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SOME CAUSES OF AMAUROSIS IN INFANTS

BY

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INFANTS are often brought up to hospital because their mothers are anxious with regard to their sight. The actual complaint of the mother varies. It may be that she thinks that the infant does not notice objects around it, that it has to feel for its bottle, or that its eyes look "queer," or again that the eyes are continually "moving," or, finally, that though at first it seemed to see quite well, latterly the sight has failed and it does not seem to see, and, when crawling, knocks into objects in its way.

It is obvious that a variety of factors may be acting to produce this state of affairs, and it was with the object of investigating all possible causes which might affect the visual powers of infants that this research was started in 1913.

Sixty cases have now been observed—some of them over a period of nine years—and it was thought that sufficient material had been obtained to warrant a review of the whole series of cases.

The primary qualification for the admittance of any case into the series was the mother's statement that the infant did not appear

to see. But, in some cases, on investigation, it was found that the mother's statement was erroneous, that the child fixed the light well, and that there were no other signs, such as nystagmus, which might suggest imperfect visual powers. Such cases, of course, were not included.

In order to facilitate the investigation and to establish a uniformity, a scheme of points to be inquired into was made out:—

1. Why patient was brought up? What did the parents first notice?
2. Are the parents related?
3. Number of pregnancies? Miscarriages? Position of patient in family?
4. Similar cases in family or relatives?
5. Wassermann reaction?
6. Delivery: normal, instrumental, protracted?
7. Feeding: breast, artificial?
8. Any history of acute illness?
9. Fits; urine?
10. General condition?
11. Position of eyes: parallel or deviating?
12. Ocular movements: full or limited?
13. Eyes held stationary or moving?
14. Nature of nystagmus?
15. Vision, light fixation?
16. Pupils: diameter, reaction?
17. Colour of iris?
18. External appearances of eyes and appendages?
19. Condition of lens?
20. Media?
21. Fundus: discs, macula, general?
22. Refractive error?
23. Eye rubbing?
24. Evidences of congenital syphilis?

In considering these cases as a whole it must be remembered that all of them, when first seen, had defective vision.

Certain features stand out. There are the cases of true temporary amaurosis; the cases which became mentally defective; and there is the close relationship between delay in the development of the fixation reflex and the presence of albinism. Then the association of certain signs or symptoms attracts attention, the significance of eye-rubbing for example.

It seems best, therefore, to attack each feature independently, but there must, of course, be much overlapping and repetition as one case may figure under several different headings.

Temporary Amaurosis

This condition of temporary or fleeting amaurosis of infancy has been described by Nettleship (*Trans. Ophthalm. Soc., U.K.*, 1884, IV, 243), by Gay (*Royal London Ophthalm. Hosp. Reports*, 1893, XIII, 404), and Sydney Stephenson (*Reports of Soc. for Study of Diseases of Children*, 1902, II, 276). The children affected are usually under two years of age. There is a history of a sudden illness associated with fits, head retraction and vomiting. Immediately following upon this it is noticed that the child no longer appears to see. This failure of sight may be of short duration, and clears up soon after the general illness has subsided. But there is a more or less definite relation between the length and severity of the illness and the speed and completeness of the recovery of sight. In some cases, indeed, with a similar onset, no recovery of sight ensues, and though these cases cannot, naturally, be classed under this heading, nevertheless the underlying pathological process would seem to be the same. In the cases in which no recovery of sight occurs, atrophy of the optic discs is usually present, whereas in the cases of true temporary amaurosis no fundus abnormality is to be seen. It has been suggested that the pathological basis of these cases consists in a basal meningitis which seals the foramen of Majendie and so causes a distension of the third ventricle. This distension will produce pressure upon the optic chiasma, and, in consequence, interference with the conductivity of light impulses to the cortex. In those cases in which the amaurosis is temporary, it is suggested that the sealing of the foramen of Majendie is of short duration only, whereas in those cases in which permanent blindness ensues it is suggested that the closure of the foramen of Majendie is for a sufficiently long period to cause permanent damage to the chiasma, by reason of the prolonged distension of the third ventricle. In the present series of cases two typical cases of this condition were met with.

