegrade and retrograde directions, then the next step is to cross in the subintimal plane. I think there is a difference between antegrade and retrograde intraluminal failure.

If antegrade intraluminal failure occurs, I do not usually convert this to antegrade subintimal crossing. The reason is, I am concerned about antegrade subintimal

dissection into the distal BTK or BTA arteries and not being able to cross back into the true lumen, risking losing the outflow to the foot.

If retrograde intraluminal crossing fails, then I will change to retrograde subintimal crossing and snare the wire within the CTO itself, ensuring minimal extension of the occlusion in the subintimal planes. In the rare occasion when snaring is not possible, I carefully push the retrograde wire proximally until the wire is within the lumen of the proximal artery (usually popliteal artery), and then I will snare the retrograde wire from there. This has to be performed carefully to prevent inadvertently diverting the dissection outflow plane to the target lesion and losing the inflow to the other tibial arteries.

I think this technique is safer compared to pushing the antegrade wire subintimally in the antegrade direction into the foot. However, there are occasions when the latter technique is necessary. One scenario is when there are no distal targets for retrograde puncture or if retrograde puncture has been unsuccessful. If there are no distal targets, then one may have to push the antegrade wire subintimally into the pedal arch and attempt reentry into the subintimal plane in the opposite tibial artery. The decision for how aggressive to be and how much risk to take is at the discretion of the operator, based on the overall vascularity and the size of the wounds.

**Dr. Bryce:** My preferred approach is a bidirectional strategy with retrograde access. It gives better control and is often more efficient. The distal cap is frequently easier to cross, and it helps avoid prolonged uncontrolled subintimal dissection. If one direction fails, I try not to persist and change the approach.

### What specific anatomic or procedural factors lower your threshold to move to retrograde access early rather than using it as a last resort?

**Dr. Bryce:** Long occlusions, heavy calcification, flush caps, and poor proximal visualization all push me to go retrograde early. I also move earlier when there is a single runoff vessel or when I need to target a specific angiosome. If continued antegrade attempts risk damaging the vessel, I prefer to access distally (the foot, typically) and proceed in a controlled way.

**Dr. Choke:** I use retrograde access early in these cases:

- A flush occlusion with the complete absence of a proximal stump to guide antegrade entry into the target vessel

- Good distal targets for retrograde puncture. Distal targets are considered ideal if they are easily visualized on angiography or ultrasound with minimal disease or calcification. In such cases, retrograde crossing is often in the intraluminal plane, and retrograde puncture is fast and safe.
- Long CTOs with anticipated low success rates of antegrade crossing in the intraluminal plane
- Severely calcified lesions

**Dr. Holden:** As previously discussed, my threshold for moving to retrograde access is low for BTK arterial interventions. In several situations, I'll switch even earlier. Flush occlusions involving the origins of tibial arteries are challenging to identify and cross antegrade. Another situation is where an antegrade guidewire has caused perforation or is located deep in the subintimal space.

**Dr. Migliara:** There are many different reasons to make an earlier shift to retrograde access. First, the CTOP (CTO crossing approach based on plaque morphology) classification needs to be kept in mind, because type III and, above all, type IV are easier to cross in retrograde. Second, in arteries with prevalence of medial calcification, it's mandatory to stay intraluminal, so in these cases, if the antegrade intraluminal crossing is difficult, instead of shifting to the subintimal way, I shift directly to the retrograde because it's easier to maintain an intraluminal crossing in retrograde. Third, move to retrograde access in the case of a flash occlusion of the superficial femoral artery (SFA) or tibial arteries when finding the origin of the artery is impossible.

Usually, there are no limits regarding retrograde access, because in extreme cases, it's also possible to obtain a retrograde access through occluded arteries. Thinking about BTK arteries, the anatomic factor that decreases my threshold to move to a retrograde access is the patient with only the peroneal artery supplying the flow into the foot. In this case, the retrograde approach can be dangerous for two different reasons: (1) if a retrograde approach also becomes impossible, it could be difficult to obtain hemostasis and we might induce a compartmental syndrome, and (2) if the peroneal artery is damaged, we might induce acute ischemia.

