Plastic and maxillofacial trauma symposium

Vol. 1

Volume one

Plastic and maxillofacial trauma symposium

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Proceedings of the Symposium of the Educational Foundation of the American Society of Plastic and Reconstructive Surgeons held at Walter Reed General Hospital, November 30–December 2, 1967

With 390 illustrations

The C. V. Mosby Company

Saint Louis 1969

Printed in the United States of America

Standard Book Number 8016-1801-0

Library of Congress Catalog Card Number 70-80309

Distributed in Great Britain by
Henry Kimpton, London

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Foreword

This revival of instructional courses in the management of maxillofacial trauma at the Walter Reed Army Medical Center sustains a tradition dating from World War I.

Care of maxillofacial trauma during World War I. With the entry of the United States in this war, Surgeon General of the Army Gorgas organized, under the Division of Surgery, a section on head surgery that included subsections on ophthalmology, otolaryngology, brain surgery, and oral and plastic surgery. Major Vilary P. Blair of St. Louis, a recognized general surgeon with special interest in surgery of the head and neck, was selected as head of the subsection and I was appointed his assistant. The preparations made in the Surgeon General's Office for the care of face and jaw injuries are found in *The Medical Department of the United States Army in the World War,* Vol. I, pages 458-462. These plans were based upon observations of these injuries in the armies of the Allies and upon the best experience from civilian practice. Their special difficulties in treatment were initiated by the attitude that regarded surgery and dentistry as distinct and separate. The surgeon was untrained in splinting fractures of the jawbones, while the dentist was unable to care for wounds of the soft tissue.

Blair adopted two fundamental principles: close cooperation of surgeons and dentists and prompt institution of proper treatment with systematic lines of follow-up. The chief problem was to select, educate, and assign teams of surgeons and dentists to the hospital units being assembled. In addition to caring for facial and jaw injuries, they would perform their other duties. This was a difficult task. At that time the specialty lacked organization, and few men were either proficient or interested in this field. Letters were sent to over 200 prominent surgeons to find individual men whose training and practice might render them especially suitable for this work. Simultaneously, inquiries were made as to available dental oral surgeons. The cooperation of the Dental Section was invaluable. By late 1917, 147 surgeons and 117 dental oral surgeons had been selected and classified for this work. It was emphasized that the commanding officer or director of each hospital would be free to delegate other duties to these surgeons and dentists. However, the face and jaw injuries would be assigned to their care.

Special courses of instruction during World War I. Fundamental principles were taught to these men by intensive courses of instruction at three civilian medical and dental schools: Washington University, St. Louis; the University of Pennsylvania, Philadelphia; and Northwestern University, Chicago. The courses were conducted by the faculty of these schools, supplemented by teachers from neighboring schools.

The content of the intensive courses of instruction, varying from three to six weeks in length, consisted of lectures, demonstrations, cadaver dissection, dog surgery, and attendance at plastic and maxillofacial hospital clinics. The dentists were given practical work in the construction of dental splints and other means of fixation of jaw fractures. The surgeons were taught emergency methods of wiring.

Assignment of plastic and oral personnel to overseas hospitals. In my own notes are the assignments of particular teams of medical and dental officers especially educated in the care of maxillofacial injuries. These assignments were to 67 base hospitals, 33 evacuation hospitals, and

several hospitals specially organized for service overseas.

Special units. In April, 1918, under the leadership of Major Blair, ten units of surgeons and oral surgeons, from one of the several courses provided at the civilian institutions mentioned, proceeded to France. On arrival in England, they were temporarily assigned to centers for observation and limited participation in the care of the numerous cases of injuries of the face and jaws from France. Their definitive treatment was executed by Harold Gillies, Kelsey Fry, Percival Cole, Sir John Colyer, and others. This exposure, voluntarily extended by our British colleagues, proved valuable to our officers on assumption of their assignments in France. In this group were several men destined for leadership in the field of plastic surgery: Dorrance, George C. Schaeffer, William T. Coughlin, Frank J. Tainter, Justin M. Waugh, and Herbert A. Potts; and in the field of dental oral surgery: James B. Davidson, Robert H. Nones, Jr., Rea P. Magee, Royal E. Wight, Stewart D. Ruggles, and Leo B. Winter.