Case 8. Female child, aged ten months, was first seen October 27, 1913. The youngest of nine, seven surviving. The mother says that at nine months old she was found one morning in bed, twitching, "like a fit that other children have in teething." No fever. One month later she started bumping into things. Previous to this she had crawled about on the floor quite well without bumping into things. Her sight seemed bad for two or three months, then gradually improved. The left eye was found turned in from the time of the fit. No other fits since.

When seen, with the exception of the squint, the eye appeared normal and the pupils reacted readily to light.

March 16, 1921. Now eight years old, eyes straight, had the squint operated on at St. Bartholomew's Hospital, 1920.

V.R. with -1 cyl. 40 degrees 6/12. V.L. with -3 cyl. 30 degrees 6/36. Fundi normal.

Case 9. Female child, aged eighteen months, brought up to hospital because she could not see. Five in family, no miscarriages.

September 9, 1913. "The child was well until a month ago, then had 'screaming convulsions.' When given the bottle the child felt for it and did not see it. Crawled round cot and hit her head. Was taken to see Mr. Fisher, who observed that the pupils were larger than normal, and reacted feebly to light, and that the child certainly did not see well."

September 16, 1913. A week later child now sees quite well. Pupils normal and react well.

April 8, 1920. Postcard returned from the dead letter office.

Cases 10, 38 and 44. These cases may reasonably be included under this heading. Here the onset of the meningeal lesion was so early in the child's life that it is hardly possible to assume normal visual acuity (for the age it would be merely the fixation reflex). In these cases the earlier onset and the more prolonged duration of the disease has produced serious disturbance to the visual pathways, and the amount of vision present is doubtful, though there appears to be some appreciation of light.

Case 10. Male child (fourth in family, no miscarriages, premature eight months), aged fourteen months. Brought to hospital because he could not see. "At two months had convulsions on and off for four consecutive days, none since. Quite healthy child. Regular movements of eyes. Cannot see except possibly bare perception of light. The blindness came on about fourteen days after the fits. Pupils under atropin. Fundi and media normal. Rubs eyes."

April 15, 1920. Received answer to inquiry saying that patient died at two years of age.

Case 38. Male child (firstborn) premature three weeks. "On the fourth day the infant became ill, the doctor who attended called the illness meningitis on account of the 'fits and cry.' The fits continued until the infant was three months old."

March 12, 1921. The infant is fairly well nourished and moves his limbs well. The eyes are usually held stationary, but sometimes converge and diverge, and occasionally show rapid horizontal movements. It was doubtful whether he sought the light. The pupils reacted to light. The fundus showed deficient choriocapillaris and pigment except at the macula which had a good red colour. There was a speckled sheen (internal limiting membrane) at and around the macula.

Last seen September 7, 1921. Definite pupil reflex to light. Doubtful if the child fixed the light. He seems definitely to gaze

at objects, but does not respond to any attempts to fix his gaze. Child is backward.

Case 44. June 15, 1921. Male infant fifteen months (first; no miscarriage) brought to the hospital because he did not take notice of things. No fits. Hydrocephalus noticed from eighth week, and is being treated for this at Queen's Hospital. Eyes held parallel and stationary, no paralysis. Pupils react to light, did not follow objects with eyes, but tried to avoid the light of the ophthalmoscope. Fundi showed a pigment deficiency, generalized, and there was pallor of both discs.

Last seen November 30, 1921. Tendency for left eye to diverge. Mother thinks the child's sight is improving. He does not fix the light, but yet seems to be aware of the light.

Mental Deficiency

Included in this group are all cases which showed any evidence of backward development. Some of the cases were observed for a short time only and then were lost sight of, so that it was not possible to know whether definite mental deficiency was established. Therefore such signs as delay in holding up the head, delay in development of speech, etc., were taken as probable evidence of future mental deficiency.

