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THE WASTE OF SLAUGHTER AND THE RAGE OF FIGHT

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Inhuman discord is thy dire delight,
The waste of slaughter and the rage of fight.

Jove to Mars—

Homer's Iliad, Book IV

IT SEEMS particularly fitting at this time to talk about the military problems of thoracic surgery. This Association was founded at the close of World War I; only a few years ago we concluded a second major war, World War II, and are now enmeshed in another whose casualties are already over 106,000. Inasmuch as we shall probably continue in a military way of life for some years hence, I believe, therefore, we should assume certain responsibilities in the preparation of young men for their future tasks in the Armed Forces.

Military surgery is as old as man himself. At the siege of Troy the Greeks had two surgeons in their army and when one, Machaon, forsook his primary calling and was wounded while joining his fellows in arms to repel a particularly fierce assault by the Trojans, great consternation fell upon the Greeks lest they lose him:

A wise physician skilled our wound to heal,
Is more than armies to the public weal.

Idomeneus to Nestor—

Homer's Iliad, Book XI¹

In his descriptions of the numerous battles in that matchless epic, Homer depicts the battle wounds and deaths with exquisite vividness and anatomic precision, and there is great drama, pathos, and exultation as he describes the mortal wound:

Deep in his breast above the pap it went,
Amid the lungs was fixed the winged wood,
And quivering in his heaving bosom stood.

Thoas—

Homer's Iliad, Book IV¹

From the Department of Surgery, Columbia University.

Presidential Address, Thirty-second Annual Meeting of The American Association for Thoracic Surgery, Dallas, Texas, May 8-10, 1952.

His lab'ring heart heaves with so strong a bound,
The long lance shakes, and vibrates in the wound,
Fast flowing from its source as prone he lay,
Life's purple tide impetuous gushed away.

Idomeneus slays the young Alcahous—
Homer's *Iliad*, Book XIII¹

Then drew the weapon from the panting heart,
Its reeking fibers clinging to the dart.

Patroclus slays Sarpedon—
Homer's *Iliad*, Book XVI¹

The age of hand-to-hand combat persisted for still another twenty-five hundred years. The only weapons to be added were the catapult and the crossbow.

In A.D. 1215, however, a new extremely potent and destructive agent appeared, destined to change the entire character of arms and of war itself. Although first introduced by Genghis Khan against the Chinese, gunpowder was first heard of in the West at the battles of Cressy (1246) and Agincourt (1415), where cannon and gunshot were employed.

The gunshot wound was first described by Brunschwig in 1497, and again a few years later by Vigo, as a poisoned or envenomed wound. This idea was finally dispelled by Peré, in 1536, when he observed that gunshot wounds dressed with simple emollients ran a far more kindly course than those treated by the standard method of cauterization with boiling oil. The surgery of gunshot wounds was stated with amazing clarity and vision by an Elizabethan surgeon, Thomas Gale, in 1586, and here is the very essence of débridement as we know it today. After proving that they were not poisonous per se, he says:

And there are two intentions properly hereto belonging. The one is to deliver the wound of all such things as are not agreeing to nature. The other is restoring of such things as are lost or perished. I call things not agreeing with nature not only shot, iron, splinters, or slivers of wood, cloth, dust, oil, or such like; but also the clots of blood, matter, bruised flesh, and such like as have no society with nature. The restoring of that which is lost, is properly the office of nature, as to engender flesh, blood, and such like parts as are to be engendered. Notwithstanding the surgeon herein is Nature's minister, and shall labor to bring the part to his right temperature: and it so reduced to conserve it in the same estate.²

Again it was more than two centuries later that the next great advance in military surgery was made by an extraordinarily brilliant young French surgeon, Baron Dominique Larrey. Not only was Larrey a very great surgeon, but he was also a most able administrator and a military genius. He was a zealous advocate of prompt surgery for the seriously wounded, and strongly condemned the prevailing custom of leaving the wounded on the field until after the battle. Therefore, in 1795, during the Italian campaign, he introduced the "flying ambulance." This innovation consisted of two- and four-wheeled ambulances with companies of men trained as litter-bearers and in simple first-aid measures. They carried the wounded to forward dressing stations or ambulances, where the seriously wounded were operated upon and the lesser casualties evacuated to the rear. We thus see the germination of the three-point system of forward surgery: triage, early surgery for the non-

transportable wounded, and near-by rear installations for the transportables, which was responsible in great measure for the very considerable decrease in mortality in chest and thoraco-abdominal wounds in World War II. Larrey also noted that penetrating wounds of the chest with an opening larger than the glottis did badly. He therefore advised that these patients be placed on the wounded side to permit the blood to drain out and that the chest be closed, and described several such cases with dramatic improvement and recovery following this treatment. This was a truly notable advance in the surgery of penetrating wounds of the thorax, and the first recognition of the dangers of an open chest.³