Special courses at Medical Officers' Training Camp, Fort Oglethorpe, Georgia. In August, 1918, plans were formulated for four-week instructional courses in plastic and oral surgery as part of the training at the Medical Officers' Training Camp, Fort Oglethorpe, Georgia. Two courses were given, the first ending November 16, 1918, and the second December 14, 1918. The signing of the Armistice rendered further activity unnecessary.

Plastic and maxillofacial surgery during World War II. The imminence of World War II found our country better prepared than prior to World War I in every field, including that of plastic and maxillofacial surgery. In the years following World War I, many advances had been made in the art, especially in the technique of skin grafting and tissue transplantation. Many excellent surgeons had been trained throughout the country, notably at the clinics of Blair and his colleagues at St. Louis, Staige Davis at Baltimore, Ferris Smith at Grand Rapids, Padgett at Kansas City, Gordon New at the Mayo Clinic, and Jerome Webster at New York to mention only a few. The introduction of sulfa drugs, antibiotics, blood transfusions, and other adjuncts to surgery was of tremendous aid in the technical achievements of the surgeon.

The American Board of Plastic Surgery began to certify surgeons in this specialty in 1938. The necessity for the inclusion of plastic surgery in the military organization in preparation for the care of World War II casualties was evidenced by the selection in 1940 of a plastic surgeon (myself) as a member of the Committee on Surgery of the National Research Council, and chairman of the Subcommittee on Plastic and Maxillofacial Surgery. The function of these committees was to advise the Surgeons General of the Army, Navy, and Public Health Service (the Air Force did not have a separate service until after World War II) in matters relating to the various specialties of medicine and surgery. Among these was the setting up of intensive courses of instruction in special fields, at military and civilian institutions, for officers intended for assignment to care of casualties in these fields. Several courses were organized in military institutions, notably the Walter Reed Army Hospital, and in several civilian institutions. These were patterned somewhat on experience gained during World War I but supplemented with developments since that time.

Manual of Plastic and Maxillofacial Surgery. An urgent consideration in this connection was the preparation of manuals to serve as texts for the various instructional courses. One covered plastic and maxillofacial surgery. Ferris Smith supplied the majority of material for plastic surgery. The section on maxillary fractures was largely the work of Brigadier General Fairbank and Lt. Colonel Stout, U. S. Army Dental Corps. Bone grafting was written by me, facial and oral prostheses by P. C. Lowery, and anesthesia by Frederick P. Haugen. The *Manual of Plastic and Maxillofacial Surgery* was published by The W. B. Saunders Co. of Philadelphia in 1942 and was the first of several on various subjects to appear under the auspices of the National Research Council.

Special courses of instruction. In October, 1941, several four-week courses in plastic and maxillofacial surgery were given at the Walter Reed Army Medical Center for qualified medical and dental officers. Each course consisted of lectures, cadaver dissection, technique of wiring and emergency fracture fixation apparatus, demonstration of patients, operative clinics, local and general anesthesia, and roentgenologic technique and interpretation. Technique of splint

construction was provided for dental officers. These courses were discontinued at the Walter Reed Medical Center in November, 1942, but resumed for the period July, 1943, to October, 1943. It was felt at the time that the subject was being well covered in courses at several civilian institutions where about 200 officers were expected to receive training in the first six months of 1943.

Courses in civilian institutions. An elaborate set of courses was arranged at the University of Pennsylvania, involving the teaching staffs of the School of Medicine, the Graduate School of Medicine, and the School of Dentistry, as well as teachers from other schools in Philadelphia. These consisted of courses in surgery of the extremities, thoracic surgery, anesthesiology, and plastic and maxillofacial surgery. The first course in plastic and maxillofacial surgery was of four weeks' duration and extended from October 12, to November 7, 1942. Subsequent courses in the subject were preceded by a two-week course in the fundamentals of surgery for officers sent for training in all the above-mentioned branches, and then followed by four weeks' training in a specialty. Six of these six-week courses were provided for medical and dental officers and were continued until September 25, 1943, A total of 49 medical and 56 dental officers received instruction in plastic and maxillofacial surgery at the University of Pennsylvania courses.

Courses were also arranged at other civilian institutions, such as Harvard University, with the valuable participation of V. H. Kazanjian, and the Mayo Clinic (Gordon B. New, Chief of Plastic Surgery) under the auspices of the U. S. Navy. John B. Erich, a Navy Medical Reserve Officer, directed this course with Louis Austin, head of the dental section. Other special courses were arranged at Tulane University Medical School by Neal Owens and at San Francisco under the auspices of the University of California, directed by George Warren Pierce.

