Supracondylar fractures of the humerus are common fractures in children, accounting for up to 70% of all pediatric elbow fractures. Neurovascular injury complications are not uncommon due to the adjoining nerves and vascular structures to the joint. Vascular complications could range from 3.2% to 14.3%.

Vascular and orthopedic surgeons encounter three scenarios with patient’s post-supracondylar fracture reduction and fixation. The first scenario is a patient who presents with a pulseless limb, in which the pulse returns post-fracture reduction and fixation; however, the hand is well perfused and warm. The second scenario is a patient who presents with a persistent absence of the pulse, regardless of the hand status, well-perfused or not. In the third scenario, the hand is showing signs of acute ischemia such as coldness, duskeness and poor capillary refilling time.

We did not encounter a certain protocol in managing such a condition with universal agreement. Some authors have advocated observation for 24 hours post-reduction and fixation and then re-evaluate as a treatment of choice. On the other hand, others have advocated early intervention once the pulse is absent, regardless of the hand status, well-perfused or not.

Blakey et al recommended urgent exploration of the brachial artery in a child with a ‘pink pulseless hand’, not relieved by reduction of a supracondylar fracture. He claims that early recognition of an ischemic injury is a matter of utmost importance for an optimal outcome as reversibility of any ischemic damage is related inversely to the duration of ischemia. White et al showed that majority of perfused, pulseless limbs following supracondylar humeral fractures have a vascular injury. He advised aggressive vascular evaluation and vascular exploration even if the hand appears pink and warm. Furthermore, patency rates for revascularization procedures appear sufficiently high, making this intervention worthwhile.

Immediate surgical exploration was advocated because of concern for long-term cold intolerance, exercise-induced ischemia, brachial artery thrombus with potential propagation, limb contracture and limb loss. On the other hand, Pirone et al proposed a “watch and wait” approach with careful observation and regular assessment of neurovascular status; they concluded that “persistent absence of radial pulse, but with good distal perfusion justifies an expectant treatment approach.”

In a study by Choi et al, 24 of 33 patients with a well perfused but pulseless hand, the fractures were reduced and stabilized and the hand remained perfused through the observation period. Authors advocate that the pulseless hand is most likely due to brachial arterial spasm or a brachial artery injury with distal perfusion maintained by rich collateral circulation at the elbow. Soh et al also agreed on expectant treatment, provided that the pulse oximetry shows O₂ saturation of more than 99% with good wave pulse. He proposed a treatment algorithm using the pulse oximeter for children with supracondylar humerus fractures.
fractures presenting with an absent pulse; he proposed to explore the patient when there is an absence of good waveforms in the pulse oximetry, see figure 2 (A and B). Careful monitoring post-reduction for 24-48 hours is mandatory. Exploration of the brachial artery is indicated if the hand perfusion deteriorates, the pain intensity increases and there are signs of neurological deteriorating. Until now, there are no local or regional studies to resolve this issue.

In our institution, the vascular surgeons would explore the brachial artery instantly if the pulse did not return immediately after fracture reduction and fixation, even in a well perfused warm hand. Nevertheless, after a series of observations, this practice has been modified, as most of the explorations were negative for any vascular injury as well as the return of the pulse within 24 hours.

Accordingly, we proposed the following protocol, see figure 2. In the protocol, we favor watchful policy for a pulseless limb but well-perfused, provided O2 saturation is above 95% with good waveform pulse. Nevertheless, we advise immediate exploration if the hand is showing signs of acute ischemia. Further research should be performed for these cases to reach an evidence-based conclusion. This protocol and algorithm of management should be tested by a well-designed study.

REFERENCES