Caffeine-containing drinks – a cause of arrhythmias?

Caffeine-containing drinks are being promoted as energy boosters. However, this case report demonstrates that they may have arrhythmogenic potential.

Abstract

Caffeine-containing drinks are increasingly available but excessive consumption can give rise to health hazards. A case is described here of a 31 year old man with no history of cardiovascular disease but a very high caffeine intake; he developed atrial fibrillation, which required treatment with flecainide. He has reduced his caffeine intake and remains well to date.

Key words: caffeine, arrhythmias, atrial fibrillation.

Introduction

Caffeine-containing drinks and supplements are being increasingly consumed, due to the popularity of the coffee-shop culture and the '24 hour, up-all-night' culture. While the stimulant properties of caffeine might have some advantages in social circumstances, the excess sympathetic stimulation gives rise to potential health risks, in particular to cardiac arrhythmias. We report a case of atrial fibrillation associated with consumption of further quantities of caffeine-containing drinks on a background of chronic excess caffeine ingestion.

Case report

A 31 year old marketing manager with no history of cardiovascular disease was admitted with a four-hour history of palpitations and mild breathlessness. He had an irregular pulse of 135 beats/minute and a 12-lead ECG showed atrial fibrillation with no other changes. His cardiovascular and general examination was otherwise normal.

A detailed dietary history revealed his daily consumption of up to eight cups of espresso coffee over the preceding several months, with an additional six cans of a caffeine-containing drink ('Red Bull') daily, over the previous week, due to increased work stress.

Initial treatment was with intravenous heparin and a beta blocker (50 mg atenolol), which resulted in rate control. As he remained in atrial fibrillation at 24 hours he received a single intravenous infusion of 150 mg flecainide, with subsequent conversion to sinus rhythm. Biochemistry, including electrolytes and thyroid function, revealed no abnormality and a transthoracic echocardiogram showed normal cardiac anatomy and function. Following dietary advice, the patient reduced his caffeine intake without obvious withdrawal symptoms,[1] and he has remained well to date.

> ***'Excessive sympathetic stimulation gives rise to potential health risks'***

Discussion

The association of caffeine ingestion with cardiac arrhythmias has been previously reported,[2,3] but this association has been challenged by data from more recent studies which did not show a specific pro-arrhythmogenic effect of caffeine, at least for ventricular arrhythmias.[4] Potential mechanisms of the caffeine-arrhythmia link may be indirect through noradrenaline release,[5] and may be potentiated by either noradrenaline or a raised intracellular calcium ion concentration.[6] Induction of an oscillatory potential in the Purkinje fibres has also been postulated.[6]

A standard cup of espresso coffee contains approximately 80–100 mg of caffeine (in contrast to 60 mg for instant coffee) and the stimulant drink consumed in this case contains 80 mg caffeine per can. Our patient had a daily caffeine intake of nearly 1,300 mg in the week preceding admission: this gives rise to concern in the context of the reported ill health associated with high caffeine intake, namely addiction[1] and mortality.[7] With the widespread marketing of caffeine-containing drinks (coffee, tea, colas etc.) and supplements as healthy, energy-giving products, it is likely that their consumption will increase. A detailed dietary history, establishing the quantity of caffeine ingested, may yield the incriminating and potentially modifiable lifestyle factor precipitating cardiac arrhythmias.

Key messages

- Excessive sympathetic stimulation from high caffeine intake may lead to cardiac arrhythmias
- Noradrenaline release and raised intracellular calcium are potential mechanisms
- In patients with arrhythmias, a detailed dietary history and estimate of caffeine intake may aid the diagnosis

References

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