Courses at Columbia-Presbyterian Medical Center. Probably the most valuable World War II courses in plastic and maxillofacial surgery for medical and dental officers were given at the Columbia-Presbyterian Medical Center in New York by Jerome P. Webster, who supplies this summary:

"There were four courses of twelve weeks each given at the Columbia-Presbyterian Medical Center between September 28, 1942 and December 18, 1943.

"In the first two weeks, basic training in surgery was given under the direction of Dr. Allen O. Whipple. The last ten weeks of each course were under the direction of Dr. Webster. Eighty-two officers were trained in the four courses. A majority of the officers in the Medical Corps were surgeons, and an attempt was made to have all these officers who had had training in general surgery take the courses. This was particularly desirable so as to fit in with the requirements of the American Board of Plastic Surgery for applicants for certification.

"After the basic surgical courses were given, the general principles of plastic surgery in all its phases were taught, injuries of the face and jaws being particularly stressed. As many as 125 hours of laboratory work making various splints and accessory appliances for prosthesis for the treatment of jaw fractures were given for the dental officers. Twenty hours of cadaver surgery were provided for each group. There were 27 hours of dog surgery, many hours in the Oral Surgery Clinic and in the Plastic Surgery Clinic, and at operations in oral surgery and in plastic surgery.

"The officers were taken also to the Memorial Hospital for Malignant Disease, to the Harlem Hospital where, in particular emergency treatment was studied, and to the Halloran General Hospital on Staten Island where definitive work was observed on wounded soldiers coming immediately from the European theatre. Dry clinics were given in both oral and plastic surgery. The major amount of time in teaching was in didactic lectures. Many other phases of plastic surgery, such as the keeping of records, drawings, photographs, casts, etc., were included in the course.

"Altogether there were as many as 77 instructors in each of the four 12-week courses. One thing that gave great satisfaction was to see the way in which all of the instructors for the course gladly contributed their time in order to do their part in the war effort. Even the private patients were delighted to be used as teaching material and there was no objection to the Army officers coming in to receive instruction on ward rounds. The Professor of Anatomy at Columbia had been with me in Peking. He

provided as many as 18 cadavers for the courses. It was most instructive, after the basic principles of plastic procedures had been taught, to use these cadavers for all types of plastic operations before performing them on dogs. They were indeed needed to give the students the actual operating experience.

"Three cadavers were defrosted and a sharpshooter with a 30.06 rifle hit particular places on the face. X-rays helped to determine what structures had been injured. The officers determined what one would do in caring for the patient at the first aid station if seen immediately after injury at the field hospital, and what definitive surgery should be performed at the general hospital level. Some of the officers, who later treated as many as a thousand cases in France and Germany, reported that they had many instances of the treatment of wounds of the face and head comparable to the cadaver injuries made for the courses. These courses covered all phases of the subject and after the war inspired many of the student officers to practice plastic surgery. It is interesting that Dr. David Robinson, the past-president of the largest society of plastic surgery in the world, and the incoming president, Dr. F. X. Paletta, were led into the specialty of plastic surgery through one of these courses. Many others now working in the field of plastic surgery could be mentioned."

Conclusion. With Dr. Webster's report, I conclude this foreword to the publication of the transactions of the first symposium held under the aegis of the Educational Foundation of the American Society of Plastic and Reconstructive Surgeons. I hope it will fulfill the primary educational purpose intended, serve to add definition to the respective fields of endeavor of the specialties, and involve and foster cooperative efforts of care in the best interests of the patient.

Robert H. Ivy

D.D.S., M.D., F.A.C.S.

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The scope of the problem of maxillofacial trauma and its relation to the Vietnam War

Chapter 1

Medical services in Vietnam

Brig. Gen. James A. Wier, M.C., U.S.A.
Lt. Col. James F. Peterson, M.C., U.S.A.

The United States forces fighting in South Vietnam have been provided the finest medical support in the history of warfare. This support has been extended to an unparalleled degree to the armed forces of our allies and to the civilian population of South Vietnam. The scope of this care extends from the combat medical aidman rendering first aid on the battlefield to evacuation by medical helicopters to first-class hospitals throughout the country. This in turn is backed up by efficient out-of-country evacuation by the U. S. Air Force to hospital beds throughout the Pacific area and to the continental United States.

