

simple failure to maintain independent existence even with the full support of social services, but incontinence and mobility are preserved, and there is no significant behaviour disturbance, admission to a local authority welfare home will be appropriate. Old people in need of this may have little insight and may not accept this course. In such cases the social worker's skills will be

needed to gain the old person's acceptance. Where incontinence, behaviour disturbance, or immobility make hospital care the necessary alternative, the choice between psychiatric or geriatric admission will be determined by the balance of behaviour disturbance on the one hand and immobility or associated physical illness on the other.

Surgery of Violence

Report on Injuries Sustained by Patients Treated at The Birmingham General Hospital Following the Recent Bomb Explosions

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Summary

As a result of recent bomb explosions a total of 82 patients were treated at the Birmingham General Hospital, 61 with minor injuries. Bomb injuries may be divided into three main groups due to the blast effect (such as blast lung and ruptured tympanic membranes), the flash (such as burns to the exposed part of the body), and shrapnel (which may cause a wide variety of injuries). The amount of warning of such explosions is usually minimal, and so the prepared accident schemes of most hospitals are inappropriate. If the disaster occurs outside normal working hours much responsibility initially falls on the resident staff. This report gives some idea of the type of injuries they are likely to see.

Introduction

On the evening of 21 November 1974 two bombs exploded in two crowded public houses in the centre of Birmingham. Eighty-two patients were seen and treated in the General Hospital. Of these, 61 were suffering from minor injuries and were discharged after treatment in the accident department. Twenty patients were admitted, one of whom, suffering from extensive burns, was immediately transferred to a burns unit, where he subsequently died. One further patient died in the accident unit.

Of the 19 patients admitted none subsequently died, and the following is an account of their injuries and immediate management.

Report of Cases

CASE 1

On admission this patient, a 21-year-old female, was found to be hypotensive and to have the following injuries: (a) Penetrating wound

left lower abdomen with prolapsing intestines; (b) large wound with marked tissue loss left upper arm; (c) multiple facial lacerations; and (d) multiple shrapnel wounds to leg, scalp, and left upper arm.

She was taken to the theatre after resuscitation and laparotomy was performed. Blood and bowel contents were found in the peritoneal cavity. A large piece of shrapnel had entered the abdominal cavity low in the left iliac fossa and had traversed upwards, ending in the lumen of the stomach. Two perforating injuries were also found in the ileum and in the transverse colon. These were treated by excision and anastomosis. Peritoneal toilet was performed and the abdomen closed with drains. The entry wound on the abdominal wall and the large area of tissue loss in the upper arm were treated by excision, and the wounds packed. X-ray of the leg showed a piece of shrapnel in the upper tibia.

CASE 2

On admission this patient, a 22-year-old female, was shocked and required immediate resuscitation. She had sustained: (a) Open fracture of skull involving the frontal sinus, containing various wood and bone fragments; (b) open fracture of left tibia with extensive soft tissue damage containing much debris; (c) multiple facial lacerations and bilateral perforating eye injuries; (d) flash burns to exposed parts; and (e) additional minor lacerations.

In the theatre excision of her wounds was carried out and the fractured tibia supported in plaster-of-Paris. Some of the wood fragments were removed from her eyes, and the frontal sinus was cleaned and packed. Dressings were applied to the burnt areas.

CASE 3

On admission this patient, a 27-year-old male, was complaining of severe dyspnoea, with pain on breathing and a persistent desire to cough. He was restless with marked tachypnoea. His pulse was 120, and the blood pressure was 90/70 mm Hg. Both sides of his chest were moving equally, with good air entry in all areas without added sounds. He was also suffering from superficial flash burns to both lower legs and the face, the former being grossly contaminated by wood and metal fragments driven in by the blast. At this time it was commented that he appeared more shocked than his injuries suggested, but no other cause could be detected. In particular his abdomen was soft and pain-free on palpation. Chest x-ray showed "blast lung" (fig. 1) injury, and he was curarized, intubated, and ventilated. Hydrocortisone and antibiotics were begun. Two pints (1.1 l) of blood was given. Six hours later his blood pressure, which had recovered initially, showed a fall. This was accompanied by a rising pulse. No