Although an excellent English translation was available in 1814, the United States Army seems to have profited little from the observations of this remarkable surgeon. At the outbreak of the American Civil War there were two two-wheeled ambulances assigned to each regiment, but they were at the complete disposition of the Quartermaster Department; the result was that the Medical Department rarely, if ever, was able to use them. On the recommendation of the Sanitary Commission, William A. Hammond was appointed Surgeon General in 1862. He was a man of considerable vision and of great professional and executive ability, and promptly nominated Jonathan Letterman as his Inspector General. When this appointment was not confirmed by the Senate, he named him Medical Director of the Army of the Potomac. Together they accomplished a revision of the whole evacuation system based on the experience of Larrey, so that at Antietam all the wounded were collected within twenty-four hours. Furthermore, the type of sick and wounded reports instituted by them were later of tremendous value in compiling the Medical and Surgical History of the War of the Rebellion.⁴

In this war there were 253,142 wounds of which 20,607 (8.1 per cent) were in the chest.⁵ This ratio of chest wounds to the total number has remained approximately the same in all the major wars during the past one hundred years, with the exception of World War I, when it dropped to 3.8 per cent for Great Britain and 2.5 to 5 per cent for the United States. This is quite inexplicable in view of the German, Russian, and French figures of 6 to 9 per cent. Again, in World War II our incidence was about 8 per cent.

It is difficult for us, ninety years later, to picture the status of surgery in the war between the States. Anesthesia was limited, antisepsis and asepsis undreamed of, our medical schools poorly organized and administered, there was scant dissemination and exchange of medical knowledge, there was no intern and residency training, and no order and system at all within the Army. The over-all mortality for 20,607 chest wounds was 27.8 per cent, and for 8,404 penetrating wounds 62.5 per cent, chiefly from hemorrhage and empyema. As to thoracentesis: "This operation was occasionally resorted to during the war to relieve the effects of effusion resulting from acute and chronic pleurisy; and, more frequently on account of effusions consequent on traumatic pleuropneumonia, or the lodgment of foreign bodies within the chest." One hundred twenty wounds involving the diaphragm are recorded; recovery was rare.

Of the major vessels, there were twenty-five ligations of the subclavian artery with five recoveries, and thirteen ligations of the axillary artery with thirteen fatalities. All died of secondary hemorrhage and sepsis, and in only two instances were *both* ends of the artery tied.⁵

As we proceed, we note that in 1892 a change in the type of arms occurred; the high-powered rifle replaced the old muzzle loader, and about the same time the jacketed bullet appeared with the thin steel, nickel, or copper jacket. The surgeon was the important figure in the Civil War, but after this he began to fade into insignificance with the rise of sanitation and preventive medicine. The vital necessity for these was emphasized during the Spanish and Boer wars, when typhoid was rampant and sanitation almost nil. Thus we find ourselves at the threshold of the twentieth century with modern surgery in its early formative years, and sanitation and preventive medicine just awakening. As we entered World War I, the treatment of wounds was not very different from that of the Franco-German War of 1870: dress the wound, drain, or occlude the part. We were completely unprepared for the extravagant use of artillery, high explosives, and high-velocity missiles that were soon manifest after the outbreak of war in 1914. Until that time the preponderance of wounds had been caused by bullets and low-velocity missiles. Now the pendulum swung the other way and 70 per cent of the wounds were caused by high explosives and high-velocity missiles.

Before the United States entered the war, Pierre Duval of the French Army made some important observations.⁶ At the outbreak of the war it was taught that thoracic wounds should not be operated upon until after the patient had reacted from his initial shock. Duval, however, realized the dire results of this policy, and stated that the chief causes of death at the Aid Posts were hemorrhage and mechanical asphyxia due to an open thorax; he further noted that the septic sequelae of shell wounds were far greater than in those from bullets, which were fatal either immediately or else ran a relatively benign course. The mortality from the former was approximately 30 per cent, from bullet wounds somewhere between 5 and 15 per cent. In 3,453 hospital admissions in the Army areas the over-all death rate of admissions to field surgical units was 20 per cent, while the average mortality of chest wounds in the forward units of the field hospitals was 45 per cent. He realized that it was difficult to state clearly the indications for immediate operation, but urged that if signs of hemorrhage persisted, the wound should be promptly opened and the damage sought for and repaired, whether in the chest wall or lung. As débridement for wounds of the soft parts and extremities was already being practiced with considerable success, he stated that the lung and pleura were contaminated just like other wounds, and therefore the treatment should be the same. In one series of 500 cases of hemothorax, 195 were infected, and in a personal series of 193 of his own in the Battle of the Somme there were 49 bullet wounds with no infections and 144 shell wounds with 34 infections. He advocated further that all shell wounds and retained foreign bodies be promptly operated upon under local novocaine block, and that the chest be closed tightly without drainage. "As technique improves," he said, "the

