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InteRyc-volume 2, April, May and June, 2003

UPDATE the contents

ALL INDIA STRABISMOLOGICAL SOCIETY

JKA Institute of Strabismology and binocular Vision

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President AISS, Director JKAI & Author & Editor of InteRyc:
Sudha Awasthi Patney, MBBS, MS (Ophth), FRCOphth (London)

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(NOTE: The following is a repeat for obvious reasons)

A special request to the members: Prevent strabismus and amblyopia in children

This is an appeal to all the members to please start a campaign for prevention of amblyopia. Actually I am of the opinion that a legislation is needed badly, that will make it compulsory that every child's eyes are thoroughly examined by the age of 1 year, so that measures can be taken to prevent amblyopia (strabismic, anisometropic and ametropic) and strabismus. If it could be done for vaccination, it can be done for eye examination also.

At present there is general indifference towards this subject. It is also obvious that pediatricians and ophthalmologists have to be trained not to advise delay in treatment because the patient is a young child / infant. It is tragic that although parents have now become aware of the need for early treatment, the pediatricians only rarely refer them to ophthalmologists who are advising them to wait until the child is 8-10 / old enough for examination. We have to advise them strongly against this practice. If we can not compel the Government to bring in legislation, we can at least alert the public, the pediatric physicians and the ophthalmologists.

It is obvious that many more Institutes of Strabismology are needed in various parts of the country. Would you, dear members, be willing to take on the task of starting a branch of this JKA Institute in your area? *Any help and advice that I am capable of providing will be forthcoming. You will need some basic instruments to start with. Orthoptic instruments are the cheapest of the lot, have you noticed*? *Please let me know at once if you are interested.*

Please try to alert the patients, parents and other relatives, the public and other physicians, particularly ophthalmologists and pediatricians about the dangers of amblyopia, strabismus and other complications if significant refractive errors are not corrected within the first years of life and if strabismus is not treated immediately.

It is very painful to see so many cases of amblyopia. This condition, as you know, is totally preventable if treated early, whatever the age of the patient, the younger the better. The best time is immediately after the start of strabismus. However, it is obvious that to prevent ametropic and anisometropic amblyopia and in many cases strabismus, the children have to be thoroughly checked at least once by the age of 1 year. The saying that prevention is better than cure is *truest* in the case of strabismus and amblyopia.

INFORMATION

1. *About the Institute (and Sitapur Eye Hospital)*

A) *The need to have a squint treatment center* and a training center for strabismologists and orthoptists in India could not be ignored anymore in *nineteen fifties*. Dr. H.L.Patney felt it most acutely as he had trained as a premedical student, medical undergraduate and postgraduate in ophthalmology in UK. He had been doing orthoptics, contact lenses and all types of surgery as a Registrar in the Ophthalmology department of the Royal Cardiff Infirmary in Cardiff, Wales, UK back in 1942-44. He had the good fortune of being the assistant of Sir Tudor Thomas and used to assist him in his private practice also. Sir Tudor Thomas was a living legend in those days and was a pioneer in keratoplasty. However, he did all types of operations including retinal detachment repair and plastic surgery. Young Dr. Patney was given lots of opportunity to operate even on Sir Thomas' private patients. Sir Thomas was a very famous and busy man and he must have had confidence in Dr. Patney's prowess in surgery as he gave him even major surgeries to do. Sir Thomas' words and signatures on Dr. Patney's old books testify to this.

In 1946 when Dr. H.L. Patney was asked by Dr. M.P. Mehrey, the founder of Sitapur Eye Hospital, to make a plan for the expansion of the hospital, he did a thorough job. He included in the plan, the name of *a squint / orthoptic department and school* along with those of ocular pathology, instrument factory, blind school, optometry school, postgraduate institute of ophthalmology, trainee's hostels, staff's residences etc. Much later he used to say that everything in that plan materialized except a boundary wall.

Dr. Mehrey who was himself keen on keeping everything upto date in his hospital happily worked hard to realize their dreams. It took them a few years to get a first rate orthoptic department and school.

1) The beginning was with *an orthoptic department* in early fifties by Dr. Patney who taught a smart compounder in the hospital the basic techniques of orthoptic examination and exercises on synoptophore.

2) *The Orthoptic School* was started in 1960 and according to plan Dr. Sudha Awasthi (who was at that time in K.G. Medical College, Lucknow) was asked to join the hospital by Dr. M.K.Mehra, (Dr. Mehrey's son). Dr. Awasthi had just passed her MS (Ophth.) from King George's Medical College, Lucknow, and was known to be specially interested in the subject. She joined Sitapur Eye Hospital and was soon after sent to London in October 1960.

3) A first rate orthoptic department, the first in India, which was on the lines of that at Moorfields Eye Hospital (High Holborn branch where Mr. T. Keith Lyle was the Director of the Orthoptic Department), was established after she returned from London after 1 year's training under Mr. Lyle.

B. *The need for imparting training in the subject of strabismology* (including orthoptics), was repeatedly impressed upon Dr. Sudha Awasthi (now Patney) by another living legend of those days, Mr. T. Keith Lyle. He was in 1960 and later for many years, the Dean of Institute of Ophthalmology, London and Director and Surgeon-In-Charge of the famous Orthoptic Department of the Moorfields Eye Hospital (High Holborn branch), London. Dr. Sudha Awasthi was training under him to further her somewhat limited knowledge of the subject, already gained during the running of an orthoptic clinic by her from 1957 to 1959 under the guidance of Prof. M.K.Mehra, a double FRCS.

Mr. Keith Lyle insisted that she should also train like an orthoptist-trainee in their Orthoptic School to gain first hand practical knowledge so that she can train orthoptists and Ophthalmologists / strabismologists with confidence. She stayed at Moorfields Eye hospital for 1 year and was then sent to Germany and Switzerland to learn first hand, pleoptics from the two pioneers (Prof. Cuppers of Giessen, W. Germany and Prof. Bangerter of St. Gallen, Switzerland, respectively). On her return to India in 1961, the ground was ready for her to impart to the ophthalmologists and the orthoptic trainees, special training in strabismology and orthoptics. The *first Squint / Orthoptic department and Orthoptic School of India had already been started at Eye Hospital, Sitapur, which was the premier eye institution of India in fifties, sixties and seventies* (for some more information see the inside of the back page). During her days there she kept on running the squint department, training the orthoptists, DOMS candidates (as Associate Professor in the Nehru Postgraduate Institute of Ophthalmology) and visiting ophthalmologists wishing to learn the subject.

C. *The idea of starting a training institute for strabismology* was conceived soon after Dr. H.L. and Dr. Sudha Awasthi-Patney left Sitapur and came to Rajkot.
The center for squint treatment was being run since their arrival in Rajkot in 1972 but a formal inauguration of a training center was performed in 1983. However, due to Dr. H.L. Patney's serious and prolonged illness the plan had to be kept suspended. The Institute started functioning in real earnest since 1996 but the foundation was being strengthened by Dr. Sudha Awasthi-Patney since 1994. She took a 4.5 months study tour of USA and UK in 1994, followed by annual visits to update her knowledge in preparation for starting and running the Institute and reviving the AISS. New orthoptic instruments were bought and old ones serviced.

D. AS already mentioned, the Institute became functional in 1996 along with the newly revived AISS.

E. At present there are only 29 members in good standing, i.e., the members who have paid up their dues until last year (2001). In all there were 88 registered members. Invitation to join the society was circulated once only. It has never been repeated / sent out again after 1997.

F. The Institute is running a fellowship course by correspondence. A diploma course is soon to be started for people who find the fellowship course too hard.

G. Other activities are the various annual contests, the winners getting trophies and cups and a total of Rs.4350 in cash prizes every year.

H. A free squint camp (diagnostic and surgical) is held every year, usually in collaboration with the Rotary Club of Rajkot Midtown.

I. There is a fellowship (Rs.1000/pm) for members 35 years old or younger during their stay at Rajkot for practical experience. So far nobody has applied for it.

2. <u>About the Society</u>

(1) All India Strabismological Society (AISS) was *conceived and started* by Dr. H.L. Patney and Dr. Sudha Awasthi (now Patney) in 1967. The idea came to them during their participation in the founding session of the International Strabismological Association (ISA), which was held in 1966 at Giessen, W. Germany. Prof. Cuppers, one of the pioneers of pleoptics was the head of Ophthalmology at the Universitats Augenklinik (University Eye Clinic) there. Mr. Keith Lyle was the founding president and Dr. G.K. von Noorden, the founding secretary. Dr. Sudha Awasthi was one of the panelists and speaker at the ISA meeting.
One of the 4 aims of ISA is to spread the knowledge of the subject of strabismology. The other three are given on the inside of the front cover.

(2) The founding meeting of the society was held in Calcutta in 1967 during the AIOS conference. Neither Dr. Patney nor Dr. Awasthi wished to be the President. They asked Dr. L.P.Agarwal to be the first president and he accepted. Dr. Awasthi was the founding secretary and Dr. Patney the treasurer. Many senior and well-known ophthalmologists joined the society.

(3) The first regular meeting was held at Ahmedabad during the AIOS congress in 1968. At the executive committee meeting, a proposal to have the *society registered* was passed. This was done same year.

(4) The first activity of the new society was to hold a 7-days refresher course (workshop) on squint and other ocular motility disorders in September 1967 at Sitapur. It turned out to be very successful, probably because it was the first of its kind in India. Members who were mostly senior ophthalmologists attended it; some of them were fairly well known.

(5) Every year new elections were held and the management of the society changed hands. Somewhere around 1976 the society became defunct.
Note: Frankly speaking, I have recently realized that this is a drawback in the democratic system that a lovingly conceived and nurtured institution / organization may die a premature death if it falls into indifferent hands.

(6) *Revival of the society* was proposed during a meeting (of old members and some other ophthalmologists), that was hastily arranged at the request of Dr. Sudha Awasthi-Patney in 1981 just after the conclusion of Dr. Nagpal's very successful National Symposium on squint. It was decided to revive the society during the next conference of AIOS and Dr. Sudha Awasthi-Patney was asked to be the convener and do it. New and old members gave their names to be enrolled again.
Dr. Awasthi-Patney unfortunately failed to attend the next AIOS conference in 1982 due to the sudden serious illness of Dr, Patney. She requested Dr. B.T. Maskati, the Hon. Gen. Secretary of AIOS to make an announcement that Dr. Awasthi-Patney cannot come now but she will be sending circulars for

a meeting of the society to be held later at Rajkot. She never knew what happened but Dr. Prem Prakash started a new society named as "Strabismological Society of India". It is no use going into the details now.

