

HEALTH & MEDICAL CONDITIONS > VISION > ESOTROPIA

Esotropia

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1. Vision - What is Esotropia_

Hi, my name is Anna and I'm a mother of twin girls, Evie and Isabel, and today we'll be discussing esotropia and my daughter Evie, which my daughter Evie has. Perfect, and I'm Dr Elizabeth Connor and I'm a paediatric ophthalmologist and a general ophthalmologist actually, I see people of all ages, but obviously today we're talking about Evie, so with my hat on as a paediatric ophthalmologist, I'm going to answer a lot of questions which many parents have, so hopefully this will make you more comfortable waiting while you see a specialist for your own children. So Anna, I do want to start by telling me what you first noticed, and I actually brought a photograph of Evie for you, so if you could just tell us what you noticed first in Evie's eyes, what made you worried, what made you sort of ring around and say what do I do?

Yep, so initially so Evie was about two and a half at the time and initially I just was, when I looked at her I sort of thought, oh your left eye is going, facing inwards, oh am I just imagining that or is that, was there a problem here? So then within about a week I thought, oh no, there's something wrong here, because it was facing inwards about 70 to 80 percent of the time. And one of the other interesting things you told me was about Evie's behaviour. Yes, yeah, so she was quite an easygoing child and then all of a sudden she just got extremely frustrated and I was watching her one day trying to pick a flower and she couldn't do it, so I thought, oh something's really going on here.

And during that time was there anything you were particularly worried about? Yes, yeah, so I was really concerned because I thought why is this happening and why has it come on so rapidly and what could the outcome be for her? Is it treatable? And I think those concerns are very common and unfortunately with the weights in the system often people have to wait and think those questions for longer than we'd like before they get answers. So fortunately for Evie she had this condition called accommodative esotropia, which I'm going to explain some slightly complicated terms because I think the first time anyone hears them they're more confusing than we'd like.

So accommodation is the process where the eye has to bring its focus point in up close. So normally at your natural resting state you've kind of, you've got good vision in the distance, but actually if you kind of look down with your peripheral vision you can't read. So when you actively read you have to focus your eyes to do that. And in a child with hypermetropia, which is where the eyeball, the focusing power doesn't match up with the length of the retina. So instead of the focusing point being right on the retina, the focusing point is behind the retina. And so we need to put in some extra focusing power so that you can see clearly.

And the brain prioritises trying to see clearly. And so as it does that the lens in the eye becomes more round and makes the eye stronger for focusing. But that's naturally linked to a mechanism in your brain that makes you go a little bit cross-eyed. And usually that's because the rest of us when we're looking in the distance, when we look in up close, the focus point is closer and we have to turn our eyes in to see clearly and get depth perception. But because those mechanisms are linked, when a child has hypermetropia, or what was historically called farsighted, although we don't really use that term now, but they need to put in that extra focusing power just to see clearly in the distance.

So they're putting in that extra focusing power and then they're going cross-eyed in the distance. And when they look at something up close there's even more focusing power and they're going even more cross-eyed for up close. And the problem with that is when you're cross-eyed you get double vision. Makes you really grumpy, means you can't pick flowers, you sort of lose coordination and balance. So from my point of view it's reassuring that Evie had had normal straight eyes for so long and then suddenly became cross-eyed and was grumpy because she clearly had double vision. And usually that means that the children have good vision in both eyes if they're now getting two images with those images crossed.

So hypermetropia is the need to extra focusing power to see clearly. And then esotropia is when the eyes turn inwards and esotropia means inwards, exotropia meaning outwards. So some kids present with eyes that turn outwards, although in this situation of needing accommodation they always cross inwards. And often it starts around the age of two and a half because their visual systems are developing, they're getting more interested, they're getting finer focus, they want to see clearly and their brains are trying really hard and suddenly they start turning inwards. And over a period of time, a period of weeks to a couple of months, their eyes are always turning inwards.

Yeah, so those are kind of the complex terms that you probably heard for the first time in clinic and were like, oh my gosh, what's going on there?

