THE ACCIDENT SURGERY OF MOTORWAYS

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I am happy for this opportunity to extend the gratitude of American surgeons to British surgery for its contribution to our development. Two of the periods of greatest progress in surgery of trauma occurred as the result of two world wars. The advances made during these periods were, in large part, due to British surgeons. During the first world war Sir Robert Jones developed the speciality of orthopaedic surgery so that it became a major branch of medicine rather than a minor subdivision of general surgery. During the second world war Sir Reginald Watson-Jones made great contributions in the training of young surgeons in the treatment of injuries. Many of our army surgeons stationed in England during that war were afforded the wonderful opportunity both of reading the works of Sir Reginald and of attending his courses and profiting from his teaching at first hand. These young surgeons returned after the war, greatly inspired, and with tremendous enthusiasm for the wisdom and knowledge thus imparted to them. It is therefore a great personal pleasure for me to have the opportunity to express our gratitude for the tremendous strides our young men have made in the surgery of trauma as a result of his efforts.

Over the past fifty years the relentless pace of our civilisation and the never ending demand for rapid action has made speed in transport a necessity to our society. We seem unwilling, and indeed we are unable, to halt this increase in speed, and we shudder to think of what may be in store for us in the next fifty years. Unfortunately, the inevitably price we pay for speed is injury and death. In spite of all our efforts to the contrary, speed and death will always go hand in hand.

In 1958 in the United States 38,000 people were killed and 1,400,000 injured in consequence of crashes on the highways (National Safety Council 1959). We are, therefore, faced with a very serious public health problem, one in which the medical profession has a great responsibility. As in any public health threat there are two phases to be considered: the first is the problem of prevention, and the second concerns the treatment of the individual involved.

PREVENTION

Speed and failure of judgment on the part of the driver are the most important factors in the causation of motor accidents, and, human behaviour being what it is, it is obvious that even with our greatest efforts only a small percentage of accidents can be avoided. Education in driving, disciplinary laws, enforcement of the laws, and improved road engineering are all important and necessary in the effort to reduce the number of accidents, but these are primarily the responsibility of government agencies, and the medical profession is only indirectly involved. Since we must accept the inevitability of motor crashes as a consequence of rapid travel, one of the measures we may take to prevent injury and death is the protection of the passenger in the motor car. Great advances have been made in the interior design of cars to protect the passenger.

In 1942 De Haven, a research fellow in physiology at Cornell University Medical College, investigated the factors involved in unusual survivals after free falls and attempts at suicide. From his studies he was able to suggest certain changes in the interior design of cockpits of aeroplanes to prevent injury to the pilot in a crash. During the war he continued his research for the Armed Forces, and the improved designs of the cockpits of fighter planes did much to decrease the mortality of pilots in crashes. The natural outcome of this research was to continue

* Condensed from the second Watson-Jones Lecture delivered at the Royal College of Surgeons of England on November 10, 1960.
the same studies in relation to motor cars. With the support of national agencies the Auto-
Crash Injury Research Department was established at Cornell University Medical College,
and a comprehensive statistical study of many thousands of crashes was made from material
gathered in many states (Braunstein 1957). These studies showed that there were certain
factors that increased the danger of severe and fatal injury. One of the most important
findings had to do with the ejection of the passenger from the motor car at the time of collision
(Braunstein, Moore and Wade 1957). In the past it has often been considered fortunate if
the occupant was thrown out of the car at the time of collision, because of the mistaken idea
that the danger was greater if the passenger remained in the vehicle. But research indicated
that the risk of serious or fatal injury was five times greater if the occupant was ejected from
the vehicle (Table I). The relative safety of remaining in the vehicle is well known to stunt
drivers, who have no fear of roll-over crashes if they are strapped to a solidly fixed seat and
the doors are wired tight to prevent opening.