(7) After a few years' inactivity the AISS was revived in 1996. At present there are 88 members but out of them only 40 *are members in good standing (having paid the subscription fee for year 2002*). Only 11 members have paid for 2002.

3. *About the courses*

(a) *Fellowship*: It is a correspondence course. Theory part is sent in 15 installments of 50-100 pages each, either by **conventional mail or by E-mail**. However, we intend to make the whole course go *Online only*, as has been done by many other institutions. But until that happens the fellowship candidate can make the choice.
Apart from the theory part, some practical experience at our Orthoptic/Ocular Motility Clinic, Rajkot was considered necessary. The period of the practical experience was to be determined by the fellows themselves on the basis of their experience and expertise in the subject but a minimum of 1 month was preferable. The very minimum for somebody with some working knowledge of the subject was one week. When the fellowship candidates attend the clinic they realize that actually one week is not enough even for a workshop as those who attended the September 02 workshop found out. However, in view of the fellows' difficulties in arranging for stay at Rajkot, now it is just necessary to go through four CDs showing examination and surgery. After both the requirements are fulfilled the testimonial/ certificate can be issued.

(b) *Diploma* (to be started soon): Detailed information on request.

4. About the workshops / Refresher Courses

Some of the members who could not attend the September 02 workshop have asked me to hold another one soon. I shall see if it can be done. Summer would have been a good time if it was not for the severity of summer in Rajkot. It is the time when maximum number of strabismus surgeries are performed as children get a 2-3 months holiday from school but it is also the time when temperatures soar to 42-44 degrees C and the sun is very hot. There are suggestions that I hold them at various places where fellows who are keen to hold such workshops are practicing. I shall be glad to know your views on this subject.

5. About InteRyc, the News-Letter-Update of the society:

(A) At present it is being published every three months. Previously it was coming out every two months. If we revive the Indian Orthoptic Journal that had been conceived by Dr. Sudha Awasthi-Patney and started with the help of Dr. J.M. Pahwa in 1963 at Sitapur, the InteRyc may have to be discontinued. However, another alternative is to go Online totally.

(B) It is sent free to every member of the AISS and JKAI but the subscription for membership must be sent every year for it to be economically viable.

6. About the proposed revival of the *Indian Orthoptic Journal*: An opinion poll form was sent in the InteRyc volume3, 02. It is a matter of regret that very few replies (in the form of poll-forms completed and sent back) were received. I appeal to the members to please opine on the subject.
***Background of the Indian Orthoptic journal*: Dr. Sudha Awasthi (Patney) was inspired greatly by her teacher Mr. T. Keith Lyle (read about him under the heading of "In fond memory" on the inside of back cover). He stressed the need of making the subject of strabismus popular among ophthalmologists and campaigning for early diagnosis in infants and children to prevent amblyopia. After coming back to Sitapur Eye Hospital in 1961, she conceived the idea of bringing out an Indian Journal of Orthoptics on the lines of the British Orthoptic Journal. Dr. J.M. Pahwa (who liked the idea and agreed to look after the practical aspect) and Dr. Awasthi (Patney) started the journal in 1963 and looked after it as the editor and the joint editor respectively until her departure from Sitapur in 1972. Dr. Pahwa continued publishing it until a few years back. About 3 years back he asked Dr. Sudha Awasthi-Patney if she would like to restart publishing the journal to which she replied in the affirmative. The journal would probably** replace the InteRyc,

(which is written by her alone) as it will be difficult to publish both. The whole set-up has to change because for a good journal there has to be a managing editor assisted by an editorial board. *It may be a good idea to publish both or one of them online only.*

ATTENTION

1. *The CME quiz-No*.2, 2003 is included in this volume. Please answer it, cut along the dotted line and send it back by conventional mail. The answers to the CME quiz- No.4, 2002 are also included.
2. *The questions in each quiz* are drawn from the material given in that particular issue of the InteRyc under the headings of Strabismus Summary Series, Update, InformIT and Short Review article on Strabismus etc.
3. *Member of the year is chosen on the basis of overall performance during that year, including the answers to the quiz.*
4. The *update questionnaire* is printed on the back of the CME quiz. *Please do answer it if there is any change or addition in the information about phone No., FAX number, mobile phone number, pager number, E-mail address or a web-site address. When I try to call the members on phone I find that many numbers have been changed.*

5. *Fellowship course fees:* Now the total amount to be paid in one lump sum is Rs.1500 *including the mailing charges, if sent by conventional mail.* The mode of mailing each installment is either by registered A.D. post or by couriers, mostly by the latter as it is faster. However, couriers do not go to all the places. Moreover, once an installment sent by the courier did not reach a fellow and another one had to be sent by registered A.D. post. Therefore now, registered post is preferred despite more expense involved. The course installments can also be sent by Electronic mail. The fee for the full course of 15 installments if sent by electronic mail is Rs.900 or US $25. It will be like a full book on Strabismology but much cheaper than similar books available at around $150-200 or more. Moreover, one has to read it through in order to be able to answer the questions at the end of each installment.

6. *The usual procedure of sending the installments*: Installments are sent one by one accompanied by the relevant question paper. The fellow has to answer the questions and send the answer sheet back, on receipt of which the next installment of the course is sent. Previously the fees had to be sent for one installment at a time. This has been changed to save the fellow's time, effort and postal expenses. It is now payable in one lump sum, in advance in the form of a demand draft for Rs1500 or $50 (for the course sent by conventional mail/courier) or Rs.900 (US $25) if sent by e-mail, by demand draft (certified check) in the name of Dr. S.A. Patney, S/B account No.4256 at UCO bank. As explained in earlier InteRycs this is a no profit-some loss venture.

7. *The membership subscription for year 2003* became due on 1st January 2003. Members, who did not pay the subscription for the year 2002 by the end of December 2002 (the final extended date) will not be sent future InteRycs until their subscription is received. As soon as due subscription is received the InteRyc will be sent. This is because of financial constraints. Despite subsidizing the expenses we are finding it hard to keep afloat. The members, therefore, *are requested to send the subscription for 2002 and 2003 soon.*

Information about subscription dues:

(a) *All the members who have not even paid for 2001 are requested to send three years subscription (for 01, 02 and 03). It can be in the form of a demand draft for Rs.300 OR cheque for Rs.320, in the name of Dr. S.A. Patney, UCO bank S/B account No. 4256, Rajkot.*

(b) Members who have paid for 2001 but not for 2002, are requested to send two years' subscription, as that for 2003 became due on the January 1, 2003. Please send DD for Rs.200 / cheque for Rs.220 only.

(c) Members who have paid up to 2002 but not for 2003, are requested to send one year subscription, as that for 2003 became due on the January 1, 2003. Please send DD for Rs.100 / cheque for Rs.120 only.

NEWS

There are no news as I have not received any. The names of the prizewinners of the year 2001 have not been decided on, as there was hardly any competition. A decision will be made soon and the members will be informed accordingly. For the same reason 2002 contests were not held. However, we shall give prizes for 2001 as we had announced them. The names will be announced in the InteRyc volume 3 or 4, 2003.

Workshop September 13-19, 02

The person entrusted with this job has been unable to compile the detailed report. We are sorry for this delay. Actually the clinic has been extra-busy and none of us had any time left from work in the clinic. However, I include a bird's eye view of the workshop. Each day, many patients of various types were examined by the participants followed by a discussion on each. Some of the participants took part in surgery (some of that was carried out on unusual cases, one of them being a case of Brown's syndrome, one of strabismus Fixus).
Welcome dinner was given on September 12, 02 at 8.30 pm.

Day	Subject	Am (10-13.00)	Pm (14-17) (Actually often it went on until 8 pm)	Special program
1	Eye strain & Heterophorias	Demo on patients	Fellows' participation, hands-on exam.	Welcome Tea 10-10.20 am.
2	Examination of ET cases	Demo on patients	Preoperative for ET surgery tomorrow & demo on patients, questions	Lunch: 1 pm-2 pm (13-14 O'Clock) daily
3	ET	Surgery 2 patients 2 fellows	Preoperative for XT surgery tomorrow & demo on patients, questions	
4	XT	Surgery 2 patients 2 fellows	Preoperative for Cyclovertical deviation surgery & demo on patients followed by questions	Afternoon tea: 4 pm-4.20 pm (16-16.20) daily
5	Cyclovertical dev.	Surgery 2 patients 2 fellows	Preoperative for Ocular palsy / of demand dev. & demo on patients, questions	
6	Special cases: Duane's retraction syndrome's, Brown's, Palsy	Surgery 2 patients 2 fellows	Demo of special cases: **Operated** patients: Brown's syndrome, Duane's retraction syndrome, Strabismus Fixus **Unoperated patients**.: Mostly those of Duane's syndrome, DVD, Brown's syndr.	Farewell dinner and presentation of contest prizes and certificates of participation in workshop on the evening of 18th
7	Presentations on various topics by fellows and →	Videos: (surgery & examination)	Amblyopia demo & questions-answer session not held. Fellows had to leave around 1 pm to get their transport.	

As you can see from the table given on the previous page, we took up one main subject every day for the first 6 days, starting with Heterophoria, and going on through esotropia, exotropia, cyclovertical deviations, special types of squint, e.g., Duane's Retraction syndrome, Brown's syndrome, strabismus fixus etc. and lastly to Amblyopia

Special feature of this workshop was a hands-on participation. The participants examined the patients and learnt various methods of examination first hand.
NOTE: It was a very successful workshop because we had a select crowd of very intelligent, interested and motivated participants. It was a pleasure for me to teach them.

It is a matter of great pleasure to me that all the participants agreed that even 7 days were not enough to cover this subject even briefly. Some of them had considered two days too much time for a squint workshop.

COMING UP

1. *6/3/2003 - 9/3/2003: American Glaucoma Society Annual Meeting, San Francisco, CA,* contact Denise De Losada Wilson, American Glaucoma Society, P.O. Box 193940, San Francisco, CA 94119-3940; (415) 561-8587; fax: (415) 561-8531; e-mail: ags@aao.org.

