In previous recorded cases either the contents of the loop had to be aspirated to facilitate reduction or the condition of the loop had necessitated resection, in both instances thus removing the highly toxic contents of a closed loop. In this case such procedures were not needed to relieve the strangulation. Chloride deficiency and dehydration were made good, and before the fatal collapse the satisfactory progress suggested that the post-operative treatment was adequate. Unfortunately this proved to be incorrect. Where large loops have been strangulated, in addition to measures already mentioned a blood transfusion appears desirable in spite of initial satisfactory progress with chlorides and fluids alone. If such a transfusion be given after relief of strangulation it will provide the circulation with healthy blood capable of more effectively neutralizing toxins. It would be helpful to know whether routine aspiration of large strangulated loops to remove toxins which otherwise would be absorbed with the restoration of loop circulation gives the patient a better chance of recovery.

BIBLIOGRAPHY

- Bailey, Hamilton (1931). *Emergency Surgery*, 1, 198, Bristol.
 Folliasson, A. (1931). *Ann. Anat. path. méd. chir.*, 8, 47.
 Holt, Robert L. (1934). *Brit. J. Surg.*, 21, 582.
 Romankevitch, V. L. (1930). *Vestn. Khir.*, 21, 132.
 Wilkie, D. P. D. (1930). *Bristol med.-chir. J.*, 47, 97.
 Williamson, J. C. F. L. (1933). *Brit. J. Surg.*, 20, 684.

THE INCIDENCE OF UNEQUAL PUPILS IN UNCONVICTED PRISONERS *

BY

HARVIE K. SNELL, M.D., D.P.H.

Medical Officer, H.M. Prison, Liverpool

AND

GEORGE A. CORMACK, M.B., B.Sc.

Medical Officer, H.M. Prison, Brixton

The incidence of inequality of the pupils in pathological states and as a physiological anomaly is generally recognized. Collier and Adie (1926) say: "Inequality of the pupils occurs in connexion with all nuclear and peripheral ocular paralyses, and with cervical sympathetic paralysis. It accompanies all defects of vision from lesions of the visual path between the eye and the external geniculate bodies, provided the appreciation of light be unequal in the two eyes. It may be congenital or associated with inequalities of the refraction of the two eyes, and then has no pathological significance. It is commonly a sign of nervous syphilis." French (1936), writing on the same subject, declares: "Inequality in the size of the pupils is observed frequently and may have no pathological significance. . . . In cases of marked inequality of the pupils one may suspect tabes, general paralysis of the insane, a unilateral lesion of the third nerve or cervical sympathetic, trigeminal neuralgia, carotid or aortic aneurysm, a unilateral intracranial lesion, or glaucoma." Firth (1914) states: "Anisocoria without impairment of the pupillary reactions is not necessarily a serious symptom, for it may occur in healthy persons. Here the difference is usually not more than half a millimetre, and rarely as much as one millimetre; the inequality persists in all states of illumination and convergence. Inequality associated with change of the pupil reactions may be taken as evidence of an organic lesion."

The significance of anisocoria as an indication of mental disorder in medico-legal cases may be uncertain unless the cerebrospinal fluid is examined; but the medical officer is seldom in a position to urge this if the accused is charged

with a minor offence and appears to be mentally normal. It therefore seemed desirable to investigate the matter further, and 3,000 men received into Brixton Prison were examined to ascertain the proportion of cases presenting anisocoria and to determine its relative frequency in the group when associated with declared organic nervous disease or mental disorder. For this purpose comprehensive notes were made on the history of each case, with particular reference to venereal disease, nervous and mental disease, head and eye injuries, and other relevant factors. A physical examination of the various systems followed, with ophthalmoscopic examinations and tests for errors of refraction. The subjects were also examined in regard to their mental conditions. All cases of anisocoria were examined on the evening of their reception and again the following morning. In many cases the inequality noted overnight was no longer present at the second examination. This was found to apply to cases of minor and major degrees of inequality. The total number of cases showing anisocoria on reception was 576. Of these, 281 (48.8 per cent.) were rejected on subsequent examination on account of the transient nature of the inequality. This could not be attributed to any difference in light intensity, and it was thought that fatigue was probably the determining factor. In the evenings the pupillary reaction was less sensitive, the pupils somewhat more dilated, and consequently any inequality more marked.

