International Journal of Healthcare Sciences ISSN 2348-5728 (Online)
Vol. 7, Issue 1, pp: (209-211), Month: April 2019 - September 2019, Available at: www.researchpublish.com

Topical Cyclopentolate Induced Acute Psychiatric Side Effects in a Paediatric Patient

Sunaina Sunil Anand

Acharya & BM Reddy College of Pharmacy, Bengaluru

Abstract: **A 5-year-old boy reports to the hospital for follow-up with a history of corneal injury. He was advised to get a dilated eye examination with 1% cyclopentolate hydrochloride eye drops instillation. After 15 minutes of the procedure, the mother noticed abnormal behaviour in the child. Upon admission to the emergency department with restlessness, carphologia, mouth opening, talking to himself and unresponsive to mother`s commands, his pupils were dilated 6-8mm with no reflex, heart rate was 100 beats/min, respiratory rate was 24 cycles/min. No convulsions, loss of consciousness, altered gait, fever. Serum glucose level and blood count were normal and no sensory deficits or cerebellar signs. Patient was referred to psychiatry department followed where he was identified with toxicity symptoms like delirium, hallucination, agitation, tachycardia, altered memory, pupils non-reactive to light. Since delirium symptoms gradually decreased, brain CT was not performed. The child was managed with intravenous fluid. Recovery was spontaneous within 8 hours. The pupils remained dilated for three days. He was discharged after 1 day.**

Keywords: **Cyclopentolate Delirium Toxicity Psychosis Mydriatics.**

1. INTRODUCTION

Intraocular drugs in Paediatric ophthalmology serve as both diagnostic and treatment medication. In Situations requiring cycloplegia / mydriasis, physicians resort to cyclopentolate hydrochloride ophthalmic solution. These eye drops are used for fundus examination before the refraction test and for inflammatory diseases of the eye. The two intended ocular pharmacological actions of cyclopentolate are mydriasis and cycloplegia which occur within 30-60 mins of topical application and can last up to 24 hours.[1, 2] The amount of cyclopentolate absorbed systemically varies greatly between the patients causing side effects, particularly in children.[3] Mydriasis occurs when this drug blocks the response to the cholinergic innervation of the iris sphincter muscle whereas preventing stimulation of ciliary muscle causes cycloplegia. Here we report the development of toxicity with psychiatric manifestations in a paediatric patient following instillation of cyclopentolate eye drops.

2. CASE REPORT

Case Presentation

A 5-year-old boy presented with inadvertent behaviour and irrelevant talking with a history of corneal injury, for which he underwent PC IOL implantation surgery (Posterior Chamber Intraocular Lens) a month ago, reports to the hospital for follow-up. He was advised to get a dilated eye examination with 1% cyclopentolate hydrochloride eye drops instillation. After 15 minutes of the procedure, the mother noticed abnormal behaviour in the child. Upon admission to the emergency department with restlessness, carphologia, mouth opening, talking to himself and unresponsive to mother`s commands, his pupils were dilated 6-8 mm with no reflex, heart rate was 100 beats/min, respiratory rate was 24 cycles/min. No convulsions, loss of consciousness, altered gait, fever. Serum glucose level, blood count, biochemical markers and blood gas analyses were normal with no sensory deficits or abnormal cerebellar signs. He had normal birth and developmental history with immunization on time.

Investigation

Patient was referred to psychiatry department followed by which he was identified with toxicity symptoms like delirium, hallucination, agitation, tachycardia, altered memory, pupils non-reactive to light according to subjective, objective evidence and literature evidence. Since delirium symptoms gradually decreased, brain CT was not performed.

Differential diagnosis

All the clinical effects present in this case occurred following administration of toxic dose of Cyclopentolate Hydrochloride. Presence of toxicity symptoms, absence of fever, convulsions, headache, gradual recovery and presence of similar cases in literature helped the physician in diagnosing the patient with Cyclopentolate induced psychosis.

Management

The child was managed with intravenous fluids. Antidote was not required.

Outcome/Follow-up

Recovery was spontaneous within 8 hours. The pupils remained dilated for three days. He was discharged after 1 day.

3. DISCUSSION

Since cyclopentolate has shorter duration of action when compared to atropine or scopolamine , it is used more often in paediatric ophthalmology.[4] The side effect incidence rate of Atropine is 7 times higher than the incidence rate of cyclopentolate.[5] Cyclopentolate`s side effects profile has two types: systemic (hallucination, disorientation, hypertension, altered speech, tachycardia and agitation) and ocular (cloudy vision, increased intraocular pressure, corneal damage).[6-9] Many cases of acute psychosis in paediatrics has been reported. Specific antidote is physostigmine, which can be used in severely agitated patients who are not responding to other therapies.

Cyclopentolate rapidly appeared in blood following ocular application. Rapid Systemic absorption occurs via the transconjunctival route. Drug entering the nasolacrimal system following absorption may be swallowed and absorbed through stomach.[3] A recent prospective randomized controlled study reported that 1%cyclopentolate solution was adequate in patients aged 3.5–20 years, and the frequency of side effects was lower.[11] The surface area of the human conjunctiva is 17 times that of the cornea, which enhances ocular penetration and systemic absorption.[12] There is intra-subject variability with relation to absorption. In one study, at 5 min the cyclopentolate concentrations varied from undetectably low to 4.2 ng/ml (median, 2. 1 ng/ml).[3]

On the other hand, in a case wherein acute psychotic reaction developed despite the application of 1% solution, researchers performed a chemical analysis and found that the concentration of cyclopentolate that was given was 1.31%, not 1%.[12] Systemic adverse effects may also develop in patients having no co-existing disease and who are given appropriate concentration or dose of the drug.[13,14] In a study that was conducted in old times when 2% solutions of cyclopentolate were used, systemic adverse effects were observed in 10 (15.1%) of 66 adult patients. Therefore, the use of 2% solution was restricted.[11] In mild to moderate toxicity, benzodiazepines may be used to used to control CNS symptoms due to effect of anticholinergics.[15]

4. CONCLUSION

This case highlights the importance to proceed cautiously while administering ophthalmic solutions in paediatrics. Physicians can reduce rapid systemic absorption and toxicity by:

1. instilling low concentration of the drug (0.5%).

not exceeding recommended number of drops (instil one drop of 0.5% or 1% in eye. If necessary instil one more drop after five minutes.)

