THE PROBLEM OF UNILATERAL AMBLYOPIA

A PRELIMINARY STUDY OF 10,000 NATIONAL HEALTH PATIENTS

BY

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It is not generally known that a substantial proportion of otherwise normal healthy individuals are wholly or partially blind in one eye. This condition of unilateral amblyopia is fairly common. Colloquially known as "lazy eye," it is in reality a serious permanent disability, arising from a failure or breakdown of binocular vision in early childhood. The affected eye is to all intents and purposes otherwise normal. There is no sign of disease in it, and yet it has a low or negligible visual acuity, whereas its partner has normal vision.

The more serious degrees of this type of amblyopia occur in the earliest years of infancy, for at that age the eyes are less developed. In the worst cases central fixation is lost or absent—that is, vision in the affected eye is less than 6/60, and when the other eye is covered the blind eye is unable to fix an object.

The younger the child the shorter the interval required for the weak eye to become permanently blind if neglected. Thus in a child 6 months old permanent blindness (loss of fixation) from neglected amblyopia occurs in six weeks; in a child 12 months old it occurs in six months; in a child of 3 years it takes 12 months to occur. In children of 5 and over permanent loss of central fixation never occurs (Worth, 1903, 1921).

A number of surveys on Service recruits were conducted during the last war. All of these revealed a high proportion of healthy young adults with one useless or amblyopic eye. As a result many authorities on both sides of the Atlantic, including Fulford Eales (1920; quoted by Dorothy Campbell, 1947), Downing (1945), and Dorothy Campbell (1947), have recommended *early routine pre-school examination of all children* to prevent this serious developmental tragedy. Duke-Elder (1949, p. 4012) suggests that such routine examination should take place at the age of one year.

Experience shows that even after apparent cure amblyopia may recur at any time up to the age of 7. So that not only should routine examination of all children's eyes be done as early as possible, but the examination should be repeated regularly until they start school.

Definition of Amblyopia

An eye is regarded as amblyopic if its visual acuity is less than 6/12, in the absence of any pathology. The amblyopia is unilateral if the other eye has normal vision and is two Snellen lines better than the amblyopic eye. Examples of unilateral amblyopia are: 6/12 part or worse (amblyopic eye) and 6/6 or 6/5 (normal eye); 6/18 or worse (amblyopic) and 6/9 or better (normal); 6/24 or less (amblyopic) and 6/12 or better (normal).

In unilateral amblyopia monocular vision replaces binocular vision. There is either a general inhibition of the retinal field (Feldman and Taylor, 1942) or macular inhibition (Travers, 1938), or there is evidence of a scotoma which is "facultative" (Chavasse, 1939) or "absolute" (Evans, 1929) or "relative" (Peter, 1932). A hysterical element has been suggested by some authorities.

The anatomical findings are equally inconclusive. It is known that only the appreciation of form is affected, and not that of colour or of light (Wald and Burian, 1944). But while Pugh (1954) places the anatomical site of the disability at the fovea, King and Passmore (1955) place it in the rods and cones, Clark (1941) in the lateral geniculate body, and Guibor (1944), Burian (1954), and Burian and Watson (1952) in the cerebrum.

Effects

Most sufferers from amblyopia are unaware of it, until by chance one day injury, a foreign body, disease of the good eye, or a routine examination exposes the weakness of the other eye. But such a sufferer is always handicapped. In the worst cases disease or injury of the good eye causes registrable blindness. But, apart from this, the affected eye is always functionally suppressed, and subconsciously the patient uses only his good eye—that is, he is virtually monocular.

Judgment of depth, as in sports and other activities which depend on the stereoscopic value of binocular vision, is handicapped. In motoring, objects approaching from the amblyopic side tend not to be seen until they come within the visual field of the good eye. In America, on the advice of the Ophthalmic Section of the American Medical Association, certain categories of heavy goods drivers have to undergo special tests to exclude amblyopia (*J. Amer. med. Ass.*, 1940).