general surgery of gunshot wounds is being applied little by little to wounds of the lungs. Let us dare to hope that those who follow in our steps may soon have many more numerous and more brilliant successes."

As we entered the war we had Duval's work upon which to build, plus the general experience of both the Allies and the Germans. In 1917 a Special Services Branch of the Medical Department was established with eight divisions.⁷ In the American Expeditionary Force, General Orders 88, General Headquarters, 1918, was the first order setting forth this organization with a Director of Professional Services appointed and the positions of Chief Consultant of Medicine and Surgery specified. Partly because of the times themselves, and partly because of the epidemic of influenza with pneumonia and the existing epidemics in the Camps in the United States of measles and pneumonia, attention was focused chiefly on the treatment of infection, and this was particularly so as regards the chest, and, as we know, empyema became such a problem that the Empyema Commission was created.

There were only 4,595, or 2.5 to 5.6 per cent, of chest wounds listed of the total of 174,296 wounds.⁸ Nevertheless, the mortality in this group was 24.06 per cent, and of the penetrating chest wounds alone, 47.7 per cent in the American Army (Tables I⁹, II¹⁰, and III¹⁰). All emphasis was placed upon the prevention and treatment of infection, particularly the latter. With the conditions as they were, and the hemolytic streptococcus and respiratory infections so prevalent, this was inevitable. Still, as we look back upon that era, it is somewhat perplexing that more attention was not directed toward the physiology and the spatial dynamics of the chest. Anesthesia, we realize, was still limited and blood transfusions, with the concept of blood banks, were just coming into being through the work of Captain O. H. Robertson,⁸ but it was not until World War II that we were to appreciate the full value of both of these extremely important agents. At that time the indications for immediate operation of thoracic wounds were: (1) aspirating wounds, (2) large retained foreign bodies, (3) severe injuries of the bone, (4) complicated lesions of the diaphragm, (5) extensive hemorrhage and suspected infection—particularly anaerobic. A firm and airtight parietal closure was imperative.

TABLE I. BATTLE CASUALTIES WORLD WAR I

	NUMBER	PER CENT	DIED	PER CENT
Abdomen and pelvis	3,546	2.0	1,536	43.3
Thorax	4,595	2.6	1,105	24.06
Face	8,607	5.0	316	3.6
Genitals	798		69	8.6
Head	10,453	6.0	1,456	13.9
Neck	594		65	10.9
Spine	598		334	55.8
Back	2,553		308	12.0
Upper extremities	62,238	36.0	2,412	3.9
Lower extremities	78,032	44.7	5,722	7.3
Unspecified	2,282		146	6.4
Total	174,296			

Carter, B. N., and DeBaKey, M. E.: Current Observations on War Wounds of the Chest, J. THORACIC SURG. 13: 271, 1944.

TABLE II. WORLD WAR I. HOCHÉ: REVIEW OF ELEVEN MILLION WOUNDS IN ARMIES OF GREAT BRITAIN, FRANCE, UNITED STATES, AND GERMANY

	NUMBER	PER CENT
Thorax	660,000	6.0
Mortality		56.0

Berry, F. B.: Treatment of Injuries to the Chest, *Am. J. Surg.* 54: 280, 1941.

TABLE III. WORLD WAR I. HOCHÉ: WOUND DISTRIBUTION IN 12,350 KILLED IN ACTION

	PER CENT
Head	47.0
Chest	20.0
Abdomen	11.8

Berry, F. B.: Treatment of Injuries to the Chest, *Am. J. Surg.* 54: 280, 1941.