The medical service in Vietnam is there primarily to provide medical support for our U. S. fighting men, Army, Air Force, Navy, and Marines: medical elements of all these services are actively participating. There has been excellent mutual support and cooperation between the services. My comments will be limited primarily to the U. S. Army Medical Service. The Army Medical Service has directly supported about six and two-thirds combat divisions and support troops of the U. S. Army, totaling about 300,000 men and women, and has provided partial support to troops of the Free World Forces and of the Republic of Vietnam. To do this job, there were seventeen U. S. Army hospitals in the country, of which ten were 400-bed evacuation hospitals or their equivalent, five were smaller surgical hospitals, one was a 100-bed field hospital, and finally, a 1,000 bed convalescent hospital at Cam Ran Bay.

In the hospitals and other units of the 44th Medical Brigade and in the medical units of the combat forces we had approximately 12,000 medical personnel, officers and enlisted men, including nearly 800 doctors. Their performance may be partially reflected in a few statistics. In the period from October 1, 1965, to May 31, 1967, over 21,000 battle casualties were admitted to Army hospitals and nearly 12,000 persons with malaria. In 1966 there were 48,761 patients discharged from Army hospitals in Vietnam and in the first five months of 1967 there were 30,909. During this period the use of whole blood was greatly expanded (10 units per ten days in early 1965 to over 20,000 units per month during the Spring of 1967). From January, 1966, to June, 1967, our 65 medical helicopters increased the number of patients carried monthly from about 3,000 to over 8,000.

Within the limitations of this paper it will be impossible to discuss the medical service of the U. S. Army in Vietnam in any depth. We will briefly cover some aspects of hospitalization, treatment, and evacuation to give some general understanding of the situation in Vietnam as an introduction to other papers in this symposium.

The war in Vietnam is being fought in a widely varied terrain, and the wounding of our men may occur under varying conditions. In the central highlands, with plateaus several thousand feet in altitude and with steep mountains rising 5,000 to 8,000 feet, heavily wooded with triple-canopy jungle, a man may be wounded in a nearly inaccessible area, requiring elevation by hoist cable several hundred feet to

a hovering helicopter or requiring transport by litter to a partially cleared landing zone. In the contrasting flat terrain of the delta country, with flooded or dry rice paddies interspersed with canals and streams lined by small trees and underbrush, the casualties occur in flat, exposed terrain that provides little cover for evacuation. In most of the country where our troops are operating in any concentration, one is confronted by either deep mud or billowing dust, seldom anything in between. In the conventional sense there are no front lines and no rear secure zones with lines of communication open to traffic. In many instances our troops are hopscotched around the country by air to engage the enemy wherever he can be found. The enemy in turn seemingly prefers to avoid head-on engagements and prefers ambush and hit-and-run tactics and surprise quick mortar attacks of base areas. Much of the time is spent on tedious search-and-destroy operations in which our troops must enter heavily mined and booby-trapped base areas honeycombed with caves and underground tunnels.

In Vietnam the restricted tactical situation, the limited secure areas near the combat sites, and the lack of controlled road nets have necessitated the increased use of air evacuation of patients, almost to the exclusion of ground evacuation by road ambulances. The almost complete use of air evacuation of patients from the site of wounding and from forward clearing stations has allowed increased dependence on hospitals miles away in secure semifixed sites where it is possible to have more elaborate facilities and equipment. This means that after receiving emergency first aid by an enlisted aidman on the battlefield, the soldier can be taken rapidly to the clearing element of a medical company where several medical officers are available and where whole blood and other resuscitative procedures can be started, after which he can be flown to the appropriate surgical or evacuation hospital. Less resuscitative activity is required at all of the forward elements, and in certain emergencies the clearing station is bypassed and the patient is sent directly to a nearby hospital where more complete care is immediately available. Few battle zones are more than 15 minutes by air from the clearing elements of the medical company or more than 30 minutes from a hospital. We must emphasize the fact that this does not mean that the casualty reaches the hospital in this time frame. While it is not unusual for a man in Vietnam to be undergoing definitive surgical repair in less than an hour from the time he is wounded, this is not the average time.

Conventionally, military medicine is based on a concept of echelons of care.

First-echelon medical care is rendered on the battlefield by the enlisted medical aidman and at the unit aid station by a medical officer. Only emergency care and resuscitative measures are undertaken.