Examination Under the National Health Service

Under the National Health Service any man, woman, or child can present himself to an ophthalmic surgeon or sight-testing optician for a sight test, with a view to having glasses prescribed, if necessary. Such an examination is free. Most of these patients are healthy, and not unduly worried about their eyes. If they do, they usually go to a hospital out-patient department, where treatment is equally free. In practice most of the patients who seek a sight test under the Supplementary Ophthalmic Service of the National Health Service complain of eyestrain, headache, blurred vision, or other symptoms which suggest that their eyes have difficulty in coping with the demands of their work, school, or enjoyment, such as televiewing or reading the evening newspaper.

The examination required by the regulations is basically one of refraction. But before refracting each patient it has always been my practice to examine the eyes *clinically* so as to exclude any pathological condition, and so assess the *functional coefficient* of the eyes.

Any untoward findings are communicated to the patient's doctor, without whose co-operation much of the value of the examination would be lost. For example, since many of the family doctors have become aware of the prevalence of amblyopia the number of very young children of amblyopic parents who have been sent to me for routine examination has increased.

Such routine clinical examination often reveals unsuspected or neglected disease in the eye, face, or elsewhere. On more than one occasion the fundal picture was the first discovered evidence of latent diabetes and also of grade I, II, or III hypertensive

retinopathy (Keith, Wagener, and Barker, 1939); while rodent ulcer, acne rosacea, and "red eye," which had been receiving treatment as conjunctivitis but was in reality an iritis or uveitis, are not uncommon. Many of these patients had not been to their family doctor for some time. Incidentally, I came across two cases in the series, one a growth on the lip, the other on the tongue, both of which turned out to be secondaries from bronchogenic carcinoma.

Present Investigation

This paper discusses 10,000 consecutive men, women, and children examined by me under the Supplementary Ophthalmic Service of the National Health Service.

The findings are recorded in Table I. Cases which fall under the definition of amblyopia have been selected for analysis.

Incidence of Amblyopia in the Series

The 10,000 patients have been divided into groups of 1,000, and these latter into subgroups of 250. Each group has been analysed according to sex, eye affected, and age. The importance of heredity is referred to below.

The total number of unilateral amblyopias was found to be 527 (5.27%). It is seen (Table II) that in each group of 1,000 individuals there is a heavy crop of unilateral amblyopias. The number varies from 37 among the first thousand to 72 in the eighth thousand. Even in the small blocks of 250 patients at least seven individuals had this disability, while in one block the figure reached as high as 25. Translated into general terms, *out of every* 1,000 *children born* 53 *fail to develop normal binocular vision.*

These are figures for a sample of the population which includes all ages and both sexes. It is interesting to compare them with figures obtained for healthy male adults in the fighting Services. In America, Downing (1945) found that, out of 60,000 airmen selected for service in the U.S. Army, 1,920 had unilateral amblyopia. Theodore, Johnson, Miles, and Bonser (1944) found 4% of 190,012 American soldiers were amblyopic. Irvine (1948) found 4% amblyopes among 5,000 air corps personnel who needed glasses and 1% amblyopes among 10,000 personnel passing out on completion of their service.

Sex Distribution

Tables II and III show that the sexes are fairly equally affected by amblyopia, though there is a slightly higher incidence in the male. This agrees with the findings of Feldman and Taylor (1942).

A study of the sex distribution is important for any understanding of the causation of amblyopia, which is probably related to the hereditary factor. Unfortunately there are scarcely any published data on this point. Even in the case of squint, so much work on which has been published, Waardenburg (1954) lamented the fact that to his knowledge no mass survey of the sex distribution had been recorded.

