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Case Report

A Combined Intervention of Single Vision Plus Lens and Tropicamide in the Treatment of Pseudomyopia: A Perspective Case Report from Nepal

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Abstract

This study highlights the role of cycloplegic refraction in the detection of accommodative spasm and the use of tropicamide 1% as cycloplegic and single vision plus lens for its management. This was a case study carried at tertiary eye hospital in Kathmandu, Nepal. In this study, 2 subjects presenting with complain of sudden onset of diminution of vision for near and distance along with asthenopic symptoms having history of prolonged near work were recruited. Pre-cycloplegic refraction showed fluctuating myopic refractive error which after cycloplegia showed a significant hyperopic shift. Single vision plus lens (base on post-mydriatic treatment) giving optimal vision for near and distance along with tropicamide 1% twice a day basis and abstinence of triggering factor was started as initial treatment modality. Subjects were kept under close surveillance and followed up fortnightly over 2 months. During this period, the dosages of tropicamide were gradually tapered based on symptomatic relief of patient and no recurrence of the condition was observed in both subjects for next 2 month.

Keywords: Accommodative spasm, Nepal, pseudomyopia, single vision lens, tropicamide

Introduction

Accommodative spasm (AS) is an involuntary condition when there is greater than normal accommodative response than accommodative stimulus (1). It may begin suddenly, is more likely to be bilateral, is constant or intermittent, occurs at distance and/or near, is frequently associated with pupillary miosis and convergence spasm (CS), disappears with cycloplegia, and may resolve spontaneously (1). Studies have reported that the prevalence of nonorganic visual loss in children was approximately 50% at a routine ophthalmological examination and its annual incidence was roughly 3.5% (2).

In our study, we performed wet retinoscopy with cyclopentolate (1%) in subjects diagnosed with pseudomyopia with the presence of triggering factors and observed the effect of combined intervention of optical and pharmacological therapy using tropicamide (1%) as a cycloplegic drug. Here, we describe the role of tropicamide and single vision plus lens for the treatment of pseudomyopia.

Case Report

Case 1 – A 12 years female (Fig. 1) presented with the history of blurring of vision for distance and near since 1 week along with severe asthenopic symptoms. She had a history of

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Figure 1. Case I (BPKLCOS photography, verbal consent taken).

excessive near work since 2 weeks. Her gross physical appearance and mental health status were normal at the time of presentation in our clinic. She was not under any regular medications and had no history of recent trauma. Her detailed ocular examination was carried out (Table 1).

Management

Initial treatment consisted of prescription of cycloplegic refraction and tropicamide drop as cycloplegic instilled twice daily. Subject was referred for psychiatric and neurologic consultation. Follow-up was scheduled for every 15 days after initiation of treatment.

On subsequent first follow-up near acuity was improved up to N10 (@ 25 cm) and distance visual acuity was improved up to 6/9 in both eyes with prescribed optical correction and patient was symptomatically relived. Clinical report from neurology department and psychiatry department reveled subject had normal neurological and psychiatric finding with no anxiety hysteria and emotional stress. Subject was advised to continue same treatment for next 15 days and 2nd follow-up was scheduled after next 15 days.

On 2nd follow-up near acuity was improved up to N 6 (@ 25 cm) and distance visual acuity was improved up to 6/6(−4/7) in both eyes with prescribed optical correction and patient was symptomatically relieved. On orthoptic evaluation on 2nd follow-up, subject was orthophoric for both distance and near. After 2nd follow-up doses of cycloplegic drug was tapered to once daily before sleep and same optical correction was continued up to next follow-up.

On 3rd follow-up near acuity was improved up to N 5 (@ 25 cm) and distance visual acuity was improved up to 6/6 in both eyes with prescribed optical correction and patient was fully relieved. On orthoptic evaluation during 3rd follow-up accommodative facility, negative relative accommodation and convergence was improved to normal values.

Then patient was advised to discontinue cycloplegic drug completely but was suggested to wear initial glass prescription on full time. Finally, subject was advised to avoid triggering factors such as excessive near work, low lighting work environment, and activities of visual overload.

Case 2 — A 14 years female (Fig. 2) presented with the history of blurring of vision for distance and near along with headache and eye strain since 1 month. Gross physical appearance and mental status were normal at the time of presentation. She was not under any medications and with no history of recent trauma. Her detailed ocular examination was carried out (Table 1).