Toward the end of the war in discussion in the Allied Medical meetings in Paris permanent airtight closure was considered imperative with control of pleural effusions by closed drainage so as to permit prompt pulmonary expansion. There was also a growing opinion in favor of open operation in the treatment of extensive hemothorax, particularly if massive clotting had occurred, though aspiration was the initial treatment when possible, as it was recognized that it led to early recovery and return to duty. The bad results or organized hemothorax were noted, and also the fact that about 25 per cent of the hemothoraces became infected; hence thoracotomy with mechanical pleural cleansing and tight closure was recommended. This might be done initially according to three methods: first, by mere débridement of the wounds of entrance and exit; second, by a formal thoracotomy at the site of election with repair of the wounds of entrance and exit; and third, with removal of foreign bodies and resection and suture of lung when indicated. At this time postoperative airtight drainage was advised as better than repeated aspirations, and early activity and ambulation recommended. Here we have at the close of the war a verisimilitude of the treatment adopted with such brilliant results in the war to come.

During these intervening years we forgot the lessons that came out of World War I and were so ably stated in the official medical history of that war, and until the advent of the sulfonamides we continued to concern ourselves with the treatment of empyema by aspiration, closed drainage, and irrigation by various methods, open thoracotomy, and the collapsing operations for chronic empyema. When this Association was founded empyemas, both acute and chronic, were so common and so much a part of the general surgical services that we debated whether or not they should be included in thoracic surgery.

Our civil injuries of the lungs and pleura were chiefly crushing or caused by bullets or stabbing with small instruments such as ice-picks. The same applied to the heart and the pericardium, and in this latter field significant contributions were made by Elkin¹¹ and Bigger,¹² who reported to the Association in 1935 and 1938. From his experience with a small group of patients with bullet wounds of the chest from the New York Police Department, Weeks¹³ advocated prompt evacuation of the hemothorax and re-expansion of

the lung in order to assure early return to duty and avoid protracted invalidism. Also during this period we witnessed the enormous advances in anesthesia and the introduction of the sulfonamides, so that when war came to us in 1942 we were far better equipped than we were in 1917. In addition, and perhaps most important of all, our intern and residency systems were at a high stage of development, with many young men well trained and ready to take over where their predecessors had left off. Unfortunately, however, although whole blood transfusions were freely used in civil practice, we had neglected to read aright the significance of Robertson's work a quarter of a century earlier, and instead had been lulled into a sense of false security by false concepts of blood substitutes. Thus, as we entered World War II the whole emphasis was placed upon plasma and the so-called blood substitutes, and no preparations had been made for the use of whole blood in quantity.

WORLD WAR II

We were catapulted into the war in three theaters, each with distinctly different types of warfare, which in turn brought their own peculiar problems and diseases. In all, however, the causative agents of wounds were similar to World War I except that high explosives were the causative missiles in nearly 80 per cent instead of 70 per cent as in World War I. Fortunately, preventive medicine was at its best, so that there were no epidemics in the camps at home, nor did we have to contend with a world-wide epidemic of influenza. Pneumonia likewise had been on the decline for many years, and we had the sulfonamides as powerful therapeutic agents. From the start, therefore, we were not bothered by infection, but were able to focus our attention upon the proper surgical treatment of the wounds on an anatomic and physiologic basis with early closure and restoration to as nearly normal function as possible. It was realized from the start by the three Theater Consultants, E. D. Churchill, E. C. Cutler, and W. B. Parsons, that the best prevention for infection in wounds was the proper initial surgery. It was recognized very early, also, that plasma was no substitute for blood, and it is a matter of record that the various hospitals in the overseas theaters used an ever-increasing amount of whole blood in the treatment of their casualties. At first this blood was obtained from the hospital personnel and also from the convalescing and ambulatory patients. Colonel Churchill was well aware of the necessity for whole blood available in large quantity, and it was due to his persistence of effort that the first blood bank was established in Naples, which not only supplied fresh blood for the Mediterranean Theater, but also cared for the needs of the Seventh Army during its invasion of southern France and until its supply was taken over by the European Theater in November, 1944.

As regards injuries and wounds of the chest, under the guidance of Colonel Churchill attention became centered upon the lung rather than on the pleural space; the physiologic disturbances incident to wounding required prompt treatment, sometimes in the most forward hospital unit, and with extensive surgery when necessary. Emphasis was placed upon adequate resuscitation, prompt re-expansion of the lung, and rehabilitation of the wounded man, and in the communication zone chest centers were established for expert

reparative surgery and convalescent care, with the result that only about 11 per cent of those with thoracic wounds developed empyema.^{14, 16} The indications for formal thoracotomy at initial surgery were: (1) continuing intrapleural hemorrhage, (2) wounds of the trachea or larger bronchi, (3) wounds of the mediastinal organs, (4) wounds involving the diaphragm, (5) presence of large foreign bodies in the pleura.¹⁵ For the other wounds only a local débridement and aspiration of the pleura was performed. Decortication was done later as indicated in the empyema group and in the small remaining group of noninfected clotted hemothorax cases. Many in this Association contributed much to these brilliant results.