There can be little doubt that anisocoria, particularly if non-pathological, is subject to considerable variation, and pupils which at one period are definitely unequal may at other times be equal. This applies also, to a lesser extent, in cases of anisocoria associated with disease of the nervous system. In this connexion Firth (1914) states: "Inequality of the pupils occurs in many organic nervous diseases, and also in functional disorders: the condition may be transient, constant, or subject to change. The degree of anisocoria may vary from day to day, even from hour to hour."

Method of Classification

Of the total cases examined 295 (9.8 per cent.) were found to have persistent anisocoria. They have been classified into three groups, according to the degree of inequality and which pupil was the larger:

Left Pupil					Right Pupil				
110 +	..	..	..	..	..	75 +			
54 ++	..	..	..	..	..	41 ++			
9 +++	..	..	..	..	..	6 +++			
<hr/>					<hr/>				
173					122				

Conditions Associated with Anisocoria

Thirty of the cases gave a history of syphilis: four of these were diagnosed as suffering from general paralysis of the insane; seven showed other signs of neurosyphilis; and in five the pupillary reactions were abnormal without other clinical evidence of neurosyphilis. There was apparently no clinical relation between the stage of the disease and the degree of inequality. In the remaining fourteen cases there were no clinical signs of syphilitic disease of the nervous system. In one case of neurosyphilis with marked pupillary inequality the condition was congenital. In another case, with a history of syphilis but without signs of any specific lesion, the inequality was due to an accident, in which the patient had been struck a blow on the eye, with subsequent retinal degeneration.

Inequality of the pupil may be present with only a slight modification of the pupillary reflexes in early cases of neurosyphilis. It may be the first ocular sign and one of the earliest indications of the involvement of the nervous system. There can be little doubt that anisocoria associated with changes in the pupillary reaction invariably indicates a definite organic lesion, and is often accompanied by other signs of the disease. Cowen (1902), refer-

* Published with the permission of H.M. Prison Commissioners, though it does not necessarily represent their views.

ring to general paralysis of the insane, states: "The intrinsic muscles of the eyes are affected in some stage of the disease in almost all cases. The first eye symptom is usually an inequality of the pupils with a sluggishness on the part of the larger pupil to contract to light, accompanied by an absence of the usual dilatation following cutaneous stimulation, while all other reflexes are perfectly normal." He quotes Bevan Lewis, who described an early inequality not associated with impairment of the pupillary reflexes and probably due to a cortical lesion, and a late inequality associated with absence of reaction to light and other stimulation and probably due to advancing spinal and bulbar disease.

Apart from the cases of general paralysis of the insane referred to above none of our cases showed evidence of mental disorder associated with anisocoria. Ten men stated that their skulls had been fractured, and in two of them bony depressions were felt. It is recognized that the nature and consequences of past head injuries are often difficult to assess from the history given by a law-breaker, but a reliable history of a severe head injury with concussion was obtained in sixteen other cases.

As to local eye conditions, sixty-two men had different errors of refraction in the two eyes with no obvious abnormality. Nine suffered from strabismus, and in ten the inequality was the result of trauma. Seventeen suffered from cataract, corneal ulceration, congenital ptosis, disseminated choroiditis, diabetic retinitis, and other ocular disease.

Anisocoria was associated in one case with aneurysm of the thoracic aorta, and in three cases with aortic lesions. One subject gave a history of tuberculous disease of the right apex, which was quiescent at the time of examination; in two cases parenchymatous goitre was present, and in one torticollis. In 139 cases both history and clinical examination proved negative. It is interesting to note that only seventeen out of the total of 295 men were aware of the pupillary inequality—seven in consequence of their own observations, while the remaining ten had been informed of the fact by their medical attendants.

The question of the relation between the degree of inequality and the pathological condition is of considerable importance. Our figures show that a minor degree of inequality was present in approximately 63 per cent. of our cases of anisocoria, a medium degree in 32 per cent., and a gross inequality in only 5 per cent. Further, it appears that minor degrees of inequality are most common when the anisocoria is a physiological abnormality or is due to a difference in refraction, whereas a gross inequality is more frequently a result of injury or disease. It may be said with some degree of confidence that persistent major degrees of inequality indicate a definite lesion, whether due to disease or injury, and in this respect our findings agree with the statement of French, that "pronounced difference in the size of the pupils may be symptomatic of some organic lesion."