### When traditional distal targets are no longer viable, what advanced techniques do you consider, and how do you determine which one to pursue first?

**Dr. Migliara:** These patients are considered no option for the standard open or endovascular arterial revascularization, and thus my first choice is DVA, as data

from the literature note a limb salvage rate > 75% at 1 year.<sup>2,3</sup> However, there are important considerations before performing DVA: (1) the general condition and life expectancy of the patient; (2) local conditions of the foot, because, due to the time required to perform DVA effectively, the wound has to be stable; (3) anatomic limitations on creating DVA; and (4) thorough discussion with the patient and his/her family about worsening of the foot during the initial postprocedure period and the longer healing time required compared to traditional arterial revascularization.

**Dr. Bryce:** I first reassess whether any vessel can provide meaningful flow, even if it is not ideal. If there is truly no arterial target, I consider if a patient may benefit from advanced options such as DVA.

Sometimes, however, the distal targets are not clearly visualized, but that does not mean they are not there. I have found that some pedal vessels are essentially “hibernating” or poorly filled and can become apparent once accessed directly through a retrograde approach.

**Dr. Choke:** This is a challenging but common scenario that requires careful consideration of the existing options and judicious selection of the different available techniques. The choice of which technique to pursue first takes safety into account, always bearing in mind maintenance of baseline vascularity. This is personalized for each patient and is usually based on the BTA angiograms and wound severity. The key questions to consider include:

- **Is a pedal plantar loop approach feasible and safe?**

This option is available if the “opposite” BTA arteries are available for wire access. If the wire can access the dorsalis pedis (DP) artery, then it is possible to cross the plantar arch into the lateral plantar artery (LPA) to treat PT artery CTOs. Conversely, if the wire can access the LPA, then it is possible to cross the plantar arch into the DP artery to revascularize AT artery CTOs. Usually both AT/DP artery systems and PT/LP artery systems are diseased or occluded. The approach is to tackle the “easier” system in antegrade fashion to get into the “harder” system in bidirectional retrograde fashion. My usual workhorse wire for the above approach is a 0.014-inch wire (Hi-Torque Command ES [Abbott] or Gladius [Asahi Intecc Co. Ltd.]) as first choice, supported by a 2.6-F CXI microcatheter (sometimes a V-18 wire is used).

Not infrequently, there is a challenging situation where both the AT/DP and PT/LPA are equally occluded with no proximal AT or PT artery stumps to engage in either system. Before making the call that this is a “desert foot,” there is one additional

technique to be attempted. In this situation, retrograde puncture of the CTO becomes necessary, and a staged crossing technique is used. I will usually attempt retrograde puncture of the occluded DP to cross the AT artery retrogradely into the popliteal artery in order to identify the proximal AT artery entry. From here, I will know where to enter the AT artery stump from the antegrade fashion. This will then allow antegrade crossing into the DP, plantar arch, and retrogradely in the pedal plantar loop technique into the PTA/LPA system. In such poor outflow scenarios, pedal plantar loop crossing is necessary to achieve adequate outflows.

Conversely, one can also do the opposite and do retrograde puncture of the occluded PT or common plantar artery to cross the PT artery retrogradely into the popliteal artery to identify the proximal PTA entry. From here, we can enter the PT artery stump from the antegrade fashion to cross into the LPA, plantar arch, and retrogradely in the pedal plantar loop technique into the AT/DP arteries.

- **Are there collateral vessels feeding into BTA**

**arteries?** If there are collateral vessels feeding into the pedal arteries, they are usually from the peroneal artery. Transcollateral crossing can be utilized in such cases to improve the perfusion into either the DP or LPA systems, where traditional distal targets are not viable.

