Practice patterns on the non-surgical management of intermittent exotropia among members of the Philippine Society of Pediatric Ophthalmology and Strabismus: a cross-sectional study

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Abstract

Objective Intermittent exotropia (IXT) is the most common form of strabismus that warrants standardized management for better and predictable outcomes. Currently there are no preferred practice guidelines on the non-surgical management of IXT. Among the aforementioned methods, orthoptics is the most favored by optometrists and ophthalmologists based in China and Israel. However, consensus statements on the use of such modality are yet to be established. This study aimed to identify preferred non-surgical management strategies for intermittent exotropia (IXT) among members of the Philippine Society of Pediatric Ophthalmology and Strabismus (PSPOS).

Methods The survey collected data on respondent and patient demographics, perceived causes of IXT, clinical course, and management preferences. Incomplete responses were excluded, and data were analyzed using frequency distribution and the Fisher test.

Results Forty of 54 (74%) PSPOS members participated, predominantly from urban settings (34 respondents). Most IXT cases were children aged 4 to 11 years. The proportion of pediatric patients was not significantly influenced by respondents' age (p=0.1628) or practice region (p=0.451). Twenty-one (52.5%) respondents cited fusion defects as the primary cause of IXT. While twenty-one noted an unpredictable course, 14 identified it as a progressive course. Overminus lenses were preferred for younger patients (1-4 years), with an increasing preference for orthoptics in older age groups (5 to>18 years). Pediatric ophthalmologists aged 30 to 40 years (p=0.005) and those with 1 to 5 years of experience (p=0.020) favored overminus lenses for 5-10-year-olds. Preference for overminus lenses was stronger outside the NCR (p=0.044). Furthermore, 90% of respondents said surgery shouldn't be performed at diagnosis, and 42.5% of respondents were against it for younger ages.

Conclusions The findings revealed a strong preference for overminus lenses among PSPOS members, with increasing use of orthoptics for older patients. Factors influencing management decisions included respondent age, practice region, and perceptions of IXT's cause and course. Future randomized controlled trials are essential to evaluate non-surgical interventions and develop comprehensive treatment guidelines.

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Intermittent exotropia (IXT) is the most common form of strabismus that warrants standardized management for better and predictable outcomes.[1] IXT can lead to possible loss of stereopsis and amblyopia

since the development of the visual cortex requires the transmission of a sharp image as a stimulus.[2] Amblyopia is particularly debilitating since it involves a decrease in vision that, if not treated early enough, becomes permanent even if the ocular pathology is removed later on in life.[3]

While extraocular muscle surgery is an option for addressing ocular misalignment, non-surgical alternatives are initially considered due to the general risks associated with surgery, including infection, severe inflammation, potential under correction, consecutive esotropia, and the risk of retinal detachment[4,5]. The use of non-invasive modalities such as prisms, over minus lenses, orthoptic exercises, and part-time patching allows for more accurate diagnosis, quantification of the amount of deviation and prevention of amblyopia.[4,5]

Currently there are no preferred practice guidelines on the non-surgical management of IXT.[6] Among the aforementioned methods, orthoptics is the most favored by optometrists and ophthalmologists based in China and Israel.[4,7] However, consensus statements on the use of such modality are yet to be established. This study aimed to survey the practice patterns of the Philippine Society of Pediatric Ophthalmology and Strabismus (PSPOS) members in managing intermittent XT through an online survey. The PSPOS is an organization of fellowship-trained pediatric ophthalmologists, with a current membership of 54 professionals practicing across the Philippines. This study may aid in streamlining existing management strategies. Additionally, such findings may serve as a practical guide for general ophthalmologists and trainees lacking access to pediatric ophthalmology consultation.