Management

Initial treatment consisted of prescription of cycloplegic refraction and tropicamide drop as cycloplegic instilled twice

Figure 2. Case II (BPKLCOS photography, verbal consent taken).

Table 1. Clinical findings of case 1

Examination details	Clinical Findings (Case I)	Clinical Findings (Case II)
Presenting Distance Visual Acuity	OD: 6/36 OS: 6/36 (unaided)	OD: 6/18 OS: 6/18 (unaided)
Presenting Near Visual Acuity	N18 at reading distance	N12 at reading distance
Orthoptic Examination	Convergence: 10 cm with RAF rule Accommodative Amplitude: Variable findings Accommodative facility: 1 cpm (binocularly), 1 cpm (OD), 1 cpm (OS) and difficulty with plus lens Cover test: Intermittent convergent squint for near and orthophoria for distance NRA (Negative Relative Accommodation): + 0.75 D PRA (Positive Relative Accommodation):-2.50 D Extra Ocular Motility: Version: Full ranged in all cardinal gazes Duction: Full ranged in all gazes	Convergence: 12 cm with RAF rule Accommodative Amplitude: 9 cm (OU) with N18 target of RAF rule Accommodative facility: 0 cpm (binocularly), 0 cpm (OD), 0 cpm (OS) and difficulty with plus lens Cover test: Esophoria for near and orthophoria for distance NRA (negative relative Accommodation):+0.50 D PRA (Positive Relative Accommodation): - 2.25 D Extra Ocular Motility: Version: Full ranged in all cardinal gazes Duction: Full ranged in all gazes
Refraction	Dry Refraction: OD: -5.75 D (No adequate optical acceptance) OS: -4.75 D (No adequate optical acceptance) Cycloplegic Refraction (under 1% cyclopentolate)* OD: + 2.00 D OS: + 1.75 D Post Mydriatic Treatment (After 3 days) Distance acuity: OD: +1.00 Ds (6/18) (by fogging technique) OS: +1.00 DS (6/12) (by fogging technique) Near acuity: OU: + 1.00 DS (N10)	Dry Refraction: OD -3.00 D (No adequate optical acceptance) OS -3.00 D (No adequate optical acceptance) Cycloplegic Refraction (under 1% cyclopentolate)* OD: + 0 .75 D OS: + 0.75 D Post Mydriasis Treatment (After 3 days) Distance acuity: OD: + 0.50 (6/12) (by fogging technique) OS: + 0.50 (6/12) (by fogging technique) Near acuity: OU: + 0.50 DS (N10)
Diagnosis	Accommodative Spasm (pseudo myopia)	Accommodative Spasm (pseudo myopia) :
Initial Treatment	Optical intervention: Optimal cycloplegic prescription for near and distance with single vision lens Pharmacological intervention: Tropicamide eye drop (1%) twice daily for 15 days with tapering in subsequent follow-up Life style modification: Avoidance of excessive near work, improper working distance, visual overload, and emotional distress	Optical intervention Optimal cycloplegic prescription for near and distance Pharmacological intervention: Tropicamide eye drop (1%) twice daily for 15 days with tapering in subsequent follow-up Life style modification: Avoidance of excessive near work, improper working distance, visual overload, and emotional distress
Follow up	3 Consecutive follow-ups were made in 15 days each after initiation of treatment and progression of the condition was evaluated	3 Consecutive follow-ups were made in 15 days each after initiation of treatment and progression of the condition was evaluated

daily. Subject was referred for psychiatry and neurology consultation. Follow-up was scheduled for every 15 days after initiation of treatment.

On subsequent first follow-up near acuity was improved up to N8 (@ 25 cm) and distance visual acuity was improved up to 6/9 in both eyes with prescribed optical correction and patient was symptomatically relived. Clinical report from neurology department and psychiatry department reveled subject had normal neurological psychiatric finding with no anxiety hysteria and emotional stress. Subject was advised to continue same treatment for next 15 days and 2nd follow-up was scheduled after 15 days.

On 2nd follow-up near acuity was improved up to N 6 (@ 25 cm) and distance visual acuity was 6/9 in both eyes with prescribed optical correction and patient was symptomatically better. On orthoptic evaluation during 2nd follow-up, subject was orthophoric for both distance and near. After 2nd follow-up doses of cycloplegic drug were tapered to once daily before sleep and same optical correction was continued till next follow-up.

