

Middle Articles

GENERAL PRACTICE OBSERVED

Electrocardiograph Service for General Practitioners: An Appraisal

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In mid-1965 an electrocardiograph (E.C.G.) service for patients referred by general practitioners was started by the department of cardiology at the Middlesex Hospital. Patients who have a letter from their doctor giving clinical details may have an E.C.G. recorded by a cardiac technician. Sessions are held daily (on weekdays except Wednesdays) at 1.30 p.m. A reporting session by one of the senior registrars is held the same afternoon (or, at the latest, next day) and a photostat copy of both the E.C.G. tracing and report is sent by post to the referring practitioner. In these circumstances patients are not seen by a hospital doctor, but any whose E.C.G. or condition causes concern to the technical staff are referred immediately to the casualty medical officer.

Initially, 100 general practitioners were sent details of the scheme. These doctors had recently attended postgraduate courses in the department of cardiology. Knowledge of the service has spread, and in the 30 months it has been available 429 doctors have referred patients. This paper reviews the experience gained during this period.

Material

Since the service started 2,956 E.C.G.s have been taken. Monthly attendances have ranged from 66 to 148 (average 99).

Details of the principal reason for each request, and of the major E.C.G. abnormality found, are given in the Table. For reasons of clarity, subsidiary E.C.G. findings have been omitted—for example, digitalis effect or ectopic beats—unless these were the only abnormality. If two major abnormalities were present in the E.C.G., only the more certain or more important one has been listed. For example, myocardial infarction with ischaemic changes elsewhere has been listed as "myocardial infarction," and left ventricular hypertrophy in which the tracing showed ST and T-wave changes possibly suggestive of additional myocardial ischaemia has been listed as "left ventricular hypertrophy." Relatively few decisions of this kind were necessary.

The majority of the referring letters contained only one clinical diagnosis. The only common composite referring diagnosis was "ischaemic cardiac pain in a hypertensive patient," and this has been treated as a separate subgroup in the Table.

Results

Referring Diagnosis

The majority of requests were for help in elucidating the cause of chest pain, and in many cases (usually of left chest pain) the E.C.G. was requested for purposes of reassurance.

Of 1,339 requests (45% of the total) in which the referring letter mentioned chest pain but did not positively identify it as ischaemic in type, 950 (71%) were normal, 246 (18%) showed ST and T changes suggestive of myocardial ischaemia, and 71 (5%) showed a myocardial infarction.

The referring practitioner regarded chest pain as ischaemic in type in 567 (19% of the total). Of these a slightly higher proportion had ischaemic E.C.G. changes (25%) or myocardial infarctions (9%), and normal tracings were found in 341 (60%).

When the diagnosis of myocardial infarction was suspected by the referring practitioner (182 patients—6% of the total), ischaemic changes were found in 38 (21%) and myocardial infarctions were diagnosed in 56 (31%).

The next commonest request was for E.C.G. assessment of patients with hypertension, with or without additional ischaemic cardiac pain (231 requests, 8% of the total). Of these tracings, 65 (28%) showed evidence of left ventricular hypertrophy, 39 had ischaemic changes without definite evidence of left ventricular hypertrophy, and 13 revealed myocardial infarction. In all, 241 patients (8% of the total) were referred for investigation of arrhythmias—the clinical diagnosis was "tachycardia" (83, 3% of the total), "palpitation" (81, 3% of the total), or "irregular pulse ? atrial fibrillation" (77, 3% of the total). Most of the tracings recorded were normal, though atrial fibrillation was confirmed in 16 instances. Ectopic beats probably accounted for the referral in 20 patients in whom they were recorded. Paroxysmal atrial tachycardia was documented six times, and the Wolff-Parkinson-White syndrome was demonstrated in three of these patients. Fifteen requests queried heart block, and 43 patients were referred after attacks of loss of consciousness. Only one of the 13 patients with any degree of heart block was found in these two groups, the others being unsuspected.

No diagnosis accompanied 163 patients (6% of the total), and most of this group (125) had normal tracings. The abnormalities recorded were ischaemic changes (15), myocardial infarction (4), left ventricular hypertrophy (8), and atrial fibrillation (4).

E.C.G. Abnormalities

Of the 531 patients with ischaemic tracings, 441 (83%) were diagnosed as having ischaemic heart disease by the general practitioner—a high proportion. However, of the 207 myocardial infarctions documented, only 56 (27%) were referred with this diagnosis, though 130 (63%) of these patients had been referred with a more general diagnosis of ischaemic heart

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disease. This discrepancy is explained by our failure to distinguish between old and recent infarctions in the E.C.G. analysis.

Discussion

The organization and administration of a general-practitioner E.C.G. service requires considerable effort. Analysis of our results indicates that such a service is of value, both in the confirmation and assessment of existing heart disease and in the demonstration of unsuspected lesions. The overall incidence of abnormality (36%—1,075) compares favourably with that found (33%) in a recent survey of 500 unselected tracings requested by all departments, except cardiology, of this hospital. Both groups naturally contained many requests of a routine nature, but the similarity is striking.