Nineteen cases were observed. The majority of the cases in this group were firstborn children.

Three cases were premature.

Congenital syphilis was established in three cases.

Fixation was poor in all the cases, and in none did any marked improvement appear during the period of observation.

Albinism was present in nine cases.

A history of fits was obtained in ten cases.

Convergent squint was noted in eight cases.

Divergent squint was noted in two cases.

Horizontal nystagmus was noted in five cases.

Roaming movements were noted in two cases

Eye rubbing was seen in six cases, and in five of these there was a refractive error, and in one a congenital cataract.

Head nodding appeared in three cases, and in two of these head banging was associated.

Pallor of the discs was observed in five cases.

Disseminated choroiditis observed in one case.

Paralysis of both external recti observed in one case.

In every case the pupil reactions were noted as being obtained.

Of these nineteen cases seven have been observed for over two years, and have become definitely mentally defective. Most of these infants appear to notice objects in a vague way. It requires a very strong light stimulus to evoke a response, and often it is very

hard to say definitely whether the light is noticed or not. The pupil reflex to light was obtained in every case, and certainly the impression which is produced by these infants upon the observer is that it is a lack of attention which is the underlying fault rather than a failure of the visual apparatus.

The two following cases are good examples of this group.

Case 2. John F., aged six months when first seen, October 30, 1913. His mother thought that he was blind. Three confinements, no miscarriages, two live children (one died of scalds). This child, the third, normal labour, jaundiced at birth. Internal strabismus, lateral nystagmus, pupils react to light, fundi normal.

October, 1915. Now two and a half years old, does not talk or walk, does not recognise people.

April, 15, 1920. Has been for the last four years an inmate of the Temporary Fountain Mental Hospital.

Case 53. Elizabeth B., aged 8 months, first seen August 8, 1921. Mother thinks that she does not notice things. Confinements one, miscarriages none, living child one, Wassermann reaction positive, fits for first six months, ten to fifteen a day, cries a lot, fair development, eyes straight, no nystagmus, pupils react to light. Fundi show a slight pigment deficiency, but macula has good red colour and discs are not pale.

November 14, 1921. Mother says "the child does not seem like other children of the same age, does not grasp things up in front of her, is backward, cannot sit up by herself, no teeth yet, does not crawl."

December 12, 1921. Will fix and follow light, but seems slow in making up her mind to do so, has not yet sat up or crawled.

Fits

In fourteen cases a history of fits was obtained. On reviewing these fourteen cases it appeared that the fits could be divided roughly into two types:—

(1.) Those which came on soon after birth, which lasted some months and were characterized by their frequency.

Case 4 as example:—

"Female infant thought to have defective vision. (Youngest sister was similar to this child, could not walk, had fits in infancy, no use of hands or legs, but sight was good; died age 6 years.) Patient was 7 months' child, had fourteen fits a day till 2 years old. Spastic contraction of lower limbs.

Right disc pale. Left disc temporal pallor.

When last seen obvious idiot, spastic legs, eyes divergent, pupils active to light, eyes always moving. Discs appear pale but difficult to see on account of movements."

(2.) Those which occurred at seven to nine months; generally only lasting a few days.

Case 8 as example:—

“Female infant. Mother says at nine months was found one morning in bed, twitching. One month later she started bumping into things, and did not take notice of things. Previous to this she had crawled about on the floor without bumping into things. Her sight seemed bad for two or three-months and then gradually improved.

Vision when last seen—R. with -1 cyl. 40 degrees $\downarrow = 6/12$.
L. with -3 cyl. 30 degrees $\downarrow = 6/36$.”

The subjects of the first type of fit, in most cases, became mentally deficient and never developed average vision. The second type of fits was probably associated with a basal meningitis. These latter cases showed a true temporary or fleeting amaurosis.