**TABLE I**

**RISK OF INJURY AS RELATED TO EJECTION OR NON-EJECTION**

<table>
<thead>
<tr>
<th></th>
<th>Percentage of occupants with:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderate/fatal grade injury</td>
</tr>
<tr>
<td>Not ejected</td>
<td>23-9</td>
</tr>
<tr>
<td>Ejected</td>
<td>49-9</td>
</tr>
<tr>
<td>Injury ratio</td>
<td></td>
</tr>
<tr>
<td>Ejected: not ejected</td>
<td>2:1:1</td>
</tr>
</tbody>
</table>

Certain parts of the interior of the motor car were found to be more dangerous than
others during a crash. The steering assembly, windscreen and instrument panel were often
the cause of injury. The fact that the front seat often tore loose, throwing the passenger
forward against the dashboard, was found to be another cause (Table II).

On these findings, the Auto-Crash Injury Research Department made certain suggestions
concerning the interior design of motor cars. They recommended: 1) provision of a safety belt
for all occupants; 2) padding of the instrument panel and removal of protuberant knobs and
keys; 3) change in design of the steering assembly, the wheel being dish-shaped to catch the
body of the driver and prevent the impaling action of the steering rod; 4) improvement of
doors locks to prevent doors from opening on impact; and 5) firm fixation of the front seat
to the chassis. These suggestions impressed the Trauma Committee of the American College
of Surgeons, and on its recommendation the Board of Regents of the College transmitted
them to the five major motor manufacturers in America with the request that these changes
be made. Most of the manufacturers complied, and one company incorporated all of these
suggestions in its 1956 model. Some of the improvements, such as padding of the dashboard
and provision of seat belts, were offered only as optional features at added cost to the buyer.
This was unfortunate because most of the public was not aware of the value of the safety
features. One of the manufacturers centred its advertising campaign on these safety features,
but unfortunately its sales figures showed a severe drop, and the experts attributed this decline
to the accent on safety. Apparently safety suggestions are not popular with the man buying
a car. Nevertheless the manufacturers are continuing to include many of the safety features
in their new models.

Since these changes in motor car design were made in 1956 the Cornell group has
investigated the effectiveness of safety features in some 2,750 accidents producing injury in
rural areas. The findings indicated a highly significant decrease in the injury potential of the
motor car. Table III shows a comparison on the basis of incidence of door openings, of ejection and of the risk of dangerous or fatal injury. The greatest improvement in risk of ejection was 48·7 per cent and the greatest decrease in risk of dangerous or fatal injury was 29 per cent. Both of these changes are significant at the 95 per cent level of confidence.

### TABLE II
**MAJOR CAUSES OF INJURY**

<table>
<thead>
<tr>
<th>Major Cause of Injury</th>
<th>Any Degree</th>
<th>Moderate/Fatal Degree</th>
<th>Dangerous/Fatal Degree</th>
<th>Order of Importance *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering assembly</td>
<td>29.4%</td>
<td>8.4%</td>
<td>2.5%</td>
<td>1</td>
</tr>
<tr>
<td>Ejection</td>
<td>14.6%</td>
<td>6.9%</td>
<td>3.2%</td>
<td>2</td>
</tr>
<tr>
<td>Instrument panel</td>
<td>20.6%</td>
<td>4.2%</td>
<td>0.7%</td>
<td>3</td>
</tr>
<tr>
<td>Windscreen</td>
<td>16.9%</td>
<td>4.6%</td>
<td>0.6%</td>
<td>4</td>
</tr>
<tr>
<td>Backrest of front seat (top portion)</td>
<td>11.0%</td>
<td>2.4%</td>
<td>1.1%</td>
<td>5</td>
</tr>
<tr>
<td>Door structures</td>
<td>7.7%</td>
<td>2.4%</td>
<td>0.5%</td>
<td>6</td>
</tr>
<tr>
<td>Backrest of front seat (lower portion)</td>
<td>15.1%</td>
<td>2.5%</td>
<td>0%</td>
<td>7</td>
</tr>
<tr>
<td>Front corner post</td>
<td>2.0%</td>
<td>1.2%</td>
<td>0.7%</td>
<td>8</td>
</tr>
<tr>
<td>Flying glass</td>
<td>3.0%</td>
<td>0.5%</td>
<td>0.02%</td>
<td>9</td>
</tr>
<tr>
<td>Top structures</td>
<td>1.2%</td>
<td>0.6%</td>
<td>0.2%</td>
<td>10</td>
</tr>
<tr>
<td>Rear view mirror</td>
<td>2.2%</td>
<td>0.6%</td>
<td>0.02%</td>
<td>11</td>
</tr>
</tbody>
</table>

