

How glaucoma impacts vision

Dr Caroline Cobb Consultant Ophthalmologist

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My name is Caroline Cobb and I'm a consultant from NHS Tayside. I look after a lot of the glaucoma patients within NHS Tayside and glaucoma is my special interest. I'd like to thank John for asking me to come and speak at this meeting and also thank David and John and the IGA in general for ensuring that meetings like this can carry on, because the more that you understand about your disease, the easier it is for you and for us to treat you.

So, to begin with, I need to tell you that very few people in the United Kingdom, with the care that we have, go blind from glaucoma.

There have been big population studies done on glaucoma throughout the world where they take whole populations and work out how many people have glaucoma and from these we have a figure of about two per cent of people over the age of forty. So in Tayside we can look at our population and we know exactly what percentage is over forty years old, so there are about four thousand people with glaucoma within our area. Last year we had to register

nine people blind, so really, very few people within the United Kingdom go blind from glaucoma, but the two keys to preserving vision are early detection and good compliance with the treatment (taking the drops on time every time).

The other thing these studies showed is that about fifty per cent of people who have glaucoma don't know they have it! So for every one of you sitting here, there is somebody out in the community who's blissfully unaware that they have glaucoma. We have to ask ourselves - why this is the case? The answer is that glaucoma (in most cases), is a very slow condition, it's called the silent thief of sight because it happens slowly; one eye will fill in for the other and your brain adapts to it. So the symptoms of glaucoma are often masked early on because you are compensating for them and by the time the symptoms arrive it's very late on in the disease.

I use the term 'blissfully unaware' just now and I've thought about it very carefully because we know that when you're told you've got glaucoma your quality of life goes

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down. In the 1970s the sociologists did lots of studies and one of the ones they did was to take a population of people who were fit and healthy and got them to fill out a quality of life questionnaire. So they asked them about how they felt, were they happy and did they manage to do all the things that they want to. Then they took them into a room and they said, 'Look we're really sorry, but you have glaucoma'. (These people did not have glaucoma, but they were told they had glaucoma.) Two or three days later they made them fill the questionnaire in again and all the people who had been told they had glaucoma felt miserable; they felt worse off. So we know that telling people that they've got glaucoma reduces the quality of life.

What does this tell us? It tells us that when we have people in front of us we have to be absolutely sure that we're telling them the right thing. We need to be sure that they are being told that they have got glaucoma because they have got glaucoma, not just because one of the tests was slightly abnormal. We also need to be sure that if we are telling people that they have glaucoma, then there are the networks available that these people can go to, so that their quality of life isn't reduced. If you have glaucoma, you've got the damage already happening and you've been

dealing with that in blissful ignorance, so it's really just the label that's causing the problem.

The reason that people are frightened of glaucoma or worried about it is that people go blind from glaucoma. People do go blind from glaucoma and the people that you talk about are the people that go blind. So if we tell you that you've got glaucoma and you go out and you say to your friends 'I've got glaucoma' they're not going to say 'Oh yes, Mrs Smith down the road, she's got glaucoma but she's doing fine'. What they'll say to you is 'Mrs Smith up the road, she's got glaucoma and she's gone blind'. So this is the trouble: there is a weighting towards the people that have problems with glaucoma. So, if you remember nothing else from my talk, I want you to remember that blindness from glaucoma in this country is very rare, especially if it is detected early and treated effectively.

The other thing that I wanted to talk to you about was some anatomical aspects of the eye, to help you understand how glaucoma affects the eye. Essentially the eye is like a camera. You've got a cornea at the front with a lens which together focus the light on the back of the eye, which is the retina. The retina is made up of columns of photoreceptors. Each one of these is a photoreceptor cell that

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takes light and turns it into an electric current. The current then passes through a second cell (a ganglion cell) and all the way out, through the optic nerve at the back of the eye, to the brain.

We believe that the point at which the ganglion cells make a ninety degree bend from the retina to form the optic nerve (the optic disc) is in some way vulnerable to raised pressure and that raised pressure in the eye damages them and that these cells then die. The number of ganglion cells declines and we end up seeing a larger cup, so when you hear us talking about cupping, what we're really talking about is a surrogate marker for loss of these fibres.

Now, your eye is incredibly clever in that it can function on far fewer than a hundred per cent of its ganglion cells so most patients don't develop any symptoms until the number of cells is really quite low. Let's say you develop glaucoma sometime in your life. Now, what glaucoma does is this - it just speeds up the natural loss of ganglion cells that is simply a part of ageing. What we need to do is to intervene and slow the rate of loss so that in your lifetime we can keep you seeing what you need to see.

