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Original Article

Spasm of Near Synkinetic Reflex: Outcomes of a Comprehensive Management Protocol

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ABSTRACT

Objective: To find out the frequency of spasm of near reflex presenting to our clinic and outline the management outcomes.
Study Design: Quasi-experimental study.
Place and Duration of Study: Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, from May to Dec 2022.
Methodology: A patient who was suspected to have spasm of near reflex underwent subjective and objective refraction and detailed orthoptic evaluation. Dry and cycloplegic retinoscopy was obtained along with post-mydriatic refraction achieved after 3 days of Cycloplegic. Spasm of near reflex was categorized as mild if it resolves on administration of a weaker cycloplegic drug like cyclopentolate, moderate if administration of stronger cycloplegic i.e., atropine/homatropine is required or severe if long term home therapy of atropine 0.5% once daily is required.
Results: Our study included 236 patients with suspected spasm of near reflex, among which it was confirmed in 200 only. Of the 200 patients with confirmed spasm of near reflex, there were 74 mild cases (37%), with no spasm of near reflex during their post-cycloplegic visit. Eighty-eight patients (44%) had moderate spasm of near reflex that was relieved by the post atropine examination. Whereas, 38 patients (19%) had severe spasm of near reflex, requiring long-term atropine 0.5% management.
Conclusion: Spasm of near reflex is often a diagnostic dilemma which is otherwise not very difficult to treat. Most of such cases were found to be mild to moderate having good visual outcomes to once or twice application of moderate (Cyclopentolate 1%) to stronger acting Cycloplegic eye drops (Atropine 1%).

Keywords: Cycloplegic refraction, Pseudo myopia, Refractive error, Spasm of near reflex, Spasm of near synkinetic reflex.

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INTRODUCTION

Spasm of the near reflex (SNR), also known as near synkinetic reflex is a rare clinical occurrence characterized by multiple episodic accommodation spasm, esotropia and pupillary miosis.[1] Patients with this condition usually present with temporary episodic diplopia and blurred vision along with a range of nonspecific symptoms such as headache, visual fluctuation, ocular pain and dizziness.[2]

The Near reflex is a normal physiological response due to changing the visual focus of the eye. When a person shifts their gaze from a far object to a near object the process of accommodation, pupillary miosis and and convergence is elicited in order to maintain proper visual focus. In individuals with SNR, this process is defective in that their eyes do not revert back to their original unrelaxed state even if they look at a distant object.[3]

The phenomena of accommodation, convergence and pupillary response occurring in SNR are collectively referred to as the near-triad.[4] The diagnosis of the condition is primarily clinical however the fact that is an extremely rare occurrence makes initial diagnosis challenging and patients often undergo a myriad of diagnostic screening tests before the condition can be identified.[5]

SNR can be classified as either functional or organic. Functional refers to SNR being caused due to anxiety or some form of emotional distress in a patient who does not have any other underlying disease. This is the more common form of SNR. Organic SNR occurs due to some underlying pathology and can be due to multiple causes including tumors, multiple sclerosis and congenital anatomic abnormalities such as Arnold chiari malformations among others.[6] SNR in paediatric patients has been mistaken for bilateral sixth nerve paresis and transient esotropia in the past.[3,7]

SNR is primarily a clinical diagnosis but different studies have been done which use an objective assessment method to confirm SNR. In one study SNR was confirmed primarily by the presence of hyperopic shift >2.00 D in cycloplegic retinoscopy when compared to the non-cycloplegic retinoscopy. A similar assessment method was used for SNR diagnosis in another study assessing clinical characteristics and assessment methods for SNR.[2,4]

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There is no definitive treatment protocol for SNR management. Etiology is highly variable and unless there is high index of suspicion, diagnosis is delayed. Literature reports management of SNR with primarily cycloplegic drugs such as atropine. atropine was used as a treatment modality but although it provided immediate clinical effect, Fitzgerald reports that it did not produce a lasting affect.[8] Regardless, atropine remains one of the primary treatments used for SNR with dosing depending on the severity of the SNR present. Initially the dose is kept high and is gradually tapered over a period of months. Other treatment modalities having been using in the past with inconsistent results include plus lenses, minus lenses, occluders and miotics.[3] Objective of our study was to find out the frequency of spasm of near reflex presenting to our clinic and outline the management outcomes.

METHODOLOGY

The quasi-experimental study was conducted at department of Pediatric Ophthalmology and Strabismus, Armed forces Institute of Ophthalmology (AFIO) Rawalpindi Pakistan, from May 2022 to December 2022. Written informed consent was taken from participants of the study and confidentiality of data was maintained at all tiers. Hospital Ethical Review Committee approved the study protocol (ERC# 276/AFIO). A single investigator collected the data on preformed Microsoft Excel Sheet and all data was analyzed by a different investigator unaware of the study objectives to reduce the bias. A sample size of 73 was calculated using OpenEpi software online keeping reference prevalence of 5% and a confidence level of 95%.[1]

Inclusion Criteria: Patients with diagnosed or suspected spasm of near reflex were included.

