may be required if dehydration cannot be corrected by the oral route. Bed-rest is essential to produce quiescence of the ulcer and so enable the patient to absorb the food he is given. When there is delay in emptying, daily gastric lavage will often considerably reduce the emptying time, with consequent nutritional improvement.

Anaemia as a result of occult or obvious bleeding from the lesion, or of nutritional deficiencies, is often present, and can usually be corrected by the oral administration of ferrous salts. If this fails, or in the more urgent carcinoma cases, blood transfusion may be required.

The mouth should be cleaned by washes, tooth-cleaning, and scaling—extensive dental extractions should be undertaken only in the more quiescent cases in which there will be time to regain a comfortable and clean mouth well before operation. Breathing and regular limb exercises should be carried out before and after operation. The patient should refrain from smoking for 48 hours before operation.

Prophylactic Sulphapyridine

In May, 1941, I decided to try the use of sulphapyridine by mouth as a prophylactic against pulmonary and peritoneal infection in all gastrectomy cases. The effect was striking. In the 18 months prior to that time there were four fatal primary infections in under a hundred gastrectomies—one case of peritonitis in a completely penetrating ulcer case which was shown at necropsy to have watertight suture lines, two lobar pneumonias, and one confluent bronchopneumonia. In 18 months since then I performed 120 partial gastrectomies for simple ulcer with only one death. These were not selected cases: 6 of the patients had gastro-jejunal ulcers; 20 had multiple ulceration; 42 had complete penetration with the ulcer base in pancreas, liver, or colon; many were stenosed; and their ages ranged up to 74. There were some chest infections in the series, mostly moderate degrees of bronchitis in old bronchitic subjects, and one basal collapse.

Among 14 gastrectomies for carcinoma in the same period there were three deaths—syphilitic aortitis (aged 75), post-operative collapse (aged 68), and leak from a feeding jejunostomy in a total gastrectomy—but none from primary infection. The only severe wound infection occurred in a patient who required colonic resection as well, but he recovered from it. There were a number of minor wound infections.

Anaesthesia

The anaesthetic is of paramount importance. The elderly patient is usually co-operative and not very apprehensive, and forms the ideal type for local anaesthesia. He certainly appears and feels less exhausted after a local than after a deep ether anaesthesia. High spinal anaesthesia is often contraindicated by the presence or suspicion of cardiovascular degeneration. Of all general anaesthetics cyclopropane seems to cause the aged patient the least distress. My preference, however, is for local anaesthesia, and I use either a combination of rectus-sheath block and anterior splanchnic anaesthesia (Braun) or intercostal block with posterior (Kappis) splanchnic anaesthesia. When injecting the splanchnic plexus by the anterior route in the aged care should be taken not to press on an atheromatous aorta or displace it too roughly.

Post-operative Period

For 24 hours after operation the aim is to rest the temporarily paralysed intestine, and so we give by mouth only the little water or fruit juice necessary to enable the patient to take the sulphapyridine comfortably. Fluid is administered by slow rectal drip—tap-water or saline-and-glucose solution. High-quality protein is given in the form of skim-milk, egg, etc., as soon as possible. Boiled sweets to suck or sugar with drinks supply the carbohydrate requirements. Blood transfusion is not given as a routine during or after the operation, though it may be required in rare cases.

Breathing and leg exercises are restarted as soon as the patients recover from their post-operative sleep. When necessary they are instructed to clear their air passages by coughing.

Summary

A case of duodenal ulcer perforation at the age of 91, and cases of recovery from duodenal perforation at 79, from total gastrectomy at 74, and from partial gastrectomy at 80, are recorded.

A series of 120 partial gastrectomies for gastric, duodenal, and gastro-jejunal ulcers with one death is recorded, a result which is attributed in part to the use of prophylactic sulphapyridine.

The causes of death in aged patients after major gastro-duodenal procedures are recorded.

My thanks are due to Dr. W. Allen Daley, Medical Officer of Health to the County of London, and Dr. Norman S. Craig, medical superintendent of St. James Hospital, for permission to publish this paper. Dr. E. W. Glennie has given me great help in anaesthetic problems. I must also acknowledge the great nursing skill displayed by Sister B. Dodsworth and Sister M. Ridgeway while these fragile patients were under their care.

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INCIDENCE OF PULMONARY TUBERCULOSIS OF ADULT TYPE IN THE R.A.F.

