NAPHAZOLINE NASAL DROPS INTOXICATION IN CHILDREN

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Received November 12, 1993

Naphazoline, a sympathomimetic and an imidazoline derivative, is used as a 0.05-0.1% solution for local decongestion of the nasal and nasal mucous in adults. In excessive dosage, or if ingested by accident, may cause depression of the central nervous system (disturbances of consciousness progressing to coma), hypothermia, bradycardia and sweating. These naphazoline effects are particularly strongly pronounced in children. Anglo-Saxon pharmacotherapy excludes the application of naphazoline nasal drops in children younger than six years, whereas the Croatian pharmacotherapeutical literature (and practice) allows its use even in infancy. At the Kantrida Paediatric Clinic, Clinical Hospital Centre in Rijeka, 11 children with signs of intoxication with naphazoline nasal drops were hospitalized from 1990 to 1992. The symptoms pertaining to the central nervous system i.e. disturbances of consciousness in the form of somnolence were clearly marked in all children. Some children developed akinetia, bradycardia, bradypnoea and hypothermia. Resolution occurred within 24 hours and the findings returned to normal values. Clinical picture followed by rapid resolution and normal findings, with a personal history of drug taking, is a safe indication for diagnosis.

There are several reasons to account for intoxication (drops difficult to use with children, containers inadequate for proper dosage), but the major factor is the age of the patient— all hospitalized children were younger than six years. It is pointed out that administration of naphazoline drops at an early age is not advisable.

Key terms: adverse effects, Croatian pharmacopoeia, sympathomimetic agent, toxic effects, young children

Naphazoline is a sympathomimetic agent, an imidazoline derivative. Although the mechanism of its action has not been completely explained, especially in the central nervous system, most pharmacologists believe that the drug directly stimulates alpha-adrenergic receptors (of the sympathetic nervous system) and exerts little or no effect on beta-adrenergic receptors (1-5). Naphazoline is used most frequently alone or in different combined preparations for relieving congestion of the ocular and nasal mucosa in acute and chronic inflammations. When applied
topically in recommended dosages as a 0.05–0.1% solution, the incidence of serious adverse effects is low. Its prolonged use (for more than 4–5 days) may bring about irritation of the mucosa and result in its ulceration, nasal cilia paralysis and anosmia (4, 5). Like other sympathomimetics, naphazoline may cause, after discontinuation of treatment, adverse reactions associated with "rebound phenomenon" (vasodilation, congestion, rhinorrhea, etc.). Although naphazoline absorption through the lipid matrix of biological barriers is good, local application on the ocular and nasal mucosa rarely causes general sympathomimetic effects. An overdose of the drug, or its accidental oral consumption, may cause a very severe intoxication with the central nervous system depression, hypothenmia, bradycardia, sweating, disturbances of consciousness and even coma (6–8). Toxic effects of naphazoline are very frequent and serious in children younger than six years. This is the reason why the Anglo-Saxon pharmaco-therapeutic literature excludes the application of naphazoline drops in younger children (4, 6, 7). It is to be regretted that the Croatian literature mentions (and practice confirms) the possibility of its use even in infancy (9, 10). Being aware of this and also of the fact that physicians are not sufficiently informed of the problem and that literature data in this field are scarce, we considered it worthwhile to present our experiences in naphazoline intoxication in children and to offer several recommendations.

PATIENTS AND METHODS

The patients in the investigation were hospitalized at the Kantrida Paediatric Clinic, Clinical Hospital Centre in Rijeka, from 1990 to 1992, with signs of intoxication by naphazoline nasal drops. After a personal history and the clinical status were taken, routine laboratory tests were made (complete blood test, acidobasic status, electrolytic status, blood sugar, urine analysis). An examination of the eye fundus, otorhinolaryngologic examinations and electroencephalography were made. Some patients, where it was diagnostically justified, were tested by other diagnostic methods (lumbar puncture and ultrasound of the head).

RESULTS

Eleven patients were hospitalized in the Kantrida Paediatric Clinic from 1990 to 1992. The examinations confirmed suspected naphazoline nasal drops intoxication (clinical picture and personal history with other normal findings). Among the patients there were seven girls and four boys. Most patients were in the 2–3-year age group (three aged one year, six aged 2–3 years and two aged 4–6 years). The youngest patient was two months old, and the oldest five years and eight
months. In eight cases the drops were administered by parents (mother), in two cases the content of the bottle was swallowed accidentally, and one child took the drug by himself. In all cases the naphazoline solution concentration was 0.05%. Age distribution, sex, drops application and symptoms (somnolence in all 11 patients – the most pronounced symptom bringing all the patients to the physician) are shown in the Table.

It should be pointed out that in children to whom the drops were administered by parents (Table) the dosage (according to personal history) was in allegedly therapeutic limits. Therapeutic dosage (1–2 drops) was certainly exceeded in three cases (Table – two by swallowing, one self-administered). The recovery in all the patients was very fast, within 24 hours, and without consequences.

DISCUSSION AND CONCLUSIONS

According to data from literature (4, 6–9), naphazoline effects are known as depression of the central nervous system.