In the European Theater after the invasion a similar regime was followed. Chest centers were established in Great Britain under the direction of General Cutler, the Theater Consultant, and it was in one of these centers that Harken¹⁶ made his great contribution to cardiac surgery, the safe removal of intracardiac foreign bodies.

Although the final statistics of World War II have not yet been published, in 20,000 chest wounds treated up to 1944 the mortality was 8.1 per cent.⁹ Perhaps the treatment of thoracic wounds reached its zenith from the spring campaigns of 1944 to the close of the war, because it was at about this time that penicillin became available in quantity, blood banks in the United States and in all theaters were well established, and in the personnel of the hospitals and the auxiliary surgical teams were a large number of well-trained surgeons who had profited not only by their experience at home, but were now also veterans in the surgery of the trauma of war. It was with such a group that I found myself in the Seventh Army (Tables IV and V^{9, 17}). In an analysis of over 55,000 wounds treated in the Seventh Army Hospitals from Oct. 1, 1944, to May, 1945,¹⁷ the field hospital platoons treated 264 thoraco-abdominal wounds (5.3 per cent) and 1,675 thoracic wounds (33.6 per cent). In other words, wounds involving the thorax comprised 38.9 per cent of admissions to our most forward hospital units. On the other hand, the evacuation hospitals, and at times some of these were within a half mile of the field hospital platoon, rendered primary hospital treatment to 187 patients (0.4 per cent) with thoraco-abdominal wounds and 2,645 (5.3 per cent) with thoracic wounds—5.7 per cent of their admissions. This is an example of the proper proportion of the work load in these two types of hospitals. The total number of thoracic wounds amounted to 4,320, or 7.8 per cent of our wounded. Of the 1,675 direct admissions to the field hospitals, only 38.5 per cent required formal operative surgery, and 59 per cent were evacuated after resuscitation and aspiration to the evacuation hospitals; 2.5 per cent died before operation could be accomplished.

As might be expected, the mortality in these two field installations was entirely different. For the field hospitals the mortality of the thoraco-abdominal cases was 26.5 per cent (in the last 200 cases cared for by the Second Auxiliary Surgical group the mortality was 20 per cent), and 15 per cent in the evacuation hospitals, with an over-all mortality of 21.7 per cent. This

TABLE IV. PERCENTAGE OF WOUNDS ACCORDING TO CAUSATIVE AGENTS

WAR	BULLETS	HIGH EXPLOSIVE FRAGMENTS
American Civil	90.10	9.80
World War I		
British	38.98	60.70
American	28.06	71.62
World War II		
Russian	20.00	80.00
American	19.50	80.40
Fifth Army		82.67
Seventh Army		75.20
Korea		
U. N.		
Bullets, mortars, grenades	70.00±	

Carter, B. N., and DeBakey, M. E.: Current Observations on War Wounds of the Chest. J. THORACIC SURG. 13: 271, 1944.

Berry, F. B.: Treatment of Injuries to the Chest, Am. J. Surg. 54: 280, 1941.

TABLE V. MORTALITY FROM CHEST WOUNDS

	NUMBER	DEATHS PER HUNDRED CASES
American Civil War	20,607	27.8
World War I, U.S.A.	4,595	24.06
World War II, U.S.A.		8.2
U.S. Seventh Army	4,320	5.4
Thoraco-abdominal	451	21.7

Carter, B. N., and DeBakey, M. E.: Current Observations on War Wounds of the Chest. J. THORACIC SURG. 13: 271, 1944.

Berry, F. B.: Treatment of Injuries to the Chest, Am. J. Surg. 54: 280, 1941.