RESULTS OF MASS RADIOGRAPHY OF 75,000 CASES

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The object of this article is to give a detailed analysis of the age incidence and types of case discovered by mass radiography and to discuss the problems which will arise in dealing with these and other cases so discovered in the future. The work of the tuberculosis and health services generally will be considerably increased when mass chest radiology becomes a national undertaking, but it is only by utilizing to the full this recent and valuable addition to our methods of investigation that we can hope to get a real and lasting improvement in the incidence of pulmonary tuberculosis in this country.

As might be expected in a first examination there are wide variations in the extent and degree of activity in the cases discovered, and when running a mass chest x-ray unit one is impressed by finding how far advanced some of the active sputum-positive cases have become without any complaint having been made to the medical officer by the airman or airwoman. It may be that to a certain extent a young man who is keen to serve his country conceals his symptoms; but this in itself makes it all the more necessary that men and women in the Services, and the public generally, should have a periodic routine chest x-ray examination. It is wishful thinking to expect a majority of early cases at once, before the more advanced cases have been discovered in the preliminary surveys.

Active Cases

Let us first consider the active cases of pulmonary tuberculosis discovered in 75,000 cases, 65,000 of which are airmen

Airmen (65,000) : Unilateral Pulmonary Tuberculosis

Age Group:		18-19	20-24	25-29	30-34	35-39	40-45	Total
Sputum positive	With symptoms	6	6	2	1	6	1	22
	Without symptoms ..	2	1	2	0	1	0	6
Sputum negative	With symptoms	13	18	1	4	3	1	40
	Without symptoms ..	14	16	1	3	0	0	34

Airmen (65,000) : Bilateral Pulmonary Tuberculosis

Age Group:		18-19	20-24	25-29	30-34	35-39	40-45	Total
Sputum positive	With symptoms	14	7	2	1	4	2	30
	Without symptoms ..	1	1	1	0	1	0	4
Sputum negative	With symptoms	7	14	3	7	5	1	37
	Without symptoms ..	12	7	1	1	2	0	23

W.A.A.F. (10,000) : Unilateral Pulmonary Tuberculosis

Age Group:		18-19	20-24	25-29	30-34	35-39	40-45	Total
Sputum positive	With symptoms	0	0	0	0	0	0	0
	Without symptoms	0	1	0	0	0	0	1
Sputum negative	With symptoms	2	1	0	1	0	0	4
	Without symptoms	6	6	0	0	0	0	12

W.A.A.F. (10,000) : Bilateral Pulmonary Tuberculosis

Age Group:		18-19	20-24	25-29	30-34	35-39	40-45	Total
Sputum positive	With symptoms	0	0	0	0	1	0	1
	Without symptoms	1	1	0	0	0	0	2
Sputum negative	With symptoms	3	2	0	0	0	0	5
	Without symptoms	8	4	1	0	0	0	13

and 10,000 of which are W.A.A.F. Our criterion of activity is a strict one, and the patient suspected has a large radiograph, a full clinical examination, blood sedimentation, exercise, and sputum tests, and observation in station sick quarters before such a diagnosis is arrived at. In doubtful cases the film is referred to headquarters for further opinion. The patient is closely questioned as to the presence or absence of symptoms. The accompanying tables analyse the active cases discovered.

From these tables it can be seen that there are altogether 29 unilateral and 37 bilateral sputum-positive cases. Owing to time and present laboratory facilities we have to restrict ourselves to three simple examinations of a sputum smear by the Ziehl-Neelsen method, and on further tests and by concentration methods this would probably be very considerably higher.

In order further to analyse the types of disease discovered by mass radiography, appended below are tables of the radiographs which definitely suggest vomica formation as opposed to infiltration only.

		Airmen	W.A.A.F.	Total
Unilateral	Infiltration only	76	11	87
	Infiltration and cavitation	26	6	32
Bilateral	Infiltration only	67	14	81
	Infiltration and cavitation	27	7	34

It is rather alarming to note that 66, or approximately 28%, of these so-called "fit" individuals discovered to have active pulmonary tuberculosis have already reached the stage of cavity formation. Out of these cases 32, or nearly 50%, have returned a positive sputum.