TABLE II.—*Number of Amblyopias in the Series Divided According to Sex*

Patients Examined Divided into Groups	Amblyopes		
	Male	Female	Total
1- 1,000 (8, 10, 8, 11) ..	22	15	37
1,001- 2,000 (8, 7, 14, 14) ..	20	23	43
2,001- 3,000 (16, 9, 10, 13) ..	20	28	48
3,001- 4,000 (10, 18, 15, 13) ..	21	35	56
4,001- 5,000 (13, 11, 12, 25) ..	27	34	61
5,001- 6,000 (16, 14, 11, 14) ..	23	32	55
6,001- 7,000 (7, 14, 15, 14) ..	19	31	50
7,001- 8,000 (19, 18, 16, 19) ..	30	42	72
8,001- 9,000 (18, 12, 16, 7) ..	24	29	53
9,001-10,000 (10, 15, 16, 11) ..	19	33	52
1-10,000	225	302	527

The figures in parentheses are the number of amblyopes, of both sexes, in each subgroup of 250 in each 1,000.

TABLE III.—*True Sex Distribution of Amblyopia in Series of* 10,000 *Patients*

	Male	Female	Total
Total amblyopias	225	302	527
Average distribution of sexes per 1,000 patients examined .	415	585	1,000
True sex incidence of amblyopia	5·42%	5·14%	5·27

Heredity

There is a strong element of heredity in amblyopia, but its exact pattern is not known. Amblyopia is a silent condition, and can be diagnosed only by specific examination. As such it is impossible to find by questioning alone whether the relatives of an amblyopic patient are amblyopic, unless they themselves have had their eyes tested. There is often a strong dominant element, as the following case shows.

A woman aged 66, who was about to join her family in Canada, came for a check-up and glasses. With full correction she had R.V. 6/6 (20/20), L.V. 6/24 (20/80). There was no clinical abnormality in either eye. To my query about her left eye, she replied that it had always been

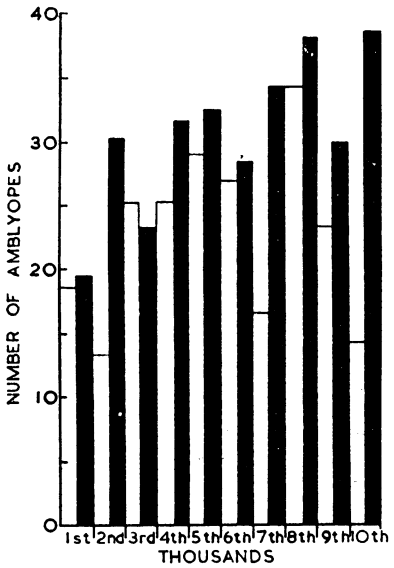
TABLE I.—*Specimen Record of Typical Sight Tests*

Name and Occupation	Sex and Age	Leading Symptom	E.S., H., B.V., E.P.*	C.P.M.F.T.†	1st Glasses?	Retinoscopy	Phoria	Remarks
T. W.; retired ..	M 74	Giddiness on looking quickly to side	Nil	Arteriosclerotic retinopathy, Gr. I	No	+2·5 + 0·5×90°=6/6 +2·5 + 0·5×90°=6/6 Add + 2·5=J1, J1	Nil	Generalized senile tremor
H. M.; draughtsman	M 31	Shimmering lower field. Hemianopsia. Blurred vision	Headache	Nil	Yes	+0·25×90°=6/5 +0·25×90°=6/5	No convergence deficiency	Migraine ophthalmicus
P. O.; miner ..	M 47	Whirling shadow in front of eyes on reaching open air out of mine	,,	,,	,,	0=6/9 0=6/6 Add +1·25=J1, J1	Nil	No nystagmus
Miss M. G.; at school	F 17	Blurred distance vision	Nil	,,	No	−5·25=6/6 pt; −3·25−2·5×155° =6/6 pt.	,,	Progressive myopia
Miss C. M.; school teacher	F 26	Eyestrain	Headache	,,	Yes	+3·0+1·0×90°=6/18 +0·25+0·5×90°=6/6	,,	R. amblyopia
J. D.; retired ..	M 77	Rainbow round lights	Cataract L. eye	No evidence of glaucoma	No	+1·0=6/6 pt. +1·0=6/60 Add +3·0=J1 (R)		Referred hospital eye service

* E.S.=Eye strain. H.=Headache. B.V.=Blurred vision. E.P.=Pain in one or both eyes.
† C.=Conjunctiva and cornea. P.=Pupil. M.=Media. F.=Fundi. T.=Tension. Phoria=Muscle imbalance and strain.

