

LONDON UNDER AIR BOMBARDMENT: SOME MEDICAL ASPECTS

BY

V. ZACHARY COPE, M.D., M.S., F.R.C.S.

[In the introduction to a lecture delivered to the North of England Branch of the B.M.A. on March 6 Mr. Cope described the aerial bombardment of London, which started last September, and mentioned first of all some of its indirect effects upon the health of the community. The factors concerned were the disturbance of routine, shortened sleeping-time, poor ventilation at some of the places in which refuge was sought, and interference with essential services, especially water supplies owing to broken mains. Incidentally he expressed surprise that greater use was not made of rain-water collected in tubs or tanks from roofs, which would, of course, be less easily interfered with by enemy action. He also pointed out how conspicuously the enemy had failed in one of his evident objectives—that of interrupting transport services. One striking proof of this was that although some inconvenience was caused by road diversions and occasionally by a temporary and local dislocation on the railway, yet every morning during the bombardment the milk supply came punctually to the door of every citizen.]

Effect of Shelter Life upon Health

The health of many Londoners during the period of severe and prolonged attack from the air was affected by their stay for many hours at a time in protective shelters. It had been anticipated that shelters would be necessary, and many, though not enough, had been provided, but it was not foreseen that the continuous nature of the nocturnal attack would necessitate the provision of sleeping accommodation. In these places, for some weeks before bunks could be provided, people slept on improvised beds and in deck-chairs. One surprising complication was the onset in a number of cases of thrombosis of the deep veins of the leg and consequent oedema of the ankle and foot, due to the fact that a person reclining in such a chair is apt to have his legs press unduly upon the lower transverse bar. The thrombosis is brought about by the continuous pressure with relaxed muscles. Dr. Keith Simpson (1940) has pointed out a more serious sequel in the form of pulmonary embolism. The number of cases of sudden death due to this cause reported in the various London districts in September and October, 1940, was 24, as compared with only 4 in the corresponding months of the previous year. These cases of pulmonary embolism have disappeared since bunks were provided, and it is reasonable to conclude that there was a direct association between the two facts. It is possible that a further consideration of the mechanism of the production of thrombosis in such cases may furnish valuable information concerning the occurrence of post-operative thrombosis and embolism.

Another surgical complication directly attributable to the prolonged stay in shelters was the great increase in cases of retention of urine in old men. Cold and damp may have been contributory, but the main factor must have been the limited conveniences at first provided: opportunity could not be found to pass urine until the bladder was over-distended, and thereafter retention ensued. Such cases will no doubt occur less frequently now that the shelters are better equipped.

A method of prophylaxis which, we are informed, may be introduced into the shelters can be properly commented upon by a surgeon—namely, the provision that has been made for the wearing of masks to prevent the spread of droplet infection. We are told that half a million masks are ready to be distributed as and when required. Surgeons have long acted upon the view that infection can easily be transferred by means of the breath, and the wearing of masks is a routine in the operating theatre. The human nasal and pharyngeal mucosa is in some cases as susceptible to infection as an open wound, and I have often been surprised that physicians have not strongly preached, and by force of example demonstrated, that

contagion of the common influenzal cold could be prevented by the wearing of an efficient mask. If in the shelter, why not in the work-room or office? Making the reasonable assumption that in Great Britain every year one million people lose one day from work as the result of a cold, the time lost from this cause annually would equal nearly 3,000 work-years. Would it not be worth attempting to reduce this time by mask prophylaxis?

The direct mental effects of the bombardment confounded the prophets. The predicted panic and mass hysteria did not occur, the plain fact of the matter being that the average British citizen, whether soldier or civilian, is brave and resolute, and when faced with danger preserves an equanimity and stability of mind which is in large measure responsible for the greatness of the nation.

The Casualty Lists

Another surprise was the relatively small number of casualties following upon bombardment. Pre-war estimates had mentioned anything from 30,000 to 150,000 as likely to follow one big raid. When the attacks were made they were certainly on a large scale, for on several occasions it was said that 300 or 400 bombers dropped their explosive loads upon the metropolis in one night; yet the number of casualties, while most regrettable, was on a much smaller scale than the most optimistic of prophets had ventured to forecast. The number for the country as a whole has been published, and we were told on one occasion that the casualties for London then comprised about four-fifths of the total. Since then the proportion has been less great because several provincial cities have had severe attacks. From the figures officially announced a rough estimate can be made that during the 100 days of intensive attack there was a daily average in London of more than 100 killed and more than 150 injured.