Let us now, for the sake of argument, say that among the active cases all the sputum-positive and all the sputum-negative cases discovered with symptoms will require a sanatorium bed. To start with, this brings us to a total of 152 cases in 75,000, or approximately 2 beds per 1,000 individuals radiographed. It is my opinion that in a mixed civilian population the incidence will be considerably higher, as all people who have entered the Service have been examined and passed by a medical board; and also, as the civilian sets will probably be distributed in selected industrial areas where the incidence of pulmonary tuberculosis is highest, it will probably work out to more like 3 beds per 1,000.

It is hoped, and anticipated, that a considerable proportion of these cases, having been discovered in an early stage, will be suitable for artificial pneumothorax, which after preliminary induction in a sanatorium can be continued at the local tuberculosis dispensary. By a scheme which will probably be brought in by the Government, at first the patient can be partially re-employed in industry, with compensation for the time that he is unable to work, thereby causing a minimum economic upset to himself or herself and the family as a whole.

Sputum-negative Cases without Symptoms

Let us now consider the unilateral sputum-negative cases without symptoms whose radiographs, clinical signs, and B.S.R. suggest active infiltration without cavitation. Should all these cases be immediately admitted to sanatorium with a view to collapse therapy? The answer is undoubtedly "No." In these cases the patient usually appears to be very fit, and the radio-

logical appearances are probably due to an exudative response to a very small number of bacilli. A somewhat similar appearance can also result transiently from a low-grade apical pneumonia. If, therefore, the patient is under dispensary observation and is radiographed at two-monthly intervals for the first year, no harm should come to him. If at any stage there appears to be extension, then sanatorium treatment should be advised. It is suggested that in the younger age groups so discovered the individual should be re-radiographed six-monthly for two years, then annually for three years. If the patient is then written off the dispensary books he will be given due warning, should any symptoms arise, to report first to his local practitioner.

The bilateral symptomless sputum-negative cases are a debatable problem. It is my opinion that they should, if the bed situation permits, have a preliminary period of sanatorium observation and treatment, particularly with a view to instructing the patient in after-care; but this will have to be left to the discretion of the local tuberculosis officer.

With regard to the persistently sputum-positive cases it is most necessary that the general practitioner should, from the point of view of public health, continually stress to the patient the necessity for correct disposal of sputum, use of his own eating and drinking utensils and towels, and the like, as it is upon the practitioner who sees the patient weekly or fortnightly that this big responsibility rests. A three- or six-monthly visit to the dispensary does not sufficiently impress the patient, who is inclined to become careless as the years go by. This type of patient should never be re-employed in an indoor industry, however well he may feel in himself, except in a light sedentary clerical job where he has an office to himself. The fact that a patient has become temporarily sputum-negative is no guarantee that he will not again become sputum-positive under conditions of stress. One envisages that in the future there may be some form of industrial segregation of this type of case in the big industrial areas so that they can be usefully employed in indoor industry. It is only by such bold measures that we can hope to tackle efficiently the problems before us.

Inactive Cases

The unilateral and bilateral cases of inactive disease have not been analysed in such detail, but in order to give some idea of the incidence the table below is included. This refers to parenchymatous disease, calcified or fibrotic, including healed Assmann type of foci, but does not include Ghon's foci or calcified hilar glands.

Incidence of Inactive Pulmonary Tuberculosis

		65,000 Airmen	10,000 W.A.A.F.	Total
Unilateral		248	40	288
Bilateral		82	17	99

The majority of these patients are kept as useful members of the Service, in a lowered category, unless the extent of affected lung is such that in spite of the apparent healing it is considered that the airman or airwoman is liable to break down under conditions of stress. A problem that here arises is whether the patient should be told that he has any pulmonary abnormality. It is my opinion that if the disease is unilateral and calcified he should not be told; but if bilateral, or if there is evidence of infiltration other than calcification, he should be warned to report if any symptoms arise.

A number of these cases may require dispensary observation for a time, and it is a matter for the tuberculosis services to decide what extent of disease will require further observation. Up to the present well under 1% of our cases classed as inactive have broken down since their preliminary radiograph, but as these units have been working for only one year it is rather early to make a dogmatic statement.

Conclusion

I would add that the views expressed are by a medical officer who spent several years as a tuberculosis officer prior to enlistment, and is now fortunate enough to be in charge of a miniature chest radiography unit in the Royal Air Force. My thanks are due to Wing Commander R. R. Trail for his help, and to my colleagues running the other units, without whose co-operation I should have been unable to produce these statistics.