2. occluding the lacrimal passage following instillation
3. blotting away excess drops
4. using micro drops (drops with volume of 5.6 μL)

Pharmacists must be familiar with the neuropsychiatric side effects of many common prescription medications so that they can educate physicians about this possible event and develop strategies to minimize risk.

ACKNOWLEDGEMENT

I would like to thank Mr. Binai K. Sankar, Department head, Pharmacy Practice for his guidance. I acknowledge my family and friends for their continuous support.

REFERENCES

[1] Mutti DO, Zadnik K, Egashira S, et al. The effect of cycloplegia on measurement of the ocular components. Investigative ophthalmology & visual science. 1994 Feb 1;35(2):515-27. https://iovs.arvojournals.org/article.aspx?articleid=2161355. (accessed 2 January 2019).

[2] Pappano AJ, Katzung BG. I. BASIC PHARMACOLOGY OF THE MUSCARINIC RECEPTOR-BLOCKING DRUGS. Basic & Clinical Pharmacology. 2004:109.

[3] Lahdes K, Huupponen R, Kaila T, et al. Systemic absorption of ocular cyclopentolate in children. Ger J Ophthalmol. 1992;1(1):16-8. https://pdfs.semanticscholar.org/9a2f/9e6412e75a002b5ab3b359b85f90c65365bc.pdf. (accessed 14 April 2019)

[4] Farhood QK. Cycloplegic refraction in children with cyclopentolate versus atropine. J Clin Exp Ophthalmol.2012;3(7):1. https://www.researchgate.net/profile/Qasim_Farhood/publication/274545755_Cycloplegic_Refraction_in_Children_with_Cyclopentolate_versus_Atropine/links/57f9116008ae886b89845fe4.pdf. (accessed 23 March 2019)

[5] Wakayama, A., Nishina, S., Miki, A. et al. Jpn J Ophthalmol (2018) 62: 531. https://doi.org/10.1007/s10384-018-0612-7. (accessed 4 February 2019)

[6] Khurana AK, Ahluwalia BK, Choudhary R, et al. Acute psychosis associated with topical cyclopentolate hydrochloride. Am J Ophthalmol 1988; 105: 91. https://www.ajo.com/article/0002-9394(88)90128-6/pdf. (accessed 20 January 2019)

[7] Bhatia SS, Vidyashankar C, Sharma RK, et al. Systemic toxicity with cyclopentolate eye drops. Indian paediatrics. 2000 Mar;37(3):329-31. https://www.indianpediatrics.net/march2000/march-329-331.htm. (accessed 28 March 2019)

[8] Tayman C, Mete E, Catal F, et al. Anaphylactic reaction due to cyclopentolate in a 4-year-old child. J Investig Allergol Clin Immunol. 2010 Jan 1;20(4):347-8. http://www.jiaci.org/issues/vol20issue4/10.pdf. (accessed 4 April 2019)

[9] Derinoz O, Er A. Inability to walk, disequilibrium, incoherent speech, disorientation following the instillation of 1% cyclopentolate eyedrops: case report. Paediatric emergency care. 2012 Jan 1;28(1):59-60. https://journals.lww.com/pec-online/Abstract/2012/01000/Inability_to_Walk,_Disequilibrium,_Incoherent.17.aspx . (accessed 26 February 2019)

[10] Watsky MA, Jablonski MM, Edelhauser HF. Comparison of conjunctival and corneal surface areas in rabbit and human. Curr Eye Res 1988 7 :483-486. https://www.tandfonline.com/doi/abs/10.3109/02713688809031801. (accessed 6 April 2019)

[11] Bagheri A, Givrad S, Yazdani S, et al. Optimal dosage of cyclopentolate 1% for complete cycloplegia: a randomized clinical trial. Eur J Ophthalmol 2007; 17: 294-300. https://doi.org/10.1177/112067210701700303. (accessed 18 January 2019)

[12] Huismans H. Intoxikationspsychose nach Cyclopentolat-HCl (Zyklolat). Klin Monatsbl Augenheilkd 1979; 175: 100-2. (accessed 25 June 2019)

[13] Kara S, Gencer B, Ekim YÖ, et al. Bir Yetişkinde Siklopentolat Damla Kullanımı Sonrası Gelişen Akut Deliryum. Int J Clin Res 2013; 1: 76-8. (accessed 25 January 2019)

[14] Ağın H, Gerçek H, Kutlu A, et al. Topikal siklopentolat kullanımına bağlı gelişen deliryum tablosu: Bir vaka takdimi. Çocuk Sağlığı ve Hastalıkları Dergisi 2008; 51: 39-42. (accessed 2 March 2019)

[15] Turan, C, Keskin G, Gunes S, et al. Infantil delirium induced by cycloplegic eye drops. Hong Kong Journal of Emergency Medicine 2018 25(4), 226–228. https://doi.org/10.1177/1024907917748726. (accessed 15 March 2019)