* Based on 1) the number of occupants actually exposed to the injury-hazard of the object, 2) the frequency of injury caused by the object, 3) the degree of injury caused by the object.

### TABLE III
**SAFETY OF 1956 AND PRE-1956 CARS**
(Based on 2,750 rural accidents)

<table>
<thead>
<tr>
<th>Year of manufacture</th>
<th>Percentage risk of door opening in:</th>
<th>Risk of dangerous fatal grade injury</th>
<th>Percentage of occupants with dangerous fatal grade injury</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overturning accidents</td>
<td>Accidents without overturning</td>
<td>All types accidents</td>
</tr>
<tr>
<td>1940-1955</td>
<td>75.1%</td>
<td>38.1%</td>
<td>46.3%</td>
</tr>
<tr>
<td>1956</td>
<td>60.0%</td>
<td>25.3%</td>
<td>34.0%</td>
</tr>
<tr>
<td>Difference in risk of front doors opening</td>
<td>15.1%</td>
<td>12.8%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Maximum improvement demonstrated</td>
<td>20.1%</td>
<td>33.6%</td>
<td>26.6%</td>
</tr>
</tbody>
</table>

In another investigation of the effectiveness of seat belts, 300 cars equipped with such devices, involved in crashes, were studied (Braunstein et al., loc. cit.). By reviewing 4,000 control cases it was possible to match closely eighty-one cars with seat belts and eighty-one without. The control and experimental groups were identical as to type of accident, area of principal impact, direction of principal force, speed at impact, frequency of door opening, number of cars per accident, make of car, weight of car, year of manufacture, and seated area of occupants.
The results of the comparison are listed in Table IV. Some injury was sustained in 75 per cent of persons with no belt, but in only 29-9 per cent of those with seat belts. Moderate injuries were reported for 23 per cent of the group with no belts and 9-2 per cent of those with belts. Fatal injuries were reported in 3-6 per cent of those without belts and in only 1 per cent of those with belts. All degrees of injury were decreased to a degree which was statistically significant at a very high level of confidence. Three examples showing the increased safety provided by seat belts will be quoted from the eighty-one paired accidents studied. In the first pair of cases (Cases 1 and 2) each car was involved in a head-on collision at the same speed, causing similar car damage (Figs. 1 and 2). The driver without the seat belt was killed, but the other survived with minor injuries. In the second example (Cases 3 and 4) each of the accidents involved a right front corner impact with another car at thirty-five to forty miles an hour. The damage to the car was similar in each case (Figs. 3 and 4). The driver wearing the seat belt was uninjured, but the other driver was thrown violently against the right front door and sustained multiple injuries, including facial contusions, fractured clavicle, fractured ribs, punctured lung with haemo-pneumothorax, and fractured patella. In the third example (Cases 5 and 6) both accidents occurred at seventy miles an hour and the damage to the two cars was similar (Figs. 5 and 6). The driver wearing the seat belt sustained minor contusions, whereas the other driver was partly ejected through the windscreen and sustained severe injuries which included multiple facial lacerations with avulsion of the right ear, fracture of the right femur, and multiple lacerations about the right knee.