2. Vision - How do the glasses help_

So Evie went and got glasses, so can you just explain to me like how do the glasses work? Yeah so like I was saying before the lens, the natural lens inside your eye is trying to change shape to be a stronger lens, so instead of that mechanism, by putting glasses on you relax the accommodation and the eye doesn't need to do all that hard work focusing, so then it's also not going cross-eyed. So you pop the glasses on and we'll show you a photograph of that as well, pop the glasses on and her eyes go nice and straight. So you take the glass off, cross-eyed, glasses on, straight. So it was quite interesting, how do you measure a two-year-old for glasses?

Yeah, that's a very key question that parents are wondering. So we used dilating drops and the dilating drops are what we call cycloplegic drops or cyclo and that causes the pupils to get very big but it also completely relaxes the accommodation, so the child can't do any focusing now. Okay. And what that means is when I shine a bright light in to measure a reflex on the retina, they're not trying to look at my light or if they do it doesn't matter because they can't focus on it and it results in the eye being in its natural resting state, so the child's not putting any extra force of accommodation.

Eyes in its resting state and I can measure the strength of the focusing power of the eye compared to the length of the eye based on a reflex that I see when I shine that flashlight in their eye. And you can measure up the short or long-sightedness, you can measure for astigmatism, you can do all sorts. And it is tricky, if a kid's sitting there with their eyes closed and screaming then I'm not going to be able to see very much, but usually they're kind of interested in the light, they kind of see some rainbows, it's kind of interesting. Usually kids will say it tickles, so they're sort of, they don't actually mind that light once they get used to the idea that I'm shining a light in their eyes.

The most annoying thing is the drops obviously because you come in and you have to have the drops put in, the drops sting so the kids will cry a little bit. Usually just for a few seconds. And then you then have to wait around for at least half an hour to get that full relaxed state so that we get a good measurement for the glasses.

3. Vision - What happens if the glasses don't work or there is no treatment_

And what do you do if the glasses don't work? Yeah, so yeah, that's always the next question. So there's a few things, so if the glasses don't work then we can use surgery to straighten the eyes. Sometimes it's that they haven't been in a fully relaxed state when we do the eye drops, so often we'll repeat the eye drop exam with stronger dilating drops, make sure that we've got the full correction in their glasses. But about two-thirds of the time the glasses will fully correct the turn, at least for the distance, and if they don't fully correct the turn and there's still a little turn for up close for it near, that's actually not a problem for visual development.

Some ophthalmologists would put in a bifocal ad, but actually the evidence that's coming out doesn't make too much difference long term to your visual development. So generally unless there's a really good reason to use bifocal glasses, I don't tend to do it. Right, cool, okay. And what can happen if you don't treat it, if you just leave it, what are the risks? Yeah, so some kids do pretty well actually, and then if they don't have glasses, they will be always cross-eyed though, so it might be noticed by friends and family that they're always cross-eyed. If they switch eyes and sometimes they're looking out of their left eye, and sometimes they're looking out of their right eye, then both eyes can still develop good visual pathways and good visual development in the brain.

But what can also happen is that one eye is their dominant eye, usually because it requires less prescription than the other eye, so it's a slightly stronger eye to start with, this eye's a little bit blurry, the brain's now got double vision, so it needs to pick an eye to ignore, and it ignores one eye all the time, and that eye ends up turning inwards and not developing the visual pathways, and that's when you get what's called a lazy eye or an amblyopic eye, and so that's when we might instigate some patching. And so we'd put glasses first, because sometimes just the glasses will straighten the eye, and then that will be enough to correct the vision, but if that eye really isn't learning to see properly, then we have to start doing patching so that we switch the fixation and force the weaker eye to do some work and learn to see properly.

And the important thing about that is we've got a sensitive period of visual development, and by the time you're seven or eight, basically your brain pathways for vision have locked in, so the earlier we treat kids the better, but certainly after the age of eight it gets really hard to treat amblyopia, and so that eye may not see well for the whole rest of your life.