"lazy" and that both her son, aged 45, and his daughter, aged 7, had "lazy" left eyes. None of the three had ever had strabismus.

On the other hand, such dominance may be irregular and may miss a generation or two. The heredity element may be recessive, X-chromosomal, sex-linked, or autosomal. It may be polymorphous or polygenetic, as in the case with strabismus (Duke-Elder, 1949). It is of the utmost importance that the incidence and pattern of heredity in amblyopia should be studied. Whether or not it is a complication or a predisposing cause of strabismus is immaterial, though it gives added point to the inquiry. It is surprising that amblyopia has not received from the geneticists the attention which has been devoted to such other eye conditions as myopia, retinitis pigmentosa, night-, day-, and colour-blindness, presenile cataract, and acute glaucoma.



Incidence of amblyopia among groups of 1,000 patients. White columns=Right eye. Black columns=Left eye.

Amblyopia More Often Left-sided

Among the 527 amblyopias, 224 (42.5%) involved the right eye, and 303 (57.5%) the left (see Chart). Feldman (1941) found 71% of his series of amblyopias were on the left. In the present series, among the groups of 1,000 patients, in only one (the third) is there a slight preponderance of right-sided amblyopia, while among the subgroups of 250 patients, only 10 times out of 40 do we find amblyopia occurring more often on the right side.

This predilection for the left side probably has a bearing on the nature and causation of amblyopia. It would seem to support Burri's (1942) view that the development of normal simultaneous binocular vision takes place by a process of learning, the progress curve of which is similar to those for learning to walk and talk. The processes leading up to the development of binocular vision are governed by proprioceptive impulses between sight and touch, especially those from the hands.

Age Distribution

When the patients are analysed according to age groups (Table IV) it is seen that in every group there is a significant number of amblyopes. No age, no group, is exempt. The youngest amblyopic patient discovered was 4 years old, the oldest 85. A comparison of these figures with the age distribution of the entire series of patients examined (Table V) also confirms that each age group has a significant quota of amblyopes. Furthermore, both the number of patients examined and the numbers which are found to be amblyopic steadily increase with each decade up to the fifth, after which they diminish steadily. For comparison the figures of the first 7,000 patients are added. It was at this point (7,000 patients examined) that the problem of amblyopia was first reviewed and a communication privately published among interested colleagues.

TABLE IV.—*Number of Actual Amblyopias Discovered, Arranged in Age Groups*

Group of 1,000	Age in Years								Total
	0–10	11–20	21–30	31–40	41–50	51–60	61–70	70+	
1st ..	0	4	6	6	10	7	3	1	37
2nd ..	0	5	7	8	9	6	5	3	43
3rd ..	0	4	7	7	11	7	10	2	48
4th ..	2	6	10	6	9	11	8	4	56
5th ..	1	7	10	17	13	6	5	2	61
6th ..	5	2	8	10	13	10	5	2	55
7th ..	3	4	6	9	12	7	5	4	50
8th ..	8	10	5	13	13	13	4	6	72
9th ..	3	3	6	9	16	8	4	4	53
10th ..	2	7	4	7	9	4	13	6	52
Total	24	52	69	92	115	79	62	34	527

