usually dissolved in 5 minims of warm water and drawn into the syringe; the needle was then thrust into the pituitrin ampoule and its contents also drawn in and the combined solution injected subcutaneously.

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X-RAY TREATMENT OF INTERSTITIAL KERATITIS.

BY

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THE value of treatment of various pathological conditions of the eye by x rays has been recognized for some years, but the literature on the subject is scanty. In the earliest published cases a few unfavourable results were reported, probably owing to imperfect technique, but latterly some foreign writers have published cases showing marked benefit from x rays carefully applied. We have come across few references to x-ray treatment of eye conditions in the British journals, and none as applied to interstitial keratitis.

Jendralski¹ reports five cases of glioma of the retina successfully treated by x rays and radium. In two of these a cure was claimed, whilst in the other three life was prolonged by a retardation of the rapidity of growth of the tumour cells. Other foreign writers detail cases of iridocyclitis, irido-choroiditis, uveitis, and vernal conjunctivitis treated by this method with good results, whilst Sgrosso,² Japiot and Bussy,³ and Nicolle⁴ all report excellent results in cases of interstitial keratitis.

Parenchymatous or interstitial keratitis must be regarded as a disease of the uveal tract, of which the posterior layers of the cornea form a part, a disease also involving the iris and choroid. It used to be considered as essentially of syphilitic origin, regardless of the circumstances in which it took place. Sir Jonathan Hutchinson as recently as 1890 stated that it could not be the result of anything else. Although the large majority of cases are of specific origin—generally inherited—there is no doubt that tuberculosis is also a very definite cause in a large number of cases, whilst malaria, trachoma, rickets, and focal infection (such as teeth, tonsils, sinusitis) have also proved to be the cause in isolated cases. A point recently emphasized by Butler⁵ is that trauma and operation are often factors precipitating the disease in a cornea predisposed to it by either syphilis or tuberculosis. Alyanakian⁶ goes so far as to assert that interstitial keratitis is a dyscrasic affection, most frequently associated with hereditary syphilis, but that a determinant cause, such as acute infectious or chronic cachectic disease, is necessary in most cases for the disease to develop.

This all goes to show that the treatment of interstitial keratitis, arising as it does among persons whose power of resistance is low, is often a very long affair before improvement takes place. It is still longer before the disease, having passed through the stages of infiltration and vascularization, reaches that of reabsorption.

Swanzy⁷ states the average duration of the acute stage to be six to eight weeks, or even longer, and we have all seen cases where the vascularizing stage has stretched into months, in spite of active treatment, leaving opacities so dense that vision has been reduced to hand movements. As the damage is done in the acute stage not only to the cornea but also to the whole uveal tract the chances of useful vision would be much improved if this stage could be cut short. Consequently, excessive infiltration and vascularization, together with the subsequent opacity, iritis, and choroiditis, might be minimized.

With this end in view we decided to try the effect of x rays on certain selected cases at the Royal Southern Hospital, Liverpool, and we consider the results sufficiently striking to report. The number of cases treated is not large, but from the first application the effect of the x rays was marked and improvement of the condition started almost immediately.

We have adopted the following technique, which is both simple and requires no special apparatus. The patient lies on his back on the couch, the head being firmly fixed by sandbags which are brought up level with the forehead on each side. A rectangular piece of thick felt about 14 inches by 6 inches, to which two layers of lead foil have been stitched, is taken, and in this are cut two circular windows approximately the size of the eyeballs and at the necessary distance apart. This pad is accurately centred, felt side down, over the eyes and held in position by means of additional sandbags. The tube stand, with a lead glass speculum just large enough to include the eyes, is placed in position so that the distance between the anti-cathode and the eye is 8 inches. A 7-inch gas tube is used, through which we pass a current of 1 milliampère backing up a 6-inch spark-gap, the rays being filtered through 0.5 mm. of aluminium and one layer of felt. The duration of each treatment is six minutes. A treatment is given every seven days, and usually five or six suffice.

We have been led to adopt this "small dose" method with little filtration for the following reasons:

(a) The lesion treated is superficial, being mainly confined to the anterior chamber of the eye.

(b) We desire to give a stimulating or exciting dose. It is a well recognized fact that in such diseases as pruritus and certain forms of eczema small doses of soft rays are sufficient to effect rapid cures.

(c) With a small dose such as that described there is no risk of damage to the surrounding tissues; in no case have we caused redness of the skin or falling out of the eyelashes, and we have no reason to believe that any damage has occurred to the developing cells in the eyes of our young patients.