2. 18/3/2003 - 1/4/2003**:** 24th Pan-American Congress of Ophthalmology, San Juan, Puerto Rico. *Contact:* Spectrum Negroni & Associates, Phone: (787) 708-2100; Email: mjlandrau@spectrumdms.com

3. *18/3/2003 - 22/3/2003: American Society of Cataract and Refractive Surgery 2005 Annual Symposium and Congress, San Francisco, CA,* contact ASCRS, 4000Legato Rd., Ste. 850, Fairfax, VA 22033; (703) 591-2220; fax: (703) 591-0614; e-mail: ascrs@ascrs.org.

4. 19/3/2003 - 23/3/2003: *Fourth Annual International Glaucoma Symposium (I.G.S.), Barcelona, Spain;* contact the Symposium Secretariat, Kenes International, 17 Rues du Cendrier, P.O. Box 1726, CH-1211, Geneva 1, Switzerland; (41) 22-908-0488; fax: (41) 22-732-2850; e-mail: glaucoma@kenes.com.

5. *21/3/2003 - 23/3/2003: International Vision Expo, New York, NY;*
contact Liz Lollis, Registration Manager, (203) 840-5954; fax: (203) 840-9954; e-mail: elollis@reedexpo.com

6. *12/4/2003 - 16/4/2003: American Society of Cataract and Refractive Surgery 2003 Annual Symposium and Congress, San Francisco, CA,* contact ASCRS, 4000Legato Rd., Ste. 850, Fairfax, VA 22033; (703) 591-2220; fax: (703) 591-0614; e-mail: ascrs@ascrs.org;.

7. *1/5/2004 - 5/5/2004: American Society of Cataract and Refractive Surgery 2004 Annual Symposium and Congress, San Diego, CA;* contact ASCRS, 4000Legato Rd., Ste. 850, Fairfax, VA 22033; (703) 591-2220; fax: (703) 591-0614; e-mail: ascrs@ascrs.org.

8. *2/5/2003 - 3/5/2003: First Annual International Society for Imaging in the Eye Meeting, Fort Lauderdale, FL,* contact: Registration Manager, toll-free 1-877-307-5225; phone: 856-848-1000; e-mail: meetingregistration@slackinc.com

9. *22/5/2003 - 24/5/2003: 8th Annual Florence Symposium on Cataract, Glaucoma and Refractive Surgery, Florence, Italy***,** contact: Registration Manager, toll-free 1-877-307-5225; phone: 856-848-1000; e-mail: meetingregistration@slackinc.com

10. *22/5/2003 - 24/5/2003: International Joint Meeting of the Italian Society of Ophthalmology, the Italian Association of Cataract and Refractive Surgery and OCULAR SURGERY NEWS, Florence, Italy,* contact: Registration Manager, toll-free 1-877-307-5225; phone: 856-848-1000; e-mail: meetingregistration@slackinc.com

11. *6/6/2003 - 7/6/2003: First Annual Ocular Surgery News Symposium Glaucoma: Improving Your Odds, Las Vegas, NV.* It is to be held at The Venetian Casino Resort. Contact: Registration Manager toll-free: 1-877-307-5225; phone: 856-848-1000; e-mail: meetingregistration@slackinc.com

12. *15/11/2003 - 18/11/2003: American Academy of Ophthalmology 107th Annual Meeting, Anaheim, CA; For information*, contact the AAO, P.O. Box 7424, San Francisco, CA 94120-7424; (415) 561-8500; fax: (415) 561-8533; e-mail: meetings@aao.org.

13. *ONGOING: Axial Eye Length Biometry, Flourescein Angiography, Diagnostic B-Scan, and Visual Field Fundamentals, San Francisco, CA; contact:* Denice Barsness, CRA, COMT, ROUB, Eye Education, 2060 Sutter Street #306, San Francisco, CA 94115; Phone: (415) 921-8595; Fax: (415) 775-8826; Email: denicebars@worldnet.att.net.

14. *A platform for interaction in Strabismology and related topics*: JKA Institute of Strabismology & Dr. H.L. Patney Memorial Eye Clinic, 10. Bhaktinagar Society, Rajkot-360 002, India, phone: +91-(281)-2362838; FAX: +91-(281)-2221399; E-Mail: sawasthi6@yahoo.com; Website: Geocities.com/sapatney/.

STRABISMUS SUMMARY SERIES PART XX

In this XX part of Strabismus Summary Series the topic of "Getting familiar with orthoptic instruments is continued.

Getting familiar with orthoptic instruments: Part 6

This series will not only deal with instruments for use in orthoptic / ocular motility clinics / strabismologists' offices but also in those ophthalmologists' offices who are even slightly interested in diagnosing strabismus and other ocular motility disorders.
I wonder if it ever occurs to the ophthalmologists that very often they have not been able to help their patients suffering from eyestrain because they could not diagnose that the cause was a muscle imbalance and not glasses only.
We shall now take up the instruments one by one to give a brief description of each of them (please refer to the list of instruments that was given in InteRyc volume 4, 2001 on page 9). In the following text we shall describe in short the more useful and the more commonly used instruments named in the list.

Maddox Rod (continued from InteRyc volume 1, 2003)

We continue here with the uses of Maddox Rod after a short summary of previously printed matter. In this part we show illustrations diagramatically in figures 1 and 2.
Summary of previous description:

- *This is another instrument based on the principle of diplopia. One object (a small light) is seen double. The second image is in the form of a red line, which is perpendicular to the grooves and rods of the Maddox Rod.*
- *Used in cases of heterophoria, it is quite handy, easy to use and reliable in patients with normal retinal correspondence.*

- *All three types of heterophoria, horizontal, vertical and torsional, can be measured with Maddox Rod.*

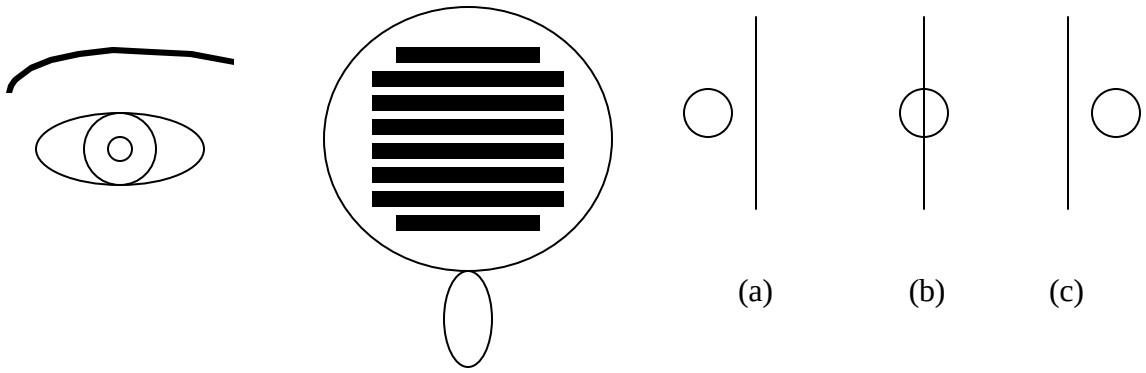
Description of the device: The device is quite small, made of glass consisting of multiple rods. One groove separates two rods. The whole thing is fitted in a round frame. It easily fits in a slot in the trial frame and is the size of trial lenses. The usual color is red, which is preferable to white that is used much less often. The rods act as a series of cylinders so that if one looks at a small fixation light through the Maddox Rod, it is seen as an elongated red line (if the fixation light is very small), or a red thin band (if the light is somewhat larger).

Uses:

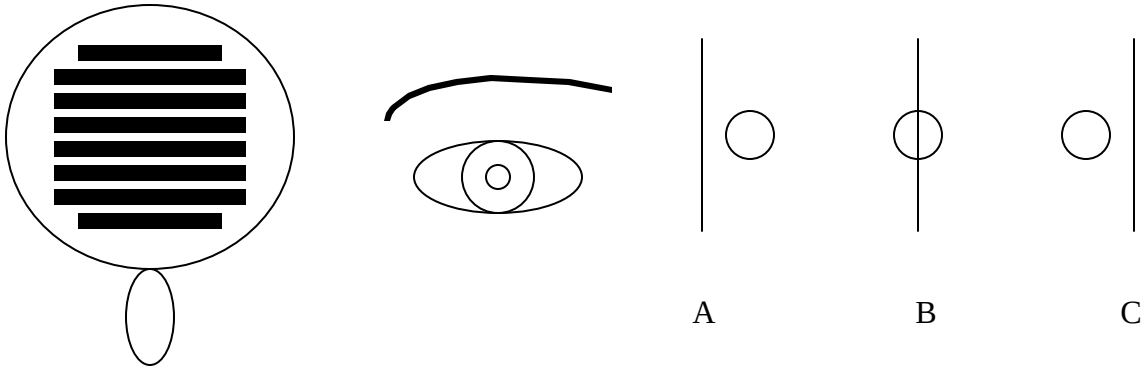
1. One Maddox Rod used in conjunction with prisms to measure the degree of heterophoria, both vertical and horizontal.
2. Two Maddox Rods are used to measure cyclophoria
3. It can give an idea of the type of retinal correspondence (if there is a manifest deviation but the patient says the line is in front of the light there is obviously abnormal retinal correspondence of the harmonious type.