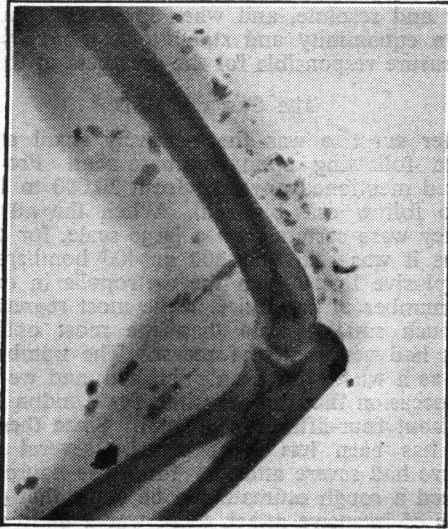
This comparatively small casualty list was not due to the fact that the people were all in shelters, for the majority still elected to sleep in their own houses, preferring, as one woman said, "to die suddenly in our own home rather than die a lingering death from 'shelter pneumonia.'" The striking feature of the casualty list, however, is the high proportion of fatal injuries. It was fairly constantly found that about 40% of those sufficiently hurt to be termed casualties had been fatally injured—a proportion much higher than in ordinary battle, and requiring some explanation. The explanation is to be found in the age and condition of the victims, the nature of the injuries, and the number of factors which may operate in one case. A battle is fought by young men in good physical health, but civilian air-raid casualties include the old and infirm, and the very young and sensitive. In battle a single bullet or part of a shell may cause considerable injury without hitting a vital part, while in air raids one vital part at least is likely to be damaged by the common crush injury. Again, when people are caught in the wreckage of a house many secondary missiles are formed by fragments of the building. In addition there are the dangers of asphyxia from burial in debris or from inhaling clouds of dust, the peril of poisoning from escaping gas, the risk of fatal burning in the ensuing fire or scalding by steam from broken pipes, and there is the effect of severe shock induced by the pressure of heavy and not easily removable structures pinning down the victim.

Wounds due to Glass: Crush Injuries

I cannot here describe fully the various types of wound and the complications that may be encountered. I can only emphasize some points in respect of which the injuries due to bombardment differ in kind or degree from those customarily met with in civil or in military surgery. These differences depend for the most part on the large proportion of crush injuries which result from falling buildings, on the frequent occurrence of severe effects of blast from high explosive, and on the injuries from secondary missiles, particularly from fragments of glass.

Injury from broken glass can be very serious. The force of an explosion often breaks all the windows in the buildings around the site, and glass fragments of all sizes

are propelled in every direction at great velocity. Glass easily enters the tissues, but is not as a rule infective. Large fragments may do serious damage, and may need to be removed promptly, but in some cases innumerable small portions may become embedded, the removal of which is impossible or inadvisable. Some of these cases have developed anaemia a few days later, and have required blood transfusion. Perhaps it may be assumed that there were multiple small haemorrhages caused by some of the deeper fragments. Recognition of glass in the tissues by means of radiographs is fairly easy (see Fig.).



Radiographic illustration of multiple glass fragments in the arm (by courtesy of Dr. J. C. Davidson).

Injuries due to crushing of body or limbs by great masses of debris have constituted some of the severest lesions. This is not a question of a sudden crush which is soon relieved, but, as a rule, of a pressure continuing for minutes or even for hours before release. Fractures of limbs, pelvis, or spine, which ordinarily cause a great amount of shock, will in these circumstances depress the vitality to the limit of endurance or beyond it. One form of spinal fracture which I have not seen in civil work is a horizontal fracture through the bodies of several adjacent vertebrae, with little or no compression and only slight forward displacement of one or other fragment of the fractured bodies. In one or two cases there had been no suspicion of a fractured spine until routine x-ray examination revealed the state of affairs.

Shocked Patients

As a rule there is no difficulty in recognizing that a patient is suffering from severe shock, but it is well to remember, what I pointed out as long as twenty years ago, that the classical symptoms of shock are not all present in any individual case. Recently Whitby (1941) and others, in a study of secondary shock as seen in air-raid casualties, have emphasized the same point of dissociation of shock symptoms. They rightly insist that the pulse rate may be dangerously misleading, that the mental state is no index to the severity of shock, and that the amount of sweating may be unrelated to the degree to which shock is present. I agree with Whitby and his colleagues that blood pressure is at present the most reliable measurable factor at our disposal for assessing the severity of shock, but I would add that in some cases the pulse pressure may be a better guide to the patient's condition. It may be that in the future we may obtain a better indication from the measurement of the blood volume or the specific gravity of the peripheral blood. A point not sufficiently recognized is that a degree of shock may exist before the systolic pressure falls, and that sometimes an apparently normal systolic pressure may coexist with a very serious state of shock. The most important

lines of treatment for shock are rest, warmth, administration of morphine or omnopon, and the giving of plasma or blood transfusions, before disturbing the patient further by undressing, washing, taking radiographs, and, still more, by operative intervention.