4. Vision - What follow up is required and will glasses always be required_

And so how often do we have to come for a review with you? Yeah, so we like to see you, it depends how concerned parents are often actually. So if there's been some really concerning signs, then we might see you back after about eight to ten weeks to see if the glasses are working well enough and you've got the glasses and the kid's happy wearing them, you're not having any issues, particularly if there was, you know, difficulty getting into clinic in the first place or, you know, there might be a reason that we see you sooner rather than later. It takes about 14 to 16 weeks to fully adapt to the glasses, so we probably wouldn't be changing the prescription.

If you come back at that visit and your child's eyes are nice and straight and they're seeing well with their glasses, they're happy wearing them because they don't have double vision, they're not grumpy anymore, they're like, yes, this is amazing, put my glasses on, and the vision is equal between the two eyes, then when they're little, like two and three, I probably see them every four months, and then after that, once things are stabilised, we're sure what we're dealing with, then every six months after that. Just to check, because kids grow quickly, their eyes change shape, they might need new glasses.

Right, that's good to know. And so could I expect that Evie will always wear glasses? Yeah, so it depends a little bit on the prescription. So if a child's prescription is like plus six, that means that their eyeball is relatively short compared to the focusing power of the eye. They've got a lot of growing to do to grow out of their plus six glasses, and often those children would need glasses for their whole lives, unless they have some sort of surgical intervention when they're older, like LASIK or some other corrective surgery. If they're like a plus three, plus two, and two and a half, and they gradually are growing, then they may grow out of their glasses.

So they may absolutely not need them when they get older. If they grow enough that they're just sitting around that plus one mark, it may be that when they're eight or nine, they choose not to wear glasses. Things will be a little bit blurry in the distance. They're probably not going cross-eyed, and they don't like wearing glasses because they're playing sport, running around. That's kind of on them at that point. They don't have to wear glasses, but our job as doctor and parent is that we need them to have good vision until they're seven or eight so that they develop all those brain pathways.

So as much as it's a battle and a struggle, constantly reassuring parents that a good investment is really important. And sometimes kids will wear their glasses really well when they start. They think this is amazing. And then they'll grow and change, and the prescription's not quite right. And so if they start being less happy wearing their glasses, often that's a sign to me that we need to bring them back to clinic, put the drops in, recheck their prescription. That's good to know. So if you find that you try the glasses and they're not helping, what would happen then? In terms of still having a turn?

Yeah, and when would you look at surgery and those sorts of options? Yeah, so some children, when they put the glasses on, makes no difference to the turn. So then they've just got an intrinsic turn. And so usually we don't wait too long before we're doing surgery for them because the glasses aren't helping. If the glasses have helped somewhat and for a period of time they were straight and then they're starting to go across it again, usually update the glasses. And then if you put the glasses on and they sort of correct half the turn, so they might have had what we call a 30 diopter turn, and it's about 15 diopters, then we might talk to the parents about doing surgery.

And the reason for getting on to doing surgery is that, this gets a little bit complicated again to digress into some more ophthalmology, but when you want to look in the distance, your eyes are naturally displaced with two images, one from each eye, and your brain locks those two images together to give you a sense of depth perception. So you have to have good vision from both eyes and the images have to be close enough that your brain knows to fuse them together. So if they're completely separate because you're cross-eyed, then you've just got double vision. You ignore this image, so you don't get double vision, but you maybe don't learn to see properly.

If a child has more than about 10 diopters of turn, they're going to be switching fixation between the two eyes because there's too much double vision to try and merge those things together. And so there's a lot of argument about, is it important to treat so that you can get good depth perception? And in someone like Evie who had good depth perception before she started to go cross-eyed, we've got everything to gain. So say we'd put her glasses on and she was only half corrected. I probably have an earlier discussion with you about whether we do surgery to try and maintain her binocular function.

But if a child presented at five or six, they're probably not going to regain that binocular function anyway. And so if they had a small turn that looks good with their glasses on, we don't have to do surgery. Generally, they're going to have good vision in both eyes. They look good with their glasses on. We don't have to operate. So that's where it becomes an informed discussion with your surgeon and your ophthalmologist about the risks and benefits of surgery and whether it's worth doing.