TABLE V.—*Comparative Incidence of Amblyopia per Age Group*

	Age in Years								Total
	0–10	11–20	21–30	31–40	41–50	51–60	61–70	70+	
Total number of amblyopes	24	52	69	92	115	79	62	34	527
Mean number examined per group of 1,000	31	104	129	129	217	214	108	63	1,000
Incidence in entire series ..	7·7%	5·0%	5·4%	7·1%	5·3%	3·7%	5·7%	5·0%	
Incidence in first 7,000	5·0%	4·5%	6·0%	7·0%	5·0%	3·5%	5·0%	4·0%	

A comparison of the age incidence curves of the first 7,000 patients with those for the whole series shows an increase of 50% in the proportion of children under 10 found to be amblyopic. The ratios are 5.0% and 7.7% respectively. During this intervening period more young children were recommended for examination as the implications of amblyopia became more widely known. The figures themselves emphasize the heavy incidence of the condition in childhood.

Diagnosis in Very Young Children

Clearly amblyopia can be tackled only in childhood. Fortunately, although the usual tests for visual acuity are not applicable to children under 5 years, it is possible to diagnose amblyopia even in the youngest baby. A child of 3 or 4 years cannot distinguish fine objects at 6 metres. A baby is "wall-eyed"; and it is only as it grows that the eyes become able to distinguish finer objects, and also ordinary objects at further distances. In seeking out amblyopia in such young children, therefore, it is important to realize that our aim is really to compare the function of the two eyes. If one eye appears to see normally for its age, while at the same time the other eye sees much less, then we suspect that the latter is amblyopic.

I was examining a girl of just under 4 years, with correcting glasses, using a well-known Snellen-type picture chart, the first object on which is a horse representing 6/60, the next line a dog and a cat representing 6/36. In the room near the girl sat her mother with her baby sister, aged 1 year 9 months, on her lap. The girl herself read three rows (6/24) with the left eye. But with the right eye she could barely recognize the horse and could not at all distinguish the dog. I was just about to point to the next object, the cat, when the baby shouted out "dog-gie." This unexpected intervention proved beyond doubt that the

girl should have been able to recognize the dog, and I was able confidently to diagnose her as amblyopic, and to institute treatment immediately.

The acuity of a child's eyes improves with its growth. At any particular time one or other eye will be more efficient than its companion. But in general they should function and develop as a team. Amblyopia is suspected when there is a marked difference between the acuity of the two eyes, and it should be diagnosed when there is as much as two Snellen chart lines between them.

The *family history* is important. Often one parent, especially the mother, and/or one child in the family, is amblyopic in one eye, or has a high degree of hypermetropia in both eyes, or a squint in one eye.

A boy of 2½ was the only member of his family who had not previously been examined. All the others wore glasses, the father for left amblyopia and hypermetropia, the mother for left amblyopia and myopia, and the sister, aged 5, for bilateral hypermetropia with astigmatism. In view of the family history I applied trial occlusion to his left eye for a week and he was perfectly unconcerned; but on covering the right eye, thus forcing him to rely on the left eye, he became immediately uncomfortable and quarrelsome, and stumbled against objects for some days, showing that he was amblyopic in the left eye.

A history of *strabismus fugax*, or *fleeting squint*, is very important. This is the type of squint which appears at certain odd times in the day, usually when the child is tired or towards evening. It often lasts for only a few days at a time, then disappears only to recur on some future occasion. This type of squint may become permanent, may disappear completely, or may continue to be occasional and lurking, until when the child is examined at the age of 6 or 7 he is found to be amblyopic in that eye. Worth (1903, 1921) stressed that no squint, however fleeting, should be regarded as of no significance, but rather was a reason for thorough examination of the eyes.

It is true that many squints if left alone tend to clear up. But they leave behind a trail of permanent amblyopia. Many of these squints are the only evidence that a child's eyes are encountering difficulty in developing binocularly.