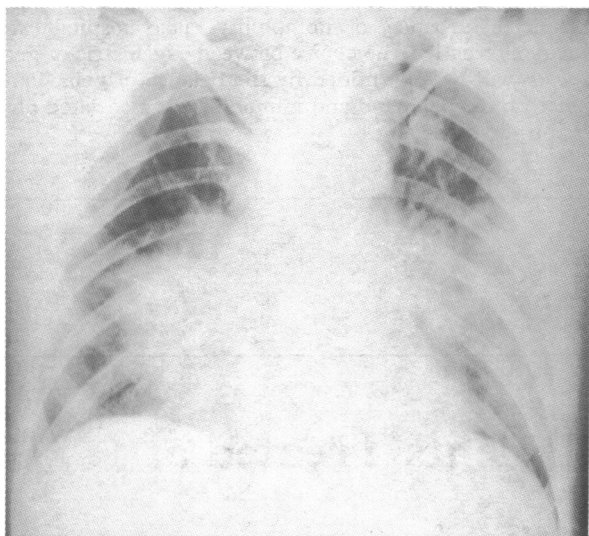


FIG. 1—Case 3: Radiograph of blast lung.

abdominal tenderness could be elicited on account of the paralysis, but four-quadrant tapping yielded fresh blood. An immediate laparotomy showed a ruptured spleen, which was removed.

CASE 4

This patient, an 18-year-old male, arrived in a shocked state and required resuscitation. He had received serious injuries to his left leg, with much retained debris and an open fracture of the left tibia and fibula. There were flash burns to the exposed parts of his body and the right leg. The fractured lower leg was stabilized with a compression plate, as much soft tissue as possible was preserved, and the remaining gaps packed. The burnt areas were dressed with petroleum jelly gauze.

CASE 5

This patient, a 27-year-old male, was found to have a small puncture wound on the right side of his neck, which was bleeding profusely. X-ray showed a piece of shrapnel adjacent to the body of C2. On exploration of the wound it was found that the vertebral artery had been completely severed. Haemostasis was secured by clipping the divided artery with Cushing's clips. Postoperatively he developed a transient unsteadiness of gait, which resolved within 48 hours.

CASE 6

This patient, a 28-year-old male, was also shocked and required resuscitation. He had an open double fracture of his right tibia and fibula, again with extensive soft tissue damage and retained debris. There was a large laceration in the left lower leg and also the left iliac fossa region. The fracture was stabilized with a compression plate after thorough wound excision and the tissue loss made good with a skin graft. The other wounds were also excised.

CASE 7

This patient, an 18-year-old male, was admitted with approximately 40% superficial flash burns involving the whole of both legs, lower abdomen, right side of face, and both hands. The protection offered by socks and pants are clearly seen (fig. 2), the loose fitting trousers having been removed by the blast. All these burns were grossly contaminated by penetrating debris—wood, metal, paint, clothing and concrete—driven in by the blast. In addition he had numerous lacerations and a large perforation of the right eardrum. He was treated by toilet and excision under general anaesthesia, and Sofratulle occlusion dressings were applied (which were changed to silver

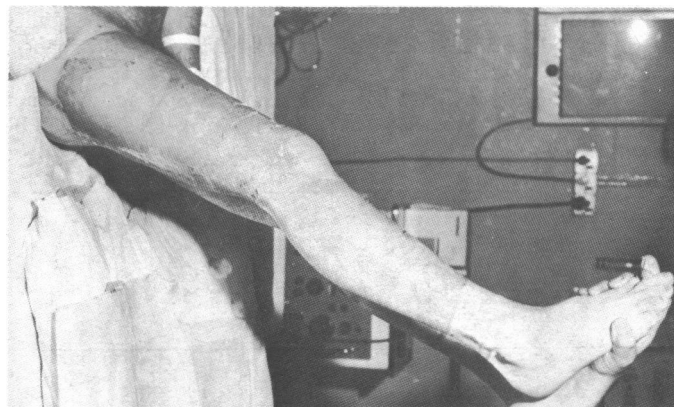


FIG. 2—Case 7: Protection to legs by socks and pants.

sulfa diazine as soon as this was available). Intravenous fluid, plasma, and blood were given.

CASE 8

This patient, a 21-year-old male, had similar injuries to case 7 but with approximately 50% burns involving both legs and lower abdomen, right side of thorax and back, right upper arm and axilla, right hand, and face. In addition there were patchy burns on the left arm, thorax, and hand. These were likewise contaminated. He was treated with intravenous fluid, plasma, and blood, and the burns were cleaned and dressed in a similar fashion to those of Case 7.

CASE 9

This patient, a 29-year-old male, suffered extensive soft tissue damage to his left leg. A laceration in the calf had punctured the posterior tibial artery; a further laceration nearer the ankle had severed the artery again. Debris was removed from these and other wounds, and all the wounds except the smallest were packed to await secondary suture. The leg was supported in plaster-of-Paris.

CASE 10

This 16-year-old male had flash burns to face, neck, hands, and lower legs and considerable conjunctivitis. He was cleaned and dressed in theatre. Chloramphenicol eye drops were administered.

CASE 11

This patient, a 21-year-old female, had not sustained any major injury but had received a number of lacerations on her limbs. These contained pieces of metal, most of which were initially removed under local anaesthetic, and the wounds were closed.

