

## Inadvertent intra-arterial phenytoin

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A 55 year old male, operated for a frontal glioma presented in the post operative recovery unit with acute pain and bluish purple discoloration of right hand due to administration of intra-arterial injection of phenytoin in the premedication room 1 hour prior to surgery. The patient was kept on conservative management but ultimately developed gangrene of the limb for which amputation had to be undertaken.

**Keywords:** phenytoin; gangrene; intra-arterial injection; inadvertent; complications

### Introduction

Phenytoin is a broad spectrum anticonvulsant used for seizure control both during emergency and as an oral drug. The parenteral form of phenytoin has a pH of 12. Inadvertent arterial injection has been reported to cause gangrene and acute limb ischemia.<sup>1</sup> Here we present an operated case of frontal glioma where intra-arterial phenytoin was accidentally injected into right radial artery preoperatively, leading to gangrene of right hand.

### Case report

A 55 yr old male with frontal glioma after craniotomy was shifted to recovery room for observation. There was no complication during the intraoperative period and the patient was extubated smoothly. His medical history was significant for seizures for which he was on tablet phenytoin 300 mg single night dose daily. On the day of surgery he received phenytoin undiluted 100 mg and dexamethasone 8 mg in the premedication room 1 hour prior to surgery through 22g peripheral venous cannula on the volar aspect of right forearm adjoining the hand (Figure 1). As soon as phenytoin 2ml bolus was given patient complained of pain and retracted his hand. Thereafter cannula was flushed with saline. After surgery the patient was completely reversed from anaesthesia. He was shifted to recovery room in a totally conscious state with stable vitals and was provided adequate analgesia. After a few minutes patient complained of severe pain in right hand. On examination the right hand was bluish purple in colour along the

radial side of the hand in thumb and index finger. The hand was oedematous without blistering. Muscle power was 5/5. The radial pulse was feeble in comparison to the left hand. There was no sensory loss. Saturation was 87% on index finger. Saturation on index finger of opposite hand was 98%. A possibility of intra-arterial phenytoin injection was thought of. A colour Doppler scan of the right forearm revealed thrombosis of right radial artery with absent pulsations. The patient was given supportive care. Heparin gel was applied locally. Vascular surgeon was consulted and low molecular weight heparin was started but after 48 hours patient had numbness in fingers and discolouration gradually increased. After one week there was complete gangrene of the radial side of the right hand for which complete amputation of thumb and index finger had to be undertaken.

### Discussion

One of the potentially serious complications of administering intravenous medication is the inadvertent injection into an artery. Inadvertent intra-arterial phenytoin injection is a rare but serious cause of acute limb ischemia.<sup>1</sup>

The parenteral form of phenytoin has a pH of 12 and is dissolved in 40% propylene glycol and 10% ethanol. Due to alkaline nature of phenytoin its arterial injection can lead to severe complications including gangrene of the limb. Intra-arterial phenytoin causes thrombosis in arterioles and capillaries that cause distal ischemia.<sup>1</sup>



Most cases of accidental intra-arterial cannulation involve radial artery branches of the forearm and hand and are often due to vascular anomalies. The most common are a high rising radial artery resulting in a superficial branch in the forearm and the ante brachialis superficialis dorsalis artery which crosses underneath the terminal branch of the cephalic vein just superficial to the radial styloid process.<sup>2</sup>The antecubital fossa is also a site for error because of the proximity of the arteries and veins.

An early symptom of intra-arterial injection is discomfort and pain on injection but sometimes inadvertent intra-arterial cannulation and injection may be hard to detect as the signs of cannula misplacement may not be apparent and the drug may inject easily with few local signs. Warning signs include pulsatile flashback cannula, redder than expected blood of flashback, distal signs of ischemia and more painful insertion of cannula.<sup>3</sup>

There is no universally accepted treatment protocol. As thrombosis is ultimately the cause of the tissue injury, anticoagulation with heparin should be considered in an attempt to limit the extent of the ischemia. Management should aim at symptomatic relief, cessation or reversal of arterial spasm, maintaining and/ or reestablishing blood flow to the distal portions of the extremity, treating any sequelae of vascular injury and ischemia and rehabilitation.<sup>2</sup>

Awareness may decrease the likelihood of intra-arterial phenytoin injuries. All the drugs given through intravenous route should be given under supervision. A patent large bore i.v. cannula should be used sited in a large caliber vein followed by infusion of normal saline.

To conclude awareness of risk factors, associated signs and symptoms and available therapeutic modalities is necessary for anyone involved in administering intravenous therapy. Such awareness can decrease the incidence, delays in diagnosis and resulting complications of iatrogenic intra-arterial injections.

## References

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