Case Report

An accidental intra-arterial injection of phenytoin in a 43-year-old woman

ABSTRACT
We report an accidental intra-arterial injection of phenytoin in a 43-year-old woman undergoing ventriculoperitoneal shunt for hydrocephalus. To flush the arterial line with heparin, mistakenly phenytoin was injected which caused cutaneous gangrene along the radial side of the forearm and an absence of pulsation in the radial artery. After flushing the artery with normal saline and lidocaine, the patient was transferred to the Intensive Care Unit. There the patient was put on intravenous heparin that resolved the problem leading to complete recovery of the patient. The case is being reported to emphasize the importance of close surveillance in injecting drugs through the arterial line access.

Key words: Accidental, injection, intra-arterial, phenytoin

Introduction
Craniotomies, especially supratentorial ones are associated with a high-risk of subsequent seizure. About 20-50% of the patients have at least one seizure postoperatively,[1,2] which mandated a prophylactic dose of phenytoin in this particular case. Mistakenly phenytoin was injected into the radial artery to flush the arterial line, on the erroneous assumption that it was heparin. Intra-arterial injection of phenytoin has been reported in the literature, leading to gangrene, and amputation of the digits.[3]

Case Report
A 43-year-old woman with raised intracranial pressure was scheduled to undergo ventriculoperitoneal shunt under general anesthesia. After induction of anesthesia, a 16G cannula was inserted into the radial artery and fixed for invasive blood pressure monitoring. The anesthesia staff inadvertently injected 4 ml of phenytoin sodium solution (200 mg) instead of heparin to flush the arterial line access during surgery. After injection, the erratum was immediately recognized, and the arterial line was flushed with 20 ml of normal saline and 0.5% lidocaine. The arterial line was maintained until the patient recovered after general anesthesia and later on unplugged. Fifteen minutes after injection of phenytoin, a red discoloration of the thenar eminence, thumb, index finger, and radial side of the forearm appeared [Figure 1] along with the absence of a pulse at the radial artery. However, the pulse oximetry continued to give correct readings. Suspecting an evolving gangrene of the forearm, we started a therapeutic dose of intravenous heparin (80 unit/kg bolus and then 18 unit/kg/h as an infusion to reach an intended INR of 2-3).[4]
A color Doppler scan of the left forearm was done on day 2 of surgery, revealing thrombosis of the radial artery with a compensatory increase in flow in the ulnar division. Suspecting compartment syndrome, we tried to warm up the affected region with hot towels and placing the hand in an elevated position so as to improve drainage of the affected forearm that was showing signs of increased girth measured with a tape. Nonsteroidal anti-inflammatory drugs were also given as the patient complained of excruciating pain, in the entire forearm.

The discoloration did further increase in extent but from 5th day onward, the color of the affected region showed a marked improvement [Figure 2]. We also started low molecular weight heparin (LMWH) (enoxaparin) despite the fact that the patient was receiving heparin until the 7th day (1 mg/kg subcutaneously every 12 h). A color Doppler scan was done before discharge that showed resolution of the thrombus along with an improved perfusion in the thenar aspect of the forearm. On day 14, the LMWH was stopped.

An opinion was taken from the vascular surgeon who suggested no further active intervention. After 3 weeks follow-up, the woman showed good recovery and all the complaints were resolved.

Discussion

Phenytoin is an anti-epileptic used for seizure control both during an emergency and intraoperatively. Being very alkaline, extravasation of phenytoin can lead to severe phlebitis and thrombosis. It may also lead to fatal cardiac arrhythmias. Sintenie et al. have described a case similar to that of ours which led to digital gangrene and amputation. Phenytoin extravasation may lead to purple glove syndrome.

In hand, the presence of deep palmar arch being fed dually by the radial and ulnar arteries serve as a protective factor, and thrombosis of any one of the arteries and a reduction of flow in one, is compensated by the other one which limits damage, as occurred in our case. In this case, a continuity of flow in the ulnar artery and for that matter in the deep palmar arch provided adequate protection in terms of enough collateral flow which established blood flow and thus saved the patient to encounter an irreversible vascular damage.

A maximum provision in terms of both supportive and therapeutic treatment is a need during an accidental intra-arterial drug injection. Drugs such as hyaluronidase and nitroglycerine have been successfully used after phenytoin extravasation.

Percutaneous catheter-directed thrombolytic infusion has been shown to be effective in the treatment of patients with severe ischemic hand symptoms secondary to thrombosis following radial artery cannulation.

In our case, heparin followed by LMWH was given to reduce the damage. The thrombosis showed a substantial reduction in size on the 5th day and by the day 14, it had resolved completely. On follow-up 3 weeks later, the patient showed full cosmetic and functional recovery.

Conclusion

We would like to emphasize that the danger of an injection into the artery always lurks, and all precautions should be made that this territory remains forbidden for injections except those that are needed, such as heparin. An Allen test should routinely be performed before cannulating the radial artery to provide us a clue that the ulnar artery is fully patent. Patency of the ulnar artery in this particular case was the pivotal point in saving the patient from an onslaught of full-blown gangrene and amputation of the affected digits. However, in case of accidental drug injection, prompt measures should be taken, and a surgical consultation sought in case a compartment syndrome is suspected or is in the offing.

Figure 1: A red discoloration of the thenar eminence, thumb, index finger, and radial side of the forearm

Figure 2: A marked improvement of the affected region
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Conflicts of interest
There are no conflicts of interest.

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