After the history the next step is *refraction*. It is better, where possible, to conduct this test without the use of a cycloplegic, as this upsets the balance of the internal muscles of the eye. As Donders (1864) pointed out, refraction is a twofold process involving an examination of (*a*) the structure of the eye in static relation to entrant light rays, and (*b*) the reaction of the eye (accommodative power) to such rays. In my view amblyopia is a disability of function, and structural deviations are incidental to the problem. Discussion of this point, however, is beyond the scope of this paper.

The special *subjective tests* involve an application of the Snellen chart, either in its standard form of individual selected letters or in the various modifications used for illiterate patients and young children. The letter "E" or Landolt's rings are suitable for children of 5 and 4. But for the younger child of 2 or 3 and even 4, nursery Snellen-chart pictures form a more suitable modification of the tests.

Below 3 years, however, such tests become increasingly difficult, and some modification of Worth's marble balls can be used. These are balls of diminishing sizes from 2½ to ½ in. (6.3 to 1.3 cm.) which are flicked on to the floor in such a way that the child cannot tell from the movement of the hands where the ball has gone. The child is then asked to recover the balls, and the number and sizes of these which he is able to recover give a rough indication of his visual acuity. This test can be modified in a number of ways, using such objects as sweets, to mention one medium.

For still younger children diagnostic occlusion is used. When one eye is covered in this way, a child is not unduly bothered if he can see with the other eye. But if the exposed eye is amblyopic, he becomes uncomfortable and tugs at the occlusive dressing, cries, and stumbles against objects. With experience it is possible to detect amblyopic eyes in such very young children.

Where the National Health Service Fails

Although the National Health Service offers free and comprehensive medical care of the entire population, at least 5 out of every 100 children born, and possibly more, still continue to develop one useless eye, with all the hazards and inconvenience this entails. This unexpected gap in the medical eye service is due to the fact that the first compulsory or general examination of children's eyes takes place after they have started school. But unilateral amblyopia is already well established long before this; often before the age of 3, and in the worst cases by the end of the first year. Early ophthalmic examination is indicated if this disability is to be attacked. But as unilateral amblyopia is developmental, and has no presenting symptom, the only way to success is by examining *all* children early and regularly. This is an administrative problem of some magnitude. But the following experience is worth recording.

Not long ago I did a pilot test of some 100 children in order to find out what could be learned from the routine examination of pre-school children, as advocated by many authorities. The patients were unselected. I simply asked as many mothers as were willing, and whose family doctors were agreeable, to bring all their children of school and pre-school ages for ophthalmic examination, including refraction. At the time I could not do more than record the refraction in each case and ask each mother to watch for any untoward development.

The interesting thing is that within a few months three mothers rang up, each to say that her child had been showing signs of strabismus in one eye, chiefly towards the evening or when the child was tired. I examined these children and found that in one, aged 4½ years, there was now a difference of two Snellen chart lines between the eyes. The other two, who were about 3 years old, appeared normal, and I kept them under observation. Later, diagnostic occlusion revealed the presence of early amblyopia in the left eye of one of them. The other remained normal.

The last thing one wishes to do is to encourage undue anxiety or fussiness in parents about their children's eyes. At the same time, once it is generally known that, without developing obvious squint, a child can lose the sight of one eye partially or even totally, the first step will have been taken towards mass attack on the preventable disability of amblyopia.

Summary

Routine examination of a consecutive series of 10,000 patients under the National Health Service disclosed

that no fewer than 527 (5.27%) have one practically useless eye. This condition is colloquially known as "lazy eye." In 1% of all the patients examined one eye was registrably blind, in another 2% the eye had such poor vision as to be quite useless. In the remaining 2% of amblyopic patients the vision was so poor that binocular vision was absent. If this finding were extended to the population at large, it is apparent that, out of every 100 children born, between 5 and 6 are destined to lose the use of one eye.

This condition of unilateral amblyopia is well known throughout the civilized world as a source of wastage of man-power in times of national emergency. Its economic and social disadvantages are equally serious, especially should anything happen to the good eye.