Methods:

1. Measurement of heterophoria:

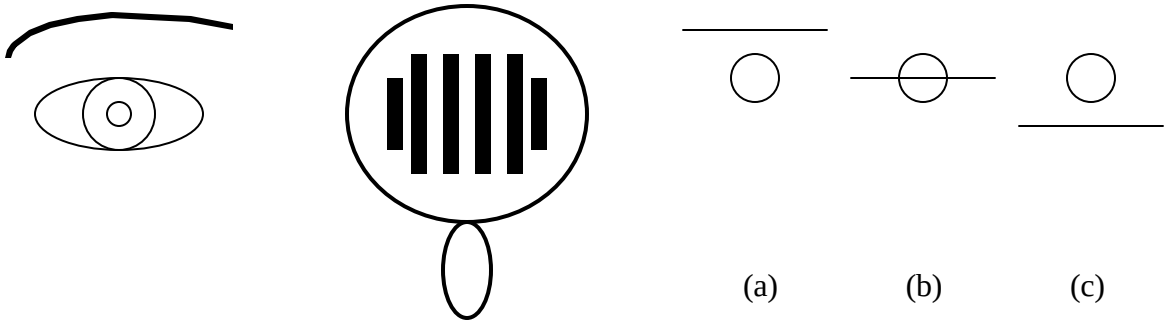


Maddox Rod in front of left eye: (a) & A show uncrossed images, (c) & C show crossed images

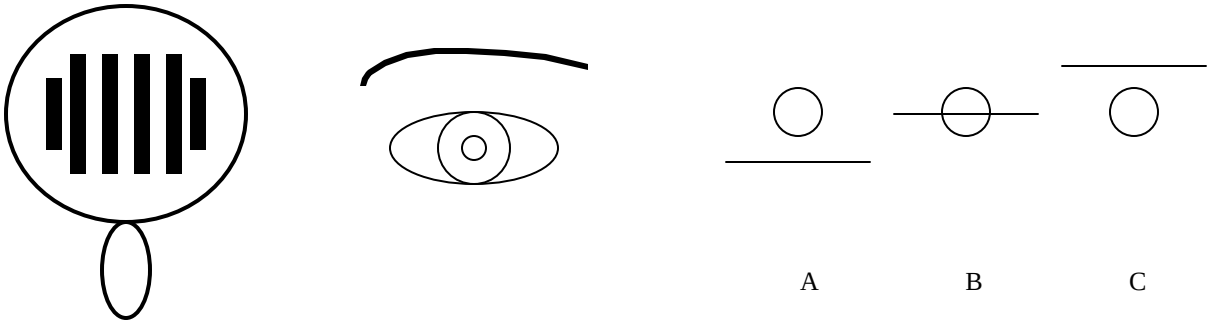


Maddox Rod in front of right eye. The circles are the spot-lights and lines are the red lines seen by patients.
Legend: (a) & A=Esophoria; (b) & B=Orthophoria; (c) & C=Exophoria

1. *Measuring horizontal heterophoria*: The use of Maddox Rod for measuring the horizontal heterophoria has already been described in InteRyc volume 4, 2002. The grooves are to be horizontal so that a vertical red line is formed that gets horizontally displaced if there is an exodeviation or an esodeviation. Using horizontal prisms this vertical line is brought in front of the spotlight. One just has to remember that the image (the red line) is displaced towards the apex of the prism (Figure 1).
2. *Measuring vertical heterophoria*: The basic procedure is the same as that for horizontal heterophoria. However, the direction of the grooves has to be vertical in this case so that a horizontal red line/band is formed (figure 2). Vertical prisms (loose or as a prism bar) are used to displace the line vertically if the patient does not see it in front of the light. The step-by-step procedure has been described in InteRyc volume1, 2003.
3. *Measuring cyclical/torsional heterophoria (cyclophoria)*: We need double Maddox Rods for this test.



Maddox Rod in front of left eye, with rods vertical for vertical heterophoria (fixing right eye). The red line is seen horizontal by the patient. It is seen opposite to the direction of heterophoria (perceived by the patient situated below the round spot light with the hyperphoric eye and above with the hypophoric eye).



Maddox Rod in front of right eye (fixing left eye), patient looking at round spot light, can see a horizontal redline with right eye and the round spot light with left eye.

Figure 2, Measurement of vertical heterophoria

Legend: (a) & A=Right hyperphoria; (b) & B=Orthophoria; (c) & C=Left hyperphoria

(To be continued in InteRyc volume 3, 2003)

UPDATE

Note: Update contains abstracts/short outline of the articles that are of clinical interest and that have been recently published in the medical/ophthalmic literature.

Update-General ophthalmology

1. *CrystaLens receives first U.S. accommodative IOL approval: Top story in Ocular Surgery News on 16-11-2003*: ANAHEIM, Calif. — The CrystaLens has become the first accommodative IOL to receive U.S. regulatory approval, according to manufacturer eyeonics. The company announced the Food and Drug Administration's approval of the lens here on Friday during the American Academy of Ophthalmology meeting. The CrystaLens model AT-45 accommodative posterior chamber IOL was given regulatory approval, "indicated for primary implantation in the capsular bag of the eye for the visual correction of aphakia in adult patients in whom a cataractous lens has been removed and is intended to provide near, intermediate and distance vision without spectacles," according to the approval letter sent by the FDA to eyeonics. Company executives told *Ocular Surgery News* the first implantation is expected in the U.S. by the end of next week.

2. *Lamellar approach an alternative to full-thickness graft for keratoconus: Top story in Ocular Surgery News on 4-11-2003*: Deep lamellar keratoplasty is a valid alternative to penetrating keratoplasty in the treatment of stage 3 and 4 keratoconus, according to Pierre Fournié, MD. "It is a less invasive, extraocular surgery, there is no risk of endothelial rejection and patients maintain their own endothelium," Dr. Fournié told *Ocular Surgery News.* He discussed the results of deep lamellar keratoplasty (DLK) in 15 eyes of 15 patients between the ages of 18 and 64, with a mean age of 42. Results over a mean follow-up of 1 year were encouraging, Dr. Fournié said. Intraoperative complications included perforation of Descemet's membrane, which occurred in one-third of the eyes. Postop complications included two cases of delayed epithelial scarring, which were treated with the application of a therapeutic contact lens.

Update- Strabismology

1. *Ultrasound of the horizontal rectus muscle insertion sites: implications in preoperative assessment of strabismus (Tamburrelli C. et al: Invest Ophthalmol Vis Sci 2003 Feb;44(2):618-22):* The authors conducted a study to compare the measurements of distances between the limbus and insertion of the medial recti and the lateral recti. These measurements were obtained first by ultrasound (US) and later by actual measurement on the eyes intraoperatively. CONCLUSIONS: The results indicate good reliability and accuracy of US readings and suggest a potential usefulness in preoperative assessment of patients with strabismus with surgical failure and missing preoperative clinical data.
2. *Botulinum toxin as a treatment for strabismus in systemic diseases: (Moguel-Ancheita S. et al: Arch Soc Esp Oftalmol 2003 Jan;78(1):9-14)*: Purpose of this study was to demonstrate the effectiveness of botulinum toxin for treating strabismus secondary to systemic diseases. CONCLUSIONS: The authors describe their results as follows:

The effectiveness of Botulinum toxin in strabismus secondary to systemic disease is up to 74%. We can offer rehabilitation in all of these cases even during the sometimes long diagnostic period or in patients under treatment. We also suggest our direct technique for the application of Botulinum toxin (without electromyography) to avoid risks in this type of patients. We are reporting the use and positive effect of the Botulinum toxin chemodenervation in Myasthenia gravis, Human Acquired Immune-deficiency Syndrome, and mental defficiency.

3. *Use of augmented rectus muscle transposition surgery for complex strabismus (Paysse EA, Brady McCreery KM, Ross A, Coats DK: Ophthalmology. 2002 Jul;109(7):1309-14)*: This study aimed at assessing the effectiveness of full tendon rectus muscle transposition augmented with posterior fixation sutures (in 13 patients). The authors also used three-fourths partial tendon transposition modification of this procedure for a variety of complex vertical and horizontal paralytic eye movement disorders in 5 patients. Results: Comparing preoperative to postoperative status, presence of primary position diplopia decreased from 64% to 14%, anomalous head posture decreased from 56% to 6%, and primary position alignment improved in all patients. CONCLUSIONS: Full tendon rectus muscle transposition surgery augmented with posterior fixation sutures and the vessel-sparing three fourths partial tendon transposition modification of this technique are effective for the treatment of a variety of complex vertical and horizontal paralytic ocular motility disorders.

4. *Incomitant strabismus associated with instability of rectus pulleys (Oh SY, Clark RA, Velez F, Rosenbaum AL, Demer JL: Invest Ophthalmol Vis Sci. 2002 Jul;43(7):2169-78)*: BACKGROUND: Connective tissue pulleys serve as functional mechanical origins of the extraocular muscles (EOMs) and are normally stable relative to the orbit during gaze shifts. PURPOSE: The author aimed at evaluating pulley stability in incomitant strabismus. METHODS: Contiguous 2- or 3-mm thick magnetic resonance images (MRIs) perpendicular to the orbital axis spanned the anteroposterior extents of 12 orbits of six patients with incomitant strabismus. Imaging was performed in various gaze positions. Paths of EOMs ran toward the pulleys. Sharp EOM path inflections in secondary gaze indicated pulley locations in three dimensions. RESULTS: MRI revealed substantial inferior shift of the lateral rectus (LR) pulley of up to 1 mm during vertical gaze shifts in patients with axial high myopia and a posterior shift from abduction to adduction in simulated Brown syndrome. There was substantial LR pulley shift opposite the direction of vertical gaze in a subject with X-pattern exotropia who had undergone repeated LR surgery. The medial rectus (MR) pulley shifted inferiorly with gaze elevation in Marfan syndrome. Pulley instability was associated with significantly increased globe translation during gaze shifts. CONCLUSIONS: Pulley instability, resulting in EOM sideslip during ductions, occurs in some cases of incomitant strabismus. Resultant patterns of strabismus may depend on static pulley positions, pulley instability, and coexisting globe translation that alters pulley locations relative to the globe. Translational instability of pulleys and the globe could produce abnormalities in actions of otherwise normal EOMs, and connective tissue disorders causing these instabilities should be considered as potential causes of strabismus.

InformIT

By: Mr. Sameer Shah, Technical IT advisor to the JKA Institute of Strabismology
(NOTE: Mr. Shah is a teacher at the NIIT, Rajkot, one of the famous institutions that is imparting training in the subject of Information Technology (IT). He was my teacher at NIIT. We are fortunate to have his help in this series on IT. This series will be continued in the InteRyc volume 3, 2003.)

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SHORT REVIEW ARTICLE ON STRABISMUS

Esotropia has been selected as the subject of the short review article on strabismus and related anomalies for this volume 2 of InteRyc, 2003. It is being presented as a series in two parts. The references will be given at the end of the second part in the InteRyc volume 3, 2003.

HETEROTROPIA - ESOTROPIA- Part one

CLASSIFICATION- COMITANT

(By S.A. Patney)

Most of the basic information and general guidelines about esotropia have already been discussed earlier under the headings of "examination", "etiology", "classification", "symptomatology", " and "the treatment of the neuromuscular anomalies" and heterophoria".
In this chapter the focus is mainly on constant esotropia but there are many borderline cases between esophoria and esotropia and therefore the basic information given here also applies to esophoria and intermittent esotropia. Discussion on heterophoria had included decompensated esophoria, which is the same as intermittent esotropia.