The following day she presented with symptoms of irritation of her right ulnar nerve, which x-ray showed was due to a missed piece of shrapnel. Under general anaesthetic and tourniquet this piece of metal was found to be lying deep to the ulnar nerve at the wrist and was removed, with relief of her symptoms.

CASE 12

This man, a 40-year-old male, was found to have a penetrating injury to the upper left thigh, containing a large fragment of glass, associated with much bleeding; and two adjacent deep lacerations. The fragments of glass were removed and all wounds explored before primary suture. In addition there were various metallic foreign bodies, two of which required removal later (one in the left middle finger, one in the left upper arm).

CASE 13

This 25-year-old female had a compound fracture of right medial malleolus, which was treated by wound excision. Four days later delayed primary suture with screwing of bone fragments was undertaken.

CASE 14

This patient an 18-year-old female, had superficial flash burns to face, hands, and lower legs, amounting to 20% of the body surface together with minor abrasions to the lower legs. These were cleaned and dressed without general anaesthesia. In addition she complained of severe photophobia, but apart from conjunctivitis no eye injury was apparent. She was treated with chloramphenicol eye drops and rapidly improved.

CASE 15

This patient a 30-year-old male, received a number of lacerations to the face and left hand and a penetrating wound to the right foot with a retained metal fragment. These were treated under local anaesthetic. He also suffered bilateral perforated eardrums and superficial corneal abrasions.

CASES 16-19

These patients comprised three women aged 25, 21, and 18 and a man of 22. They all received superficial flash burns to exposed parts—namely, face, hands, and legs, and minor lacerations caused by shrapnel. In addition Case 17 had bilateral corneal abrasions, which were treated by amethocaine and sulphacetamide drops. Case 19 also had a perforated left eardrum.

TREATED AND DISCHARGED

The 61 patients treated and discharged the same evening suffered the following injuries: Superficial burns, 7; minor multiple lacerations, 33; lacerations with retained shrapnel, 3; perforated tympanic membrane, 7; dislocated shoulder, 1; contusions, 4; sprained ankle, 1; chest pain, 1; shock, 1; nil recorded, 14.

All cases that were either admitted or treated as outpatients were given tetanus toxoid and antibiotics if indicated.

Discussion

In bombing attacks of this kind the types of injuries that are likely to be presented to an accident department in large numbers differ from those likely to be seen in a modern disaster from some other cause. They therefore require a reappraisal of the principles of management and organization within our hospitals.

The injuries may be divided into three main groups: those due to the blast effect, those due to the flash, and finally those due to the shrapnel.

Of the patients seen² at the General Hospital there was one case of "blast lung" (case 3). He also had a ruptured spleen, with no evidence of direct trauma and thus possibly due to the blast effect, and bilateral perforated tympanic membranes. The signs and symptoms of blast lung¹ are not usually met with in civilian practice. Early and rigorous treatment is required.

Of the 19 patients admitted 9 suffered perforated tympanic membranes, in 5 cases bilateral. Of the outpatient group 7 cases of perforated tympanic membrane were recorded. This figure may in fact be higher because a further 6 patients had complained of tinnitus without a perforation being recorded. Moreover, since a perforated tympanic membrane may on occasions give rise to only a very few symptoms, it may go undetected unless a very careful examination is made.

The injuries caused by flash result in extensive but superficial burns to exposed parts of the body, mainly the face and hands. Loose clothes, such as blouses and baggy trousers, are blown off the body, thus extending the area of skin likely to be exposed. Deeper burns as a result of clothing catching fire are a possibility but were not encountered in our experience. Of those admitted to this hospital 10 of the 19 suffered from burns; for 6 of these patients it was the main indication for their admission. The extent of the burns varied from approximately 50% down to 10%. Also there was one patient with more extensive burns who was transferred to a burns unit, where he died. Fortunately the eye closes very quickly in response to flash, and though the exposed face and eyelids were burned only two cases (10 and 14) suffered any flash injury to the eye itself.

The injuries due to fragments of metal from the bomb itself plus blast-driven wood, concrete, and glass can cause a wide variety of injuries, determined by the size of the fragment and the site of injury. This is illustrated in cases 1, 2, and 5, in which small fragments caused serious lesions by reason of the site of penetration. Only one case (2) suffered severe penetrating of the eye, though two other patients had corneal abrasions without evidence of penetration (cases 15 and 17). In one fatal case a small metal fragment traversed the lungs and penetrated the thoracic aorta. The larger fragments caused serious fractures and loss of soft tissue, as illustrated by cases 2, 4, and 6. These were mainly in the lower limbs owing to the bomb being placed on the floor. Of those that died, the worst injuries were seen in the lower limbs.

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