

# Adverse effect of intraoperative phenylephrine 10%: case report

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**SUMMARY** The case is reported of a patient who suffered severe acute hypertension, cardiac arrhythmia, and myocardial infarction probably as a direct effect of phenylephrine overdose. Instillation of the drops during surgery probably enhanced the systemic absorption of a significant amount of the drug. Therefore it should be used during surgery with caution, especially in elderly patients and those with cardiovascular disease.

Phenylephrine hydrochloride is a commonly used mydriatic agent. While the cardiovascular effect of parenteral phenylephrine is well known, serious complications from its topical use are rare and are believed to be due to an idiosyncratic reaction. This report presents a case of phenylephrine induced systemic side effects due to overdosage.

## Case report

A 57-year-old man had a total retinal detachment in the left eye. He had no known cardiovascular disease. On admission to hospital his blood pressure was 120/80 mmHg. His pulse rate was 80 per minute and the electrocardiogram (ECG) was entirely normal. Phenylephrine 10% and homatropine 2% were instilled in both eyes, one drop each every half hour for two hours. His preoperative blood pressure was recorded as 120/80 mmHg.

Under general anaesthesia the eye was encircled with a silicone strip. During subretinal fluid release the eye became soft and the pupil constricted. Intraoperative phenylephrine 10% was instilled, but four drops were administered inadvertently. Within minutes his blood pressure rose to 260/120 mmHg. The ECG monitor recorded ventricular bigeminy and multifocal ectopic beats.

Intravenous lignocaine 50 mg was given to correct the arrhythmia. The blood pressure dropped gradually to 120/80 mmHg over 30 minutes. Three hours after reversal of anaesthesia he complained of chest pains. The ECG showed widespread T wave

inversion in leads I, II, AVL, and V1 to V6. He was treated as having an acute myocardial infarction. Two days later ST elevation was noted in leads V1 to V4. Serial testing of cardiac enzymes showed a rise in creatinine phosphokinase levels.

Further management was uncomplicated and he recovered eventually. The final diagnosis was that the patient suffered a non-Q-wave anterolateral myocardial infarction which was most probably due to the sudden alpha-sympathetic stimulation intraoperatively.

Prior to this episode he had an uneventful right cataract extraction. His preoperative blood pressure then was 140/90 mmHg. He had topical homatropine 2% and phenylephrine 10%, one drop each every half hour for two hours. No rise of blood pressure was recorded during the entire duration of the operation or in the postoperative period.

## Discussion

Phenylephrine is a sympathomimetic drug which is a powerful alpha-receptor agonist with no beta-receptor activity. Parenteral phenylephrine causes increase in systolic and diastolic blood pressure due to peripheral vasoconstriction. Topical phenylephrine can cause a similar effect because it is absorbed rapidly via the conjunctiva and nasal mucosa.<sup>1</sup> Heath and Geite<sup>2</sup> had shown that topical phenylephrine 10% can increase the blood pressure up to 10 mmHg in 2% of subjects tested. However, a marked acute rise in blood pressure is thought to be an idiosyncratic reaction in a small subpopulation, because reports of such side effects are rare despite

the widespread use of phenylephrine as a mydriatic agent.

This case is different in that the severe reaction was probably due to overdosage rather than hypersensitivity, for the patient had had topical phenylephrine on two previous occasions without any rise in blood pressure. The dose received on this particular occasion was very high. If the average drop size is 0.05 ml, each drop of phenylephrine 10% would contain 5.0 mg. This patient had four drops, which is equivalent to 20 mg. Under anaesthesia, with the eyelids kept apart with a speculum and the conjunctiva opened extensively, a considerable part of the phenylephrine would have been absorbed via the exposed soft tissues. As the accepted safe dose of intravenous phenylephrine is only 1.5 mg, the dose that this patient was exposed to would probably be sufficient to cause a direct effect.

The adverse side effects associated with phenyl-

ephrine are severe acute hypertension, cardiac arrhythmia, myocardial infarction, and subarachnoid haemorrhage.<sup>3</sup> In a review of 33 cases of phenylephrine induced side effects<sup>4</sup> 15 had myocardial infarctions. Their average age was 71 years, and nine had a previous history of cardiovascular disease.

#### References

- 1 Kumar V, Schoenwald RD, Chien DS, Packer AJ, Choi WW. Systemic absorption and cardiovascular effects of phenylephrine eyedrops. *Am J Ophthalmol* 1985; **99**: 180-4.
- 2 Heath P, Geitie CW. Use of phenylephrine hydrochloride (Neosynephrine hydrochloride) in ophthalmology. *Arch Ophthalmol* 1949; **41**: 172.
- 3 McReynolds WU, Havener WH, Henderson IW. Hazards of the use of sympathomimetic drugs in ophthalmology. *Arch Ophthalmol* 1956; **56**: 176.
- 4 Fraunfelder FT, Scafidi AF. Possible adverse effects from topical ocular 10% phenylephrine. *Am J Ophthalmol* 1979; **85**: 447-53.

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