group comprised the most severe types of wounds, usually multiple and often with large fragments from high explosive artillery shells. The purely thoracic wounds, however, in the field hospitals suffered a mortality of 8.7 *per cent*, and in the evacuation hospitals 3.3 *per cent*, an over-all mortality in the Army hospitals of only 5.4 *per cent*. As you will note, there has been no differentiation as to whether the wounds were penetrating, perforating, crushing, or from blast, as this was not considered when tabulating our figures. These statistics are similar in the hospitals in the forward zones, both in the Mediterranean and European theaters in the last year of the war and show marked improvement over the earlier statistics up to 1944. At that time our men were receiving the maximum of fire from the Germans, from artillery, land mines, and from the air, with the causative agent 82.6 per cent high explosive missiles in the Fifth Army¹⁸ and 75.2 per cent in the Seventh Army.¹⁷ The chief contributing factors, I believe, to this really amazing record were first, the training and skill of the many surgeons involved; second, the excellent resuscitation afforded us with the fine judgment bred only by experience and soundness of knowledge of the physiological needs of the human body; third, the skilled and effective triage by the division clearing stations; fourth, the fluidity of personnel exchange and the availability of expert surgical teams; fifth, the Consultant system; and sixth, the antibiotics and other antibacterial agents. This is a complete about-face from World War I, when it was believed that the antibacterials and antiseptics were of ultra-prime importance.

I have dwelt upon these results in the last year of World War II at some length. Although the official medical history of World War II has not yet been published by the Office of the Surgeon General, the whole conflict is fresh in the minds of many, and the many excellent articles that have appeared provide easy reference for the new generation of surgeons that has come upon the scene within the last six years. During this period also there has been far closer cooperation between the Officers of the Surgeon Generals and the civilian profession through the Society of Consultants of World War II, the Medical Advisory Council to the Secretary of Defense, the less formal surgical clubs arising from the war, liason between the Surgeon Generals' Offices and the medical schools, the Committee on Medical Sciences of the Research and Development Board, and with the establishment of the Section on Military Medicine by the American Medical Association.

KOREA

Nevertheless, when the Korean conflict began in June, 1950, there was neither preparation, available personnel, nor the necessary medical units. Therefore, those in charge, particularly in Tokyo, had to make the best of an extremely difficult situation. The field hospital with its three platoons had been abandoned in favor of the Mobile Army Surgical Hospital (M.A.S.H.), which was constituted to accommodate priority I surgical patients with the concept that it should be placed adjacent to the clearing station, as had been the field hospital platoon. Its personnel consists of a fixed complement of about twelve Medical and three Medical Service Officers. The Commanding Officer, a Lieutenant Colonel, is listed as an experienced surgeon of B grade. There were no auxiliary surgical teams, and for some reason these were no longer regarded in very high favor, as it was thought that the M.A.S.H. unit with its intrinsic personnel could handle existing situations without difficulty. The M.A.S.H. units were assigned to the Army Surgeon for attachment at the rate of one per division. These units, however, had never been assembled except on paper. Furthermore, as the war broke there was but one evacuation hospital in existence in the United States, hence the Surgeon of the Far Eastern command in Japan had to do his best with the meager facilities at hand. In addition to a lack of necessary units and the superb field medical organization that existed in 1944 and 1945, personnel had been pared to the bone, and many officers were in or just finishing residencies in the re-educational program of the Army. This happily provided a small nucleus of well-trained, capable specialists in the various branches of the medical profession.

Korea itself presented a special situation. It is a narrow peninsula with several high mountain ranges running north and south, and deep valleys in between. The mountains vary from a few hundred to seven or eight thousand feet in height, and are steep and in large measure barren. There are two railroads up the peninsula, one through the large central valley, and one along the east coast. The north and south roads followed a similar course and were not good; both were largely the work of the Japanese during their occupancy. There were almost no lateral communicating roads due to the terrain itself.

This forced all military traffic over these few roads and the two railroads, which soon began to deteriorate under the strain. In order to meet this desperate situation in the best manner possible, and in view of the fact that the United Nations Forces were in a movement of rapid retreat, something had to be done in a hurry. Therefore, M.A.S.H. units were hastily organized and blown up into small mobile evacuation hospitals as an emergency measure, so that each was theoretically able to care for two hundred patients, although at times they had six hundred. All patients passed through them on the way to the rear, thus creating a bad situation from the start in that these hospitals had to perform triage, priority I, and priority II surgery.^{18, 19} Obviously, triage suffered somewhat, and priority II surgery suffered the most (Table VI).

TABLE VI. REPORT OF M.A.S.H., JULY 9-DECEMBER 31, 1950

Admissions		8,577
Patients operated		1,516
Number of surgical procedures		2,280
Laparotomies	221	
Thoracotomies	60	
Amputations	59	
Head cases	10	
Débridements	1,173	
Number of pints of whole blood used		1,298
Deaths		112

Modified from Bowers, W. C., Merchant, F. T., and Judy, K. H.: The Present Story on Battle Casualties from Korea, *Surg., Gynec. & Obst.* 93: 529, 1951.