The following cases are illustrative of those treated:

CASE I.

I. L., aged 13, presented a typical picture of severe interstitial keratitis affecting both eyes. Photophobia was present to such a degree that the eyes could be opened only with difficulty, lacrymation was profuse, and there was intense ciliary injection with vascularization of the cornea. Iritis was present and pain was exceedingly severe. The child had to have her bed shielded from the light and generally was found kneeling under the bedclothes with her face buried in the pillow. The Wassermann reaction was positive, but tuberculous tests were not made. The case was singularly unresponsive to treatment although the usual remedies were applied—hot applications, atropine, diionine, calomel, together with intravenous injections of neo-kharsivan.

Little change was apparent in spite of vigorous treatment till finally we decided to try x rays. The applications were given weekly, and to us—it was the first acute case we had treated in this way—the effect was remarkable. After the first treatment photophobia and lacrymation were relieved; after the second the acute stage showed marked signs of abating, the ciliary injection had almost disappeared, and the child could sit up in bed happy and contented. After the third treatment she could read the large print of a child's book and was practically fit to leave hospital. The same treatment—local, x rays, and specific—was, however, continued, and when last seen she was ready to go back to school, distance vision being—R. 6/18 partly, L. 6/12. There were a few deposits on the lens capsule from posterior synechiae, and slight scarring of the cornea. There was no choroiditis. She had in all fourteen applications of x rays, and apart from the relief experienced in the acute stage we consider that there was a decided beneficial effect on the opacities.

CASE II.

D. A., aged 5, when first seen had severe interstitial keratitis of three weeks' duration in the right eye, photophobia and ciliary injection being very marked. The left eye showed early infiltration of the lower half of the cornea with ciliary injection. The Wassermann reaction was ++, but it was decided not to submit the child to antisyphilitic treatment until the effects of x rays had been observed. This treatment was commenced at once with hot bathing and atropine locally. Eight days later the effect of the x-ray treatment was so marked that the acute stage was almost over. In this case there can be no doubt that x-ray treatment alone arrested the progress of the disease, the acute stage in the left eye having been cut short by several weeks. When last seen the opacity in each cornea was slight, and there is no doubt that no progression of infiltration had taken place since x rays had been applied.

CASE III.

J. G., aged 22. Old-standing interstitial keratitis was present with dense corneal opacities, and when first seen he was suffering from a recurrence, the eyes being in a semi-acute condition. On examination three days after the first application of x rays the pain and "gritty" feeling in the eyes were relieved, and after the second application all acute symptoms had disappeared. Local treatment was also carried out and the patient had weekly injections of neo-kharsivan. When last seen the corneal opacity was less marked, but vision was poor owing to the presence of central choroiditis.

This case would suggest that even in young adults treatment by x rays is useful in the semi-acute stage, especially for the relief of pain and photophobia.

CASE IV.

R. B., aged 17, had suffered from interstitial keratitis in 1920, and after six months' treatment a very dense central opacity remained. The Wassermann reaction was +, and antisyphilitic measures seemed to have little effect. When seen about twelve months later keratitis punctata was present in the left eye, together with ciliary injection and photophobia, followed later by irido-cyclitis, and finally by infiltration and vascularization of the deeper corneal layers. Active antisyphilitic and local treatment seemed again to have no effect. X -ray administration was commenced four months after the first symptoms appeared in this eye. Improvement started at once and after three attendances the acute stage was practically over. Nine applications of x rays were given, and though the amount of corneal opacity left was extreme the patient himself professes that the vision improved each time x rays were applied.

CASE V.

A. A., aged 63, had suffered from interstitial keratitis in childhood, and when she was first seen vision was reduced to hand movements in each eye. Both corneae were almost opaque, and in addition to the parenchymatous condition new superficial vessels had spread over the surface. Evidence of old iritis, ciliary injection, and firm tension were present in each eye. Pain and photophobia were marked. The usual forms of treatment were given but without any benefit. X rays were then applied, and after four doses the pain and photophobia had disappeared, but no improvement in vision took place.

This case would tend to show that in old chronic interstitial keratitis in aged adults relief of pain and photophobia only can be expected from x -ray treatment.

CASE VI.