On 3rd follow-up near acuity was improved up to N 5 (@ 25 cm) and distance visual acuity was improved up to 6/6 in both eyes with prescribed optical correction and patient was fully relived. On orthoptic evaluation during 3rd follow-up accommodative facility, negative relative accommodation and convergence was improved to normal values.

Then patient was advised to discontinue cycloplegic drug completely but was suggested to wear initial glass prescription on full time. Finally, subject was advised to avoid triggering factors such as excessive near work, low lighting work environment, and activities of visual overload.

Discussion

AS also termed as hyper accommodation, pseudomyopia, and ciliary spasm has been attributed to either excessive action of the ciliary muscle or excessive flexibility of the crystalline lens (3). Clinically, AS is defined as a condition in which the accommodative response exceeds the accommodative stimulus and a lead of accommodation is noticed (4).

Apart from psychological stress and excessive near work, certain conditions predispose to it viz. Topical miotics (parasympathomimetic and cholinergic), (5) after refractive surgery (LASIK surgery and photorefractive keratectomy), (6) after head trauma, (7) due to central lesion involving dorsal midbrain or idiopathic intracranial hypertension, (8) rare causes reported are Brimatoprost induced, (9) and secondary to long-standing intermittent exotropia (10).

Joel Hyndman suggested that three presentations, namely, AS, CS, and spasm of near reflex (SNR) are varied expressions of the same condition (11). However, some authors make a distinction between these conditions in certain instances. London et al. state that AS and CS due to head trauma should be considered a distinct clinical entity from SNR, as treatment and prognosis differ for these patients. (7) Cogan et al. stressed the importance of pupil miosis as a necessary and always present finding in case of SNR (12).

Different interventions have been employed for the treatment of AS including cycloplegics, miotics, plus lenses, minus lenses, vision therapy, and occlusion of nasal section of spectacle lenses with variable results (13). Common treatment modality is by prescribing bifocals with cycloplegic drops like atropine (14). In our cases, we used single vision plus lens and tropicamide 1% eye drop as a cycloplegic for the treatment of subjects diagnosed with pseudomyopia.

In our study, we had two cases diagnosed on the basis of hypermetropic shift after cycloplegic refraction along with the presence of predisposing factor as excessive near work. Both the subjects had milder asthenopic symptoms along with suboptimal distance as well as near visual acuity. Tropicamide 1% eye drop was used twice a day along with single vision plus lens (based on post-mydriatic treatment after 3 days) on both subjects along with avoidance of triggering factors. Dosages of tropicamide were tapered after two follow-ups of 15 days each to once daily before bedtime. The tapering of dosages of tropicamide was done on the basis of the symptomatic relief noticed by the subjects after each follow-up. In the study by Laria et al., (15) they prescribed 1% atropine once a day and spectacle of + 1.0 in both eyes to control the accommodation of their patient with near reflex spasm. Similarly Shanker and Nigam (10) administered 1% atropine twice a day for 1 week with punctual occlusion to relax the accommodation of a patient with the SNR. However, Wakayama et al. (16) reported a higher incidence of adverse effect with 1% atropine. On the other side, we used tropicamide 1% Eye drop as cycloplegic due to its fewer ocular as well as systemic side effects along with short duration of action as compared to similar dose of Atropine. Optical intervention, typically bifocal glasses for near work, are recommended in the management of pseudomyopia along with atropine (17). However, in our study, we use single vision plus lens along with tropicamide for the treatment of pseudomyopia which gave the similar result as the conventional treatment modalities. Tropicamide being weaker cycloplegic as compared to atropine did not cause complete loss of ciliary muscle tone and low amount of plus lens correction eased the near visual task along with relaxation of accommodation throughout the treatment period. Similarly, the low amount of plus lens power prescribed for near did not cause significant distant blurring in both of our subject as there was hypermetropic shift post cycloplegia hence single vision plus lens were preferred over bifocal in our case scenario.

After 45 days (3 follow-ups) of initiation of treatment,

the AS and asthenopic symptoms completely resolved along with full recovery of distance and near visual acuity to 6/6 OU and N5, respectively. Large sample size and continuous follow-up for longer duration need to be done to aid in more concrete decision.

The use of single vision plus lens and tropicamide 1% seems to be effective in the treatment of AS. Our case study has added light into the use of safer and short acting cycloplegic drug i.e., Tropicamide 1% over existing treatment modality of atropine 1% for the treatment of pseudomyopia. Hence, the combined intervention of tropicamide 1% and single vision plus lens proved to be the convenient and effective mode of treatment of AS.

Disclosures

Informed consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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