Methods

This study was approved by the Ethics Review Committee of the UERMMMCI Research Institute for Health Sciences (RIHS ERC Code: 1695/H/2024/062). The authors conducted a cross-sectional, questionnaire-based study among pediatric ophthalmologists and strabismologists across the Philippines through PSPOS to examine the preferred nonsurgical methods for managing intermittent exotropia. Through the PSPOS Viber conversation group, a link to the informed consent was shared, outlining the goals, methods, and data security protocols of the study. All of the 54 PSPOS members were asked to take part in the research. Although some participants were permitted to select 'other' if the options did not align with their preferences, all participants were obliged to respond to it. Participants were prompted before moving on to the next portion if a question remained unanswered. The survey questions were adapted from a survey conducted in China, with modifications and additions made by the investigators of this study[4]. Prior consent for the use of these questions was obtained. The final list of questions was evaluated by eight pediatric ophthalmology fellows in training under PSPOS member consultants. Only questions with a mean acceptance rating of 80% or higher were included in this study.

The finalized survey questions were categorized into demographics, practice characteristics, clinical opinions, and preferences. An electronic questionnaire was administered via www.kwiksurveys.com.

To be included in the study, respondents must have access to an electronic device and internet connection and must have consented to participate in the survey. Responses were excluded if the respondent did not complete the online survey.

The demographics, characteristics of their practice, clinical opinions, and preferences were presented using descriptive statistics. Subgroup analysis was done looking into participant's age in years (31-40, 41-50, 51 and above), years of practice (1-5, 6-10, 11-15, greater than 15 years), region of practice, practice profile. The Fisher test with a significance p-value of 0.05 was used to determine significant differences in opinion between subgroups.

Results

Strabismologist Profile and Practice Profile

Of the 54 current PSPOS members invited to participate, 40 members responded (74.1%). The respondents' ages ranged from 30 to 80 years. The majority were female (65%), and most (85%) practiced in metropolitan areas, with 21 (52.5%) respondents indicating they spent more time in the city than in the province. In terms of regional distribution, 25 (62.5%) respondents practiced in the National Capital Region (NCR), followed by Region IV-A (Calabarzon) and Region III (Central Luzon). Most respondents had been practicing as strabismologists for one to five years. Intermittent exotropia (IXT) affected between 20% and 50% of the individuals they treated and

most IXT patients were between the ages of 4 and 11 (Table 1).

Intermittent Exotropia: Etiology

The factors that respondents considered as the main cause of IXT are shown in Table 2. Of the 40 respondents, 21 (52.5%) considered fusion mechanism defects as the main cause of IXT. Notably, eight (20%) were uncertain of the cause and two (5%) respondents chose the "other" options which they identified as multifactorial and genetic causes.

Natural Course Without Intervention

There were 21 (52.5%) who believed that IXT could be progressive, stable, or improve over time, while 14 (35%) believed the condition was solely progressive. Only a few considered the disease to be stable (12.5%), and none believed it would improve spontaneously (Table 3).

Non-surgical Management

As shown in Tables 4 and 5, 12 (30%) respondents preferred using the same nonsurgical management

Table 1. Demographics of respondents and patients

		Frequency (n=40)	Relative Frequency
Gender	Male Female	14 26	35% 65%
Age	31-40 41-50 51 above	12 19 9	30% 47.5% 22.5%
Years in practice	1 - 5 6 -10 11 - 15 >15	13 10 8 9	32.5% 25% 20% 22.5%
Percent of practice in urban areas	<5% 6 - 10% 11 - 20% 21 - 50% 51 - 100%	6 3 2 8 21	15% 7.5% 5% 20% 52.5%
Percent of practice dealing with pediatric patients	6 -10% 11 - 20% 21 - 50% 51 -100%	7 3 7 23	17.5% 7.5% 17.5% 57.5%
Percentage of patients with IXT in a month	<5% 6 -10% 11 -20% 21 - 49% 50 -100%	2 4 16 14 4	5% 10% 40% 35% 10%
Place of Practice	NCR Region IV-A Region III Region V Region VI Region VII Region X	25 5 3 2 2 2 1	62.5% 12.5% 7.5% 5% 5% 5% 2.5%
Age group when IXT is diagnosed	4 -11(School Age) 11 - 18 (Adolescent)	39 1	97.5% 2.5%

method across all age groups while 28 (70%) chose different methods depending on the child's age. Among these, seven (17.5%) selected overminus lenses as their preferred method, while two (5%) preferred observations, two (5%) chose part-time patching, and one (2.5%) opted to correct refractive errors based on the specific refractive situation. Of the 12 respondents, eight frequently use overminus lenses, 2 use part-time patching, 1 uses botulinum injection, and 1 prefers observation.

