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Clinical Review

SAFETY OF EPINEPHRINE IN DIGITAL NERVE BLOCKS: A LITERATURE REVIEW

Jonathan Ilicki, MD, MSc

Department of Emergency Medicine, Karolinska University Hospital, Solna, Stockholm, Sweden

Reprint Address: Jonathan Ilicki, MD, MSc, Department of Emergency Medicine, Karolinska University Hospital, 17176 Solna, Stockholm, Sweden

□ Abstract—Background: Digital nerve blocks are commonly performed in emergency departments. Health care practitioners are often taught to avoid performing blocks with epinephrine due to a risk of digital necrosis. **Objective:** To review the literature on the safety of epinephrine 1:100,000–200,000 (5–10 µg/mL) with local anesthetics in digital nerve blocks in healthy patients and in patients with risk for poor peripheral circulation. **Methods:** PubMed, Web of Science, and the Cochrane Library were searched in June 2014 using the query “digital block AND epinephrine OR digital block AND adrenaline”. The searches were performed without any limits. **Results:** Sixty-three articles were identified, and 39 of these were found to be relevant. These include nine reviews, 12 randomized control trials, and 18 other articles. Most studies excluded patients with risk for poor peripheral circulation. Two studies described using epinephrine on patients with vascular comorbidities. No study reported digital necrosis or gangrene attributable to epinephrine, either in healthy patients or in patients with risk for poor peripheral circulation. In total, at least 2797 digital nerve blocks with epinephrine have been performed without any complications. **Conclusions:** Epinephrine 1:100,000–200,000 (5–10 µg/mL) is safe to use in digital nerve blocks in healthy patients. Physiological studies show epinephrine-induced vasoconstriction to be transient. There are no reported cases of epinephrine-induced harm to patients with risk for poor peripheral circulation despite a theoretical risk of harmful epinephrine-induced vasoconstriction. A lack of reported complications suggests that the risk of epinephrine-induced vasoconstriction to digits may be overstated. © 2015 Elsevier Inc.

□ Keywords—digital nerve blocks; digital blocks; analgesia; epinephrine; adrenaline; digital trauma

INTRODUCTION

Patients often present to the emergency department (ED) with injured digits and require digital nerve blocks (DNB). Health care practitioners are taught to never use epinephrine in a DNB due to the risk of excessive vasoconstriction causing digital ischemia and necrosis. Some studies defend the use of epinephrine but state that epinephrine should be used cautiously in patients with preexisting peripheral vascular diseases (PVD) (1–7). Because epinephrine can improve a DNB by accelerating anesthetic onset and prolonging analgesia, it is important to determine its safety profile (7–9).

This literature review proposes to answer two questions: 1) Is local anesthetic with epinephrine 1:100,000–200,000 (5–10 µg/mL) safe for DNB in a patient without vascular diseases? 2) Is local anesthetic with epinephrine 1:100,000–200,000 (5–10 µg/mL) safe for DNB in patients with risk for poor peripheral circulation?

METHOD

A search of the medical literature was performed via PubMed, Web of Science, and the Cochrane Library in June 2014. The query “digital block AND epinephrine

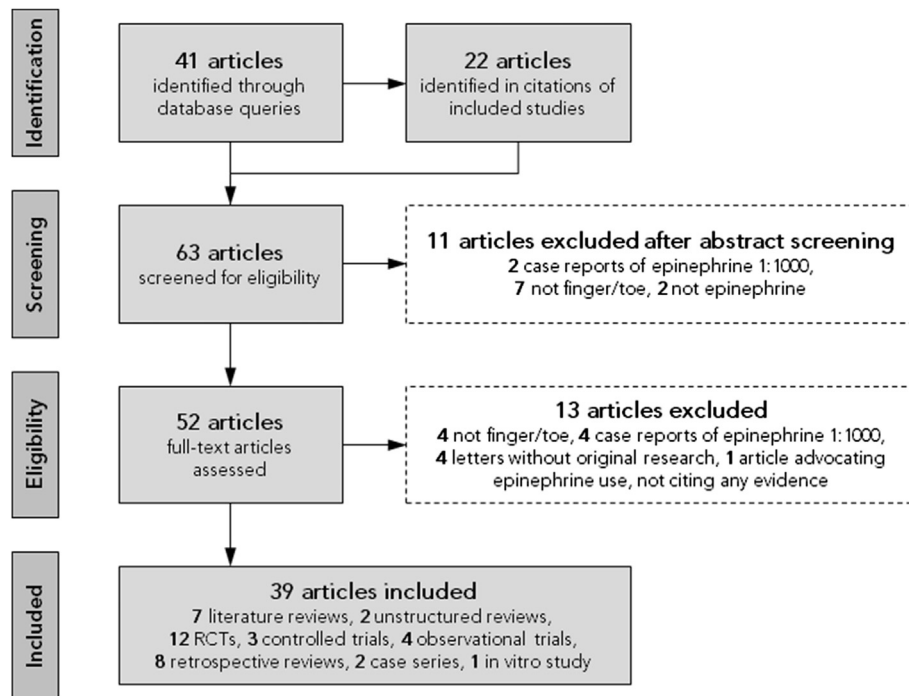


Figure 1. Flow diagram of search and selection process. RCT = randomized controlled trial.

OR digital block AND adrenaline” was used and the searches were performed without any limits. The search process is described in Figure 1. The search strategy was intentionally broad to minimize the chance of missing a relevant study.

Articles were included if they examined the use of epinephrine (regardless of concentration) in either a DNB or as local infiltration in either fingers or toes. Case reports pertaining to harm after DNB were included. For brevity, single case reports of accidental epinephrine 1:1000 auto-injection were excluded, whereas reviews on the same topic were included. Letters not containing any original research were excluded.

All included studies were first screened based upon their abstracts. Articles deemed relevant were then reviewed in full. Finally, citations in all retrieved articles were examined to identify potentially relevant studies missed in the first database search.

RESULTS

The search strategy yielded 41 articles after duplicates were removed. Citations in all retrieved articles were examined and 22 additional articles of interest were identified. Of the 63 identified articles, 24 were excluded and the remaining 39 articles are included in this review. The studies included in this review are described in Tables 1–5 (1–38). All trials including objective physiological measurements (such as measuring digital blood flow with Doppler or measuring capillary blood gas) can be

found in Table 1. The remaining studies are grouped in Tables 2–5 according to study type.

DISCUSSION

The retrieved articles will be discussed according to the three ways in which they address the safety of using epinephrine. First, some articles review early 20th century case reports, which created the idea that epinephrine is dangerous to use in DNBs. Second, some studies investigated the safety of epinephrine in DNBs in healthy individuals. Third, some studies address whether epinephrine can be used in DNBs in individuals with risk for poor peripheral circulation.

Origins of the Idea that Epinephrine is Dangerous to Use in DNBs

Digital blocks were first performed in the late 19th century. Fifty case reports were published between 1889 and 1948 describing finger necrosis and gangrene after a digital block (32). Only 21 of these 50 cases reported epinephrine use. In each case, later reviews identified other more plausible causative agents for the necrosis than the use of epinephrine (4,30,32). Putative causative agents include concurrent infection, hot soaks, tourniquets, and older local anesthetics (cocaine and procaine), which by themselves can cause digital infarction. Moreover, the epinephrine concentration was unknown in 17 of the 21 cases mentioned above as epinephrine often was diluted

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