The principal use made of the service by general practitioners was in the diagnosis of pain in the chest, accounting for 71% (2,088) of all requests. A source of criticism of a service such as this is the false sense of reassurance that may be engendered by a normal tracing. Many requests asked for an E.C.G. "to exclude ischaemia." This, of course, is a fallacious approach to the problem, since the E.C.G. is normal at rest in a large percentage of patients with true angina pectoris (Scarborough et al., 1952). On the other hand, an abnormal E.C.G. may be found in patients with non-cardiac pain. Indeed, the demonstration of ischaemic changes in patients with chest pain of doubtful origin or cardiac neurosis, referred for an E.C.G. expressly for purposes of reassurance, was not uncommon. Another difficulty was that few doctors indicated whether or not their patient was receiving digitalis. Ignorance of this fact may well have led to incorrect evaluation of ST and T changes in a few patients, and the importance of including this information in the referring letter must be stressed.

The principal reporting problem, however, was posed by minor electrocardiographic deviations from normal. Changes such as non-specific T-wave flattening or trivial ST depression raise many difficulties in interpretation. There is always considerable personal variation in E.C.G. reporting even with experienced observers (Davies, 1958) and no distinct border exists between normality and disease. Many factors apart from ischaemia influence T-wave configuration, such as obesity, pericarditis, myxoedema, or hypokalaemia, and, on occasion,

even the faulty design of some types of electrocardiograph can do so (Cliffe, 1967, personal communication). Mindful, therefore, of our relative ignorance of the patients' clinical state, we did not mention changes that were doubtful, and, when uncertain, used terms such as "suggestive of ischaemia" or "possibly ischaemic." Of course, this problem often arises whenever reports are prepared on E.C.G.s and is in no way peculiar to a general-practitioner service. One is equally liable to mislead one's colleagues, whether in or out of hospital, and a proper appreciation of the limitations of the E.C.G., as with any investigation, is essential.

Myocardial infarction presented special difficulties. Certain patients apparently had had a recent infarction. While some were referred for confirmation of the diagnosis in the convalescent period, others were in the acute phase. When this was suspected by the technician recording the E.C.G. such patients were sent at once to the casualty department. Of course, it was never intended that the technicians should interpret E.C.G.s, but naturally, being experienced, they were able to identify acute infarction on many occasions. In a few instances the diagnosis was made only at the reporting sessions after the patient had left, and in these cases the family doctor was informed by telephone.

Since it was impossible to circulate all potential users of the service, some doctors have been misinformed of its nature and have referred patients for a cardiologist's opinion as well as an E.C.G. The solution we have adopted is to send a covering note back with the report reiterating the details of the service. Again, some practitioners have expected admission as of right for their patients who had had an E.C.G. and later fell ill, but it is impossible to guarantee this. Lastly, acutely ill patients were sometimes referred. This placed a burden on the service which it was not designed to bear, and the responsibility of the general practitioner to ascertain the fitness of his patient to attend must be emphasized.

In general the service has run smoothly. Despite the pitfalls in interpretation, we believe that it has provided useful guidance to the referring doctor in most instances, that it has been helpful in diagnosis and valuable in reassurance, and that it has afforded needed support to doctors wishing to manage their own patients without recourse to unnecessary visits to medical outpatient departments. The continuing demand, the great increase in the number of doctors referring patients, and the appreciative comments of practitioners to us and the

Principal Diagnosis of Referring Doctor

E.C.G. Report	Total	Chest Pain	Angina, Ischaemic Heart Disease	Myocardial Infarction	Hypertension	Ischaemic Heart Disease, Hypertension	Paroxysmal Tachycardia	Palpitation	Heart Block or Bradycardia	Loss of Consciousness	Atrial Fibrillation, Irregular Pulse	Valvar Heart Disease	Heart Failure	Dyspnoea	Chronic Bronchitis, Emphysema, Cor pulmonale	Psychiatric	Hiatus Hernia	Thyroid Disease	Miscellaneous	No Diagnosis
Normal ..	1,881	950	341	71	65	32	53	58	7	31	35	27	5	24	10	20	8	4	15	125
ST-T changes suggesting ischaemia	531	246	137	38	19	20	5	9	2	5	9	4	4	7	—	3	4	2	2	15
Myocardial infarction	207	71	50	56	4	9	3	—	1	2	2	—	2	2	—	1	—	—	—	4
Left bundle-branch block	20	7	5	1	3	—	—	—	—	—	—	1	1	—	—	—	—	—	—	2
Right bundle-branch block	74	30	11	11	8	4	2	1	—	1	—	1	—	1	—	—	1	—	1	2
Left ventricular hypertrophy	133	22	16	3	42	23	5	3	1	1	1	3	2	1	—	—	—	—	2	8
Right ventricular hypertrophy	3	1	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—
Partial heart block	11	3	1	1	—	—	—	2	—	—	1	1	—	1	—	—	—	—	1	—
Complete heart block	2	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
Atrial fibrillation	37	3	3	—	2	—	2	1	1	—	16	3	1	—	—	—	—	1	—	4
Ectopic beats	29	1	—	—	—	—	4	4	1	3	12	2	—	—	—	—	—	—	—	2
Paroxysmal tachycardia, W.P.W. syndrome	6	2	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—
Sinus tachycardia	7	—	1	—	—	—	4	2	—	—	—	—	—	—	—	—	—	—	—	—
Minor arrhythmias*	8	2	1	—	—	—	1	—	1	—	1	1	—	—	1	—	—	—	—	—
Miscellaneous†	7	1	2	—	—	—	—	—	—	—	—	1	2	—	—	—	1	—	—	—
Total ..	2,956	1,339	567	182	143	88	83	81	15	43	77	44	17	36	12	24	14	7	21	163