Another remarkable survival of a driver wearing a seat belt is illustrated in Figure 7. In this accident the car was completely sheared in two by a tree, and the front half of the car was thrown fifty feet across a field. The driver, who was wearing a seat belt, walked away from the accident unhurt.

It cannot be expected that a seat belt or other safety device will afford protection in accidents that occur at excessive speeds (Fig. 8). The safety factors that may be incorporated by the motor manufacturer will continue to be helpful in saving lives, but those that depend on the judgment of the individual driver and passenger will be difficult to apply. It is the duty of the medical profession to help in the effort to educate the public in this respect. The American Medical Association, the United States Public Health Service, and the National Safety Council are cooperating in an effort to expand the use of seat belts. Much progress has been made, particularly in the acceptance of the seat belt by large companies controlling big fleets of cars and trucks. It is hoped that in the future all cars will be equipped with seat belts and that the public will be educated to use them.
TREATMENT

The major responsibility of the medical profession to the accident victim lies in the treatment of his injuries. In the opinion of the Trauma Committee of the American College of Surgeons the care of the injured patient in the United States is not all that it should be, and we are now investigating the present state of the ambulance services and of emergency treatment in hospitals in America.

**FIG. 1**
Case 1—State of car after head-on collision. The driver was not wearing a seat belt and was killed.

**FIG. 2**
Case 2—Car similarly damaged. The driver, who was wearing a seat belt, sustained only minor injuries.

The transport of the injured may be a major factor in the outcome of the treatment of his injuries. In the United States there are few cities and rural communities in which an injured person is transported under ideal conditions. Through its Trauma Committee, the American College of Surgeons is continuing, as one of its major efforts, an attempt to improve this situation.
Since the excitement and hysteria aroused by an accident usually stimulate all concerned to use as much speed as possible in their actions, the ambulances are usually driven at excessive speed on the highways, even when not answering an emergency call. The thrill of speed and the feeling of special privilege are too great a temptation for the average ambulance driver to resist. In a study of 2,500 cases of patients taken to hospitals in Flint, Michigan, it was found by Curry and Lyttle (1958) that undue haste was not essential to the patient's welfare.

In their opinion in only one case would moderate delay in transport have caused a fatality. In only forty-five cases was the interval between the accident and the patient's arrival at hospital considered to be significant in determining the patient's course. In nine cases, on the other hand, a rough, weaving ride to the hospital may have produced death or permanent disability. In my opinion the speeding ambulance kills more people than it saves. Until there comes a time when ambulances are manned by responsible and qualified drivers who will speed only when it is necessary, and who will use careful judgment in tempering regulations,
ambulances and other vehicles carrying the injured should be required to obey the usual traffic laws.

The quality of care received by an injured patient in the emergency room is also now under scrutiny by a special group under the auspices of the Trauma Committee of the American College of Surgeons (1960). We believe that emergency room care can be improved and we hope that this investigation will result in the establishment of minimal standards which hospitals will be encouraged to meet.

Case 5—State of car after high-speed impact. The driver, not wearing a seat belt, was severely injured.

The injured workman in large industrial centres in America receives excellent care because his accident occurs during working hours and he is taken immediately to a well equipped hospital staffed by surgeons experienced in the type of injury which may be expected in the industry in question. A motor accident, in contrast, often occurs in an out-of-the-way place at an unpredictable hour. The victim is usually taken to the nearest hospital, which may not be equipped to handle an emergency.
This car was cut in two by the tree with which it collided. The driver was wearing a seat belt. He walked away uninjured.

Even with the protection of seat belts it cannot be hoped that severe injury will be prevented in high-speed accidents. The two occupants of this car were both killed instantly despite seat belts.
The following cases illustrate the multiple nature of the injuries so frequently seen in hospital emergency rooms. Each presents serious problems of treatment in many different fields of surgery.  