Exclusion Criteria: None

A patient was suspected to have spasm of near reflex, if there is difference in dry and Cycloplegic refraction with >2 dioptres (D), history of new onset blurring of vision with unrema-rkable anterior and posterior segment examination, myopia on automated refractometer readings and or vacillation of retinoscopic reflex i.e. change in retino-scopic reflex from with movement to against moment or vice versa over a short span of time, and/ or change in pupil size or squint (esodeviation) which changes with cycloplegia with cyclopentolate 1% drops. All such patients underwent subjective and objective refraction and detailed orthoptic evaluation. Dry and cycloplegic retinoscopy was obtained along with auto-refractometry and post-mydriatic refraction achieved after 3 days of Cycloplegic. SNR was categori-zed as mild if it resolves on administration of a weaker cycloplegic drug like cyclopentolate, moderate if administration of stronger cycloplegic i.e. atropine/ homatropine is required or severe if long term home therapy of atropine 0.5% once daily is required overcome the spasm of near reflex.

Data was analyzed using Statistical Package for the social sciences (SPSS) version 23. Baseline variables were analysed descriptively using frequencies and percentages for qualitative variables and mean with standard deviation for continuous variables. Statistically significant differences in pre and cycloplegic assessed using Paired sample t-test. The correlation coefficients was determined taking *p*-value ≤0.05 as significant.

RESULTS

Our study included 236 patients with suspected SNR, among which SNR was confirmed in 200 only. The average age of the study participants was 17.10± 5.71 years. Out of the total 200, 76(38%) patients were females and 124(62%) were males. Majority of the patients 70(35.0%) Blurred Vision followed by Headache 50(25%), Eye Pain 18(9.0%), Eye Deviation 12(6.0%), Watery and Itchy Eyes 12(6%), Shaking Objects 6(3%), Dizziness and Nausea 6(3.0%) and Ear pain 4(2%). However, 164(32%) patients did not have medical Surgical History while 8 patients (4.0%) had Protid Gland Swelling, 10(5%) patients had Emotional Disturbance, 6(3.0%) patients had Dengue Fever, 6(3.0%) patients had Dermolipoma, 4(2%) patients had Sinusitis and only two patients (1.0%) had Gastritis. (Table-I). Out of total, 36 patients had misdiagnosis. Details of the misdiagnoses (who had other underlying pathologies but were suspected to have SNR at filter clinic) given in Table-II. Of the 200 patients with confirmed SNR, there were 74(37.0%) mild cases, with no SNR during their post-cycloplegic visit. Eighty-eight (44.0%) patients had moderate SNR that was relieved by the post atropine examination. Whereas, 38 patients (19.0%) had severe SNR, requiring long-term atropine 0.5% management (Figure-1).

There was statistically was seen in mean of visual acuity of the left and right eyes in pre-cycloplegic, and post-cycloplegic stages (*p*-value <0.001) shown in Table-III.

The left eye had positive correlation for presenting visual acuity pre and cycloplegic (r 0.841; *p*-value <0.001) and right eye had negative correlation (0.971, *p*-value=0.171) in pre and post-cycloplegic stages shown in Table-IV.

Table-I: Demographic Characteristics Common presenting Complaints and Medical Surgical History of the Patients (n=200)

Parameters	Value
Gender	
Male	76 (38.0%)
Female	124 (62.0%)
Mean age (Years)	17.10±5.71
Symptoms	
Blurred Vision	70 (35.0%)
Headache	50 (25.0%)
Eye Pain	22 (11.0%)
Double Vision	18 (9.0%)
Eye Deviation	12 (6.0%)
Watery and Itchy Eyes	12 (6.0%)
Shaking Objects	6 (3.0%)
Dizziness and Nausea	6 (3.0%)
Ear Pain	4 (2.0%)
Medical Surgical History	
No	164 (32.0%)
Dengue Fever	6 (3.0%)
Dermolipoma	6 (3.0%)
Protid Gland Swelling	8 (4.0%)
Sinusitis	4 (2.0%)
Gastritis	2 (1.0%)
Emotional Disturbance	10 (5.0%)

Table-II: Misdiagnosis at initial presentation (n=200)

Misdiagnosis	n (%)
Maculopathy	6 (16.7%)
High Myopia	12 (33.3%)
Disc Pallor	8 (22.2%)
Amblyopia	5 (13.9%)
CN3 Palsy	2 (5.6%)
CN6 palsy	1 (2.8%)
Retrobulbar Neuritis	2 (5.6%)

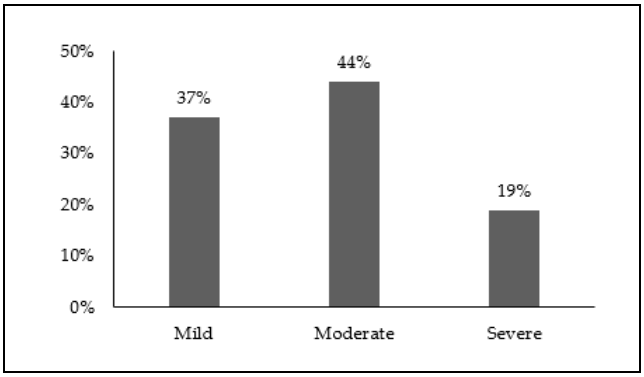

Figure: SNR status of the Patients (n=200)