Other Complications of Injuries

A new form of intestinal injury, caused by prolonged pressure on the abdominal cavity, has been discovered. In the case of a woman who lay helpless with a heavy beam pressing upon the lower part of the abdomen, subsequent exploration showed a state of peritonitis due to multiple points of gangrene in a coil of small gut lying in front of the lower lumbar vertebral bodies. Resection was carried out, but did not long delay a fatal issue. As there was no obvious lesion of the abdominal wall and no thrombosis of the mesenteric vessels, it is reasonable to conclude that the multiple points of gangrene resulted from the continuous direct pressure on the wall of the coil of gut. McMichael (in a personal communication) and others have recently described a very serious complication of severe crushes of the limbs in the shape of symptoms of profound shock accompanied by signs and symptoms of renal failure. Urinary output diminishes, vomiting and abdominal distension supervene, and the blood urea rises to a high level. In cases which came to necropsy extensive aseptic necrosis of the crushed limbs was found and the kidneys showed some tubular degeneration and blood casts in the collecting tubules.

The effect of blast is an important factor in air-raid casualties. The experiments of Zuckerman (1941) suggest that much of this effect may be due to the impact of the sudden pressure upon the exterior of the trunk, causing injury to the contained viscera. Surgically, the effect of blast on the abdominal cavity is of importance. Zuckerman, in experimental cases, has observed haemorrhage into the gut wall and even rupture of the bowel. Some confirmation of the experimental findings is given in the account by O'Reilly (1941) of five air-raid casualties which presented symptoms of acute abdominal disorder, and in which at operation some subserous haemorrhages were found but no major lesion. Mitchiner (1941) mentions a case in which he attributes rupture of liver and spleen to the effect of blast.

Clearance of Casualties

[In the last part of his lecture Mr. Zachary Cope recalled the inauguration of the Emergency Medical Service, the arrangements which were set up for distribution of casualties to hospitals, the division of London and the surrounding area into sectors, and the enlargement and equipment of outlying hospitals.]

The immediate medical treatment of casualties fell to the lot of the mobile units and first-aid posts. Doctors attached to mobile units were quickly on the scene of "incidents," and the work done by them in conjunction with first-aid squads has been in the highest degree praiseworthy. First-aid posts dealt with casualties as they were brought in, and the more serious cases were sent on to the nearest hospital. The view held by Trueta that first-aid posts should generally be in or attached to a hospital, where any necessary treatment can be performed, seems to have some support from London experience.

The effect of bombardment, with evacuation and blackout, was to diminish considerably the work of the general civilian practitioner. Patients did not throng the surgeries as in peacetime. Fewer beds were available in the central hospitals and many hospitals were hit by bombs, but a good out-patient service has been maintained. As for medical education, the pre-clinical students for the most part are out of London. Students doing hospital work have been distributed among the hospitals in the sector to which their medical school is attached. In some cases this has led to a closer relation between student and teacher, which is all to the student's good, but in certain instances regular teaching has not been easy to maintain.

In this rapid survey I have skimmed the surface of the subject; in due time many will write more fully of each

of its aspects. It is to the credit of the medical profession that its members, sharing ordinary civilian risks, stood to their posts of duty, which often involved great additional risks, with unflinching courage and resolution.

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Simpson, Keith (1940). *Lancet*, 2, 744.
Whitby, L. E. H., and others (1941). *Ibid.*, 1, 99.
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For crush uraemia see also Bywaters, E. G. L., and others (1941). *British Medical Journal*, 1, 427, 432.

PSYCHOLOGICAL TERMS USED IN CASES OF HEAD INJURY

A glossary of psychological terms commonly used in cases of head injury has been drawn up by the Brain Injuries Committee of the Medical Research Council (chairman, Prof. E. D. Adrian) and is published by H.M. Stationery Office as M.R.C. War Memorandum No. 4 (price 1d.). The object in view is to secure greater uniformity in case notes on such patients. Hitherto there has been no generally accepted definition of the words commonly used to describe the clinical effects of trauma upon the brain. The committee's notation, set out below, is already employed at the special centres for treatment of head injuries, and it is hoped that publication in this form may facilitate its adoption as a standard terminology throughout the medical services. The terms defined refer to the commoner psychological disturbances after head injury, but the list is by no means complete. The definitions are intended also to be useful for abbreviating description and for facilitating exchange of information between different observers. They are arbitrary and may not readily find universal acceptance; but since many of the words have in the past been used in varying senses, it seems essential, to avoid further ambiguity, that fixed definitions should be accepted and used. The prefix "traumatic" as used in this glossary denotes that the symptoms are due to the physical effects of head injury on central function; it may be added as a qualification to the appropriate term wherever applicable (for example, in "traumatic semicoma"), but its use should be obligatory for the terms to which it is attached in the list.