Tables 4 and 5 are the preferences per age group of the remaining 28 respondents. For the ages 1 to 4yo, 15 out of 28 (53.6%) preferred overminus lenses and considered it as effective management, this was followed by observation and part time patching. Their choice was they saw good compliance with these methods and that the provision of a good retinal image was essential for this age group. Three of the respondents chose to provide unadjusted refraction and one mentioned enforcing the reduction of gadget use as an option to lessen the likelihood of furthering the development of high refractive error.

For the age group of 5-10 years, 12 out of 28 participants (42.9%) identified overminus lenses as the most effective option for them, while 14 participants (50%) selected it as the most frequently used choice. A total of 8 participants (28.6%) and 6 participants (21.4%) out of 28 identified orthoptics as the most effective and most frequently used options, respectively. The primary objectives for this age group were to establish a clear vision, prevent amblyopia, and to improve the deviation. Overminus glasses was chosen as the preferred management in 12 (42.9%) of 28 and frequently used in 10 (35.7%) of 28 for the age group of 11-18. A greater percentage chose orthoptics for this group, with 8 (28.6%) and 9 (32.1) choosing it for most effective and most frequently used respectively (Table 4).

For patients older than 18 years old, an equal number of respondents chose overminus and orthoptic exercises, with 9 choosing it as most effective and 8 choosing it as most frequently used.

Subsequently, the respondents were asked if supplemental treatment was needed and what their choice of management was. Eighteen out of 40 (45%) chose orthoptic exercises as the most frequent option followed by part time patching (22.5%) as seen in Table 6.

Timing of Surgery

The respondents were asked regarding the choice of early surgery to gain superior sensory outcomes based on these timings: (a) surgery at a younger

Table 2. Factors that practitioners considered as the main cause of intermittent exotropia

Factors	Response (N=40), No (%)
Defects of fusion mechanism	**21 (52.5%)**
Defects of other cortical mechanisms	5 (12.5%)
Abnormality of extraocular muscles	4 (10%)
Uncertain	8 (20%)
Other (Inheritance, Mixed)	2 (5%)

Table 3. The clinical course of the natural course of intermittent exotropia without intervention

Timing of surgery	Response	No (%)
Progressive	14	35%
Stable	5	12.5%
Improve	0	0%
Each of the above is possible	21	52.5%
Total	**40**	**100%**

Table 4. Most effective non-surgical options for patients with intermittent exotropia

Interventions	Any age (N=12)	1-4yo (N=28)	5-10yo (N=28)	11-18yo (N=28)	>18yo (N=28)
Overminus lenses	7(58.3%)	15 (53.6%)	12(42.9%)	12(42.9%)	9(32.1%)
Part-time patching	2(16.7%)	4 (14.3%)	1(3.57%)	1(3.57%)	1(3.6%)
Observation	2(16.7%)	4 (14.3%)	4(14.3%)	4	4(14.3%)
Orthoptic exercises	0(0%)	2 (7.1%)	8(28.6%)	8	9(32.1%)
Prisms	0(0%)	0(0%)	0(0%)	0(0%)	1(3.6%)
Botulinum toxin A injection	0(0%)	0(0%)	0(0%)	0(0%)	1(3.6%)
Others	1((0%)	3(10.7%)	3(10.7%)	3	3(10.7%)

Table 5. Non-surgical options for patients with intermittent exotropia

Interventions	Any age (N=12)	1-4yo (N=28)	5-10yo (N=28)	11-18yo (N=28)	>18yo (N=28)
Overminus lenses	8(66.7%)	15(53.6%)	14(50%)	10(35.7%)	8(28.6%)
Part-time patching	2(16.7%)	4(14.3%)	1(3.6%)	1(3.6%)	1(3.6%)
Orthoptic exercises	0(0%)	1(3.6%)	6(21.4%)	9(32.1%)	8(28.6%)
Observation	1(8.3%	5(17.9%)	4(14.3%)	5(17.9%)	4(14.3%)
Botulinum toxin A injection	1(8.3%)	0(0%)	0(0%)	0(0%)	0(0%)
Prisms	0(0%)	0(0%)	0(0%)	0(0%)	4(14.3%)
Others	0(0%)	3(10.7%)	3(10.7%)	3(10.7%)	3(10.7%)

