

Piloerection: a Side Effect of Intravenous Administration of Dobutamine

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Summary

Background: When a dobutamine stress echocardiogram is performed, piloerection is frequently found in the scalp area.

Objective: The aim of the present study was to establish the incidence of this phenomenon and its association with other clinical findings.

Methods: A total of 218 consecutive patients that underwent dobutamine stress echocardiography in our department were included in the study.

Results: Piloerection was present in 42.2% of the sample. No correlations could be established between piloerection and gender, result of the stress test or other side effects. A statistically significant correlation was established with the age of the patients: piloerection was present in 73% of patients aged 50 years or younger. It appears most often with a dobutamine dose of 10 $\mu\text{g}/\text{kg}/\text{min}$.

Conclusion: Piloerection is a frequent side effect of dobutamine infusion, particularly in patients aged 50 or less; it usually precedes the increase in heart rate caused by dobutamine; therefore, it is an early and clear indication that the intravenous set is working properly. Also, the previous warning of its possible appearance may contribute to the patient's well-being. (Arq Bras Cardiol 2009;92(4):275-277)

Key words: Piloerection/drug effects; dobutamine/administration and dosage.

Introduction

Echocardiograms with intravenous administration of dobutamine have been performed at the Department of Echocardiography of the 'Umberto I' Italian Hospital since 1995. During these procedures, it is common for the patients to refer piloerection, particularly in the scalp area.

No references were found regarding this phenomenon¹⁻⁶; therefore, we decided to study its incidence and possible association with other clinical variables.

From the chemical point of view, dobutamine (Dobuject®) is a racemic combination of its (+) and (-) isomers⁷. Its well-known cardiac effects (positive chronotropism and inotropism) are attributed to a prevalent beta-adrenergic effect of the (+) isomer⁷. On the other hand, piloerection would be the result of the stimulation of alpha receptors by the (-) isomer - with the contraction of the piloerector muscles being an alpha-1 effect⁷.

Methods

Dobutamine stress echocardiograms were performed on a total of 218 consecutive patients, including 105 males and 113 females, aged between 38 and 82 years, with a mean age of 63.55 years ($SD \pm 56$). All of them had been previously warned of the drug's possible side effects - particularly piloerection of the scalp. Whenever the latter was felt, the patients were asked to report it. These reports were then checked by direct observation of hair and scalp under a strong white light and/or touching of the scalp.

A number of variables were registered: presence or absence of piloerection; if piloerection was present, the administered dose of dobutamine at the time; gender; age; test results; presence of other cardiac and extracardiac side effects (ventricular tachycardia, supraventricular tachycardia, urinary urgency, sinus node deceleration and hypotension).

The first 74 cases were duly warned of the possible side effects of the dobutamine infusion and whenever the patients mentioned it, hair and scalp were checked for piloerection.

The following 144 cases were not only previously warned, but also specifically asked about piloerection during the dobutamine infusion. Even when the answer was negative,

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patients were examined for the presence of piloerection.

The usual incremental protocol, from 5 to 40 $\mu\text{g}/\text{kg}/\text{min}$ in three-minute stages, was used^{3,6}. In patients that did not achieve 85% of their theoretic maximal heart rate, atropine was added up to 1 mg.

The statistical analysis of the significant variables was carried out by the Chi-square test.

Results

In the first group of 74 patients, piloerection was mentioned by 29.7%. In the second group of 144 patients, the phenomenon was found in as many as 48.6%. The global incidence was 42.3%.

All cases of reported piloerection were confirmed by direct observation (Figure 1). In the second group, no piloerection was found in the patients that denied feeling it.

The difference between these two groups was statistically significant, with $p < 0,005$ or $0,008$, with Yates correction (Table 1).

No statistically significant correlations were found between the appearance of piloerection and most of the variables considered. However, a statistically significant correlation was indeed found with the age of the patients. The most significant age was 50 years old. Of the 218 cases, piloerection was more frequently found (73%) in those patients that were fifty years old or younger, with $p < 0.0000003$ or 0.0000007 , with Yates correction (Table 2).

With no beta-blocking medication present, piloerection takes place at dobutamine doses of 20 $\mu\text{g}/\text{kg}/\text{min}$ or less. Of the patients that referred piloerection, 51.5 % did so with a dose of 10 $\mu\text{g}/\text{kg}/\text{min}$, 33.3 % with a dose of 20 μg and 15.1 % with a dose of 5 μg .

Of the six patients with beta-blocking medication, two referred piloerection after a dose of 30 $\mu\text{g}/\text{kg}/\text{min}$ had been administered.