S. W., a man aged 45, was suffering from Mooren's ulcer, which is, strictly speaking, a superficial disease of the cornea, but we include the case as a matter of general interest. The lesion was of a particularly progressive type, unaffected by treatment—local, medicinal, or operative. First the cornea of the right eye and then that of the left was totally destroyed, the pain, photophobia, and purulent discharge being very distressing. For these latter symptoms, as treatment seemed unavailing, x rays were suggested, and twelve applications were made at weekly intervals. After the first two or three doses there was marked relief; the discharge rapidly became less and shortly ceased altogether. The pain and photophobia disappeared. No improvement in the scar tissue was expected, and apparently none took place.

CONCLUSIONS.

1. In syphilitic interstitial keratitis (we have not treated by this method a case known to be definitely tuberculous) x rays in weak doses have an undoubted effect in cutting short the early stages of infiltration into the deeper corneal layers.

2. The earlier the stage of the disease at which this treatment is started the more rapid the improvement and the more satisfactory the results. Case II exemplifies this in a striking manner, and it will be noted that in this case x rays were practically the only curative agent used, till the acute stage was over.

3. The younger the patient the better the reaction to x rays. In the cases treated children reacted more rapidly than young adults, whilst in older people the reaction was less satisfactory.

4. It is in the relief of pain, photophobia, and lacrymation that x rays show the most striking results. The acute stage is also much shortened by checking infiltration and vascularization.

5. The opacities in young subjects are undoubtedly benefited by x rays. This was strikingly shown in Case I, but is opposed to the findings of the foreign writers.

6. In no case was any damage done to the eye or the surrounding tissues, and the patients complained of no inconvenience during the treatment.

7. Small doses only of x rays are necessary.

8. X rays should be used as an aid to, but should not take the place of, local, antisyphilitic, and general treatment.

9. The value of small doses of x rays shown in interstitial keratitis justifies their trial in certain chronic eye diseases where treatment has been disappointing, such as the painful blind glaucomatous eye and scleritis of the aged. Further, a safe and more stabilized technique such as that here described holds out hope of better results in many eye conditions, both chronic and acute.

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THE TREATMENT OF ASTHMA WITH COMBINED PEPTONE AND VACCINE.

NOTES ON TWENTY-FOUR CASES TREATED.

BY

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In regard to the treatment of asthma by the system or protein shock, it was found that certain cases did not react to peptone or vaccine when given alone. Some cases did better with a course of peptone followed by vaccine treatment; but still there were some that did not react, so I devised a system of giving a course of injections of peptone and vaccine combined in one solution. The solution used was in three strengths, as follows:

- 5 c.cm. of 5 per cent. solution = 0.25 gram peptone + 235 million organisms mixed catarrhal vaccine.
- 5 c.cm. of 10 per cent. solution = 0.5 gram peptone + 940 million organisms mixed catarrhal vaccine.
- 10 c.cm. of 10 per cent. solution = 1 gram peptone + 1,880 million organisms mixed catarrhal vaccine.

The injections were given every seven days: for the first four weeks half a tube of A solution per week, for the second four weeks half a tube of B solution per week, and so on, increasing in strength of dosage. The injections were given intramuscularly in the so-called painless area just below

No. of Case.	Sex.	Age.	Duration of Condition.	No. of Injections at Weekly Intervals.	Origin: Whether Specific or not.	Results.
1	M.	Yrs. 38	8	12	No	Slightly improved.
2	M.	32	10	24	Yes	Cured (nephritis case).
3	M.	37	9	20	No	Cured.
4	M.	21	2	24	No	Cured.
5	F.	17	2	20	No	Cured.
6	M.	13	8	24	No	Cured.
7	M.	24	10	24	No	Greatly improved.
8	M.	65	2	12	Yes	Cured.
9	M.	29	6	12	Yes	Cured.
10	M.	16	6	24	Yes	Greatly improved.
11	M.	17	2	12	Yes	Cured.
12	F.	10	4	12	No	Cured.
13	M.	12	10	12	No	Slightly improved: still under treatment.
14	F.	42	8	12	No	Slightly improved.
15	F.	25	5	18	No	Cured.
16	M.	34	10	19	Yes	Reduced number of attacks; longer period between attacks.
17	M.	13	6	12	No	Cured.
18	M.	43	12	24	Yes	Greatly improved.
19	M.	11	2	12	No	Cured.
20	M.	35	4	12	No	Cured.
21	M.	10	15	12	No	Improved.
22	M.	49	30	24	Yes	No improvement.
23	M.	35	12	18	Yes	Cured.
24	M.	11	8	12	No	Greatly improved.