Adverse Cardiac Effects Of Decongestant Agents

Zeynettin Kaya, Abdullah Tuncez

ABSTRACT

Especially in spring and winter months many people use excessive dose topical or systemic decongestant agents to relief the allergic or infectious nasal congestive symptoms without physicians' prescription. Although these agents bring some symptomatic benefits, sometimes serious adverse cardiac events reported at all drug users, especially who had known cardiac disease. These agents may cause slightly elevation of blood pressure in hypertensive patients, can trigger mortal arrhythmias like ventricular tachycardia, can also trigger myocardial infarction patients with known coronary artery disease or normal coronary artery and may cause decompensation of heart failure. In conclusion all these decongestant agents give only symptomatic relief and they don't treat flu and allergic disease. For this reason if the symptoms are mild or moderate not using these agents will be more wisely.

Key words: *Decongestants, pseudoephedrine, phenylephrine, cardiac, arrhythmias*

Dekonjestan Ajanların Kardiyak Yan Etkileri

ÖZET

Özellikle bahar ve kış aylarında insanların birçoğu allerjik ya da enfeksiyona bağlı nasal konjesyonu gidermek için gereğinden fazla ve sıklıkla reçetesiz topikal veya sistemik dekonjestanları kullanmaktadırlar. Bu ilaçların semptomatik faydalarına karşın özellikle bilinen kardiyak hastalığı olanlar başta olmak üzere tüm kullanan kişilerde ciddi istenmeyen kardiyak olaylara neden olabildiği bildirilmiştir. Hipertansif hastalarda az da olsa kan basıncını yükselttiği, bazıları ventriküler taşikardi gibi ölümcül olabilen pek çok aritmiyi tetiklediği, bilinen koroner arter hastalığı olan ya da normal koroner anatomiye sahip kişilerde miyokard enfarktüsünü tetikleyebildiği, kalp yetmezliği olan hastalarda dekompansasyona neden olabildiği rapor edilmiştir. Sonuç olarak tüm dekonjestan ajanların allerjiyi, soğuk algınlığını tedavi etmediği sadece semptomatik rahatlama sağladığı unutulmamalıdır. Bu nedenle semptomlar hafif veya orta derecede ise öncelikle ilaç dışı yöntemlerin denenmesi mevcut yan etkiler düşünüldüğünde daha akıllıcadır.

Anahtar kelimeler: *Dekonjestanlar, psödoefedrin, fenilefrin, kardiyak, aritmi*

INTRODUCTION

Decongestants are systemic or topical pharmacological agents which provide symptomatic relief by decreasing the nasal and upper respiratory tract congestion. Majority of the agents used as decongestants are stimulating α-adrenergic receptors and increasing adrenergic activity by sympathomimetic effect and wanes edematous mucosal tissue volume and mucus secretion by causing vasoconstriction at the upper respiratory tract, paranasal sinuses and nasal mucosa (1). At the present time pseudoephedrine (PDE) and phenylephrine (PE) with their sympathomimetic effects are largely using as systemic decongestant. PDE shows indirect agonist effects over peripheral α1 and cardiac β adrenergic receptors by increasing the secretion of noradrenaline. PE has relatively selective effects on α_1 receptors and shows weak agonist effects on α_2 and β receptors. Majority of the effects of PE on α-adrenergic receptors is direct and little indirect effect arise from mild noradrenaline secretion increase (2). Nowadays xylomethazoline, PE and oxymethazoline are the sympathomimetic agents that used as topical decongestants. Oxymethazoline and xy-

[1]*Mevlana University, School of Medicine, Department of Cardiology, Konya,* [2]*Konya Numune State Hospital, Division of Cardiology, Konya, Turkey*

Correspondence: *Zeynettin Kaya M.D.*
Mevlana University, School of Medicine, Department of Cardiology
E-mail: zeynettinkaya@yahoo.com

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lomethazoline are direct acting on α receptors. Because of locally direct use of topical decongestants on nasal mucosa they have more rapid and effective effect on symptoms and their systemic absorption and – theoretically- their potential systemic adverse effects will be much less (3).

Hypertension

Lots of case reports revealed that oral sympathomimetic agents used as decongestants causes serious blood pressure elevations (4). But published reviews about this issue suggest, the blood pressure elevation effects of these agents were exaggerated (5, 6). In 2005 Salerno et al. published a review about effects of oral PDE on heart rate and blood pressure. 1285 patients from 24 trials included in this review. As a result PDE was associated with small but statically significant systolic blood pressure and heart rate increase. PDE was not associated with diastolic blood pressure increase. The effects in patients controlled hypertension according to the non-hypertensive patients demonstrated a similar systolic blood pressure increase and no increase of diastolic blood pressure and heart rate. The absence of an increase in heart rate arises from ß blockers in the hypertension treatment regimen of the patients in four clinical trials. Women were less sensitive to cardiovascular adverse effects of these drugs. Higher doses and immediate-release preparations of PDE were associated with greater BP increases. Shorter duration use of these drugs was associated with greater increase in both systolic and diastolic hypertension. Small number of elderly patients is a limitation of these trials and couldn't be evaluated the real cardiovascular effects of PDE on elderly patients in this review (7). Phenylpropanolamine, the drug that previously used as a nasal decongestant agent, due to its effect of blood pressure elevation and hemorrhagic stroke risk withdraw by the FDA at 2003 (8). Although there is not enough data about the effects of xylomethazoline, oxymethazoline and PE on hypertension, it's reported that chronic intoxication with these agents can trigger hypertensive crisis (9).