They appeared in all 11 patients (in eight cases the drops were administered by parents – obviously overdosage of the drug). Dominant clinical symptoms are characterized as mild disturbances of consciousness (somnolence) and in some cases, pallor, hypothermia, bradycardia, bradypnoea and sweating (Table). This clinical picture and personal history of naphazoline nasal drops administration, with other normal findings, are an indication for diagnosing naphazoline intoxication. We may also say that the results in cases of milder disturbances of consciousness will also be favourable and that there will be no need for additional

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Drops application</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 months</td>
<td>F</td>
<td>by parent</td>
<td>somnolence, pallor, bradycardia</td>
</tr>
<tr>
<td>4 months</td>
<td>F</td>
<td>by parent</td>
<td>somnolence, pallor, bradycardia, bradypnoea</td>
</tr>
<tr>
<td>5 months</td>
<td>F</td>
<td>by parent</td>
<td>somnolence, pallor, hypothermia</td>
</tr>
<tr>
<td>1 year</td>
<td>M</td>
<td>by parent</td>
<td>somnolence, pallor</td>
</tr>
<tr>
<td>1.2 years</td>
<td>M</td>
<td>by parent</td>
<td>somnolence</td>
</tr>
<tr>
<td>1.8 years</td>
<td>F</td>
<td>by parent</td>
<td>somnolence, hypothermia, sweating</td>
</tr>
<tr>
<td>2.5 years</td>
<td>F</td>
<td>swallowed</td>
<td>somnolence</td>
</tr>
<tr>
<td>2.5 years</td>
<td>F</td>
<td>by parent</td>
<td>somnolence, bradycardia, sweating</td>
</tr>
<tr>
<td>2.8 years</td>
<td>M</td>
<td>swallowed</td>
<td>somnolence, pallor, hypothermia</td>
</tr>
<tr>
<td>4.6 years</td>
<td>F</td>
<td>by parent</td>
<td>somnolence</td>
</tr>
<tr>
<td>5.8 years</td>
<td>M</td>
<td>self-applied</td>
<td>somnolence, pallor, hypothermia, bradycardia</td>
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</table>
symptomatic treatment or other supportive measures (control is sufficient). The following may be suggested as causing naphazoline nasal drops intoxication:

- It is extremely difficult to administer drops to children (children resist administration of drops; they do not follow definite rules; so, the effects are rather poor).
- Packing inadequate for proper dosage - administration of a proper dose is much easier if a bottle with a dropper is used. A bottle equipped with a plastic extension (widely used in recent years) is not suitable for administration to children and proper dosage is very difficult. Nasal sprays may be preferable to drops because of the lesser risk of swallowing the drug and resultant systemic absorption.
- Age is the most important factor in naphazoline drops intoxication. All the children were younger than six years of age (Table).

We may conclude that naphazoline drops should not be administered to children younger than six years. This should find mention in the pharmacotherapeutic literature (9, 10) and application in medical practice. The pharmaceutical industry should also take account of this recommendation and accordingly supplement the directions for using the drug. Certain characteristics of a child’s age should be taken into account too. This age requires a specific design of drug containers for proper therapeutic dosage.

REFERENCES


Sažetak

INTOKSIKACIJA NAFAZOLIN KAPIMA ZA NOS U DJECE

Nafazolin je skupotimolnetik, derivat imidazolina, a primjenjuje se kao 0,05-0,1% otopina za lokalnu dekongestiju sluznice oka i nosa. Predoziran ili slučajno uzet perorano može uzrokovati depresiju središnjeg živionog sustava (ponekad se svjesti ovo do kome) ili hipotermiju, bradikardiju i znojenje. Navedeni učinci nafazolina napose su izraženi u djece. Angiokineticka farmakoterapija isključuje primjenu nafazolina u djeci do šest godina starosti dobim naša farmakoterapijska literatura (i i praksi) dopušta njegovu uporabu već od dejanjaške dobi. Na Klinici za djecu bolnički Kantrida Kliničkog bolničkog centra u Rijeci, u razdoblju od 1990. do 1992. godine hospitalizirano je 11-letnja djeca s znakom trombanja nafazolinskim kapima za nos. U djetinjstvu bili su izraženi simptomi pojava simptoma središnjeg živionog sustava i to pojavljivali se u vidu somnolencije. U neka dječja priznačenja je bilo i blješće kože, bradikardija, bradipnija i hipotermija. Oporavak je u sve djece uslijedio unutar 24 sata, a učinjenom obradom dovedeni su u redni nalaži. Klinička slika s blizim operativom i urednim nalažima uz anamnestički podatke o uzimanju lijeka siguran je utiskak k dijagnozi. Razlozi koji su doveli do otvaranja ima viša (otežano ukupavanje djece, neadekvatna ambalaža za ispravno doziranje) no svakako je najistaknutiji faktor uzast. Sva hospitalizirana djeca bila su namještena od šest godina. Zakućuje se da u ovoj starosnoj skupini nije uputno primjenjivati nafazolin kap. Farmaceutski industriji valja upozoriti na neke osobitosti dječe dobi koja postavlja specifične zahtjeve za oblikom i ambalažom lijekovitog pripravka, a domaću farmakoterapijsku literaturu obogatiti ovim spoznajama.

Ključne riječi:
djeca, hrvatska farmakopeja, simpatomimetići, štetni učinci, toksični učinci

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