Classification

A revision of classification of esotropia is relevant here. Two of the best classifications I have come across, are the following*:*

1) Lyle's classification of convergent strabismus and
2) Noorden's classification of esodeviations

Lyle's classification of esotropia[1]

1. Accommodational convergence strabismus (CS): It is divided into 3 types:
   (a) Fully accommodational CS
   (b) Accommodational CS:
      (1) With convergence excess
      (2) With divergence insufficiency
   (c) Partially accommodational CS
2. Alternating convergent strabismus
3. Unilateral convergent squint
4. Innervational convergent strabismus
5. Convergent strabismus with associated vertical deviation
6. Alternating CS associated with congenital myopia
7. Secondary CS (unilateral)
8. Convergent strabismus due to convergence spasm
9. Consecutive CS
10. Convergent strabismus associated with ocular palsy

Noorden's Classification of esodeviations[2]

1. Comitant esodeviations
   (a) Accommodative
      (1) Refractive (normal AC/A ratio)
      (2) Nonrefractive (high AC/A ratio)
      (3) Hypoaccommodative
      (4) Partially accommodative
   (b) Nonaccommodative
      (A) Infantile (birth - 6 months)
      (B) Acquired
         1) Basic esotropia
         2) Nonaccommodative convergence excess
         3) Esotropia in myopia
         4) Acute esotropia
         5) Divergence insufficiency
         6) Cyclic esotropia
   (c) Microtropia
   (d) Nystagmus blockage syndrome
2. Incomitant esodeviations
   A. Paralytic esodeviations
   B. Nonparalytic
      (1) A and V pattern esotropia
      (2) Retraction syndromes
      (3) Mechanical-restrictive esodeviations
         a. Congenital fibrosis
         b. Acquired restrictive due to trauma, myopathy, excessive surgery, etc.
3. Secondary esodeviation
   (a) Sensory
   (b) Consecutive

Each of these classifications has some excellent points. While Lyle has given a simple and easy to understand classification, which was quite uptodate for those times, the one by Noorden is comprehensive, recent and updated. Although the latter is a little more complicated than the other one, it is fairly exhaustive and covers practically all the types of esotropia. Also, the correlation with AC/A ratio makes it easier to understand why some cases with hypermetropia get an esodeviation and others do not.
Clinical features and symptomatology of all the various forms of heterotropia have already been described in chapters on *classification and symptomatology* of neuromuscular anomalies. But to have a comprehensive picture of esotropia, *the main points regarding various kinds* are given below.

Fully accommodational (classification 1) or refractive accommodative esotropia (classification 2) with a normal AC/A ratio: The main points are:

- *Definition*: An esotropia (ET) which is manifest without glasses and can be controlled with glasses to orthophoria or esophoria (or even slight exophoria, if the hypermetropic correction is large, or if it is too much). A common term "orthotropia"

is used now to convey that the deviation is controlled, but I find it insufficient as this term is commonly employed, *even in the absence of binocular single vision*, to denote a successful surgical result which means that the deviation is 10 prism diopters of heterotropia or less. We need a word, which will convey that the deviation is not only reduced to 8-10 PD or less but that there is binocular single vision (BSV) as well. If we use the term "orthoheterophoria" as suggested by some workers it will do sufficiently, but it is rather an odd and long word. Actually the term “heterophoria” does convey that there is a latent deviation with BSV.

- *Age*: The deviation starts manifesting between the age of 2-3 1/2 years. In some cases it is found at an earlier age (case report 3) and in others, late, in later childhood or even during adolescence or youth. It has been reported as early as 4 1/2- 5 months of age[3] and the deviation was controlled with hypermetropic correction. In this connection it is interesting to note that the views about the age of development of accommodation have changed radically. Haynes et al[5] proved that adult levels of accommodation are reached by 4 months of age. Similar early onsets were reported by Baker and Parks who followed up these cases and found that about 50% of these patients later develop non accommodative or partially accommodative ET and fixation disparity (with an absence of bifoveal fusion in the presence of binocular functions) which is also the case with ET of early onset (infantile ET). This is so despite surgery. The usual cases however, have a good prognosis as regards cure.
- *History: Onset and progression*: In earlier stages it is typically intermittent, presenting only for near when the child looks at small objects situated close to the eyes. If the treatment is delayed, a constant esotropia develops which if unattended, will lead to complications like suppression, amblyopia, anomalous retinal correspondence and in rare long-neglected cases, eccentric fixation. Usually however, complications are rare because of its later age of onset (later than that for infantile esotropia) and gradual onset.
- *Etiology: The main factor* is the relationship between accommodation and convergence (see the chapter on AC/A ratio and the etiology of neuromuscular anomalies). *The deciding factors* are the AC/A ratio, fusional vergence (mainly the fusional divergence), presence of dissociating factors and the personality type of the patient (more likely to be highly-strung, intelligent and keen observers).
- S*equence of events:* Uncorrected hypermetropia → blurred image → increased demand for accommodation → accommodative convergence (AC) → (a) adequate fusional divergence → esophoria, (b) *inadequate fusional divergence with high or normal AC/A ratio → esotropia*, (c) low AC/A ratio → likelihood of esotropia is small.
- *Symptomatology and diagnosis*: As the deviation manifests only for near in the early stages, it is often missed for some time. This is so because the eyes are often somewhat depressed (looking down) when the object of attention is situated near to them and the corneas are not completely visible unless the observer pays attention. The earliest indication sometimes is a frequent *closure of one eye* when the strabismus manifests transiently leading to diplopia, as happens in other kinds of intermittent heterotropias. The child does this automatically, to avoid diplopia. The untreated intermittent ET then becomes more frequent and ultimately constant in the absence of treatment. Binocular function like simultaneous perception, fusion and

stereopsis, if it can be estimated, is found to be present unless the ET started in infancy which is rare. In young children, Wirt's fly test or the Titmus test can usually be performed easily to test stereopsis. Other stereograms, like random dot can be used. In older children major amblyoscope can be used to assess the binocular functions. The angle of deviation is usually larger for near, especially when accommodation is exerted. Older children and adults complain of diplopia and eye strain while doing close work. A common precipitating factor is occlusion of one eye, as by bandaging or even long hair covering one eye. The AC/A ratio is normal or high.

- *Management of fully accommodational esotropia*:
  (I) Refractive (optical) treatment: *Full correction of hypermetropia* may be all that is required. Cycloplegic refraction is necessary before glasses are prescribed. If the patient complains of blurred vision for distance with a full correction, due to a late start with glasses, atropine can be used for some time. A month after using the glasses constantly, the patient must undergo an orthoptic examination to make sure that the deviation is sufficiently controlled. These cases must be followed up *at least once a year* and checked for a cycloplegic assessment of refraction and adjustment in the power of the glasses. This is to avoid a possibility of disuse of accommodation due to overcorrection of hypermetropia, leading to a consecutive exodeviation and convergence insufficiency, if the glasses are not changed when the hypermetropic power goes down with age.
  (II) Orthoptic treatment (indicated if despite the glasses the control is not satisfactory and there is a decompensated esophoria): The aim is to:
  (a) teach relaxation of convergence while exerting accommodation
  (b) increase the range or amplitude of fusion (fusional vergence), especially fusional divergence
  (c) teach maintenance of binocular single vision by recognizing diplopia when the deviation manifests and controlling it by conscious effort and
  (d) teach appreciation of physiological diplopia to detect suppression when it occurs.
  (III) Operative treatment or Surgery is usually not required in this group of patients. The indications are as follows:
  A. When the fully accommodational ET has become partially accommodational due to a delay in treatment.
  B. Some cases in which there is a recurrence of esotropia with adequate refractive correction after a period of satisfactory control.
  C. If for some reason, the patient can not wear glasses or refuses to do so, surgery has to be undertaken in the form of recession of one or both medial recti. In fact, some surgeons favour surgery without glasses. In their opinion, there are the following reasons for advocating surgery to replace glasses:
  a) Gobin et al[6] believe that hypermetropia is not a cause of esodeviation and the accommodative component of the squint disappears after restoration of binocular vision by surgery.
  b) Dyer[7] was of the opinion that the risk of a consecutive exodeviation after surgery was worth the freedom from glasses and squint for many years. At least the power of the glasses could be reduced by surgery.

c) Frequent overaction of obliques, especially the inferior oblique, has been seen as an indication for surgery.
However, we have seen many cases where the patients came to us complaining of squint after remaining straight for some time after surgery. They had not been prescribed glasses and the surgeons had gone in straight for surgery.
(IV) Drugs: Miotics have been advised[8] but they should only be used for a short period during which the glasses can not be worn for one reason or the other. They act by removing the stimulus for accommodation, thereby reducing convergence.

- *Prognosis*: This kind of ET carries the best prognosis, provided its management is adequate and timely. In early stages, refractive correction alone is sufficient. A cure is obtained in all early cases and in other cases where binocular functions were already developed before the onset of ET.

Accommodational ET with convergence excess, 1 (a) (1) of Lyle's classification and Nonrefractive accommodative esotropia, 1 (a) (2) of Noorden's classification

The main points are as follows:

- *Definition:* It is an esotropia with a high AC/A ratio, the angle of deviation being greater for near than for distance. It is not related to refractive error. The near point of accommodation is normal.
- *Age:* It is first noticed in infants and young children between 6 months and 2 1/2-3 years of age[9]. The upper age limit can be higher[10].
- *Refractive error:* These patients usually have a moderate degree of hypermetropia but not infrequently emmetropia. For details please see treatment of heterophoria (chapter thirty). or even myopia may be present.
- *Etiology: There is a faulty relationship between accommodation and convergence:* The AC/A ratio is quite high in these cases. An ordinary effort to accommodate brings about an abnormally high amount of convergence. The near point of accommodation is normal. If the fusional divergence is good, there will be an esophoria, if poor, esotropia is the result.
- *Symptomatology and diagnosis:* Depending upon how good the fusional divergence is, there can be various combinations of findings on cover test: An esotropia more marked for near or an esotropia for near and esophoria for distance or an esophoria more pronounced for near. The examination must be carried out with and without glasses. The diagnosis is made on the basis of findings with glasses. The angle typically increases on exertion of accommodation. *Differential diagnosis*: a) It must be differentiated from a *V esotropia* in which the distance does not matter, only the direction of the gaze does. The angle of convergence increases in depression. In *nonrefractive accommodative esotropia* the angle typically increases for near, especially on exertion of accommodation as while reading small print. The direction of gaze does not affect the angle, the distance and the size of the object does. b) Esotropia of convergence-excess type in which there is a nonaccommodative convergence-excess. The AC/A ratio estimated by the gradient method can help in the diagnosis.