Glossary

COMA: A state of absolute unconsciousness, as judged by the absence of any psychologically understandable response (including, for example, change of expression) to external stimuli or inner need.

Note.—If a patient is comatose it is important to record the state of activity at levels of nervous integration lower than that which is the substratum of consciousness. Such activities are reflex—e.g., swallowing, pupillary and corneal reflexes, tendon jerks, plantar responses. It is not uncommon to hear it said of a patient who is comatose and cannot swallow that he is "deeply unconscious." This statement has no real value. He should be said to be comatose with loss of swallowing reflex.

SEMICOMA: A state in which psychologically understandable responses are elicited only by painful or other disagreeable stimuli—e.g., pinching the skin, shaking the patient vigorously.

CONFUSION (Clouding of Consciousness): Disturbance of consciousness, characterized by impaired capacity to think clearly and with customary rapidity, and to perceive, respond to, and remember current stimuli; there is also disorientation.

Note.—When a patient is said to be suffering from confusion the degree (see below) should always be specified.

Degrees of Confusion

Mild.—A state in which the patient, though presenting the characteristic features of confusion in some degree, is capable of coherent conversation and appropriate behaviour.

Moderate.—A state in which the patient, though out of touch with his surroundings, can be got to give relevant answers to simple questions such as "What work do you do?" "How old are you?" "Where do you live?"

Severe.—A state in which the patient, though for the most part inaccessible, will occasionally show adequate response to

simple commands forcibly given and, if necessary, reinforced by appropriate gestures—e.g., "Put out your tongue," "Take my hand."

DELIRIUM: A state of much-disturbed consciousness (confusion) with motor restlessness, transient hallucinations, disorientation, and perhaps delusions.

TRAUMATIC STUPOR: A state in which the patient, though not unconscious, exhibits little or no spontaneous activity. In traumatic stupor there is always confusion.

TRAUMATIC AUTOMATISM: A state in which the patient, though capable of responding normally to his immediate environment, subsequently has amnesia for the period in question. In this state there is always some degree of confusion with disorientation.

CONCUSSION: A state of unconsciousness, or impaired consciousness, however fleeting, suddenly produced by mechanical force applied to the skull, and usually followed by retrograde amnesia.

TRAUMATIC DEMENTIA: Progressive mental impairment, predominantly of the intellectual functions, resulting from structural damage to the brain.

TRAUMATIC INTELLECTUAL IMPAIRMENT: Impairment of the intellectual functions which may be persistent or recoverable, but is not progressive, resulting from structural damage to the brain.

TRAUMATIC PERSONALITY DISORDER: Alteration of temperament and character which may be persistent or recoverable, but is not progressive, resulting from structural damage to the brain.

MALINGERING: Intentional simulation of symptoms.

HYSTERIA: A condition in which mental and physical symptoms not of organic origin are produced and maintained by motives never fully conscious, directed at some real or fancied gain to be derived from such symptoms.

Note.—The adjective "hysterical" may be applied either to this condition or to the type of psychopathic personality common among those who develop this condition, but it should not be applied—as is often done—to behaviour which is merely uncontrolled and emotional.

INSIGHT: Capacity for arriving at as objective and correct an estimate of any impairment due to one's illness as would be arrived at by a detached onlooker with equal access to relevant facts.

JUDGMENT: Capacity for arriving at reasonable conclusions, leading to well-adapted behaviour, especially as indicated by conduct in the practical affairs of daily life.

COMPREHENSION: Capacity to integrate diverse percepts and/or ideas and to understand the relation between them and one's personal experience.

AMNESIA: Impairment of memory, however caused. It is most commonly applied to incapacity to recall particular topics or the happenings of a particular period.

EPSOM COLLEGE ANNOUNCEMENTS

We publish the following announcements regarding vacant scholarships for girls and a pension for a doctor, at the request of the Royal Medical Foundation of Epsom College:

Scholarships for Orphan Daughters.—The Council of Epsom College will shortly proceed to award St. Anne's Scholarships to girls attending Church of England schools. Candidates must be fully 9 and under 16 years of age, and must be orphan daughters of medical men who have been in independent practice in England or Wales for not less than five years. The value of each scholarship is dependent upon the means of the applicant and the locality and fees of the school selected.

Pension for a Necessitous Medical Man.—The Conjoint Committee of Epsom College will in May next award a "Christie" pension of £89 per annum to a necessitous medical man, fully 55 years of age. Candidates must be duly qualified, and have been registered for five years.

Forms of application can be obtained from the Secretary, Epsom College, Surrey, and must be completed and returned by April 25, 1941, at the latest.