In every case of these fourteen the pupil reaction to light was obtained.

Five cases were firstborn.

Twelve cases were mentally deficient.

One case was the subject of congenital syphilis.

Three cases showed albinism.

One case: consanguinity.

One case: premature birth.

One case: convergent squint.

Two cases: divergent squint.

Two cases: nystagmus.

Three cases: eye rubbing.

One case: head nodding.

One case: pallor of discs.

Two cases: disseminated choroiditis.

Delayed Fixation

In the normal infant the light fixation reflex should be present at, or on the first day or two after, birth. In other words the infant should fix a light which is directed towards his eyes. This fixation is only maintained momentarily; maintained fixation does not usually appear until after the first month. In some cases there appears to be delay in the development of this function. In this series of cases this phenomenon was present in nine cases. Subsequently in all the nine cases fixation appeared, and the infant was able to pick up objects.

Case 28 may be considered typical of this condition.

Female infant, aged three months (seventh, three miscarriages), “brought to the hospital because she could not see, healthy child, no fits, negative Wassermann reaction, slight nystagmus (horizontal), pupils normal. Fundi: Large gaps of white choroid,

absence of capillary layer of choroid except at macula, discs appear pale with sharp edges, physiological cup small and not filled in, lamina cribrosa not seen, does not rub eyes."

November, 1920. "Now plays with paper."

February, 1921. "Aged nine months, eyes parallel, slight horizontal nystagmus, looks at one drunkenly with some slight horizontal nodding of the head. Notices things only slightly, occasionally closes eyes when the face is threatened with a blow. Pupils active."

May, 1921. "Aged one year, seems to see and look at objects the size of half-a-crown, looks at mirror of ophthalmoscope but does not fix well, slow horizontal nystagmus and head nodding (horizontal); on the whole notices things better."

November, 1921. "Aged one and a half years, head nodding has ceased, sees much better, picked up a halfpenny on the floor, can stand, not backward, mother says she noticed that sight began to develop at seven months, says a cousin of this infant was blind until nine months of age, but now sees well; asked to bring the said cousin next time."

"Pigment deficiency of fundus except in macular area."

In seven of these cases there was a definite pigment deficiency. This is a significant fact. The family position of the infants was of no special significance. In no case was there evidence of congenital syphilis. The pupil reactions were noted as normal in eight cases (the ninth case was one of aniridia). In two cases the infant was definitely backward.

There was an hypermetropic error in four cases and correcting lenses produced improvement in vision.

Convergent squint was seen in four cases.

Divergent squint was seen in one case.

Horizontal nystagmus was present in four cases.

Head nodding was present in three cases.

Roaming movements were present in one case.

Eye rubbing was present in four cases.

Head nodding disappeared as vision improved.

Fits were noted in one case up to seven months. This child was also backward, but when last seen his vision had definitely improved.

In one case there was total absence of the iris. This case, when last seen, had good vision.

In one case there were vitreous opacities in each eye, and in the left eye some pigmentary disturbance in the macular region, indistinctly seen. The Wassermann reaction of the mother and child was negative, but the condition was improving on grey powders, and the infant now certainly sees.

Albinism

In seventeen cases this condition was present. By albinism is meant a condition of the retina and choroid in which there is deficient development of the pigment epithelial layer of the retina and the chorio-capillaris, so that the larger choroidal vessels are seen shown up on the white background of the sclera. In certain of these cases the macular area itself showed a good red coloration. In these cases it was often extremely difficult to decide upon the condition of the disc. The normal colour comparisons are absent and the discs of the cases always give the impression of pallor. The condition of the physiological cup, and the visibility or otherwise of the lamina cribrosa had to be taken into consideration.

Of these seventeen cases :—

Nystagmus was present in all save three, two of whom gave a history of fits and were definitely backward, and one was suffering from hydrocephalus and was under treatment at the Children's Hospital. These three children showed no, or very defective, fixation all the time they were under observation. Fixation certainly did not fully develop in them as it did in the others.