The European Glaucoma Society issued a one hundred and fifty page document about three or four

years ago giving guidance to all ophthalmologists on how to treat glaucoma. The thing that they said at the very beginning was that we need to make sure that we're not poisoning our patients; we need to make sure we're not operating on our patients unnecessarily. So when we're asking you all these questions in the clinic about what you like doing, what medications you're on, we are trying to work out what is the least invasive approach we can take to keep you seeing what you want to see in your lifetime

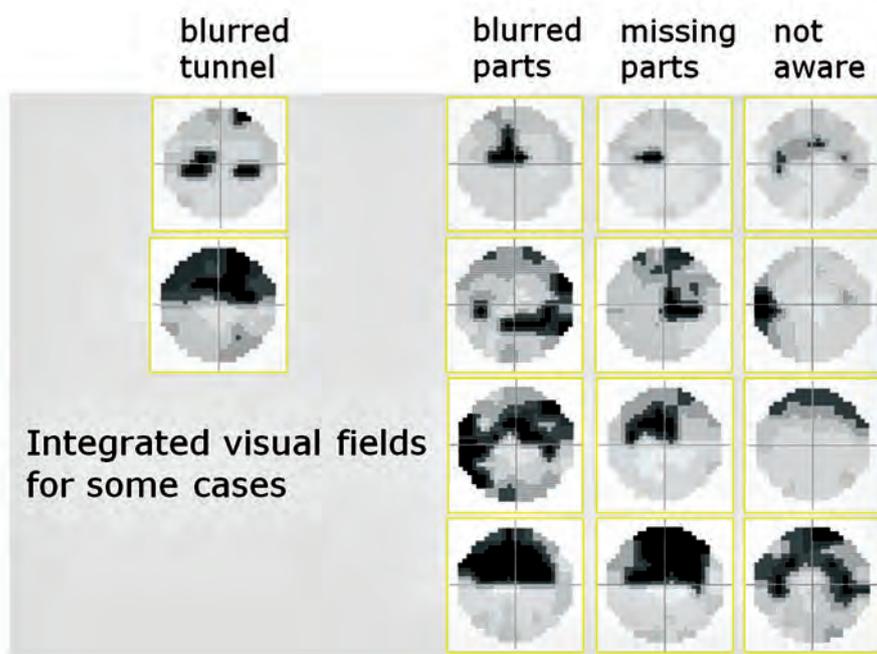
One of the most important things in vision is contrast. Your eyes may be very good at seeing little letters on a chart but can they see different intensities of light as well? This is the basis of perimetry (the field of vision test) where each of the lights that comes on during the test will come on again and again at different intensities so that we know not only if you see a light, but also how strong the light needs to be before you can see it. The eye is also able to detect motion and there are labs working down in London where they are trying to work out whether using motion as a form of perimetry will allow us to manage glaucoma better and detect it sooner, because there is some evidence to suggest that some of the motion pathways are affected early on in the condition.

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Probably the best known part of vision is the visual acuity, which is all about how well we can focus on what we see. This is a very important part of vision, but it can cause some confusion, especially when we see a deterioration in a person's glaucoma but they know that they can still see things in perfect focus. This is where I have to go back to the anatomy of the eye, because this is to do with the ganglion cells and the photoreceptors; in the macular (the central part of your vision) you've got a very high concentration of photoreceptors and ganglion cells, with perhaps one photoreceptor that's feeding into four or five different ganglion cells and that's completely different to the peripheral part of your field of vision, where you'll have three or four photoreceptors feeding into one ganglion cell (so it's the complete reverse). If glaucoma is causing a loss of ganglion cells across the whole of the back of your eye, you can see that if you lose one out in the periphery that's three or four photoreceptors gone; whereas in the macular if you lose one ganglion cell, that's okay because the photoreceptor is sending information to three or four others. So that is why the peripheral field is damaged first and also that's why

you can still see down the bottom of your chart, because the macular has still got enough reserve to continue functioning.

What I would say to you is that if you do start noticing your vision deteriorating, it may not be because you've got advanced glaucoma but there are other things going on and patients that have glaucoma; patients who take medication; patients who have glaucoma surgery all have an increased risk of developing a cataract and that can reduce your visual acuity. This is why we carry out the three tests for glaucoma. The field test tells us what you can actually see and allows us to track progress over time.