**Case 7**—Figure 9 shows the wreck of a car in which two passengers, neither wearing a seat belt, were severely injured in a head-on collision. The passenger on the left front seat sustained a comminuted fracture of the right femur, a ruptured spleen, a severe head injury, fractured ribs and division of an extensor tendon. He was unconscious and shocked on admission. After assessment of the head injury a laparotomy was performed within two hours and the spleen was removed: the femoral fracture was treated by Russell traction. The laceration of the extensor tendon of the left ring finger was not recognised for eight days (much to our chagrin) and only when the patient complained that he could not extend the finger. How often must we tell ourselves and our assistants that especially in the presence of a serious injury we must make a thorough examination to discover even a relatively minor injury? Division of the extensor tendon of the ring finger is not a minor injury to this photographer.

![Car in Case 7](image)

The driver of the car sustained a severe head injury, a posterior dislocation of the right hip, with fracture of the posterior lip of the acetabulum, an open fracture of the patella, and multiple fractures of the ribs on the right side with dangerous haemo-pneumothorax. Treatment was by immediate needle aspiration of the chest, followed by thoracotomy, and within a few days operative correction of the dislocation of the hip and repair of the extensor mechanism of the knee. A study of multiple injuries at the New York Hospital (Wade 1952) suggested that when a posterior dislocation of the hip is associated with injury of the femur, knee, or tibia on the same side the hip injury may be overlooked, and it is important that this be considered in every case of multiple injury.  

**Case 8**—The second illustrative case is that of a pedestrian struck by a car on the streets of New York. An investigation of 100 serious and fatal pedestrian injuries being carried out by the Cornell University Trauma Research Department (Wade, Braunstein, McCarroll, Cooper, Seremitis and Weinberg 1961) has shown that most of these serious and fatal accidents involve an elderly pedestrian, often under the influence of alcohol, attempting to cross a street against traffic lights and at a place where crossing is illegal. Such was the case with this man, and the injuries he sustained were typical of many in the series. He sustained multiple fractures of the right transverse processes of the lumbar vertebrae, fractures of the right eleventh and twelfth ribs and fractures of the right ilium and of the sacrum. He also sustained a dislocation of the left
knee, and fracture of the right tibia and fibula. He suffered concussion of the brain and multiple contusions and abrasions. Here was a patient who needed immediate treatment for the dislocated knee with its circulatory embarrassment and nerve damage, and treatment for shock and for the brain injury, as well as careful observation of possible kidney and intra-abdominal injury. He developed a massive retroperitoneal haemorrhage (one of the most common unrecognised causes of death in our pedestrian series) with a large visible and palpable mass in the right flank. But more important than any of these, he exhibited the classical signs of the crush syndrome with kidney damage and anuria. Figure 10 illustrates the pattern of kidney function in the four weeks after injury in the patient in Case 8. After four dialyses on the artificial kidney the kidney parenchyma began to function.

in the four weeks after the accident, during which the kidney parenchyma began to function again after eighteen days, after four dialyses on the artificial kidney. Surely this patient needed immediate care for his many injuries, but also the wise observation of the surgeon in charge, who could recognise the onset of the anuric symptoms and institute proper treatment. **Case 9**—The final example is of the type of case that may be seen in any hospital emergency room at any time, and in which the patient will need expert care if life and limb are to be saved. Figure 11 shows the damaged vehicle in which a man and wife were riding at speed when they struck a concrete pillar on a highway. Neither was wearing a seat belt, and the driver was killed instantly, impaled on the steering column. His wife was thrown violently forward and then ejected to the roadway. A passing taxi cab brought her to the hospital, unconscious, in great respiratory distress, pulseless, and in severe shock. Her injuries included fracture of the skull, fracture of the jaw, segmental crush injury to the chest with fractures of six ribs on either side, and with paradoxical respiration, a transverse fracture of the body
of the eighth thoracic vertebra, and fracture of the pelvis. She had sustained injuries to the abdomen and there was blood in the catheter specimen of urine. She had sustained a severe crushing injury to the right lower limb with avulsion of skin, and a severe open fracture of both bones of the left leg with extrusion of the fragments through the wound.