The nystagmus is noted as horizontal in nine cases and roaming in two cases.

Convergent squint was found in eight cases and divergent squint in two cases.

Position in the family of no special significance.

Eye rubbing in six cases.

Head nodding in three cases.

Consanguinity in one case.

Prematurity in one case.

It may be well to define more exactly what is meant by albinism in this connection.

Albinism is a term denoting deficiency of pigmentation. This deficiency may be widespread, or confined to one organ of the body. Nettleship (*Trans. Ophthal. Soc.*, 1906, XXVI, 244) in a paper on "Some varieties of Albinism," describes the following clinical varieties of this condition.

- (1.) Skin and eye (general albinism).
- (2.) Present in the eye but not in the skin.
- (3.) Affecting the retina and choroid alone.

The cases referred to under the heading albinism belong to the third grouping in which the retina and choroid alone are affected.

Congenital Cataract

In the series there were seven cases of congenital cataract. The type of opacity was noted in detail in four cases (32, 40, 43, 57). One case had been needled previously; this particular child did not fix the light and the pupils did not react to light. The infant

was backward in every respect and has since died. One other case of the seven has died since first coming under observation. This case died from broncho-pneumonia, and was indeed suffering from this disease when seen here, so that no very satisfactory observations were made. With regard to *position in the family*: two first, one second, two third, two fourth. One of the firstborn infants was a seven months' baby. The Wassermann reaction was positive in one case; this child was the first born following on three miscarriages. In the other cases there was no evidence of syphilis. Two cases fixed the light well, three cases indifferently, and to strong stimulus only. The pupil reaction was present in these five cases, and absent in the other two cases, who, it should be observed, were ill at the time of examination, and have since died.

One case was noted to rub his eyes; this case fixed the light readily.

Nystagmus was noted in all the cases except in the case of the infant who was ill with broncho-pneumonia at the time of the examination. The nystagmus was of the roaming type with occasional series of rapid lateral jerks. Convergent squint was noted in two cases.

Case 40. Central circular opacity anteriorly, with deeper opacities more posteriorly.

Case 43. Opacities of "dot" type, widespread, with tendency to coalesce and to become almost "lattice like" in appearance.

Case 57. Dense central lens opacity with clear periphery; some anterior capsular opacity.

Case 32. R.E. central irregular disc-shape cataract with irregular edge, not of uniform density. Red reflex peripherally.

L.E. cataract; whole vertical and lateral diameter opaque. No red reflex.

Congenital Syphilis

Cases classified under this heading were those which gave a positive Wassermann reaction, or those in which the Wassermann reaction being either negative or not taken, there were physical signs of congenital syphilis, or other significant data, such as maternal miscarriages.

Under these conditions seven cases were found in the series. In four of these choroido-retinitis was present, and, in addition, in one of these four there were considerable opacities in the vitreous.

Fits were noted as having occurred in three cases.

Three of the cases were mentally deficient.

Two cases have died since first coming under observation, one from diarrhoea and sickness; the cause of death of the other was not ascertained.

Pallor of the discs was noted in two cases.

Cataract was noted in one case.

Consanguinity was noted in one case.

Prematurity (seven months) was noted in one case.

Consanguinity

Nettleship, in his paper on " Amaurosis in Children " (*Trans. Ophthal. Soc., U.K., 1884, IV, 243*) mentions kinship of the parents as a factor of ill portent when considering prognosis in these cases. Three cases were seen in this series in which the parents were related.

Case 3. Parents are first cousins.

" Three confinements, one miscarriage (second). First child healthy. Patient is the second child. Had bronchitis when two months old, when defective vision was noticed. Fits from two months onwards. Father, mother and child gave positive Wassermann reaction. Optic atrophy, right and left eyes. Is now blind."