Table 6 Supplementary treatment for patients with intermittent exotropia

Interventions	Any Age
Orthoptic exercises	18(45%)
Part-time patching	9(22.5%)
Overminus lenses	6(15%)
Prisms	2(5%)
Observation	2(5%)
Others (Surgery)	3(7.5%)

age; (b) surgery within the critical period or time when stereopsis is susceptible (around 3-6 months)[8] (c) surgery at initial IXT diagnosis; and (d) surgery while the severity of IXT increases in terms of either angle of exodeviation or control of exodeviation or stereoacuity. Seventeen (42.5%) respondents disagreed with the idea of surgery at a younger age while 13 (32.5%) agreed and 10 (25%) were uncertain (Table 7). Thirty-nine out of 40 (97.5%) said that surgery would be done when the deviation worsened while 28 out of 40 (70%) agreed that surgery should be done at the critical period and. On the other hand, 36 out of 40 (90%) disagreed that surgery would be done at the time of diagnosis or shortly after.

The percentage of pediatric patients seen by respondents was not influenced by age (p = 0.1628) or region of practice (p = 0.451). Additionally, the duration of practice and the age of the respondent did not demonstrate an impact on their preferred nonsurgical management approach. Given the variation in preferences across regions, the authors examined the relationship between the practice region and the perceived primary cause of IXT. No significant difference was observed between the NCR region and the other regions (p = 0.764). Respondents aged 30 to 40 years (p= .005), who have between 1 and 5 years of pediatric ophthalmology practice (p= 0.020), demonstrated a preference for the use of overminus lenses for patients in the 5–10-year age group. A comparison of the combined regions to the National Capital Region revealed a significant preference for the use of overminus lenses among children aged 1-4 years in the other regions (p= 0.044). A difference in preference for NCR was noted, with some individuals choosing to observe while others engaged in part-time patching as the initial management approach. For respondents outside NCR, the utilization of overminus lenses continued to dominate among various age groups, accounting for 60%, 66.67%, and 60% for the ages of 5-10 years, 11-18 years, and over 18 years, respectively. A preference for the use of overminus lenses was observed among individuals who attributed the primary cause of IXT to abnormalities in extraocular muscles or defects in the fusion mechanism across the age groups of 5 to 10 years (p= 0.008), 11 to 18 years (p= 0.008), and those older than 18 years (p= 0.041). Respondents who viewed IXT as progressive or capable of development in either direction also demonstrated a preference for overminus lenses for children aged 1 to 4 years (p= 0.025).

Discussion

Non-surgical Management

In this study, the authors focused on presenting clinical opinions of pediatric ophthalmologists rather than provide a practice pattern or a consensus. Ophthalmologists of the PSPOS considered overminus lenses as the most effective non-surgical management option for all age groups and used them most frequently in their practice in the management of IXT. A majority viewed IXT as having an unpredictable course and tended to prefer employing initially non-surgical methods.

This study showed respondents' preference for overminus lenses and part time patching in the younger age groups (1 to 4year old) with a proportionate increase in tendency to use orthoptics for progressively older age groups (5 to >18 year old). The present study is aligned with research conducted in the UK, which indicated that these two methods were favored among individuals aged one to three.[9] In an Israeli survey on practice patterns, 57% of pediatric ophthalmologists were noted to be using overminus lenses.[10] In addition, the Pediatric Eye Disease Investigator Group

Table 7. Respondents' opinions regarding timing of surgery for intermittent exotropia

Timing of surgery	Agree	Disagree	Uncertain
Surgery while the severity of IXT increases (angle of deviation, control, stereoacuity)	39 (97.5%)	0 (0%)	1 (2.5%)
Surgery within the critical period	28 (70%)	6 (15%)	6 (15%)
Surgery at a younger age	13 (32.5%)	17(42.5%)	10 (25%)
Surgery at initial IXT diagnosis	0 (0%)	36 (90%)	4 (10%)