5. Vision - What are the risks with eye surgery_

So what would the risks be involved with surgery? Yeah so surgery for strabismus is you know we've been doing it for 100 years so it's tried and true and if you think of eye surgery or eye muscle surgery you've got medial rectus, lateral rectus so a middle muscle and an outside muscle and those are a bit like the reins on a horse so if you want to move the eye from pointing inwards to pointing outwards you need to loosen off this side and tighten up this side and we're going to either do that by operating on two muscles in one eye or we can do two muscles across the two eyes and I tend to do both eyes one muscle surgery because you're doing a little bit less surgery on both eyes and it's more balanced between.

Thinking that there's not actually a problem with the eyeball or the eye muscles it's a coordination problem between the two eyes so doing a little bit of surgery on both eyes has sort of a more balanced outcome. So for an interned eye I go into the middle muscle and just move that muscle back a little bit. So that the eye can relax and straighten up and so the risks of surgery involve the surgery itself so anytime we do an operation there's a risk of bleeding or scar tissue forming around the surgical site they're pretty unlikely to be significant.

There's always a risk of infection so if the child gets an infection around their eyes we treat it with oral antibiotics and again usually because it's on the outside surface of the eye it's not going to damage the vision and then there's the risks of having a reaction to the vicryl or any of the other medications again usually we can just manage that with a little bit of steroid and things settle down and then the final thing is the very rare risk that something else happens during surgery that was unintended unplanned and most of the time we can manage any of those complications without long term so overall it's very very safe surgery.

The hardest thing is really getting the target right yeah so in a two and a half year old we were trying to measure how much their eyes turning and they're not focusing properly on our targets when we're trying to measure how much they're focusing on our targets when we're trying to measure. We like to get a set of two or three measurements which are consistent so that at least we're starting off operating on a turn that we can measure and if we're getting measurements that are all over the place it's probably safer not to do the surgery. Cool and so what's the recovery like?

Yep so usually first 24 to 48 hours kids are pretty grumpy and we do the surgery under general anaesthetic I should say that but it's just day stay surgery don't have to spend the night in hospital but their first 24 to 48 hours their eyes feel sore and gritty and they're a

bit out of sorts and then I recommend most people take a week off school just because your eyes are still feeling a bit puffy and red and a bit achy and you're a bit out of sorts and then two weeks off swimming or really trying to avoid getting any sort of dirty water muddy play that kind of thing and so for some younger kids that might mean two weeks off daycare because you can't control them yeah and the other thing lots of parents ask me is about rubbing the eyes yeah and the stitches that I use on the muscle are very strong so I would never say never but most kids they can't they wouldn't get in there and rub their eyes to the point that they undo the muscle surgery that's all very safe and secure but the superficial layer where the conjunctiva is it's a bit like the skin of the eye where that comes together it's very easy to displace that again most kids will heal up really beautifully it wouldn't matter we wouldn't take them back to the operating theatre to try and close that up but that's why we're trying to avoid eye rubbing if we can.

6. Vision - Wearing the glasses after surgery

And so if you had the surgery and you found that the eyes aren't straight still, do you use glasses then as well? Oh yeah, great question. So because this is partly a focusing problem, the children still need to wear their glasses. So they still need their glasses to see clearly and the surgery is just on the turn that they have when they're wearing their glasses. So they'll still have a turn when they take their glasses off and the reason for that is they're going to keep growing. And so if you fully correct the turn without their glasses, then long term they might drift outwards. And also what we want to do is give them the best visual function and so that's with their glasses on.

So we operate on the turn with the glasses. For children who have a very low prescription in their glasses and we've sort of tried the glasses to see if it helps and it hasn't made much difference, those kids are wearing them out of their glasses pretty quickly because the glasses aren't doing very much. Right. So like for Eve? Eve, when she gets to the age of eight, would you then, you'd sort of expect that she might not need glasses anymore? That's right. Yeah. And especially if it's a very low prescription, she might prefer not to wear them. Kids are all really different. So some of them love their plus one glasses because it helps them with their reading and they've always worn them and they carry on.

