

PERSPECTIVE **HAND**

Digital ischaemia after adrenaline-based digital nerve block: update since 1998 publication

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Keywords: fingers, ischemia, vasculitis

Submitted: 27 November 2022 AEST Accepted: 29 January 2023 AEST

DOI: 10.34239/ajops.v6n2.87778

Australasian Journal of Plastic Surgery

Vol 6, Issue 2, 2023

In 1998 I co-authored the landmark prospective study on the safety and usefulness of using adrenaline in digital nerve blocks (ADNB).¹ Since then many more studies and reviews have supported this application.^{2,3}

Adrenaline quadruples the duration of lignocaine anaesthesia, markedly prolongs post operative analgesia, and reduces intra and postoperative bleeding. I use a combination of two per cent lignocaine with 1:80,000 adrenaline. A conservative estimate would be at least 5000 ADNB cases done over 24 years by myself. I had never recorded a case of digital necrosis, until recently.

A 65-year-old male, with no significant past medical history presented for removal of a foreign body in his index fingertip. A finger tourniquet was also applied. Postoperatively, circulation was slow to return but was doing so. Hence the wound was dressed with the terminal tip showing and the patient was instructed in post-operative care. He contacted me 24 hours later complaining of finger pain and discolouration. I found the digit to be ischaemic. The patient said he had not contacted me earlier because lately his fingers often became pale and cold, so he thought this episode as not significant. Phentolamine was injected to reverse the vasospasm. Digital circulation was partly improved but it was too late to save the distal half of the terminal phalanx, which was later terminalised. Subsequent investigations revealed that both ulnar arteries at the wrist were occluded but the serology results were unremarkable. The cause of his vasculitis remains unknown.

Neither the consulted vascular surgeon nor the rheumatologist was able to diagnose the condition. Therefore, he had unrecognised, severe, secondary Raynaud's.

Lalonde and colleagues' prospective multicentre study of WALANT anaesthesia (wide awake local anaesthesia without tourniquet) in 3110 cases had no ischaemia complications.⁴ WALANT technique uses adrenaline with the anaesthetic agent. Rougereau and colleagues performed a systematic medico-legal review of WALANT ischaemic complications for all types of hand surgery for France between 2007 and 2020 (population of 67 million people over 13 years, but the number of actual WALANT cases preformed during this period is unknown). They found only three reported cases, over thirteen years.⁵ This suggests that it is a very uncommon complication.

There have been sporadic reports of digital necrosis after using adrenaline-based anaesthetics even as proximally as for carpal tunnel release.^{6,7} These authors cautioned regarding unknown underlying vascular disorders and the need to be able to perform phentolamine rescue if the ischemia does not spontaneously reverse.

Raynaud's incidence is 2:100 of the general population; most cases are mild.⁸ Since our original publication in 1998,¹ ADNB has become increasing popular world-wide.¹ I had also become confident of its efficacy and safety. I used it on all patients, including those with some degree of Raynaud's. Admittedly they were slower to recover circulation, but all did, and none required phentolamine rescue

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nor had any ischemic damage. In our original paper we found on duplex ultrasound studies that the digital arteries did indeed significantly vasoconstrict in response to the injected adrenaline, but all investigated cases fully recovered by one-hour post-injection. However, patients with undiagnosed vasculitis are at some risk of non-reversing vasospasm and thrombosis. Presumably during vasospasm, the inflamed thickened intima adheres to itself and permits the formation of thrombus, thereby permanently occluding digital artery flow, unless reversed by phentolamine rescue, within 'warm ischemia' time limits.

Due to my many years of trouble-free use of ADNBS, the above complication took me by surprise. A digital tourniquet was used, but I cannot say if this would have been enough to cause the digital ischaemia even if the ADNBS was not used. Presuming that the adrenaline was a significant stand-alone factor in the subsequent digital ischaemia, this indicates that there is risk of digital ischaemic necrosis with ADNBS of approximately 1:5000 unselected digital surgery cases. Presumably the rate would approach zero if cases with severe Raynaud's were able to be excluded.

Therefore, to further reduce the risk of future ischaemic necrosis events, I now ask a simple pre-injection screening question; 'Do you get any recurring episodes of cold, pale finger-tips?'. If they respond 'yes', then they get plain lignocaine or bupivacaine.

After 24 years and over 5000 cases of using ADNBS, I remain convinced of their usefulness and efficacy. However undiagnosed vascular disorders introduce a risk of digital ischaemia. As the result of the above case, the risk can now be quantified as approximately 1:5000 cases, personal series. When unexpectedly encountered, early intervention with locally injected phentolamine rescue is recommended.

Conflict of interest

The authors have no conflicts of interest to disclose.

Funding declaration

The authors received no financial support for the research, authorship, and/or publication of this article.

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