Second-echelon care is provided by the clearing elements of the medical companies of divisions and separate brigades. Definitive care for minor wounds or injuries is provided here, whereas casualties with more complex injuries receive necessary emergency and resuscitative care before being moved on to third-echelon hospitals.

Third-echelon care is provided in hospitals equipped for full resuscitative and initial definitive surgery. Normally the surgical hospitals receive the seriously wounded directly from the forward aid stations by the most rapid means available. The evacuation hospital receives all types of surgical patients, including the seriously wounded from the aid stations, those requiring specialty surgery from aid stations and surgical hospitals, and in addition, those having undergone operations at a surgical hospital. Medical and psychiatric patients are also treated in the evacuation hospitals.

Fourth-echelon care is given in general hospitals outside the combat zone or outside the country.

In Vietnam the conventional patterns or echelons of evacuation have been modified to fit the situation. At the first echelon the care of the wounded on the battlefield by the aidman is essentially unchanged, but the casualty is normally airlifted directly to the second echelon of care at the division or separate brigade clearing element, usually bypassing the battalion aid station. Occasionally the patient might bypass the clearing element, proceeding directly to a hospital; ordinarily, though, the patients proceed through the clearing elements. At the third echelon the surgical hospitals are not used conventionally, that is, near the clearing company of the division to handle the seriously wounded needing lifesaving surgery.

While the surgical hospitals are generally closer to operational areas, this is frequently not the case, and the choice of evacuation to a surgical or evacuation hospital is dictated by geographic location, patients being sent to the closest hospital for care. In fact, the surgical hospitals near combat areas might receive all casualties as long as their capacity is not exceeded, becoming a triage center with continuing casualties where only surgical emergencies are treated, others being transferred to evacuation hospitals. In any areas of the country, evacuation hospitals might be located equally close or even closer to the area of battle, and in these instances, patients would be sent directly to these hospitals.

In Vietnam the Army policy has been to treat any patient in the country who could be returned to duty within thirty days. Those who require a longer period of hospitalization are evacuated out of the country by the U. S. Air Force to hospitals in the Pacific area that provide fourth-echelon care. These patients are moved as soon as they are able to travel safely. Many of the wounded receive debridement and and early care in Vietnam, with delayed primary closure of their wounds in Japan.

The magnitude of the problem of treating battle casualties or injuries from hostile action is indicated by the fact that over 21,000 wounded patients (IRHA*) were admitted to Army hospitals during the period of October 1, 1965, to May 31, 1967. During most of 1966 about 850 patients a month were admitted to hospitals, but with increased combat unit strength this rose to an average of over 1,500 per month during the first five months of 1967. The rates of admission have remained fairly constant, fluctuating between 0.15 to 0.20 admissions per 1,000 troops per day. Of these combat wounds, about 38% have been gunshot wounds, about 52% fragment wounds, and about 10% other types. These figures are generalizations based on hospital records, which occasionally are misleading in their description of the wounding agent. Fragment wounds would include those caused by grenades, booby traps, and mines.

The distribution of wounds by body area has remained fairly constant, with the predominance of wounds occurring in the extremities (Table 1-1). As expected, the highest mortality has occurred with wounds of the abdomen, thorax, and head and neck (Table 1-2).

Of the wounded patients admitted to hospitals, approximately 43% have been returned to duty in the country, 54.5% have been evacuated from Vietnam (usually to Army hospitals in Okinawa, Japan, and Hawaii), and some have been sent directly to the continental United States (Table 1-3). Statistics compiled by the Surgical Consultant of the USARV indicated that 2.5% of the wounded admitted to hospitals died. This mortality rate has dropped slightly from 2.7% during the period October, 1965, to June, 1966, to about 2.4% for the early months of 1967. More than 50% of these deaths occur within the first 24 hours of hospitalization, and many are nonsalvageable, patients that have survived to reach the hospital only because of

*IRHA indicates injuries received as a result of hostile action, a euphemism for battle casualty.

Table 1-1. Wound location in patients hospitalized with injuries received as a result of hostile action (IRHA)—October 1, 1965, to June 30, 1967

	Number	*Percent*
Head and neck	3,412	14.6
Thorax	1,763	7.6
Abdomen	1,212	5.2
Upper extremity	4,472	19.0
Lower extremity	8,528	36.6
Other*	4,009	17.0
Total	23,396	100

*Includes flanks, buttocks, genitalia, multiple wounds with no one principal lesion, and a few not sufficiently identified to classify.