At times great confusion prevailed, but with the able support of the Air Force and the Navy an excellent evacuation service was soon in operation, and hospital ships were dispatched to Pusan to function as stationary evacuation and station hospitals. The required personnel were gathered from the small group within the Regular Army, from those who volunteered for extended duty and certain doctors who were called in on an involuntary basis, either singly or as members of Reserve Units. The hospital system in Japan was expanded at the same time and ably though thinly staffed and, in order to assure the best possible care in the earlier months, emphasis was placed on evacuation. This was both easy and costly, however. Inasmuch as the planes were returning empty to Japan, Hawaii, and the United States, there was plenty of room for the wounded and ill, and unquestionably in the early days better care was available in those places than in the crowded hospitals of Korea. But at the same time many were evacuated who could easily have been kept either within the combat area or the forward part of the zone of communication had proper hospitalization been available. Selective, rather than total, evacuation with adequate combat medical organization and communication zone facilities is essential to conserve man power and morale within the fighting area. Mindful of these facts, and knowing also the magnificent record that had been established by the Medical Department in Korea in spite of what seemed at one time almost overwhelming obstacles, I arranged with the Surgeon General for a visit in December, 1951, to try to learn in what way we could be of further assistance and so report to you.

I traveled from the Battalion Aid Stations of the Marines through the hospitals of Korea, Japan, and Okinawa. First, I should like to give unreserved praise to the morale of all the troops, their superb logistical support, and the extraordinary work of the engineers in improving the roads and in cutting new roads so that now almost all, even those winding through the mountains, are two-lane highways for trucks. There was excellent spirit in all the United Nations Medical Units in all Corps areas, East and West, and the support and care rendered by these organizations, not only our own three Services, but also Norway, Sweden, Denmark, and India merit the highest praise. As you know, the front was quiet in December, and the surgeon of the Far Eastern Command was in a quandary as to what to do with his hospitals, which were admittedly out of position at that time with the M.A.S.H. units about twenty miles behind the lines, because should an armistice be agreed upon emphasis would be placed on caring for the returning American prisoners. On the other hand, if war were to continue, some re-arrangement of hospitals and additional personnel would be required.

Korea is a desolate and lonely place. From the standpoint of our medical units, each is more or less isolated, but the personnel are brought together once a month for medical meetings in each corps area. These have been a godsend, as communication between the units is difficult. There is little emotional drive to create enthusiasm, and all the men are looking forward to the time when they can leave Korea. This personnel has been held to a bare minimum; in December there were only 49 experienced general surgeons in fifty hospitals in the entire Far Eastern Command, and 13 experienced orthopedists and 2 neurosurgeons. These included the consultants both from General Headquarters and the Eighth Army.²⁰ The remaining 122 general surgeons were interns and men partly through their residencies, together with some who had been in general practice with an interest in surgery. The personnel of the M.A.S.H. units was so scant that there was little attempt at organization into teams. The problem was made still more difficult by the frequent shift in both officers and enlisted men. Both the theater and army consultants are doing almost superhuman work in covering the hospitals and instructing, attending medical meetings, and keeping up with their reports. In addition, they travel each month with the visiting Consultants from the States. The young men in all the hospitals are eager for informal discussions and talks about their work and problems. Some in the hospitals in the communication zone were requesting service in the Eighth Army units. This so impressed us that a policy was established whereby all new arrivals would first have service in the hospitals in the rear so as to indoctrinate them in the problems of forward surgery and the mistakes that might be made. After a period of several months they are then to be sent to the Eighth Army and its installations. It is believed that with this training they will do even better work in the combat zone. It has not been possible to adhere to the original organization of the M.A.S.H. units, with the result that some of the commanding officers are not surgeons at all, which thereby diminishes by one the already limited surgical personnel. Also some are not interested in teaching the

younger men on their staffs. The greatest deficiency that both my successor²¹ and I found was ignorance of the pathology of the high-velocity wound, and the reason and necessity for careful débridement. By and large the major wounds, such as those of the abdomen and chest, were well cared for, although here again there was a failure to realize, and also to absorb from the teachings of the overworked consultants, the fundamental surgical principle that each compartment of the body must be cared for in wounds involving more than one area, such as thoraco-abdominal injuries and wounds involving the buttocks, rectum, and bladder. This, of course, resulted in complications that presented extraordinarily difficult problems. These were being so well handled by the surgeons in the rear hospitals that it was evident that they were frequently having to correct the deficiencies of the initial surgery.