And other kids are like, I ain't done with theirs. They don't have to wear them. Yeah. Yeah. And actually, it's another thing with older children. There's a good range of sports glasses and goggles that you can just buy online. So if your child's wearing like plus four glasses to keep their eyes straight and then they go to swimming lessons and they're not wearing their glasses because they're swimming or you go to play at the pools for all day and they're not wearing their glasses, you can actually buy like plus four swimming goggles. Oh, right. And so then they've got the benefit of having straight eyes with their swimming goggles on.

So some parents like to do that as well. Oh, that's a good idea.

7. Vision - Optometrist, Orthoptists and Ophthalmologists

Also, what is the difference between an ophthalmologist and an orthoptist? Oh yeah, great question. And also we should add an optometrist as well. Optometrists work in the community generally. We do have two at Christchurch Hospital, but mostly they work in the community and they will measure and dispense and prescribe glasses. Lots of optometrists in New Zealand are also very good at screening for other eye health conditions and working alongside ophthalmologists. So in some ways they're like our primary care, they're like our GPs. So certainly if you had a child that was going cross-eyed and you couldn't get into the public hospital because there's a big delay, and especially if your child's over the age of three or four and getting quite cooperative, you could go and see an optometrist and get their glasses dispensed to start with.

Children under the age of four, we really like to see ourselves because we like to make sure that there's no other serious issues going on, that they've suddenly become cross-eyed. Some children will even do an MRI scan to make sure that it's just the need for glasses, nothing else going on. And so, yeah, the optometrists are really good at dispensing the glasses and fitting them well to your child and making them comfortable. And then the orthoptists are specially trained to measure eye movements in people of all ages, but particularly in children. So they're very good at getting accurate vision and measuring how much the eye's turning, how well the glasses are working.

So they're like our right-hand people in clinic. So they'll do all the work up when you first come in. Do all the measurements of the turn and the vision and then put the drops in. Then you go away for a little walk or have a cup of tea for half an hour while the drops are working and then I'd see you. And that's to check the prescription, whether you need a strong plus prescription or not, whether the glasses that you've currently got are right or not, and also to have a look at the back of the eye and make sure that the eye is healthy apart from the issue of the turn. Yeah, that's good. Good to rule out anything else.

Yeah, exactly. Yeah. And so like in Evie's case, I wasn't as worried about her as you were because I've seen this before. But particularly the onset of her turn, the prescription and her glasses and the fact there was no other neurological signs. So she wasn't having nausea and vomiting and headaches. Her eyes were nice and steady. She didn't have nystagmus. You know, those are other things that are sort

of assessing along the way to say, I don't think we need to scan her. I think we just need to give her a pair of glasses. But certainly on my fellowship, I saw a child who was admitted to hospital, had a massive workout with an MRI, a lumbar puncture, blood tests because they thought something really serious was going on and ultimately he just needed a pair of glasses.

Right. Yeah. It can look very concerning when it just presents. Yeah.

8. Vision - What if the child refuses to wear the glasses_

What happens if the child doesn't want to wear the glasses? What do you do then? So if the child is refusing to wear their glasses, it's a good sort of moment to work out why and try and figure out why. So some kids just don't like the physical feeling of the frames on their face. And so then usually lots of bribery and coercion are good options. And sometimes those kids need to just be allowed to wear them at school and take them off in the evenings when they get home. For correcting the turn, the best thing is that they wear their glasses full time. So that's what we're really aiming for. But if you have to work your way up to that, that's one option.

Another thing that I find really important is that the parents are positive and they affirm the glasses and it encourages the child to wear them. Some parents kind of have this, oh, my gosh, my baby's not perfect. I don't I don't want you to have to wear glasses like, oh, this is terrible. And it's really easy to project that onto your child and then they feel self-conscious about wearing their glasses. So I'd say. You know, when you first get the glasses, be really positive about it. That helps get children into them. And then the other thing is that the kids are used to living in this kind of blurry world or they can actually focus in the distance.