It was necessary to treat her for shock immediately and to maintain respiratory exchange. After urgent blood transfusion and tracheostomy the wounds were debrided, traction was applied to the chest wall, the fracture of the left leg was put in skeletal traction and the fractured mandible was wired. After a slow convalescence she eventually made a very good recovery.

The follower of the school of pure fragmentation in surgery might say that, ideally, this patient needed a “specialist” in neurosurgery, in maxillo-facial surgery, in orthopaedics, in abdominal surgery, in thoracic surgery, in urological surgery and in plastic surgery as well as the services of a radiologist, a laboratory expert, an anaesthetist, and experienced nurses.

It is unrealistic to hope that all seven of those surgeons could be present at the reception of any patient, and, indeed, such a cluster of experts would be confusing and confounding. One competent surgeon with a broad knowledge of trauma in every field is quite capable of caring for the early therapeutic needs. In directing total care he would use the services of consultants in each field at the appropriate time and in reasonable sequence when the need arose.

In studying the adequacy of emergency room care in American hospitals we should like answers to the following questions involved in coordinating the care of a patient similar to the one we have used as an illustration. Would the patient be seen immediately by someone competent to judge her needs? Would her respiratory embarrassment be corrected by proper treatment? Would a qualified surgeon be present to do a tracheostomy when necessary? Would a qualified observer assess the head injury and decide whether or not surgery was indicated? Would the abdominal injury and bladder injury be promptly recognised? Would laboratory, blood bank and radiological facilities be available in the emergency room? Would the wounds and open fracture be properly debrided and would these operative procedures be undertaken promptly with due consideration of the other injuries? And, above all, would
one responsible surgeon see the patient immediately after admission and thereafter direct her care throughout her entire illness?

We believe that in many hospitals this patient would receive excellent care, but fear that in a far greater number these requirements would not be met.

This problem is a fundamental one of education as well as organisation. In our medical schools today the vast amount of information that the overworked medical student is expected to absorb takes so much time that each departmental head feels that his discipline is underrated in the curriculum. Nevertheless, if we are to expect that the patient with multiple injuries will be cared for by a qualified surgeon, we must prepare to educate the surgeon and give him an opportunity to develop in the many and varied aspects of trauma therapy. The teaching of trauma in the medical schools deserves much greater consideration than it is now given, not so much in extra time as a separate speciality, but in increased emphasis on trauma in every field, so that the medical student can see all of the facets of trauma during his undergraduate education. Postgraduate training in trauma needs greater emphasis in the programmes both of general surgery and of the specialities. In recent years this has been recognised by the American Board of Surgery, which now not only requires training in trauma, but also includes the subject as a much more significant part of the written and oral examination than it did in former years. Some training programmes in general surgery do not include the treatment of fractures or other injuries. This is indeed a great mistake, because no young man who has not been trained in trauma can be considered a fully trained surgeon. In many orthopaedic training programmes the emphasis is on the purely orthopaedic problems, and many of the trainees have little experience in the treatment of multiple injuries.

These deficiencies are well known, and steps are being taken to correct them. The organisation of trauma treatment has received increasing consideration in the past few years and much good may result from this. The American Board of Surgery once considered establishing a separate speciality for surgeons interested in trauma, and several years ago an effort was made to give an examination qualifying in the surgery of trauma certain already certified general surgeons. This move was strongly opposed by orthopaedic surgeons because they feared that the so-called trauma surgeons would then absorb all fracture cases. Furthermore, the argument has commonly been advanced, by sources from both general surgery and orthopaedic surgery, that it is impossible for any surgeon to become competent in the treatment of trauma in every field. The obvious implication is that each surgeon must confine himself to the treatment in his own speciality, and should not treat conditions in other fields. As we have already seen in the cases discussed here, such anatomical fragmentation of responsibility is not to the advantage of the patient. Although it is quite correct that no one can learn all there is to know about every speciality, he can do the patient the greatest service if he knows much about the care of injuries sustained in those areas other than his own field, and if he knows a great deal about the emergency care of every body area.