It is not a function of this paper to go into the surgical specialties, but in passing I should like to pay tribute to the really outstanding performance of the neurosurgeons who already have two teams of doctors, nurses, and enlisted men, with a small amount of housekeeping equipment, in the forward areas and the Neurosurgical Center in Tokyo. I have never seen a group of patients so well, thoughtfully, and considerately cared for. As to our own work, there is a Thoracic Center in Tokyo Army Hospital which was well supported by the Chief of Surgery and ably conducted by the surgeon in charge.

I was somewhat disappointed in the attitude of some of the younger men in the forward hospitals that their time was being wasted and they were bored at being forced to concern themselves with the surgery of trauma. This was brought acutely to mind by one of my own residents who was about halfway through his residency and had been with a forward unit for eight months. He told me that he considered his entire time spent with that unit, which had always been extremely active, as just so much time wasted as regards surgery. I believe this attitude is the fault of us at home. Perhaps we should pause and consider if the definition of surgery as given by Theodoric in the thirteenth century is not just as true today, possibly more so, as it was then. He said surgery consisted of three parts: "(1) the joining together of broken parts; (2) the separation of parts unnaturally joined; and (3) the removal of whatever is superfluous."²² Have we paid too much attention to the last two and neglected the first? Certainly the desire of all young surgeons today is to remove and remove until there is not much left, because somehow or other it seems to be more interesting to subtract than to restore. But is this a true criterion of the surgeon? I would remind them of the wisdom Dr. Nathan Green offered in his presidential address in 1924: "It is of a subtler quality of the mind to know when and when not to operate than to know the technique of procedure."²³

Quite apart from battle casualties, in the first year and a half in Korea there were 22,000 road accidents.²⁴ In December last we had our one millionth death from the automobile, and during 1951, 93,000 were killed in accidents throughout this country and 9,100,000 were injured, at an economic loss of eight billion dollars.²⁵ Fatalities were four thousand greater than in 1950, and motor vehicle accidents now account for about thirty-five thousand deaths

a year. On the other hand, our one millionth death in war since the Battle of Lexington occurred on Sept. 4, 1951, in Korea.²⁶ With the exception of the formation of the Association for Trauma, which is becoming increasingly important, and committees of the American College of Surgeons and National Research Council, we tend to negate the treatment of trauma in our better teaching hospitals and not infrequently men will pass through an entire residency in general surgery without ever having to face the problem of the seriously injured patient. This was brought out somewhat forcibly two years ago at the oral examinations for the American Board of Surgery when two candidates presented themselves before another examiner and me. Each had a patient who had been struck by an automobile, and in each instance there was a fractured pelvis, a common enough injury on the roads or in industry. Both of these young gentlemen had graduated from good schools and had their residencies in teaching hospitals, still, it required a good deal of prodding and prompting on our part to get them to recommend any other treatment than that they would call an orthopedic consultation. The urological aspect did not enter their minds and, when asked about the possibility of bladder injury, why of course a urologist would also be called in consultation. When pushed to the point of what they would do themselves if the facilities of the medical center were not available, they each decided they would merely put a drain down to the opening in the bladder were it injured. I have recently had a conversation with another young man who had spent nine years in a residency in another of our teaching hospitals on the general surgical service, and when the same question was put to him as to how he would treat a seriously injured patient he said he would immediately ask for a consultation. In other words, it has become rather "old hat" to pay attention to reconstruction of the human body in anywhere nearly the same manner as to the "radical cure" of disease, with its necessary exenterations and dismemberments. I do not wish at all to maintain that this latter is not a most important part of our teaching, but I also believe firmly that we should re-orient our teaching of surgery so as to place increased emphasis on trauma and its various causes and pathology and treatment. I do not mean that one person should necessarily assume the entire responsibility, but I believe that everyone passing through our residency systems should have sufficient knowledge so that he can handle a given situation from the standpoint of initial surgery until he can get help. This means an understanding of the fundamentals of surgery, resuscitation, and restoration of anatomy and physiology in the different parts of the human body. As we are in an age of war, we should teach the pathology of trauma and healing of wounds, and the importance of comprehending the different types of causative agents and their sequelae.

War and trauma unfortunately will not decrease in the foreseeable future. It becomes, therefore, our responsibility to teach and emphasize the surgery of repair and reconstruction just as much as we teach the surgery of pathology and disease so that when our interns and residents enter military service or encounter disaster they will not be perplexed and bewildered at the devasta-

tion wrought on human frames by man and his machines, but will be prepared to treat their torn and wounded fellow men with sound knowledge of the fundamental principles of the initial surgery of wounds.

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