- *Management:* a) *Bifocals* are the treatment of choice in these cases (please see the chapter twenty-eight, p. 469-490, on conservative treatment, for details). b) *Miotics* are almost as effective but one has to watch for the side effects of their prolonged use. c) The patient must wear the *refractive correction*, which should be reassessed and readjusted according to changes every 6-12 months. d) *Surgery* is only considered when the condition is not controlled with the conservative treatment. Recession of medial recti (MR) usually effective. Some surgeons advise posterior fixation suture or recession + posterior fixation sutures[11]. The degree of recession depends on the angle of deviation as measured for near.
- *Prognosis:* In most cases of nonrefractive accommodative esotropia the prognosis as regards binocular functions is good. Some cases however, deteriorate even after a period of satisfactory control[12]. This may happen after surgery also (case report).

Hypoaccommodative esotropia, 1 (a) (3) of Noorden's classification

- *Definition and etiology:* This type of ET is also more marked for near than for distance but there is an insufficiency of accommodation. The latter demands an increased effort to accommodate, which brings about an excessive convergence. The corrective glasses do not affect the deviation. The term hypoaccommodative ET was coined by Costenbader[13]. It is in fact a very descriptive one.
- *Symptomatology:*
  * Complaints: Intermittent esotropia (for near only), blurred vision on switching the fixation from near to distance and eye strain after reading and other fine work.
  * Signs: Esotropia for near not controlled with glasses (for distance the deviation is small and usually well compensated), insignificant refractive error, a remote near point of accommodation with a reduced range and full binocular functions.
- *Management:* Bifocals with a plus addition usually relieves the symptoms and controls the ET.

Partially accommodational CS, 1 (c) of Lyle's classification or partially accommodative ET, 1 (a) (4) of Noorden's classification

- *Definition:* This type of ET is partially controlled by glasses that correct hypermetropia. The ET is constant but the angle of deviation is significantly reduced with glasses.
- *Etiology*: There is an accommodational element superimposed on a nonaccommodational one. The etiology of the latter is not clear but the explanation may be as follows: (a) It is possible that some of these cases are of the insufficiently treated fully accommodational type to start with. With the passage of time, motor and sensory adaptations take place and some degree of heterotropia becomes constant due to changes in the muscles (medial rectus contracture and consequent lateral rectus insufficiency) and fascia. (b) Alternatively, there may be an element of bilateral lateral rectus paresis, suspected to be present since birth in some children[14]. It recovers partly and leaves behind a residual paresis. (c) It has been observed that in some cases of infantile esotropia, an accommodational ET is superimposed upon it.

- *Symptomatology*: Even the full correction of hypermetropia does not get rid of esotropia completely. A smaller, residual manifest convergent deviation is always present, even with glasses. This deviation, if left untreated, leads to amblyopia and other related complications.
- *Differential diagnosis*: An undercorrected fully accommodative esotropia has to be ruled out by cycloplegic refraction.
- *Management*: * Full correction of hypermetropia
  * Treatment of amblyopia and other sensory anomalies if present
- Surgery to correct only the nonaccommodational part of ET (recession of medial rectus, one or both as indicated)

Alternating convergent strabismus (2 of Lyle's classification) or Essential Infantile esotropia (1 (b) (A) of Noorden's classification)

- *Definition and age of onset*: This condition has got several names like, congenital alternating CS, essential alternating CS, paretic alternating CS and congenital esotropia, as well the above mentioned ones. *It is a constant esotropia with an onset between birth and 6 months of age.* The word "essential" implies an unknown etiology[15]. The prefix "congenital" is not used much anymore as it conveys that the deviation was present at birth, which is not usually the case. *In fact, most of the squints in neonates are divergent and are usually transitory, disappearing by the age of 3 months*[16, 17].
- *Etiology:* The various theories have already been discussed in the chapter on etiology of neuromuscular anomalies. The causes of essential infantile ET are not known but heredity may be one of them. Some of these cases get complicated later, by an accommodational ET superimposed on the original nonaccommodational infantile deviation. The present views[18, 19 and 20] on the etiology of essential alternating ET are as follows: The basic mechanism in the etiology of all heterotropias is that *strabismogenic factors fail to cause an ET if the binocular functions are already developed and functioning normally. The same factors will cause a strabismus if the development of normal binocular functions, including the vergence and fusional reflexes, is immature (as it is in infants), delayed or absent.* At this early age the binocular functions are weak and immature and are unable to combat any strabismogenic factors (high AC/A ratio, tonic convergence, refractive error, hereditary influence etc.). *According to reports in the recent literature on this subject, if the visual axes are aligned surgically before the age of 6 months, the binocular vision develops normally as shown by random dot stereograms. This will go to prove that there is no inborn defect of fusion mechanism (as was earlier postulated) in the brain.*
- *Incidence:* The various figures given in the literature vary from 0.1% - 1.0%[16, 21 and 22]. All the same, it is generally agreed that it is the most common type of squint in children.
- *Differential diagnosis:* It includes other types of heterotropias starting in early infancy, even soon after birth. They are: a) secondary or sensory ET (due to unilateral blindness, b) early forms of fully accommodational esotropia, c) congenital (due to hydrocephalus) or intranatal bilateral VI cranial nerve palsy, due to birth trauma, d)

Duane's retraction syndrome with ET, e) ET due to nystagmus (nystagmus blockage syndrome) and f) ET associated with other congenital conditions (cerebral palsy, mental retardation, Down's syndrome, albinism with ET).

- *Sequence of events:* Visual functional immaturity, especially for the first 4 months of life + nasal bias in optokinetic nystagmus (OKN) + strabismogenic factor/factors → ET with or without nystagmus + persistence of OKN asymmetry.
- *Symptomatology:* The main clinical features of essential infantile ET are:

(a) *Early age of onset*: The onset is somewhere between 0-6 months but only a few patients present in infancy. Usually, they come in early or even late childhood. It is therefore important to elicit the history and the time of onset, carefully.

(b) *Heredity: Family history* of squint may be positive.

(c) Constant large-angle ET (30 PD or more).

(d) *Alternation:* In most patients there is an alternating deviation *initially* which later may settle down to uniocular strabismus. If left untreated, an uniocular ET leads to amblyopia.

(e) *Visual acuity* is usually normal and equal as long as the deviation is alternating. Later however, when the ET becomes uniocular, amblyopia develops even in the treated (operated) patients (see below).

(f) *Refractive error* may or may not be present. Hypermetropia is found more often and can be low, moderate or high, low being the most common according to most surveys[23 and 24]. The popular belief that the hypermetropia gradually becomes less as the age of the child grows is controversial. No change or even an increase has been reported[25].

(g) *Ocular motility:* There is a picture of a pseudoparesis of lateral rectus/recti, depending upon whether the ET is unilateral or alternating. The abduction appears to be restricted and adduction exaggerated. To differentiate from a true paresis of LR one of the two or both of the following procedures can be used: A. The doll's head movements (passively moving the baby's head) will show the full range of abduction, if it is a false paresis. B. Occlusion of the sound eye will also reveal full abduction if it not true paresis. Sometimes there is a slight limitation of abduction secondary to a contracture of medial rectus/recti and fasciae. This disappears after medial rectus recession.

(h) *Association with amblyopia:* In uniocular ET of a significant standing, there is usually some degree of amblyopia, depending upon the duration of unilaterality of squint. It has been reported by several ophthalmologists that the prevalence of amblyopia is much higher in the operated cases with the angle of deviation significantly reduced[21, 23, 26-29] than it is in untreated ones with larger angles. The incidence of amblyopia in these reports ranges between 35-50% in operated patients and 15-19% in untreated cases.

(i) *Association with nystagmus:* The more common types of nystagmus associated with infantile esotropia are latent and manifest-latent nystagmus. Less commonly, the nystagmus is of the manifest congenital type.
To differentiate between the two is often difficult but may be possible by electro-nystagmography which is difficult to perform in young children. The nystagmus typically an increases in abduction and decreases or stops in adduction, therefore there is often *compensatory head posture* to place the fixating eye in adduction. The

association of infantile esotropia with latent nystagmus, compensatory head posture (face turn to the side of the fixating eye) and restriction of abduction is known as *Ciancia syndrome. Lang syndrome* consists of early onset esotropia, dissociated vertical deviation, excycloduction of the nonfixating eye and abnormal head posture. *The incidence* of nystagmus as reported in literature varies widely between 10-50% (30). Manifest congenital nystagmus is less common that latent and latent-manifest nystagmus but it is often found in cases of esotropia associated with Down's syndrome, hydrocephalus, cerebral palsy and ocular albinism. *This association of nystagmus with infantile esotropia must be differentiated from nystagmus blockage syndrome in which esotropia is secondary to nystagmus and is brought on to reduce or stop the nystagmus.*

(j) Asymmetry of optokinetic nystagmus: It is often seen in cases of esotropia, especially in cases of infantile ET. This test thus can help in distinguishing an acquired esotropia from infantile ET when the patient presents somewhat late and the history is doubtful. *It is also found in normal but visually immature infants, in cases of anisometropia without squint, in infants with various forms of uniocular visual deprivation and in Duane's syndrome type 1.*

(k) Association with vertical deviations: It is commonly seen that childhood esotropia is often associated with a vertical muscle overaction and/or vertical deviation. It is particularly so in essential infantile esotropia. Inferior oblique (IO) overaction is the most common, in the form of an upshoot of the nonfixating eye in adduction. This overaction of IO seems to be primary. In addition to vertical deviations, there are dissociated vertical-horizontal deviations. They form part of *essential infantile esotropia syndrome and one should be aware of their presence,* as they need management before anything resembling a cure can be achieved. The upshoot in adduction may actually be a part of dissociated vertical deviation leading to a V pattern esotropia, from which a primary overaction of IO has to be differentiated. Noorden believes that most of these cases are those of dissociated vertical divergence which is commonly associated with the ET, the incidence varying from 51% to 90%[30, 31 and 32].The causes of the associated vertical deviation thus may be:

A. A primary overaction of the inferior oblique
B. Associated dissociated vertical divergence
C. Secondary to a slight paresis of SO or SR muscle/muscles[33]
D. Associated vertical-horizontal deviations

The occurrence of excycloduction of the nonfixing eye as mentioned earlier would seem to be due the presence of the dissociated vertical deviation (DVD)[34].