So from their point of view, they can see clearly in the distance. They're going cross-eyed, but their brain's ignoring one image. It doesn't bother them because in their mind they've got clear vision everywhere. So for children like that, sometimes we'll give them some dilating eye drops to use at home and you'd use that drop. Each night for three nights of the week for a couple of weeks. And it really relaxes their focusing power so they can no longer focus. So everything is blurry unless they put their glasses on. Everything becomes clear. And usually for those kids, after a couple of weeks of that, they've weaned into the glasses and then they're away.

Yeah, that's fine. And we don't often need to do that. So I don't usually give parents a prescription for atropine off the bat. But if a parent sort of was calling and saying, oh, no, child's absolutely refusing. Then we give them drops root. Yeah, that's great. I always make like the glasses are a fashion accessory. Well, they match your glasses, your top matches your glasses. Nice. Yeah. And often kids whose parents wear glasses quite happily take to them because it's normal. Yeah. Grandparents all wear glasses. So that was quite cool. Then you match your grandma now, you know, that's good. Yeah.

Yeah. Lots of encouragement and bribery. Yeah, exactly.

9. Vision - What does binocular mean and what is diopter_

So can you explain to me what binocular means? So when people look out of both eyes, your eyes are slightly offset, and so your binocular function is your ability for your brain to use both eyes at the same time and to gather more information about the world because you're using both eyes. So if you just went round with one eye, you don't have higher order function of depth perception, but actually you can live a good life. There's no evidence that having one eye limits you in your successful career options apart from maybe being a jet fighter pilot. Potentially doing really fine microsurgical stuff would be difficult if you're trying to do that one-eyed.

But I certainly know kids who have one vision that's excellent in one eye and they can play all the sports they want. The ability to get by on one eye, your brain just takes all the information and uses it. So my job with little kids is to try and give them the best binocular function that I can, which means using both eyes at the same time. Great. And so what does diopter mean? Yeah, so a diopter is the measurement of the turn of your eye. So you'll see when your child comes in for the exam that we use a stack of prisms, which is like a triangle piece of plastic, and we hold that up in front of their eye and then we do this cover test to try and measure the turn.

And the prism actually offsets an image, so it bends light and bends the image, and what we do is neutralise the movement of the eye by bending the image, so it bends the image far enough away that we can say, oh, it's a 30 diopter turn or a 20 diopter turn, which is why we might measure a 30 diopter turn without the glasses and then no turn, or we call it orthotropic, with straight eyes with the glasses. Or it might be that when we put the glasses on, there's still 10 diopters or 20 diopters of turn. And the other thing you might hear the doctors talking about is there's, you know, you might have, say, 35 diopter turn for the distance, so the eyes are crossed over 30 diopters for the distance, and then at near it's 45 or 60, so you've got a massive in turn.

And that difference of that accommodative power and increased turn, often as we grow, there's less of a link there, which again is why by the time you're eight or nine, often you don't have a big turn for near, because just the way that your eye structurally changes as you grow.

10. Vision - What is exotropia_

So there's another wee girl at the girls' preschool, and she's got intermittent exotropia. She doesn't wear glasses, and she's not going to have surgery. Can you explain to me what the difference is there? Yeah, so esotropia is when the eyes turn inwards, and then exotropia is when the eye drifts outwards. And when the eye drifts outwards, again, the brain is kind of switching off that image, so you're not getting double vision. And most often we see it when kids are sick or tired at the end of the day. Their brain is not trying very hard to get that binocular depth perception, and so it just lets the eye drift.

It's gotten to a point where it says, it's too hard having straight eyes. I'm not too worried about that, so the eye drifts off. And so most of the time, while the child's alert and active and looking, they're using both eyes together and developing that binocular function. So binocular function is where you've got one image from one eye, one image from the other eye, and your brain is able to see that they're close enough to each other that it needs to lock in together, and then you get that sense of depth. That's when you can get double vision, or you can get a lazy eye because your brain's just always ignoring that image.

So in exotropia, because the children mostly have control and mostly keep their eyes straight, their brains are developing normal visual function. They've got normal development of depth perception, normal vision, both eyes. It's not a threat to their eye function and their vision, so we don't have to do surgery. And again, often the parents will notice it more than anyone else, because the children come home from preschool, they're sitting in the car daydreaming, their eye is drifting, or close parents, grandparents will notice it, but nobody else really sees it, because as soon as the child meets a new person, they're locked in nice and straight.