Table 1 - Percentage of patients that reported piloerection during dobutamine injection ($p < 0.005$)

Piloerection	Questioned during injection	Not questioned during injection
Present	48.6%	29.7%
Absent	51.3%	70.2%

Table 2 - Percentage of patients that reported piloerection according to age ($p < 0.0000003$)

Piloerection	Aged 50 or younger	Aged older than 50
Present	73%	37%
Absent	27%	63%

Discussion

Piloerection is a phenomenon that is frequently found in patients undergoing stress echocardiograms with intravenous injection of dobutamine. The incidence increases when previously briefed patients are specifically asked about piloerection during the catecholamine injection. Therefore, many patients do not refer piloerection unless they are asked about it - even when they feel the phenomenon.

The age-related variations found in the incidence of piloerection might be due to the functional indemnity of the autonomous nervous system usually found in younger people.

From a practical point of view the phenomenon of piloerection allows us:

- to reduce mental distress - the patient knows that piloerection is a side effect of dobutamine and not something caused by his or her fears.
- to know earlier and more accurately whether the catecholamine has entered the body and started acting.

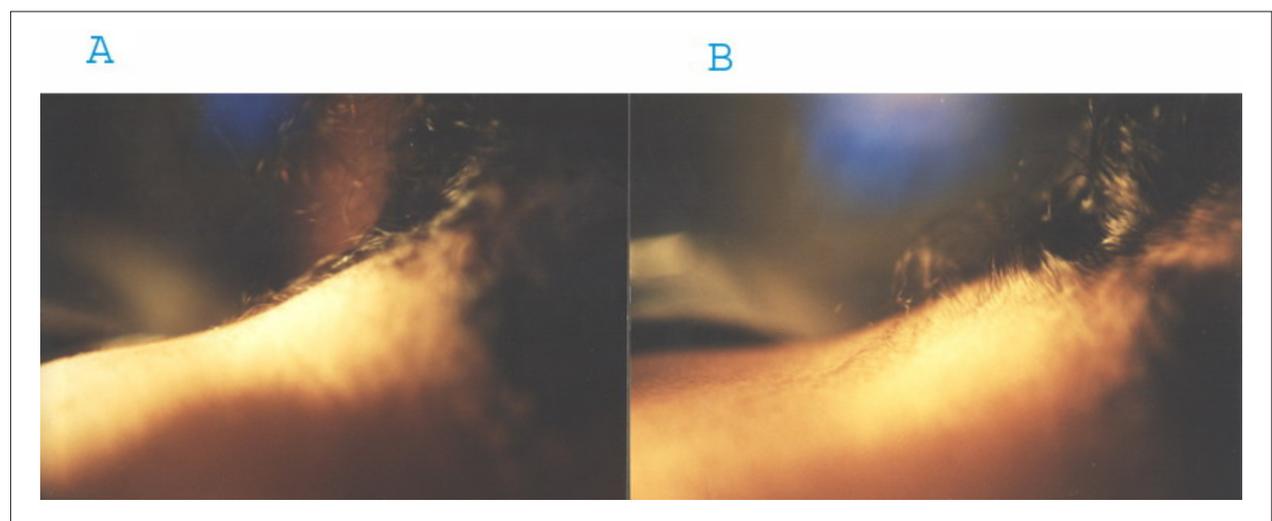


Figure 1 - A - Back of the neck before dobutamine infusion. B - Piloerection during dobutamine infusion of 10 $\mu\text{g}/\text{kg}/\text{min}$.

Sometimes it is not definite whether the intravenous set used in the procedure is working properly and only a substantial increment in the heart rate will dispel any doubts. Since piloerection usually precedes this increase in the heart rate, the reports made by the patients gives an early and clear indication that the set is functioning properly.

c) to better manage the pharmacology of the procedure by knowing the precise moment when piloerection appears. The higher dobutamine doses required in beta-blocked patients might be a logical outcome of a delayed stimulus to the alpha receptors, due to the fact that dobutamine and beta-blockers are competitive antagonists. However, the low number of beta-blocked patients precludes any definitive conclusion.

Conclusions

Piloerection of the scalp is a frequent side effect of the intravenous infusion of dobutamine, probably due to the stimulation of alpha-1 adrenergic receptors.

It appears mostly with a dobutamine dose of 10 $\mu\text{g}/\text{kg}/\text{min}$.

No correlations were established with gender, test results or other side effects.

A statistically significant correlation was established with the age of the patients. Piloerection was referred by 73% of patients aged 50 or younger.

Piloerection may be used to quickly ascertain whether the intravenous set is working properly. Also, previous warning of its possible appearance may contribute to the patients' well-being.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any post-graduation program.

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