(PEDIG), a collaborative network of ophthalmologists and optometrists conducting clinical research on childhood eye disorders, including strabismus and amblyopia, found that patients on overminus lenses gained improved distance exotropia control.[11]

Several studies have supported the use of orthoptics in older age groups. An analysis of pooled success rates showed that orthoptics demonstrated the highest success among non-surgical approaches for IXT notwithstanding the study's limitation due to the absence of a standardized definition of success.[12] A study conducted in Hong Kong demonstrated that orthoptic exercises were taught to a group of 117 children with intermittent exotropia (IXT), indicating that this management strategy is widely recognized in the region.[13] An Israeli survey on practice patterns revealed that 66% of respondents, including optometrists and ophthalmologists, expressed a preference for orthoptic exercises.[10] According to a cross-sectional survey in China, orthoptic exercises were the most popular and widely used approach to managing IXT.[4]

Orthoptic activities were preferred by Chinese ophthalmologists and by Israeli optometrists and ophthalmologists in a practice pattern survey.[4,10] In contrast, a survey study conducted by the American Association for Pediatric Ophthalmology and Strabismus (AAPOS) showed that 48% of the respondents rarely or never used non-surgical interventions.[4,14] Of those who did use non-surgical measures, part-time patching (46%) was the most used followed by minus lenses (34%). The authors assumed that the preference for non-surgical options observed in our study was attributed to the prohibitive cost and limited government subsidy for surgery and hesitancy of caregivers to proceed with surgery.

Etiology and Progression of IXT

Generally speaking, it is yet unknown how effective each nonsurgical technique is in comparison to the others.[15] The preference for overminus lenses over alternative non-surgical solutions was not obtained from the authors' survey. The respondents' perception that IXT is a condition brought on by a fusion defect was supported by the selection of overminus lenses. Overcorrecting minus lenses promote accommodative convergence and aid in exodeviation control, as detailed in a prior study.[16] The authors hypothesized that the Philippines' poor health-seeking behavior, particularly by the underprivileged populations, and the difficulties of enforcing compliance are additional factors.[17] Given the unpredictable weather in the nation, overminus lenses provide a simpler option to increase compliance, with follow-ups potentially occurring every six to twelve months.

Surgical Timing

The timing of surgery for IXT has been a topic of discussion and its role in achieving superior sensory outcomes.[18] In the authors' survey, 90% of the respondents believed that surgery for IXT should be avoided on initial diagnosis and only 32.5% agreed with the view that surgery should be done in younger age groups. This finding suggests that most of the practitioners would opt for non-surgical options initially. This is similar to findings in a study in China where only a minority agreed to surgery at initial diagnosis (23%) and surgery for younger age groups (19%).[4] This may be due to a noted incidence of small angle esotropia following surgery on young children.[16]

Strengths

This study had several strengths. First, the questionnaire covered demographics, practice characteristics, and clinical opinions to assess practitioners' strabismus management views. Second, ophthalmologists and trainees helped write the survey questions, improving their content validity. Verification with practitioners allowed for expert feedback and refinement. Thirdly, participant anonymity and voluntary participation may have improved response honesty and reliability.

Limitations

This study was limited by the response rate (74.1%) failing to sample the entire population of PSPOS members. No previous surveys of this population were found. However, this study is likely to be a good representation since response rates were higher than previous studies on IXT practice preferences[4,10] and we saw that the regional distribution of respondents in the study mirrored the distribution of ophthalmologists in the Philippines.[19] Like all surveys, reported opinions

may vary from actual behavior. Even though the most common approach was requested, recall bias may still exist. Since our survey only asked about the "most frequent" option, we could not determine the real frequency of each management approach. Part of this questioning was to keep the questionnaire brief.

Conclusion

In conclusion, this study showed that overminus lenses was the preferred non-surgical management for all age groups. But for 18 years and older, orthoptics use and overminus lenses were equally preferred. Factors that affected the decision to do non-surgical management included age of the respondent, region of practice and the perceived cause and course for IXT. Given the high prevalence of IXT in studies and present data, the authors' findings proposed that future randomized controlled trials be conducted to determine effectiveness of nonsurgical interventions and to establish treatment guidelines for IXT.

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