So if they are losing control and their eye is drifting more than 50% of the time, then that does make it difficult for them to develop normal depth perception and binocular function. And so we do. We do a lot of surgery, if that comes about, and it's basically to tighten the inner muscle or loosen off the outer muscle so that the eyes can straighten up. And we get really great results from that surgery, because you've got normal healthy eyes that are seeing well, that want to be straight, but it's just that they just need a bit of help to be straight in their natural resting position, rather than turning outwards in their natural resting state.

And because there's no threat to vision, we don't have to rush to do surgery. Oh, thank you. And it's noticed when kids are two or three, and some parents prefer to have that fixed before the children go to school, because if the eye is drifting all the time, then they're a bit funny looking, and you say, oh, for social function reasons, I want my kids to have nice straight eyes. But I always classically remember a clinic where I had two eight-year-old girls, one of whom was like, I wish this was fixed last year. I hate my eye. It turns all the time. And the other little girl was like, oh, no, it's just my party trick.

It happens sometimes. It doesn't bother me. I don't want surgery. Please, no. So in some ways, if you can wait until your child's a little bit older as well, and they have some buy-in to the surgery, that's quite good. Right. And so with those, with exotropia, you wouldn't need glasses? Yeah, usually there's no focusing problem. Yeah. Sometimes if there's a mild focusing problem, then sharpening up the image makes it easier for the brain to keep the eyes straight. So sometimes they will wear glasses, but it's kind of an independent problem. Yeah. Yeah. One of the key things is if a child's had straight eyes and they suddenly develop an exotropia, but suddenly a turn in the eye, it's really important to get it checked to make sure that the eye's healthy and they're not struggling with their vision, which is then causing the eye to drift.

Right.

11. Vision - Why is patching used_

Sometimes you see kids with a patch on their eye. Can you explain to me why you do that? Yeah, so we use the patching if the brain has been switching off the image from one eye. So rather than getting double vision, say you hadn't sought any help for Evie, and she's cross-eyed all the time, double vision making her grumpy. Instead of living with that, children's brains are very flexible and they basically start to ignore that second image. Right. And so if you're ignoring the second image and the one eye's always turned inwards, then even when you put glasses on and straighten up the eyes, the image is weaker, the vision is weaker in that lazy, amblyopic eye.

And so then we use patching in addition to the glasses. And so that might be for two or four hours a day or longer, depending on how dense the amblyopia is or how bad the vision is in the lazier eye. Because what we're trying to do is give the weaker eye as much visual stimulation as we can, and not let the brain switch off the image to that eye. So by patching the good eye, that eye, Yeah. is doing all the seeing, all the looking, all the visual processing, and really strengthening those brain pathways. And so, yeah, patching can be really difficult, and I really admire parents who- How do you stop them from ripping it off?

Yeah, it's very difficult. So yeah, some kids put up with their patches reasonably well, especially if their vision's picking up, and so they're not terribly poorly sighted. Right. Patching can be very difficult if the weaker eye is much weaker. Yeah. And so, yeah, so lots of bribery, stick a charge, you know, all sorts to try and get kids through tricky patches of patches of patching, tricky phases of patching.

And again, some parents find that easier to do at preschool, so it's like part of the routine that you get to preschool with your eye patch on, wear it for a couple of hours and take it off at morning tea.

And there's lots of distraction and other stuff going on, so the kid's not thinking about their patch. Some parents do use some screen time, because you can put the patch on, give the child 20 minutes of screen time, they forget they're wearing patches. Yeah. And then they go about their play. So it's another way of doing it. And if the patches really don't work, then we can also look to doing eye drops. So we use dilating eye drops in the strong eye, so that their eye can't focus as well. Usually that's combined with glasses, so that you're getting the best vision you possibly can from the weaker eye, and slightly blurred image in the good eye.