Case 15. " Parents first cousins, patient one of twins. Divergent strabismus, horizontal nystagmus. Vision: counts fingers, right and left eyes. Pupils react to light. Is now sixteen years old. Fits occurred when between seven and nine years of age. Discs very difficult to see aright owing to nystagmus, but appear pale. His twin brother started fits at the age of twelve, but his vision is good."

Case 20. Father and mother are first cousins once removed.

Patient is an albino.

Difficult Labour

In this grouping are collected those cases in which a history of difficulty at the birth was obtained. As the information, in many of the cases, came from the mother or husband, it must necessarily be a matter of uncertainty as to what extent the confinement can be regarded as abnormal.

Ten cases are here recorded. In three cases it is merely noted that the labour was protracted. In two cases there was difficulty in inciting respiration in the infant. In three cases instruments were used. One case was a twin, the other twin dying on the third day. In one case there was a face presentation with an extended head; in this case, following upon delivery, there appeared a left-sided facial paralysis which lasted three weeks, but was completely recovered from.

Of these ten cases the family position was as follows:—

First, five cases; second, one case; third, one case; fifth, one case; sixth, two cases.

The following particulars concerning these ten cases are derived from their notes :—

Mental deficiency or backward, two cases.

Fits, two cases.

Pallor of disc, two cases.

Albinism, four cases.

Horizontal nystagmus, four cases.

Roaming movements, one case.

Congenital cataract, one case.

Visual result : Good, five cases ; fair, two cases ; bad, three cases.

Premature Birth

There were five cases of premature birth, three of these were seven months' babies and two eight months' babies. All five cases were either mentally deficient or backward and one of these infants has since died. There was a history of :—

Fits, four cases.

Congenital cataract, one case.

Syphilis, one case.

Pallor of discs, one case.

Albinism, two cases.

Horizontal nystagmus, one case.

Roaming movements, one case.

Convergent strabismus, one case.

Divergent strabismus, one case.

Visual result : Good, one case ; fair, one case ; bad, three cases.

Position in the Family

It cannot be said that, in this series of cases, any special significance was found with regard to the position in the family. Certainly, the majority of the infants were firstborn infants, but that majority was not so large as to be beyond the normal. The figures are as follows :—

First, twenty-one cases ; second, four ; third, ten ; fourth, five ; fifth, five ; sixth, four ; seventh, four ; eighth, nil ; ninth, two ; tenth, one.

Reaction of the Pupils to Light

In seven cases only was there no reaction of the pupils to light. Of these seven cases :—

Congenital defects in the development of the iris, two cases (cases 22 and 59) ; pallor of the discs, three ; post-neuritic atrophy of the disc, one ; congenital cataract, one (this case died soon after coming under observation) ; congenital syphilis, one ; albinism, one.

In fact, excluding the two cases of congenital malformation of

the iris, four cases showed disease of the optic nerve, and in all probability the other case (congenital cataract) was similarly affected.

Eye Rubbing

It is held that this sign is an indication that the light percipient elements of the eyes are in good condition, but that clear or distinct vision is not being obtained. One would, therefore, expect that such conditions as high errors of refraction, opacities in the media, pigment deficiency and, possibly, localized macular disease, would be conditions associated with the sign.

In the present series of cases, this assumption is borne out. The sign was observed in two cases.

Hypermetropia was present in six cases.

Albinism was present in four cases.

Congenital cataract was present in one case.

Temporary amaurosis with fits was present in two cases.

Choroiditis was present in one case.

Four cases were mentally deficient.

Head nodding was associated in three cases.

Horizontal nystagmus was seen in four cases.

Roaming movements were seen in four cases.

Convergent non-paralytic strabismus occurred in four cases.

Head Nodding

This sign was observed in four cases. The movements in each were of a lateral rotatory order. In all these cases the head nodding had ceased when last seen and the vision had definitely developed, so that the infant was able to pick up small objects from the floor. In all four cases hypermetropia was present.