In the case where the above have failed and there are truly no viable distal targets, then I will consider DVA. In my opinion, this is a rare occurrence and the advanced techniques noted previously are usually adequate to improve vascularity.

**Dr. Holden:** In situations where the usual distal targets for retrograde access are not available, there are two options. The first is to attempt crossing antegrade using dedicated intraluminal crossing devices. As mentioned previously, my experience with these devices has been mixed, but one device I have used with success is the BeBack device. The nitinol needle in this device can be partially advanced to remain intraluminal or fully advanced for reentry. The second option is to consider more complex retrograde solutions—very distal targets such as the plantar or metatarsal arteries or direct puncture of the CTO.

### **When bailout leads toward extensive stenting, how do you balance limb salvage versus long-term durability?**

**Dr. Holden:** Extensive stenting in complex revascularization cases is usually required to prevent acute patency

loss due to dissection or recoil. This is obviously important in CLTI to facilitate wound healing. These patients need to have antiplatelet or anticoagulation therapy optimized, regular duplex ultrasound surveillance, and a low threshold for endovascular reintervention.

**Dr. Migliara:** When stenting is used as a bailout, long-term outcomes usually are worse than when stenting is used as a first choice. However, sometimes bailout stenting is the only possibility to maintain a patent artery. In these cases, my suggestion is to cover as little artery as possible and to respect all landing zones for an eventual secondary bypass.

**Dr. Bryce:** Limb salvage is the priority, but I try not to create a solution that will fail quickly or limit future options. I am cautious with extensive stenting, especially in tibial vessels. In patients with limited life expectancy, immediate flow may take priority. In others, I try to preserve future options, including bypass.

In my cancer patients, this balance often shifts. Chemotherapy can accelerate underlying PAD, and CLTI can progress very quickly, with ongoing vascular insult during treatment. In these patients, achieving immediate perfusion becomes critical, even if long-term durability is less certain.

**Dr. Choke:** In my practice, stenting is used in about 15% of femoropopliteal lesions and 5% of BTK lesions (where stenting is used only in proximal tibial arteries). I generally prefer to “leave nothing behind” and use antirestenotic therapy with a sirolimus-coated balloon (MagicTouch PTA, Concept Medical).

Stenting is used in cases of flow-limiting dissections, where a scaffold is needed. The premise is to use stents only in areas needed, and intravascular ultrasound can help to determine this. Judicious use of stenting is important to prevent jailing and losing the important collateral branches. If collateral branches are sacrificed and the stents become occluded, the patient can present with worsening ischemia compared to the index presentation, a highly undesirable situation with worse prognosis for limb salvage.

If extensive stenting is required to achieve flow, then there is no choice and this is the only solution to achieve limb salvage. The patient’s wound needs to be monitored in an experienced wound clinic, usually for about 2 to 6 months until the wound is completely healed. During this time, if there is clinical suspicion of stent thrombosis/occlusion, this needs to be confirmed, and the patient needs to undergo reintervention to recanalize the occluded stents. This usually requires the

use of thrombolysis/thrombectomy devices for acute occlusions or atherectomy devices in combination with antirestenotic therapy for CTOs.

### What are your “hard stop” criteria in a complex CLTI CTO case?

**Dr. Choke:** Sometimes it is prudent to stop a difficult procedure and come back for a second attempt, which can often result in success. My hard stop criteria in complex CLTI CTO case are:

- If concerns for patient safety start to arise during the case, such as changes in vital signs or electrocardiographic changes
- In cases where local anesthesia is used, if patients complain of discomfort and are unable or do not wish to continue with the procedure
- I exhaust all available techniques and guidewire crossing remains unsuccessful (earlier stop if bypass is an option)
- Large amounts of contrast are used, especially if patients are elderly or have chronic kidney disease

**Dr. Migliara:** The main criteria to stop is based on the clinical presentation of the patient. In a claudicant patient (a condition not related to major amputation), when the antegrade crossing fails and the retrograde approach is not easy, I avoid it.