And you can use those eye drops just twice a week, and it blurs the image enough that the other eye gets. Yeah. Effective treatment. So when you're patching, it's only for a couple of hours a day? Yeah, so most kids it'll be two to four hours a day. Right. You can patch up to eight hours a day, but again, that's not often, usually it's two to four. Yeah. Yeah. And the other thing is some children have nystagmus, so when you cover up their good eye, their weaker eye will have a bit of nystagmus. Right. So one other way of doing patching is to do it for a full day, one or two days a week. Right.

Because when you first patch their good eye, this eye doesn't know where to look and it's really wobbly. Right. But then after an hour or two, the nystagmus slows down, their vision's more stable, they're getting better vision. So for those children actually being patched for a whole day is a good option. And the reason why we don't do too much patching is if you're always patching the good eye, then you're losing visual stimulation on that side. So you can overcorrect and end up with poorer vision in the better eye. Right. And then you have to stop patching for a little bit to try and get things coming in again.

Yeah. How often would you check in with those parents that were patching? Every four months. Right. And when you're coming because of patching, we don't need to put the eye drops in every time. Okay. So we're just coming to see the effect of the patching, if your kid's allowing you to patch, if you need to swap over to drops. Right. Yeah. Patching's very important. And again, we've sort of got the sensitive period until the child's seven or eight, where they might need to do patching right up until that age. And then after that, it's a bit less pointless. Yeah. Okay.

12. Vision - The use of drops

So the drops that you use, what are the risks of those? Yeah, so we use Atropine which is from Belladonna. So we definitely don't want your kid to be drinking the bottle of iDrop. So it's really important that you put the cap on and put it up high in the bathroom shelf. If your child did get access to it, it would be important to bring the poisons hotline. But if you're just having one drop at a time, it's a very very low dose and unlikely to have any side effects in the kids. It will make the pupil bigger on the side that you're using it and some kids will be a bit more light-sensitive. Some kids might get frustrated because they can't focus up veneer and so yeah, in some kids it's tricky. Usually young kids are absolutely fine. But the older kids will be more bothered by it because they might struggle a bit more with their schoolwork. So for that reason, some people would prefer patching rather than using iDrops and some parents don't like the idea of putting medication in their kid when patching would work. Other people, patching is just a terrible thing, their children don't like it and it's really hard to enforce. Or the children have an allergic reaction to the sticky patch and so then switching over to the iDrops can be good. The iDrops are not quite as effective as patching. So in a child who's got quite bad amblyopia, I'd rather have complete occlusive patching than the slight blur that you get from the atropine iDrops.

13. Vision - What is nystagmus_

And so what does nystagmus mean? So nystagmus is where your eyes wobble. So either they can wobble horizontally or vertically or a little bit of both. And it's basically the visual system isn't steady. And so the eyes are, for all of us actually, our eyes are always drifting and refixing. And normally our brains have quite good control of that. And so your vision is nice and steady and the eyes aren't sort of shimmering or wobbling. And for some children who've had an amblyopia or a strabismus, a turn of their eye, when you cover one eye, it brings out the nystagmus. So when they're using both eyes together, they've got enough visual information to stabilize the system.

But you cover one eye and the other eye starts to wobble. And other children have nystagmus. Just the way that their brain is trying to coordinate their eyes means that they don't have good control. And so the eyes are constantly slipping. And you can only... You can only see your best vision when your eyes are aligned and straight with the target that you're looking at and that the image is falling on the retina in clear focus. And so in nystagmus, where your eye is constantly moving, there's only brief periods where the image is actually on the retina, on the sensitive part of your retina for seeing.

And so the vision can be less because you just aren't looking at an object for as long before your eye drifts past it. And so in those kids, sometimes they adopt a funny head position because they're trying to get to their... Neutral point where their eyes don't wobble as much. And so if children do have that, if they have nystagmus, and they find it easier to look out of the side of their eye because their

eyes are more steady that way, you should just allow the children to do that because they're getting better vision when they turn their head. And occasionally we'll do surgery to try and straighten up the head posture so that then their neutral point where their eyes aren't wobbling as much is more straight on.

Yeah, it's a whole other complex area. We could probably have a whole talk on nystagmus as well. Yeah.