An amblyopic patient is usually ignorant of his disability, relying unconsciously on his good eye. Unfortunately the condition develops in infancy and early childhood, and by the time the child starts school it too often has become permanently established.

In a country with the most comprehensive medical service in the world, it is paradoxical that its young children should be allowed to run the risk of suffering from this grave disability through neglect.

I thank Mr. N. P. R. Galloway and Mr. G. Gordon Napier for their kindness and encouragement, and numerous family doctor colleagues who kindly referred their patients to me, and who otherwise made this investigation possible. My thanks are due also to the editor of the *Journal of the American Medical Association* for special information on visual standards and problems in the U.S.A.

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The *Handbook of Treatment of Acute Poisoning*, by E. H. Bensley and G. E. Joron, of the Montreal General Hospital (2nd ed., pp. 212; E. and S. Livingstone, Ltd., 15s.), is intended primarily for the physician with no special experience of toxicology who is called upon suddenly to treat cases of poisoning. It may also be used as a basis for lectures to students. Although it deals mainly with acute forms of poisoning, with the emphasis on emergency measures, some reference is made to chronic poisoning and the late effects of acute intoxications. A number of industrial poisons are included.

A REVIEW OF 300 PATIENTS WITH HAEMATEMESIS OR MELAENA

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During the four years 1953 to 1956 inclusive, 300 patients with haematemesis or melaena were admitted to the Bristol Royal Infirmary: 14 were readmitted on one or more occasions, making a total of 321 admissions. Of these, 308 were emergency admissions, and the other 13 developed the haematemesis or melaena as in-patients. During the four-year period there were 9,355 medical admissions (both emergencies and from the waiting-list), so that haematemesis and melaena accounted for 1 in 30 of these.

Of the 321 admissions (Table I) the bleeding was attributed to a proved or presumed ulcer in 259 (81%). Treatment was medical in 224 cases (with 10 deaths) and was surgical in 35 (with 4 deaths); in most fatal cases, however, death was not from haemorrhage. A cause other than ulcer was diagnosed in the remaining 62 admissions: this group (in which there were 7 deaths) is discussed below.

TABLE I.—*Diagnosis in 300 Patients with Haematemesis or Melaena*

	Ulcer Group							
	Gastric	Duodenal	"Peptic"	Anastomotic or Stomal	Acute Ulcer or Erosion	Total	Other Causes	Total
No. of patients	63	96	38	6	40	243	57	300
,, ,, admissions	66	106	39	6	42	259	62	321
Emergency surgery	10	18	—	1	6	35	6	41
Surgical deaths	1	2	—	1	—	4	—	4
Total deaths	3	10	—	1	—	14	7	21

Before these results can be appraised it is necessary to consider various factors which may influence prognosis.

Age and Sex Incidence

Haematemesis or melaena becomes more common with advancing age (Fig. 1). The frequency increases steadily to the seventh decade; in the eighth and ninth decades the numbers are smaller; out of the whole series of 300, 134 (33%) were 60 years or over. (This increased frequency in the elderly applies both to the ulcer cases and to the others.)

Of the patients with ulcer there were 158 men and 85 women (Fig. 2). Below the age of 70 there were more than twice as many men as women (144 to

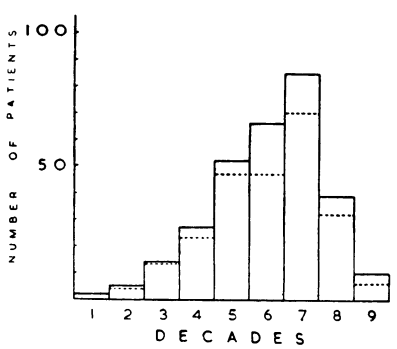

FIG. 1.—Age distribution of 300 patients with haematemesis or melaena from all causes. Those in whom the diagnosis was of some form of ulcer are shown below the interrupted lines.