Table 1-2. Mortality rate (%) by body location of wounds in patients hospitalized with injuries received as a result of hostile action (IRHA)

Period	*Head and neck*	*Thorax*	*Abdomen*	*Upper extremities*	*Lower extremities*	*Other**
Oct. 1, 1965—June 30, 1966	8.5	7.9	9.3	1.1	0.4	2.5
July 1, 1966—Dec. 31, 1966	7.0	9.4	10.2	0.2	0.4	1.7
Jan. 1, 1967—June 30, 1967	6.0	4.6	8.0	0.1	0.5	1.6

*Includes flanks, buttocks, genitalia, multiple wounds with no one principal lesion, and a few not sufficiently identified to classify.

Table 1-3. Disposition of surgical patients in USARV hospitals—October 1, 1965, to June 30, 1967

IRHA		
Initial admissions	23,396	
Disposition		
Returned to duty in country	9,918	(43%)
Evacuated out of country	12,496	(54.5%)
Deaths	582	(2.5%)
	22,896	
Other surgical patients		
Initial admissions	30,498	
Disposition		
Returned to duty in country	22,108	(72.6%)
Evacuated out of country	8,142	(27.0%)
Deaths	129	(0.4%)
	30,379	

heroic resuscitative measures, extensive blood transfusions, and rapid evacuation by helicopter.

A study conducted during the period of November, 1965, to March, 1966, showed that only 0.2% of the combat-wounded admitted to divisional medical facilities died of their wounds while being cared for in these facilities prior to transfer to hospitals.

Of those wounded, about one in four receive blood transfusions (an average of about 5 units of blood per person). Some reduction in the use of blood has been noted since the period of October, 1965, to June, 1966, with an average of 6.6 units of blood per person.

The ready availability of whole blood has been a great step forward in treating battle casualties in Vietnam. The Army's 406th Medical Lab in Japan has provided a steadily increasing supply of whole blood, primarily from donors in the Pacific area; recently this has been supplemented by blood from the United States. The quantity supplied has risen from a few units a month in early 1965 to over 20,000 units a month in the Spring of 1967. This blood is distributed to all hospitals and as far forward as the medical clearing elements of the divisions and brigades. In the forward divisional clearing units, type O blood is used exclusively; when possible, type O blood is supplemented or substituted by type-specific blood at the hospitals unless the patient had already received 4 units or more of type O blood. Fresh blood drawn locally is provided for patients with bleeding problems or for those requiring large volumes of blood. The extent to which whole blood is used in early emergency treatment may be affirmed by a report during the Summer of 1966 which indicated that 14% of blood transfused was administered in divisional medical facilities before the patient reached the hospital.

The medical policy in Vietnam is to move the patient rapidly to a hospital where definitive care can be provided in the best surroundings possible. To do this, hospitals are located in semifixed locations the length and breadth of Vietnam; the eventual plan is to have a hospital within 30 minutes by air of any battle site. The semifixed status of the hospitals makes it possible to gradually upgrade these facilities, with field-type equipment being replaced by the most modern equipment available as rapidly as it can be procured and supported with power, water, adequate facilities, etc. Air-conditioned operating suites, pre- and postoperative sections, and intensive-care units provide dust-free, insect-free, and a reasonably cool environment for the patients and for special equipment requiring it. Hot and cold running water has been provided as well as some water-borne sewage systems. This has posed a tremendous logistics load, and some of the problems in the supply system were caused by the efforts to develop such facilities before we could adequately handle all the technical aspects. While it was realized that surgery and patient care can be performed in tents, in mud and dust, it was believed that better facilities should be provided. It was the policy of the Surgeon General of the Army and of the Command in Vietnam that anything within reason that would improve the quality of patient care would be provided. This statement may prompt a wry chuckle from some who served there and could not get some cherished item of medical supply, but the shortcomings were not a matter of policy but of performance.

The new hospital provided by the Surgeon General and the Army Medical Research and Development Command, the medical unit, self-contained, transportable (MUST), made it possible to rapidly set up an operational hospital with modern equipment and facilities, one that could be transported. Presently, two surgical hospitals have this equipment. They are functioning as well as we had hoped. Just recently one was heavily damaged by mortar fire but was operational again within 48 hours.