Acute myocardial infarction

Atherosclerotic plaque rupture and thrombus formation on ruptured plaque are usually responsible for acute myocardial infarction (AMI) etiology. Coronary artery atherosclerosis couldn't be shown on coronary angiography or autopsy examination 10% of the AMI patients and this ratio reaches 35% at the patients under age 35. Congenital coronary artery anomalies, invective or non-infective coronary arteritis, coronary dissection, coronary embolism and coronary spasm are responsible for non-atherosclerotic AMI etiology. Approximately half of the non-atherosclerotic AMI patients have normal coronary arteries on coronary angiography. The AMI patients who have normal coronary arteries are usually young and they relatively have less cardiovascular risk factors other than smoke (10-12). However , whether atherosclerotic or not, there are acute coronary syndrome cases that can concurrently exist with anaphylactic symptoms which triggered by various environmental factors, diseases and drugs. This situation firstly defined by Kounis and Zavras at 1991 and today named as Kounis Syndrome (13). Today considered that the Takotsubo cardiomyopathy which similarly presents with acute coronary syndrome, normal coronary anatomy at coronary angiography, characterized as hyperkinesia at basal left ventricular and hypokinesia at mid and apical left ventricular segments and so called as stress induced cardiomyopathy, is in relation with Kounis syndrome (13,14). There is a lot of AMI case reports that triggered by topical or systemic nasal decongestants. A 19 year old, already smoking patient presented with acute extensive anterior myocardial infarction after using PDE. While normal coronary anatomy detected on coronary angiography, STsegment elevation and chest pain resolved after nitroglycerin infusion (15). There are similar AMI cases that occur after oral PDE use (16, 17). AMI can also occur after topical nasal decongestant use. A 50 year-old currently smoking male patient presented with acute inferior myocardial infarction after using the topical nasal decongestant xylomethazoline and his coronary arteries was normal on coronary angiography (18). We have to point out here that these patients are usually smoking. Smoke enhances the aggregation and adhesion of the platelets and has direct toxic effects on endothelium. Endothelial vasodilatation properties of the smokers have been decreased and these patients become more sensitive to the vasoconstrictor agents (19). On the other hand we have to consider that patients are usually using these drugs during acute infection. Acute infection and acute inflammation can cause endothelial dysfunction and it's suggested that concurrently use the drugs like PDE and other decongestants in this susceptible situation can easily trigger vasospasm and acute myocardial infarction (20). Finally, vasodilator agents must be the first option in treatment of these

patients and ß blocker agent use is contraindicated in this situation because of the possible risk of increased α adrenergic activity and enhanced vasoconstriction (15).

Arrhythmias

Although there are case reports which mention that therapeutic doses of PDE is not increase the arrhythmic events, there are many arrhythmic case reports with sympathomimetic agents that used as decongestants (21). Bektaş et al. reported a supraventricular tachycardia attack which triggered by PDE use (22). Although the patients who have a underlying cardiac disease are more prone to cardiac arrhythmias with these decongestant agents, arrhythmias can also occur in patients who have no cardiac disease (23-25). Khan et al reported a ventricular tachycardia attack with the use of topical decongestant agent oxymethazoline. A calcified fibroma detected on interventricular septum at investigation of the patient. As result the ventricular tachycardia attack triggered by oxymethazoline at the basis of cardiac fibroma (23).

In another case report, ventricular arrhythmia had occurred at a 36 year-old 19 weeks pregnant women after overdose using the PDE and phenylpropanolamine. Absence of an organic heart disease, presyncope and tachycardia that occurred during drug use are the interesting features of this patient (24).

In conclusion the sympathomimetic agents that used as decongestants, whether with underlying cardiac disease or not, can trigger and increase the frequency and severity of the cardiac arrhythmias and can also diminish the control of a known cardiac arrhythmia.

Conclusion

Although there is shown symptomatic benefits on adults and adolescents, sympathomimetic agents that used as decongestants could have serious cardiac adverse effects. Even though these adverse effects usually occurs with improper dosage and using duration, can also occur at lots of patients idiosyncratically. All patients, especially known cardiovascular disease patients, who will use these drugs must be fully informed about the possible serious adverse cardiac effects, should use these drugs under his/her physician's control and should primarily prefer the non-drug therapy choices to reduce congestion.

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