(l) *Anomalous head posture or compensatory head posture (CHP):* There is a face turn towards the fixating eye and a head tilt towards the shoulder of the side of the fixing eye. The CHP is present in some of the patients. Varying figures have been given for this association with a CHP, as regards the percentage of cases. The causes of CHP according to various ophthalmologists, may be as follows:

A) The head tilt has been explained by the assumption that it is to compensate for the incyclotropia of the fixing eye[35]. Others differ[36]. They did not find any cycloduction in the fixing eye when the other eye in a case of DVD made incycloduction movement to compensate for the excyclotropia.

B) The face turn in most cases seems to be to compensate for the nystagmus, so that the fixing eye is placed in adduction where the latent-manifest nystagmus is least and the vision is the best.

(m) Management:

A. *Optical treatment*: All patients must undergo a cycloplegic refraction. Corrective glasses are prescribed for any significant error, especially for hypermetropia with an error in excess of +2 D. I find that application of atropine for 7 days is necessary to achieve full cycloplegia. It is not uncommon that we find a higher hypermetropia than has been corrected and the patient needs stronger glasses. Although the prevailing opinion among strabismologists is that the infantile ET is nonrefractive, I have seen several cases with a significant refractive element. Full correction of the hypermetropia reduced the angle of deviation in a significant number of cases. The percentage of cases fully controlled by glasses was, however, negligible. Rethy's work[37] partly supports our observations. He found that after full correction of hypermetropia had been used for a month or so, a repeat cycloplegic refraction revealed a higher error. Every time this was repeated, a higher refractive error was discovered and more and more latent hypermetropia manifested. The power of the glasses was increased, to fully correct or slightly overcorrect the hypermetropia by 0.05-1.0 D. The esotropia in younger infants could ultimately be controlled by glasses only. If, however, this treatment is delayed, the excess accommodative tonus and the increased accommodative convergence are firmly established and do not respond to optical treatment. He says that surgery can be altogether avoided in 90% (!) of cases if this treatment regimen is followed. In our experience in a definite case of infantile ET, though the angle of squint could be reduced in several patients, surgery still had to be performed. Of course, we have never repeated cycloplegic refraction every 1-2 months and so many times.

B. Occlusion: Treatment of amblyopia by conventional *occlusion* must be done before surgery. The details have been discussed earlier in the chapters on conservative treatment and the treatment of amblyopia. The reasons for treating amblyopia before surgery are:

- The younger the infant the speedier the response is.
- The surgery and postoperative therapy take up time and there is delay in the treatment of amblyopia.
- Once the eyes are straightened, many parents discontinue treatment.
- With the large preoperative angle of deviation it is easier to recognize the fixation pattern and amblyopia. The latter is present if the strabismus is unilateral and there is no alternation of fixation.
- The chances of developing binocular vision are better if the stimuli from both eyes are nearly equal and not contradictory.

C. *Surgery* is the sheet anchor for treatment of essential infantile esotropia. The main points are as follows:

- The younger the age at the time of alignment, the better are the chances of restoration or establishment of binocular vision. We try to carry out surgery at about 8-10 months of age. Most parents however, take their time to decide and therefore most of the operations for infantile ET in our clinic get to be done

between the age of 1-2 years. There are varying views concerning *the right age* for surgery and the range varies from a few months to 2 years. In the past, older years were advised. The youngest age reported at which the eyes were surgically aligned, is 13 and 19 weeks and the authors claimed (45) that both these children gained binocular functions (random dot stereopsis being present).

- A positive history of heredity indicates a poorer prognosis as regards restoration or establishment of binocular vision.
- The younger the age of onset, the worse is the prognosis.
- The aim is to align the visual axes fully.
- Patients with a higher degree of hypermetropia carry a greater risk of developing consecutive exotropia in future; hence a more conservative approach regarding the amount of surgery is advised.
- More correction is obtained per mm of recession and or resection on smaller eyes. One should keep this in mind while planning and performing surgery. Highly hypermetropic eyes are usually smaller. This may be the reason of consecutive exodeviation being more prevalent in high hypermetropes. Presence of any form of binocular cooperation, even
- One should not be over-enthusiastic about the amount of surgery. This is to avoid overcorrection as the results are more marked in infants as compared to those in adults or older children for the same amount of surgery performed.
- *Pre-requisites*: (a) Significant degree of deviation, (b) Visual acuity equalized in both eyes (in infants and younger children it is estimated by the fixation behavior), (c) Good alternation on cover test present, (d) Presence of any vertical components properly investigated, (e) Stability of the angle of strabismus, (f) Refractive error effectively dealt with, so that an accommodative element can be ruled out before surgery.
- *Type and amount of surgery*: There are several reports in the literature with different opinions[38-44]. Many surgeons are still doing a recession-resection on the squinting eye. For the second stage surgery, if required, same procedure or only one muscle is done in the other eye. Several surgeons have changed to large (5-8 mm) bilateral medial rectus recessions in one stage and report excellent results in 73-84% cases.

We are rather conservative in approach and even then a large percentage of our cases need only one operation. I make my choice in the following manner:

1) For unilateral ET with amblyopia, I do a recession-resection (MR, 5 mm-LR, 5-8 mm) on the deviating eye. If the angle is too large (>25 degrees or 50 PD) and the one stage surgery is not enough, medial rectus recession is done in the sound eye. Only extremely large deviations need recession-resection in the sound eye also.
2) For alternating ET, I prefer bilateral MR recession, usually 5 mm. I try to avoid doing larger recessions as they may cause limitation of adduction leading to consecutive exotropia.
3) Inferior oblique weakening procedures are undertaken when indicated (presence of marked overaction of inferior oblique which is causing a vertical deviation in primary position). When there is almost equal overaction of both

IO muscles in the absence of significant vertical deviations, IO surgery is not done.

The details of surgery will be discussed in the chapter on surgery.

(n) *Aims of treatment, prognosis and results: A perfect cure* consists of: * Restoration or establishment of BSV, * normal visual acuity in both eyes, * normal binocular functions including normal retinal correspondence and presence of all 3 grades of binocular vision, particularly stereopsis (which depends on fusion), * alignment of visual axes to orthophoria (or orthotropia) and * full ocular motility. A cure is *extremely rare* in cases of essential infantile esotropia. So far only two cases have been reported[45].

A satisfactory outcome from practical point of view would include an ocular alignment to within 6-8 prism diopters of parallelism along with subnormal or even abnormal binocular vision as an alternative to both, an ideal cure and an optimal result, if either of the last two can not be achieved. It is acceptable in many cases in the absence of a better result. There are very few professions in which an ideal binocular balance is necessary, like airplane pilots, professional ball-game sportsmen and navigators in navy. Moreover, there are instances where people with uniocular vision made excellent sportsmen and occasionally, even pilots. One can compensate for the loss of stereopsis by using monocular clues to depth and distances.

The most common result achieved and one which is inferior to subnormal vision is microtropia with a mild degree of amblyopia, a tiny ET, foveal suppression in the microtropic eye and peripheral fusion. The fixation is parafoveal but the deviation is not visible. On cover test there is a very small shift.

The optimal result one would hope for is orthotropia or a deviation < 4-6 D, with almost normal or even subnormal binocular functions in which peripheral and central fusion is present.

A good classification of results has been advised by Noorden[30]. It has 4 types of results:

A. An optimal result is *subnormal binocular vision.* It has orthotropia/phoria or symptomatic heterophoria, normal visual acuity in both eyes, fusional amplitudes, normal retinal correspondence, foveal suppression in one eye in binocular vision, reduced or absent stereopsis and stable alignment.

B. A desirable result is *microtropia* with an inconspicuous or no shift on cover test, mild amblyopia, parafoveal fixation, anomalous retinal correspondence, reduced or absent stereopsis, alignment partially stable. No further treatment is required except for amblyopia prevention.

C. An acceptable result is that with a small angle eso/exotropia which is cosmetically acceptable, frequent anomalous retinal correspondence (ARC), reduced or absent stereopsis and less stable angle. No further tratment is required except for preventing amblyopia.

D. An undesirable result is the one in which there is a large cosmetically unacceptable eso/exotropia (>20 D), strong and common suppression, less chance of ARC, absence of stereopsis and an unstable angle. Further treatment including surgery indicated.

A significant change in strabismologists' attitude towards the result of treatment has taken place, "that some sort of binocular vision (even abnormal) is preferable to monocular or uniocular vision". There are distinct advantages to binocular vision. Children with large preoperative angles are often reported to be clumsy and bump into things. Their movements are reported to be better postoperatively when near orthotropia has been achieved. Another advantage of removal of the defect is a significant improvement in the children's behavior. They start doing well in their class and generally behave better.

Persistence, recurrence or occurrence of amblyopia after surgery is common. It is interesting to note that most authors agree about its incidence being lower in unoperated cases (19%) and much higher (50%) after surgery (29). This is said to be due to the fact that when the angle is large the images forming on the foveas are widely separated and the peripheral image forming on the fovea of the squinting eye is faint. The suppression does not have to be strong to get rid of this image and the initial alternation persists longer. However, once the angle is significantly reduced *and there are no binocular functions present*, the deviation tends to become unilateral with strong foveal suppression and later amblyopia in the nonfixing eye. Quite often this leads to anomalous retinal correspondence and with a small angle, mild to moderate amblyopia. A microesotropia is a common result**.** (29). If however, some binocular functions are present (usually weak fusion with a small range and weak or absent stereopsis) subnormal binocular vision results.

The prognosis of infantile esotropia depends on the following factors:

- Presence of a central defect in the visual cortex: Existence of a center for fusion has not been established but *presence of binocular neurons* in certain areas of visual cortex concerned with binocular vision, especially stereopsis, has been confirmed[46-48]. If the stimuli from both retinas are not equal due to an obstacle in the eyes (as in strabismus giving rise to foveal suppression due to a constant heterotropia), these neurons become atrophic.
- Age of onset of the ET, deciding how much development of binocular vision has already taken place. The younger the age of onset, the worse is the prognosis because the chances of the binocular vision having developed are remote.
- Age of the patient at the time of adequate treatment. The younger the age the better is the prognosis.
- The length of time the condition remained untreated. The longer it is, worse is the prognosis. It is so not only because of the sensory adaptations but also because of the changes in the muscles (especially the medial rectus), fascia (Tenon's membrane) and the conjunctiva.
- Presence of amblyopia, anomalous retinal correspondence or eccentric fixation, prognosis being worst in the presence of the last complication.
- Efficiency, regularity and continuity of treatment.