Images used with kind permission of Professor David Crabb, City University London

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The pressure test tells us what the pressure is at that moment, but pressures change from hour to hour and from day to day so they are a useful guide, but not a fixed result and when we have a look at the back of your eye that's our interpretation of what we're seeing.

I think another problem that many with significant glaucoma will be familiar with, is glare. The glare is a problem because about fifteen per cent of your ganglion cells are responsible for controlling the size of

your pupil. They are being destroyed at the same rate as the rest so for a given amount of light coming into the eye the pupil should be at a certain size, but because the brain isn't seeing as much as that light, it's not bringing the pupil size down, leading to glare.

So that is a brief overview of some aspects of glaucoma, but perhaps the most important thing about this kind of forum is that we can answer your questions. So, do we have any questions from the audience?

Questions and Answers

Q I have a problem where I have already lost vision completely in one eye, but another side effect of that is that I have a pattern which I can see the whole time and it confuses this eye as well, so that I do not see clearly now and I'm having great fun trying to resolve everything. It does help to take extraneous light away and concentrate and I can

then see the object clearly, but it's a side effect of the loss of vision – I've still got a pattern and it's a continually varying pattern and the whole thing is aggravated by optic migraines as well.

A When your eye is essentially blind or not seeing, then your brain interprets things differently and it can lead to a lot of confusion. There is a syndrome called Charles Bonnet Syndrome,

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where, if you're completely blind, you don't actually "see" things but your brain interprets vision and not quite hallucinations, but it can see images. I was at a conference in America where somebody was talking about Charles Bonnet Syndrome and she said 'I always start my conversations with "Do you ever see things that aren't there?"' And a lady said "What do you mean, doctor?" And she said "In people who can't see very well the brain can get bored and it starts just making things up". So the woman looked at her and she said "Ahhh that explains the giraffe on the porch!" The trouble is that people don't want to say anything, because if they say "I've got a giraffe on my porch", they're imagining that everybody could say, "We'll have to lock granny up, look, she's seeing things".

But the one thing that we are taught, and I don't know whether this is true, is that these visual hallucinations (they are hallucinations, it's just there, not because you're mad or because you're taking drugs, it is because your brain is thinking "Well, I must be able to see something") are not frightening. I had one

lady who's utterly convinced that she'd got gypsies who come along every day and hang their washing out in her garden and another who said she had a little girl who came and stood by their bed. That would just scare me rigid but she just said she wasn't scared by it. So they're very formed images, but I think the brain is clever enough not to scare people.

Q My dad suffers from advanced glaucoma and he also suffers from Parkinson's Disease. He gets hallucinations all the time but it's always been put down to his Parkinson's, so now you're saying.....

What type of hallucinations does he have?

Q He has families coming to stay with him, he has visitors all the time. Even just coming up the path here now, to come here, there were three of us. Father had a cataract removed quite a few years ago and it left him with double vision in the right eye which gradually went on to hallucinations.

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A It may well be that it is Charles Bonnet. I am constantly surprised because we were taught at medical school that it's blind people who experience these hallucinations. Charles Bonnet himself was blind, but I am seeing people who have got what I think is good vision who are having problems.

Q I just want to mirror what the previous person was talking about. My mother has vascular Parkinsonism as well and you got to this point before me because I was trying to understand. My mother has glaucoma, has hallucinations and I'm not sure if it's to do with the glaucoma or her vascular Parkinsonism.

A I think the trouble is, as we get older, more and more things don't work as well as they did, so I think it would be lovely to be able to say this is purely because of this. I don't know whether there is any treatment for hallucinations with Parkinson's but there is certainly no treatment for hallucinations with Charles Bonnet other than to reassure the person that

they're not going mad, that this is a perfectly understandable pathophysiological process. Maybe just reassure your mother that she's not alone.

Q I have had glaucoma for a long time and it's under control, but recently I've developed cancer of the eye, choroidal melanoma. It hasn't done anything terribly bad yet but the thought that had occurred to me was, supposing that I should experience a loss of visual field, would it be clear to the specialist looking at that whether it had been caused by the cancer or caused by the glaucoma?

A Yes, it can be, because the eye obeys various anatomical markers, so the field loss in glaucoma often follows very specific patterns whereas a choroidal melanoma obeys no boundaries at all. I'm sorry to hear of your problem.