* Wandering pacemaker, coronary sinus rhythm, sinoatrial block. † Pericarditis, myxoedema, P. mitrale, digitalis effect.

technical staff indicate the need that has been filled. It has been argued that this service carries the risks of misleading doctors and frightening patients. Such considerations also theoretically apply to the mass x-ray service, the value of which is undeniable. If the general practitioner is to be encouraged to resume his proper role in the care of patients with heart disease an E.C.G. service, such as we have described, is a step in the right direction.

Summary

An electrocardiograph service for general practitioners has been started at the Middlesex Hospital. In 30 months 429 doctors have referred 2,956 patients. The principal use made

of the service was in the diagnosis of chest pain. Though difficulties exist, both in administration and in the interpretation of doubtful electrocardiographic changes, it is concluded that such a service has a valuable part to play.

We wish to thank Dr. Walter Somerville, who organized this E.C.G. service for general practitioners, for his helpful advice. We are grateful to Messrs. D. Gibbon, R. Bullen, J. White, and W. Woodhall for their technical assistance.

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MEDICAL HISTORY

Portraits of Guy's Men

On 26 January Professor Sir Hedley Atkins, P.R.C.S., unveiled at Guy's Hospital life-size copies of portraits of distinguished Guy's men—Thomas Addison, Richard Bright, Sir Astley Cooper, and Sir William Arbuthnot Lane.

The portraits have the following captions which are largely based on *A Biographical History of Guy's Hospital* by Wilks and Bettany,¹ biographies of Sir Astley Cooper² and Sir William Arbuthnot Lane,³ and help from the families concerned.

Addison, Dr. Thomas, 1793–1860, M.D., L.R.C.P., F.R.C.P.

Thomas Addison was a Cumberland man of a long line of Cumberland yeomen. He graduated M.D. in Edinburgh and came to Guy's as assistant physician in 1824, and was made Physician to Guy's in 1837. With Bright and Hodgkin he formed one of three



Dr. Thomas Addison.

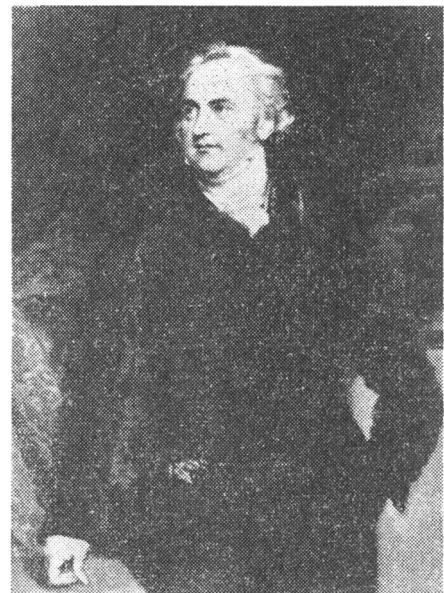
immensely eminent Guy's physicians of that time. He was responsible for the first recognition of Addison's Disease, which can cause important medical emergencies. He was the most distinguished teacher of medicine at Guy's of his time. He enjoyed the highest reputation as a physician throughout the field of medicine. Wilks and Bettany say of him, "As a teacher it is difficult to conceive a better."

Bright, Dr. Richard, 1789–1858, M.D., L.R.C.P., F.R.C.P., F.R.S.

Richard Bright was born in Bristol of the English banking family of that name. He took an Edinburgh M.D. degree and became Assistant Physician to Guy's Hospital in 1820 and Physician to Guy's in 1824. He was one of the great triumvirate of Guy's physicians in the early and middle 19th



Dr. Richard Bright.



Sir Astley Paston Cooper.

century—Addison, Hodgkin, and himself. He it was who first described that disease of the kidneys known as Bright's Disease, which was based on his very thorough studies of the post-mortem appearances which he correlated with the clinical features. As a physician he was very widely known throughout the world and of great prestige. Indeed, when he died the *Lancet* wrote, "The sudden demise of Dr. Bright has created a deep impression of grief and regret such as only a sense of irretrievable loss could occasion. A man of peculiar independence of thought, high morale, and untiring energy, he has contributed perhaps more than any other to conforming the medical opinion of his day—the life history of Richard Bright is one of unswerving energy of purpose and unceasing labour." One of his sons became Master of University College, Oxford, and the other