(Continued in InteRyc volume 3, 2003. References will be given at the end of the article)

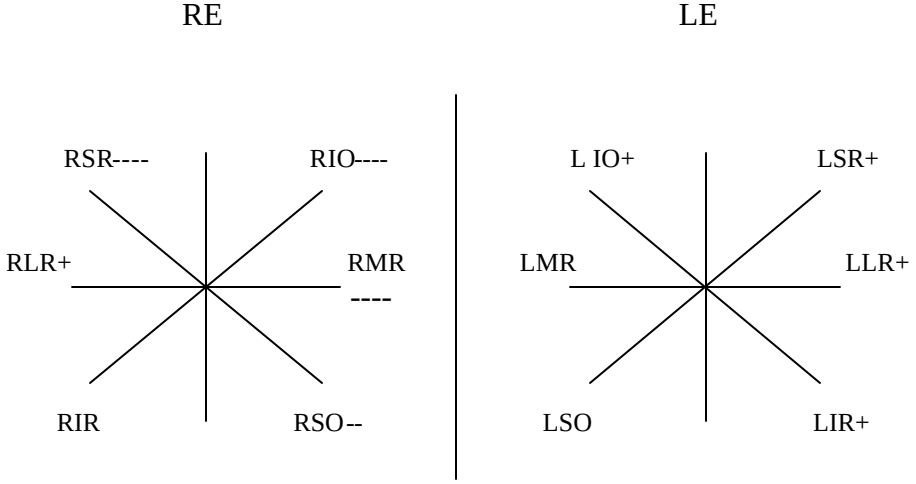
SPOT THE DIAGNOSIS No.2, 2003

History: Boy aged 12 years complains of anomalous head posture, drooping of right eyelid and squint (seen on lifting the lid) since early childhood.

Compensatory head posture (CHP): Marked elevation of chin
Ptosis of right upper lid
Cover test: RXT with LHT (RHyT) in primary position, updeviation of left eye when right eye is made to fix, which it can only do in depression, i.e., by elevating the chin. If the right eye tries to fix in PP, left eye show marked upshoot.
Ocular motility:

Binocular: Right eye: No movements except depression (infraduction) and abduction; left eye: normal

Uniocular: See the diagram below:



Please write your diagnosis, your name and JKA number below, cut on the dotted line and send by post or else as an attachment by email.

Diagnosis:

Name:

JKA number:

Address:

Phone No.: Email: Mobile No.:

HISTORY-A FEW FIRSTS IN STRABISMOLOGY

Worldwide

(a) Chevalier John Taylor (1703-1772) who performed a successful operation on a boy did first surgery for squint. He was half surgeon and half quack. He must have realized that squint was a disturbance of muscular equilibrium and conceived the idea that dividing a muscle or a nerve can cure it. However, he earned a bad name through many failures, one of them being on the eyes of Bach, the famous musician.
(b) In 1743 George L. Buffon recognized amblyopia and recommended occlusion for it.
(c) In 1839 Johann F. Dieffenbach performed the first successful tenotomy.
(d) du Bois-Reymond (1952) and Mackenzie (1954) were the first to suggest orthoptic treatment but it was elaborated and established as a technique by Javal (1864-96).
(e) Prof. A. Bangerter of Switzerland and Prof. C. W. Cuppers of Germany first advocated pleoptic treatment for amblyopia. However, their approach was different.

(Continued overleaf on page 28)

CME (Member of the year) Quiz no.2, 2003:

(NOTE: Please encircle the appropriate number or letter, fill in the blanks or describe as required. Then cut along the dotted line and return by mail. Turn over for the update-questionnaire)

1. *Circle the correct answer*:
   (1) Crystalens is is intended to provide near, intermediate and distance vision without spectacles: Yes / No
   (2) Deep Lamellar Keratoplasty is a better option as regards the corneal endothelium: Yes / No
   (3) Ultrasound is an useful tool in the preoperative assessment of an operated case of strabismus: Yes / No
   (4) Botulinum toxin chemodenervation is a viable option in the treatment of Myasthenia gravis, Human Acquired Immune-deficiency Syndrome, and mental deficiency: Yes / No

2. *Circle the correct answer:*
   (a) Two Maddox Rods are required for measuring cyclophoria: Yes / No
   (b) Muscle transposition surgery augmented by posterior fixation suture is effective in many cases of Extraocular Muscle palsy: Yes / No
   (c) Retrobulbar anesthesia can cause postoperative diplopia after cataract surgery: Yes / No
   (d) Translational instability of muscle pulleys/globe can cause abnormal actions of normal EOMs: Yes/No
   (e) Many e-book reader software programs can be installed on a PC, or a PDA: Yes / No

3. *Name the different types of esotropia:*
   (a) .
   (b) .
   (c) .
   (d) .
   (e) .

4. *What is the correct treatment of ET? Circle the alphabet preceding the correct answer:*
   (A) Optical
   (B) Orthoptic
   (C) Operative

5. *Give the Differential diagnosis of Infantile esotropia*:
   A. .
   B. .
   C. .
   D. .
   E. .
   F. .

HISTORY-A FEW FIRSTS IN STRABISMOLOGY

In India

(Continued from previous page)

(A) Dr.H.L.Patney started running an orthoptic clinic with the help of a compounder at Sitapur Eye Hospital whom he taught orthoptic exercises, in early nineteen fifties.
(B) Dr. M.K. Mehra and Dr. Sudha Awasthi (now Patney) started the first Orthoptic clinic at K.G. Medical College, Lucknow in 1957. She ran it for 2 ½ years.
(C) Dr. H.L. Patney started the first Orthoptic Department and the first Orthoptic School of India at Eye hospital, Sitapur, U.P. in 1959 and Dr. Awasthi (now Patney) Pleoptic dept. in 1961.
(D) Dr.Sudha Awasthi and Dr. J.M. Pahwa started the first Indian Orthoptic Journal in 1964.
(E) Dr. H.L.Patney and Dr. Sudha Awasthi started the All India Strabismological Society in 1967 and held India's first workshop on strabismus in 1967.

Please answer the questions or encircle the correct answers, cut along the dotted line and send by return mail)

Update questionnaire

1. I have been receiving InteRyc regularly, sent 2 monthly in 1998 (6 volumes per year) and 3 monthly (4 volumes per year since 1999): Yes / No
2. My address remains unchanged: Yes / No
3. My email address: My Web-site address:
4. My phone No.: My FAX No.:
5. My pager No.: My mobile phone No.:
6. I am enclosing herewith a demand draft for Rs100 / *cheque* for Rs120 (year 2003 subscription) / DD for Rs200 or *cheque* for Rs220 (for the years 2002+2003) / DD for Rs 300 or *cheque* for Rs320 for 2001+2002+2003.
7. I would like to resign from the membership of AISS and JKAIS: Yes / No
   If answer is yes, please write the reason if you don't mind. It may help to improve our system.
8. My membership No. is: JIM-
9. My name and present address are:

For fellowship candidates only:

10. I have paid for …….. installments.
11. I have received ……..Installments.
12. I have sent back solved question papers of …… installments.
13. I have the following problems with the course (please attach a sheet if required):

14. I have paid membership subscription for the years 98 / 99 / 00 / 01/02 / all (97-03)
15. I would like to come for the hands on experience in the month of …… 2003.

NOTE: Please inform at least 3-4 months in advance for arrangements to be made. It is regrettable that except for two doctors, one from Bihar and the other from Calcutta, and the 17 who attended the workshop in September, 2001 nobody has come for the hand-on experience. The special tips and methods of diagnosis that I could impart because of my unique and huge experience of 46 years (since 1957 as not only an ophthalmologist/strabismologist, but as an orthoptist also) was the main reason I started this programme in which I have invested large amounts of money from my pocket. So far only two fellows have completed the course (with practical one month experience. This fact has dampened my enthusiasm for the last couple of years. Can you blame me for that?

RATE YOUR PERFORMANCE YOURSELF

The results of the "CME Quiz NO.1, 03 and those of "Spot the Diagnosis" No.1, 03 are given on this page.

CME (Member of the year) Quiz no.1, 2003:
The correct answers are as follows:

Q.No.1
- WAP devices have small screens, so viewing pages is tiring for the eyes
- Can access only those sites that have a WAP interface or are coded in WML
- Typing on these devices is difficult due to the small keypads
- Poor software availability
- Expensive as compared to just a mobile phone and more difficult to maintain

Q.No.2
Circle the alphabet preceding the correct answer:
1. Maddox Rod can also measure cyclophoria: Yes
2. 1% Povidone-Iodine is better at preventing postoperative endophthalmitis than 5%: No
3. Retrobulbar anesthesia can cause postoperative diplopia after cataract surgery: Yes
4. A double-bellied inferior oblique muscle can cause a higher degree of cyclotropia: Yes
5. Is it true that smoking has no effect on Grave's ophthalmopathy: No

Q.No.3
Various surgical techniques used in cases of nystagmus
1. *Weakening procedures*: Usually recession of rectus muscles
2. *Strengthening procedures*: Usually resection of rectus muscles
3. *Recession-Resection* may be combined with posterior fixation (Faden) suture
4. Some people use *adjustable sutures*
5. *Surgery on cyclovertical muscles*: (a) for chin elevation / depression and (b) for head tilt. For head tilt surgery can be performed on cyclovertical muscles (recession-advancement /resection) or horizontal rectus muscles (supra or infraplacement as required (see under the heading of (1)c surgery for head tilt.

Q.No.4
There are three main aims of surgery:
(1) *To correct / reduce disabling / noticeable CHP (compensatory or anomalous head posture)*: This is achieved by bringing the null zone to or nearest to the PP.
(2) *To improve the visual acuity by reducing the nystagmus*: This is achieved by dampening the ocular motility to increase the foveation fraction / period, leading to improvement of VA.
(3) *To reduce the oscillopsia*: This is also done by *reducing the nystagmus* by dampening ocular motility. Using the null zone also helps.

Q.No.5
The exact nature and amount surgery is decided according to the following factors:
(a) The purpose of surgery
(b) Type of compensatory head posture (CHP)
(c) Degree of head turn
(d) Degree of reduction in VA
(e) Severity of nystagmus

SPOT THE DIAGNOSIS No.1, 2003

Correct answer: Congenital Superior Oblique muscle palsy

CARTOO-EYE AND EYE-RHYME
(S.A Patney)

Hud ho gayee deewangi ki, dekho pyar mein
Aankhen bichhi huyee hain tere intzaar mein