Much of this disagreement is the result of professional jealousy and fear of financial loss. This may not be true in Britain, but it is decidedly so in my country. The general surgeon has resisted the efforts of orthopaedic surgeons to enter general surgical fields, and the inclusion of hand surgery in orthopaedic training is often resented by the plastic surgeon as well as the general surgeon. The neurosurgeon feels that the orthopaedic surgeon should not attempt to repair nerves or operate upon intervertebral discs. The vascular surgeon resents the fact that orthopaedic surgeons may learn to perform vascular grafts in the presence of other injuries to the limb. What utter nonsense. What difference does it make to the injured crash victim whether or not his surgeon has a certificate in a certain field of surgery: he demands and deserves the best treatment he can get from a surgeon trained in the care of trauma.

It would be ideal if every injured patient could be taken to a specialised hospital or to a special unit of a general hospital where these experienced surgeons, with adequate help, equipment and supplies could remove a ruptured spleen, operate upon a middle meningeal...
haemorrhage, debride and reduce an open fracture, treat a stove-in chest, and still have access to consultation by other specialists. The regional organisation of medical trauma centres is a worthy idea and may be the answer to the problem, particularly in communities where distances are not great and where population is concentrated. However, in certain regions in the United States, where distances are great, hospitals are sparsely distributed, and qualified personnel necessarily few in number, such a concept is impracticable. In Austria and in Hungary, where accident hospitals are the rule, the experiment has been eminently successful, as has your experience in Britain, and ours too, in a few centres; but in the United States we feel that it is still our duty to emphasise the need for better care in every hospital emergency room. Later, perhaps, there may be established more regional units to which organised ambulance services may transport the injured patient.

Orthopaedic surgery now has a remarkable opportunity to become the trauma speciality of the future. If the orthopaedists do not meet this challenge then it must be the general surgeon who must develop the traumatologist, a designation hated by both orthopaedic and general surgeons. There is no reason why the general surgeon cannot be trained to treat all injuries to bones and joints, and there is no reason why the orthopaedic surgeon who has a basic surgical training cannot be trained to treat injuries in other fields so that he can handle chest injuries, abdominal injuries and vascular injuries. He may not be adept at hypophysectomy and removal of brain tumours, but he most certainly could learn to take care of middle meningal haemorrhage. He may not have time to learn the intricacies of lung cancer, but he can certainly learn how to handle a stove-in chest and pneumothorax. He may not be proficient in cardiac surgery, but he must learn the technique of vascular repair and blood vessel grafting. If orthopaedic surgery takes up the challenge and trains its young surgeons in general surgery before he takes on his training in orthopaedics, and if the directors of surgery have enough insight into the problem to allow him to continue his work in fields other than that of bones and joints, the orthopaedist will become the traumatologist of the future. One of the world’s most renowned orthopaedic surgeons told me not long ago, facetiously perhaps, but with certain seriousness: “You should remember always that the orthopaedic surgeon is the general surgeon of the future, whereas the general surgeon of the past has become more and more of a specialist.”

In any case, whether the trauma expert be primarily a general surgeon or an orthopaedic surgeon we may expect that those injured in road accidents will in future receive expert care by trained surgeons, in organised accident units of general hospitals or specialised accident centres. And in the care of these broken bodies may we always consider not so much in our belief as in our practice, and still more in our teaching, the inspiring admonition of the great man for whom today we are met to show our love and respect: “The patient must understand his disability; he must again gain confidence and be inspired; his doubts must not become anxieties; his fears and misgivings must be dispelled; his social problems must be solved; he must be reassured; he must not fear the future.”

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