Myocardial Ischaemia Following Cocaine and Adrenaline Exposure in a Child during an Ophthalmological Procedure

Abstract:
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We report a 23-month old girl who presented with bilateral epiphora who underwent bilateral lacrimal probing and syringing, during which a cocaine adrenaline solution was used. Two hours after the procedure she developed acute pulmonary oedema secondary to myocardial ischaemia. The patient was treated with intravenous glyceryltrinitrate and milrinone infusions; cardiac enzymes and left ventricular function normalised over the subsequent 72 hours. Topical administration of cocaine and adrenaline solution may have dangerous systemic cardiac effects and should always be used judiciously.

Introduction
For over a century, cocaine has been used as a topical anaesthetic and vasoconstrictor in otorhinolaryngological procedures. It thereby reduces local bleeding and mucosal swelling making it a useful agent for procedures in confined mucosal spaces. However, systemic absorption of cocaine does occur via the nasal mucosa, at rates which vary considerably between individuals. Adverse reactions are rare but occasional reports of iatrogenic cocaine induced acute coronary syndrome have been documented in the adult literature. Adrenaline is frequently used in conjunction with cocaine to reduce the absorption of cocaine.

Case Report
An otherwise healthy 23-month old girl presented to her local hospital with bilateral epiphora secondary to congenital nasolacrimal duct obstruction. Under general anaesthetic she underwent bilateral lacrimal probing and syringing, during which cotton dental roll dampened with an 4% cocaine and 1 in 1000 adrenaline solution was placed in the nose under the inferior turbinate for approximately twenty minutes. This allowed good endoscopic visibility of the lacrimal probe in the nose. She also had a small volume of the cocaine adrenaline solution injected into the lacrimal sac to anaesthetise the lacrimal sac mucosa. Approximately two hours following the procedure she became agitated, tachycardic and developed acute pulmonary oedema requiring intensive care admission. She demonstrated acute myocardial ischaemia with subtle anterolateral ST segment changes on her electrocardiogram and a markedly elevated troponin T of 161 ng/l. Left ventricular (LV) ejection fraction was reduced at 35%. At 23 hours following development of symptoms, she was urgently transferred to a paediatric cardiology unit given the risk for development of fatal tachyarrhythmias. She was treated with intravenous glyceryltrinitrate and milrinone infusions, diuretics, aspirin and an ACE inhibitor. Her electrocardiogram at this time demonstrated a return to baseline of her ST segments. Her LV fractional shortening on an echocardiogram measured 28% with markedly jeryk relaxlation. Cardiac enzymes and LV function normalised over the subsequent 72 hours. There were no arrhythmias detected. Following thorough local investigation into this adverse clinical incident at the regional hospital, no medication or procedural error was identified. Independent laboratory analysis of the cocaine solution was confirmed at 4%. This child appeared to suffer toxicity from a standard cocaine adrenaline solution that was used in a manner that is widely recognised.

Discussion
This case highlights a serious side effect of topical cocaine administration not previously reported in a child. The systemic absorption of cocaine in this child had a dramatic effect on coronary perfusion and myocardial integrity as evidenced by acute pulmonary oedema, elevated troponin T, abnormal electrocardiogram and reduced left ventricular function on echocardiogram. Although the child recovered fully, such an event may have resulted in a poor outcome, particularly with the risk of reperfusion arrhythmia.

The etiology of cocaine induced cardiac ischaemia is complex and likely multifactorial. Cocaine increases myocardial oxygen demand, but simultaneously decreases supply by inducing coronary arterial vasoconstriction from stimulation of alpha adrenergic receptors and promoting intra-coronary thrombus formation from enhanced platelet aggregation. Epinephrine is often used with cocaine in the context of topical anaesthesia, as its vasoconstrictive qualities further promote haemostasis and it is believed to reduce systemic absorption of cocaine. However, overall results showing decreased absorption of cocaine are inconsistent. There is a potential risk that epinephrine could act synergistically to strengthen its sympathomimetic effects. A healthy 18-year old male who underwent nasal surgery with prior nasal packing of a cocaine/epinephrine solution, where no drug administration error was later identified, suffered myocardial ischaemia intra and post operatively. To date, there have been no reported cases to our knowledge, of iatrogenic cocaine induced myocardial ischaemia in a child. Care should be taken with topical administration of cocaine due to its sometimes unpredictable absorption rate and potential for cardiac toxicity.

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References

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