Horizontal nystagmus was found in one case.

Roaming movements were found in two cases.

Albinism was found in two cases.

Convergent strabismus was found in two cases.

In case 22 there was bilateral paralysis of the external recti, and head banging was associated with the nodding. When last seen the head nodding and banging had ceased, the child could see well, and picked up a pin from the floor. There was four dioptries of hypermetropia—the correcting glass had been given. There was at one time some doubt as to whether the child was not going to be mentally defective, but at the last visit (December 12, 1921) the child, now aged two years and five months, walked well and appeared quite intelligent, but was only just beginning to talk. In this connection—delayed articulation with no lack of intelligence—case 23 may be mentioned.

This case was one of temporary amaurosis.

Nystagmus

This feature was present in the majority of the cases. There was, however, much variety in the type of nystagmus present. It is possible to divide into two rough classes the different forms of nystagmus observed in this series of cases, namely :—

- 1. Horizontal movements.
- 2. Roaming movements.

In many cases, however, there was a combination of both types of movements. " Roaming movements with occasional rapid lateral jerks " were often seen.

No definite factor was found which could be said to be associated with any particular kind of movement.

As might be supposed, albinism, cataract and fundus disease were practically always associated with nystagmus.

In eight cases there was a definite refractive error, hypermetropia in seven, myopia in one.

Almost certainly this factor, refractive error, was present in many more of the cases of nystagmus of this series, but the difficulty in estimating the refractive error in these cases may be very great.

Squint

Convergent non-paralytic squint was present in twenty-two cases.

Of these twenty-two cases : hypermetropia nine, myopia two, albinism six, cataract two.

And associated with the squint, horizontal nystagmus eleven cases, roaming movements three, eye rubbing six, mental deficiency seven.

Divergent non-paralytic squint, five cases observed.

Of these five cases : history of fits three, mental deficiency three, albinism one, myopia one, consanguinity one, delayed fixation one.

In the last case good fixation subsequently appeared.

Analysis of Cases

Of these sixty cases it would appear that the primary cause of the amaurosis was as follows :—

Temporary amaurosis	...	...	...	5 cases.
Mental deficiency	...	...	...	19 "
Albinism	...	...	...	17 "
Cataract	...	...	...	7 "
Hypermetropia	...	...	...	5 "
Fundus disease	...	...	...	7 "
(Optic atrophy, choroido-retinitis, etc.)				

It should be pointed out, however, that there was a certain amount of overlapping. For instance, mental deficiency was often associated with albinism.

Conclusions

(1.) That absence of the light fixation reflex in infants, with otherwise normal eyes, is often an early sign of future mental deficiency.

(2.) That delay in the appearance of the light fixation reflex is often associated with a pigment deficiency affecting the retina and choroid. That in these cases the light fixation is delayed only and will appear in due course.

(3.) That the pupil reaction to light was only absent in those cases in which there was a definite disease of the optic nerve. All the cases of temporary amaurosis and of mental deficiency in this series presented an intact pupillary reflex arc.

(4.) That congenital syphilis was established in only seven cases of this series.

(5.) That such features as consanguinity of the parents, difficult labour, and premature birth of the infant, did not figure to any great extent in these cases.

(6.) That the presence of eye rubbing usually denoted a local defect in the eyeball, such as cataract, refractive error or pigment deficiency.

SUB-CONJUNCTIVAL CATARACT EXTRACTION

BY

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DUNDEE

A PRELIMINARY communication on *sub-conjunctival cataract extraction* was made to the Forfarshire Medical Association in March, 1914, and published in the *Edinburgh Medical Journal* of May, 1914. In that communication we drew attention to what must always be regarded as a non-surgical procedure in the technique of senile cataract extraction, namely, leaving a comparatively large wound in the sclero-corneal region open and unprotected. Suturing the lips of the wound has from time to time been recommended, but, obviously, it is a somewhat complicated and difficult procedure, and, considering the delicate