Of course, in CLTI patients, particularly those with extensive and progressive foot wounds and in whom there is a high risk of major amputation, I’m more aggressive, using bidirectional accesses, guidewires and support catheter escalation, and advanced techniques, such as the PIERCE, inner PIERCE, and BADFORM (balloon deployment using forcible manner) techniques, to try to cross the lesion. I also try also to respect the landing zones as much as possible for an eventual secondary bypass.

**Dr. Holden:** There are both lesion- and patient-specific reasons to stop attempts at revascularization. The main lesion-specific reason is when successful guidewire crossing has not been achieved. Patient-specific reasons include poor patient tolerance, issues with contrast, and prolonged radiation exposure due to a lengthier procedure. Often these procedures may need to be staged and require general anesthetic support.

**Dr. Bryce:** I stop when I am no longer helping the patient. Loss of a key runoff vessel, inability to identify a distal target, worsening complications, or excessive procedure time without progress are all reasons to stop. I also stop if continuing would compromise future treatment options.

### What outcome data or real-world results have most influenced how you approach bailout decisions today?

**Dr. Bryce:** The biggest shift has been toward a limb-based, patient-centered approach. Success is not just technical—it is wound healing and limb salvage.

**Dr. Migliara:** In my daily practice, the extensive and quick use (not more than 5-10 minutes in antegrade) of the retrograde approach as a bailout if antegrade crossing fails is based on data showing a significant increase in the ability to cross complex CTOs with the retrograde or bidirectional approach and the very low rate of complications, as well as the ability to puncture every artery in retrograde, with a high success rate and reduced procedure time.

**Dr. Choke:** Studies on the pedal plantar loop technique by Manzi et al and retrograde tibioperoneal access by Schmidt et al have influenced me most.<sup>4,5</sup> To treat CLTI patients effectively, one has to be at the very least familiar with both of these techniques. If one can master these techniques, the vast majority of complex CTOs can be treated successfully, and the interventionalist will understand how far to push the boundaries without jeopardizing outcomes, and importantly, have the skills to bail oneself out of complications such as worsening vascularity as a result of aggressive attempts.

**Dr. Holden:** There is a paucity of prospective randomized data investigating the timing and best bailout approach in lower limb arterial intervention. However, there are many single-arm studies reporting the safety and efficacy of both retrograde access and reentry devices. ■

1. Haraguchi T, Tsujimoto M, Leung RW, et al. FRAP-CROSS technique: frackng and rendezvous-PIERCE for intracalcium crossing in femoropopliteal diffuse calcified occlusions. *CVIR Endovasc*. 2025;8:103. doi: 10.1186/s42155-025-00626-y
2. Roustazadeh R, Gombert A, Krabbe J, et al. Short-term outcomes and efficacy of percutaneous deep vein arterialization for no-option critical limb ischemia: a systematic review and meta-analysis. *Biomedicines*. 2024;12:318. doi: 10.3390/biomedicines12020318
3. Ucci A, Perini P, Freyre A, et al. Endovascular and surgical venous arterialization for no-option patients with chronic limb-threatening ischemia: a systematic review and meta-analysis. *J Endovasc Ther*. 2025;32:1301-1316. doi: 10.1177/15266028231210220
4. Manzi M, Fusaro M, Ceccacci T, et al. Clinical results of below-the knee intervention using pedal-plantar loop technique for the revascularization of foot arteries. *J Cardiovasc Surg (Torino)*. 2009;50:331-337.
5. Schmidt A, Bausback Y, Piorkowski M, et al. Retrograde tibioperoneal access for complex infrainguinal occlusions: short- and long-term outcomes of 554 endovascular interventions. *JACC Cardiovasc Interv*. 2019;12:1714-1726. doi: 10.1016/j.jcin.2019.06.048

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