Digital Epi - Fingers Don't Fall Off!

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Background

The established dogma in medical education is that digital administration of epinephrine leads to devastating necrosis and possible amputation of the digit. This can be traced back in the literature to 48 cases prior to 1950 where epinephrine was likely wrongly implicated as the cause of digital gangrene. Prior to 1950, procainamide was essentially the sole anesthetic agent. Unfortunately, procainamide becomes highly acidic as it ages, and it is now suspected that this acidity was more likely the cause of tissue necrosis than the use of epinephrine.[1] To date, there have been no reported cases of tissue necrosis from commercially prepared lidocaine and epinephrine when used for digital blocks.[2]

Since the 1980s, patients with a history of anaphylaxis have been prescribed epinephrine in the form of epinephrine auto-injectors which can be self-administered during anaphylactic reactions. The auto-injector is sometimes held upside down when administered during an emergency situation and the individual receives an epinephrine injection in the thumb as opposed to the thigh. This is estimated to occur in 1 of every 50,000 injections.[3] Auto-injectors administer 0.3 mg (adult) or 0.15 mg (pediatric) of epinephrine per dose. For comparison, one mL of commercially prepared 1% lidocaine with epinephrine contains only 0.01 mg of epinephrine. A 30 mL digital block would be required to deliver the same concentration as an adult epinephrine auto-injector. The authors of Six Years of Epinephrine Digital Injections: Absence of Significant Local or Systemic Effects were curious about the outcomes of accidental digital epinephrine auto-injections and reviewed several years of poison control center data for evidence of adverse effects.[4]

Methods

Unfortunately (or fortunately for the authors of this study), the accidental injection of epinephrine into a digit with an epinephrine auto-injector during an anaphylactic reaction is a relatively common occurrence. This study was a retrospective analysis of all cases of digital auto-injections reported to the six Texas Poison Centers from 2000 to 2005. All calls are reported to the national poison center database using the nationally standardized data collection form. This study included accidental injections of both the adult (0.3 mg) and pediatric (0.15 mg) strengths of the auto-injector.

A chart review was done of the cases identified by the database search. Signs, symptoms, treatments, and outcomes were extracted. Outcomes were differentiated as "no effect," "minor," "moderate," "major," and "death," using the National Poison Data System outcome criteria. The primary outcome measure used was the incidence
of ischemia. All charts were reviewed and data extracted by 2 trained abstractors. Discrepancies in categorizations were reviewed by 2 study authors for decision.

**Results**

There were 365 reported hand epinephrine injections, with 213 involving a digit, and 127 with complete follow-up information. Of the 127 cases reviewed, all had complete resolution of their symptoms. Sixty-eight (54%) weren’t even seen in a health care facility. No effects were reported in 10%, minor effects in 77%, moderate effects in 13%, and major effects in 1 case (0.79%). The case with noted major effects was discharged home from the health care facility with complete resolution of symptoms and no systemic effects. There were no reported admissions, hand surgery consultations, significant systemic effects, or vascular related complications.

Intervention was documented in 29 of the 127 cases (23%). Treatment breakdown was as follows: 19 patients had topical nitroglycerin paste, 7 had local phentolamine injection, 2 had both nitroglycerine paste and phentolamine injection, and 1 had a local terbutaline injection. Forty of the 127 patients had warm soaks alone as their treatment. Again, all patients regardless of the type of treatment or lack of treatment had complete resolution of symptoms.

Of the 127 cases reviewed, only 4 were reported to have signs of ischemia. All of these received either phentolamine, nitroglycerine paste, or both. Two of the four had resolution of symptoms within 2 hours and the other 2 were reported to have complete resolution within 24 hours. Kappa for the 2 abstractors for "complete resolution of symptoms" was 0.82, 0.79 for "ischemia" and 1.0 for "treatment used."

The study was limited by its design as a retrospective analysis. As the source for cases was limited to the Texas Poison Center database, cases in which the poison center was not contacted were not included. The comorbidity of previously diagnosed vascular disease was listed as a data collection variable but it was not discussed as to whether or not these conditions impacted any patients in their study.

**Relevance to Emergency Medicine**

In this article Muck, et al, took an ingenious approach to further debunk the myth about the use of epinephrine injections in the digits. They demonstrated that epinephrine injected into the digit, even at higher concentrations than normally used for local anesthetics, does not cause necrosis or other long term complications. For those patients with an accidental epinephrine injection from an auto-injector, it is reasonable to observe the patient. If they experience persistent or worsening pain, or decreased capillary refill lasting greater than 2 hours, medical intervention should be considered. From this article, as well as others, it should be taught that the use commercially prepared local anesthetics with epinephrine in the digits of healthy individuals without vascular comorbidities can be done safely and without the risk of long term complications.

**References**