Conclusion

To recapitulate, of 3,000 unconvicted male prisoners 295 showed persistent anisocoria. No pathological condition could be detected to account for the anomaly in 139 (47.1 per cent.); an error of refraction was the only other abnormality in sixty-two (21.0 per cent.); a history of syphilis occurred in thirty (10.1 per cent.); and in the remaining sixty-four (21.1 per cent.) the inequality was due to various causes. Only four were associated with mental disease. The anisocoria was therefore of no significance from the point of view of criminal responsibility in approximately two-thirds of the cases, and in less than half of the remaining third (13.5 per cent.) was associated with syphilis and a history of head injuries, conditions which may be related to mental disorder. It appears, then, that although anisocoria is most commonly a physiological anomaly, it should be regarded with suspicion and of possible

medico-legal significance in medico-legal cases if laboratory tests are not available.

REFERENCES

- Collier, J., and Adie, W. J. (1926). *Price's Textbook of Medicine*, 2nd ed., London.
 Cowen, T. P. (1902). *J. ment. Sci.*, **48**, 501.
 Firth, A. H. (1914). *Ibid.*, **60**, 82, 224.
 French, Herbert (1936). *Index of Differential Diagnosis of Main Symptoms*, 5th ed., Bristol.

Clinical Memoranda

Multiple Benign Sarcoid and Tuberculous Ulceration

Boeck in 1899 designated as multiple benign sarcoid of the skin the condition which Besnier had described as lupus pernio. The recent literature on this subject was reviewed in the *Journal* of September 11, 1937 (p. 534). The following case in which sarcoid was associated with tuberculous ulceration of the leg seems worthy of being placed on record.

CASE HISTORY

A rubber planter, aged 31, was admitted to the Hospital for Tropical Diseases, London, on April 4, 1934, complaining of ulcers of the left lower leg and a generalized skin eruption of six to seven months' duration. He first went out to the Federated Malay States in 1923, and had resided there ever since, except for two holidays, each of six or seven months, spent in this country. In September, 1933, while on holiday in Scotland, he noticed the left ankle to be a little swollen, and shortly after this a small ulcer appeared on its posterior aspect; this was thought to be due to an insect bite, and consequently was treated with fomentations. The ulcer healed, but the leg felt tired and painful after walking any distance, and three weeks later a rash appeared over the left lower leg posteriorly. In December, while on the way out to the Federated Malay States, this rash spread to the back, to the abdomen, and then over the skin surface of the body generally. On reaching Klang, Federated Malay States, the condition had become that of a healed but bronzed ulcer on the leg, with a number of skin patches resembling the heat spots to which he has always been subject. During January the joints became painful and all cartilages were tender, while the nasal mucous membrane showed slight but definite signs of inflammation; there was no temperature at that time, although shortly afterwards there was slight evening pyrexia, and the old ulcer became inflamed again and the lymphatics in the skin leading from it became raised and hard. Other ulcers appeared over the leg, and the raised, rather lupus-like, but discrete patches on the skin surface generally increased. The Wassermann and Kahn reactions were negative, but blood culture showed a growth of short, delicate, Gram-negative rods; guinea-pig inoculation showed these organisms to be non-pathogenic. Serum precipitation tests for glanders, made both in Kuala Lumpur and in Singapore, were inconclusive. Treatment with lotions and ointments externally, calcium internally, arsenicals intramuscularly, and protein shock was in no way beneficial. The patient then returned to England for further investigation and treatment. During the voyage home two more ulcers appeared on the same leg, and from these a slight serous discharge exuded. The skin eruption was at first itchy, but under the treatment outlined above the irritation subsided. The general health remained good. Apart from malaria in 1927 there was no illness of note, nor was there any familial history of tuberculosis.

DIAGNOSIS AND TREATMENT

On admission the patient was found to be well nourished, with apparently normal mucous membranes and a clean moist tongue. There was no cyanosis of the finger nails and no clubbing of the fingers. The posterior aspect of the left