Table-III: Comparison of Pre and Post -Cycloplegic Refraction (n=200)

Eye	Mean of Visual Acuity		*p*-value
	Pre-Cycloplegic	Post-Cycloplegic	
Left	0.57±0.27	0.72±0.29	<0.001
Right	0.06±0.01	0.41±0.20	<0.001

Table-IV: Correlation of pre-Cycloplegic and post-Cycloplegic (n=200)

Eye	r-value	*p*-value
Left (Pre-Post Cycloplegic)	0.841	<0.001
Right (Pre-Post Cycloplegic)	-0.971	0.171

DISCUSSION

The primary mechanism responsible for near vision involves constriction of the ciliary muscle, convergence of both eyes and pupillary constriction. Any weakness in this system can lead to accommodative spasm. According to a systematic review conducted on accommodative spasm, the most common causes found were emotional distress, head injury and strabismus.[9] Another study reports an overactive parasympathetic nervous system as a potential cause for spasm of the near reflex.[2] While multiple types and causes have been reported, the exact mechanism behind the phenomenon remains unclear.

According to a retrospective case series done on 22 patients with SNR, episodic blurry vision with headache were the most common presenting complaints.[2] Our study included a total of 200 patients with SNR with headache and blurry vision being the most common symptoms as well. Another study which included approximately 1300 patients, 66 of which were diagnosed with SNR. Forty four patients were recruited for the study and around 24% of patients had all three near triad components. About 71% of patients had accommodation component involvement which is the exact same percentage found in our study with 142 (71%) patients having accommodation component involvement. Most patients had marked improvement with cycloplegic agent administration while 19% of patients (38%) needed long term atropine. Similar findings are reported in other studies.[2]

Another study by Daum *et al*. involving 114 patients showed similar results to our own with the most predominant presenting symptom being accommodative dysfunction with 96 patients having the complaint. Most patients presented with headache and blurring of vision. While a large majority of patients in

our study had significant improvement with cycloplegics, Daum reports that only about half of the patients had long term improvement in his study.[10]

There is no established treatment protocol for SNR. While most patients are treated with cycloplegic medications, the clinical course is variable. Some may show immediate improvement and do not need multiple doses while some require long term cycloplegic treatment for successful resolution.[11] Hyndman *et al*. suggests that a definitive management protocol for SNR may not be possible due to the highly varied nature of its causes. Management is governed by the underlying cause.[12] Other treatment options that have been used for SNR treatment include plus reading lenses, modified optical fogging, vision therapy and orthoptic training.[13] The primary treatment modality used in our study was cycloplegic therapy. An important factor to consider during management of SNR is that due to the rare occurrence, patients are often subjected to a long plethora of unnecessary tests causing significant emotional and financial burden to the patients and their families. A proper early identification can prevent such distress and patients can be effectively managed with minimal treatment or in cases of functional SNR, appropriate psychological therapy and reassurance.[14]

In recent times prolonged screen time has presented itself as a potential cause of different ocular disorders in children. The mean age of patients in our study is 17.10±5.7 years and one can propose that increased daily screen time is a potential contributor to the increased recent incidence of accommodative spasm. Studies in Greece and Sweden have shown that a large percentage of children exceed the daily recommended screen time.[15,16] Spasm of near reflex is often an undiagnosed problem causing asthenopic symptoms in children and young adults. Underlying cause is often an undiagnosed refractive error thus, cycloplegic refraction is the recommended first step in manage-ment of all patients suspected to have spasm of near reflex.[17,18]

More study into this is warranted to confirm if there is some association between prolonged screen time and accommodative disorders.

LIMITATIONS OF STUDY

We were not able to determine the exact underlying cause of the SNR in different patients which would have allowed a better assessment of which conditions more commonly cause SNR. In addition, we were not able to acquire information regarding screen time from the patients. Doing so would have allowed us to see if there is some correlation between increased screen time and development of SNR in pediatric patients. We compared pre- and post-cycloplegic visual acuity however and to our knowledge, there have been no studies doing such a comparison. Doing so allowed us to assess patient quality of life after treatment and to see if cycloplegic treatment benefits patients in their day to day interactions.

CONCLUSION

Spasm of near reflex is often a diagnostic dilemma which is otherwise not very difficult to treat. Most of such cases in our study were found to be mild to moderate having good visual outcomes to once or twice application of moderate (Cyclopentolate 1%) to stronger acting cycloplegic eye drops (Atropine 1%).

Conflict of Interest: None

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AQ & SN: Supervision, Conception, Study design, analysis and Interperitation of data, Critically reviewed manuscript & approval for the final version to be published.

TAK & TL: Critically reviewed, Drafted manuscript & approval for the final version to be published.

MAF & FH: Data collection and entry & approval for the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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