

Treatment of Open Wounds

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THE TREATMENT OF INJURY and the correction of the results of injury have from earliest times been the concern of the surgeon. Despite the fact that modern surgery has expanded far beyond the care of accidental wounds, injuries have increased so in numbers and severity that they still make up a very sizable percentage of surgical practice. The Committee on Trauma of the American College of Surgeons has long recognized the importance of trauma and the fact that the treatment of injuries has been neglected. This development in the recognition of the importance of injury is indicated by the history of the committee itself. At first organized as the Committee on Fractures, it later became the Committee on Fractures and Other Traumas, and now, finally, simply the Committee on Trauma, recognizing that injury is no respecter of tissue, and that soft tissues, as well as bones, may be injured, and that in general the principles of care are the same.

In preparing this short talk on the care of open wounds, I have asked myself what, basically new, has been added to the concept of open wound care by recent experiences in World War II and the Korean conflict. The goal of an agent that would sterilize a wound has yet to be attained. Although one cannot deny the great blessings of the sulfonamides and antibiotics, the fundamentals of open wound care remain the same, namely, asepsis, excision, hemostasis, closure, immobilization and general supportive measures of food, fluids and transfusions.

THE ANSWER IS NEITHER SINGLE NOR SIMPLE

Methods of the care of injuries have vacillated back and forth through the centuries, from the most radical to the most conservative. As new knowledge is gained, newer ideas of treatment are developed, often wrong but grasped with enthusiasm. Many good methods have been based on incorrect concepts, and much empirical has proved valuable long before scientific proof of validity. Interest in open wound care has shifted from one factor to another, frequently to the neglect of other equally important considerations. At one time, all attention and study are directed toward the prevention or

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The Oration on Trauma

THIS ORATION ON TRAUMA was presented at the Clinical Congress, American College of Surgeons, San Francisco, California, October 11, 1956. Now professor of surgery at Northwestern University Medical School, Dr. Mason served in both World War I and II. In the first he was sergeant, first class, in charge of the operating theater, U.S.A. Base Hospital 12, for a period beginning in early 1917, ending in 1919. In the second, first as lieutenant colonel, then colonel, Dr. Mason was chief of Surgical Service, 12th General Hospital, from February, 1942 to August, 1945; then commanding officer until hospital was deactivated.

combatting of infection; at another, the local condition of the wound receives greatest thought, while, at another time, the physiologic and nutritional status of the patient seems the most significant. In keeping with these changes in interest and conception of wounds, and wound healing, the surgeon has come to realize that not one but all of these factors must be considered, and that there is no single simple answer to the care of open wounds.

IN COMPETITION WITH BACTERIA

We are living in a world full of competing life, and in one way or another we, as *homo sapiens* (we have named ourselves), have been successfully competing along with the rest. In one way or another we have gotten to the top of the heap, partly by intelligence, but, I suspect, to a very large extent, by the development of natural resistance to external enemies. We are engulfed in a sea of bacterial life.

Wounds have always been contaminated, and before Lister, almost always infected. To meet this little understood situation of "wound poisoning," surgeons in the past did very much as we do today; they used boiling oil or other irritant substances, or they refrained from the use of such materials and applied bland ointments; they put on dressings to keep noxious influences away from the wound; they applied wound oils which were supposed to furnish nourishment to the natural healing balsam. Later, such surgeons as Larrey were carrying out very radical excision—amputation above the site of injury. Theodoric advised cleansing the wounds with

wine. Paracelsus stressed the natural healing powers of the body. While some earlier surgeons preached wound closure, others vehemently opposed it. (Parenthetically, for the year 1500, I, too, would oppose wound closure.) Empirical treatments these and treatments based upon unfounded theories; nevertheless, one finds in them all elements of present-day wound care.

WHAT ARE THE SOURCES OF CONTAMINATION?

In order to prevent, or at least minimize, wound infection, it is necessary to know the sources of contamination. While for a long time it was thought the bacterial contamination of wounds was due largely to the organisms which gain entrance at the time of injury, carried in by the injuring object, and from clothes and skin, it was later recognized that often more virulent organisms are introduced on the hands and by droplet contamination from the nose and throat of patient and attendants. The air of the operating room, blankets and glove puncture are hospital sources too little recognized.⁶

Efforts to prevent secondary contamination of wounds start as first aid in the covering of the wound with a sterile dressing. This protection is continued through all phases of wound care from initial examination to final healing. All inspections and dressings of the wound are done under aseptic precautions, with everyone masked.

Studies of wound cultures and wound healing show, however, that the mere presence of bacteria in a wound does not signify that an infection will develop.³⁰ Much depends on the nature of the bacteria and the soil into which they have fallen. Very virulent organisms may find easy footing in almost any wound; on the other hand, bacteria as found in nature require some time, usually six to eight hours, to become acclimated to human tissues. On the other side of the ledger is the fact that healthy tissues can deal with bacteria if they are not present in too great numbers.

The present-day treatment of open wounds stems essentially from the experimental work of Friedrich, although it is quite possible that the full implications of Friedrich's work are still not entirely appreciated. He showed that soil-contaminated muscle could be removed from the thighs of guinea pigs and full recovery would take place if this removal were accomplished within six hours after injury. If eight hours elapsed, the recovery rate was still quite high—

nearly 100 per cent—but after eight hours recovery dropped precipitously. This work formed the basis for the eight-hour limit, wherein wounds could be cleansed and excised. After eight hours, most wounds would have to be considered infected, not just contaminated. Now, while this early excision removed the contaminated tissues, and a great proportion of the bacteria introduced into the wound, the excision also removed crushed and devitalized tissue. It is well recognized that not only does dead and devitalized tissue form an excellent culture medium for bacterial growth, but it complicates healing. What is not removed by surgical excision must be extruded or absorbed.

Besides the problem of the introduction of bacteria into wounds, there are, therefore, other factors to be considered in the care of open injuries. Mont Reid stated the problem 20 years ago when he wrote that it is erroneous to focus attention on infection so that our concept of wound healing is "essentially synonymous with asepsis and antisepsis." Intelligent wound care is based upon an appreciation of the healing process.³¹ Healing is a delicate cellular and chemical process in comparison to which even the finest surgery is coarse and traumatizing. We speak of promoting healing; perhaps we should speak of not interfering with healing, since nothing we can do will speed up the process, but many things can interfere with it. The surgeon cannot make a wound heal, nor can he speed it up. He knows of certain local factors which may lead to disturbed healing and some of these he can correct, and thus promote healing.

The local factors which may be amenable to surgical attention are several. The presence of dead or seriously devitalized tissue demands removal at first instance. This is probably the most important phase of local care. Excision is directed not primarily toward removal of bacteria or contaminated tissue as much as toward removal of tissue that will not survive. If dead tissue is left in, the living tissues must either remove it by liquefaction or by separation and cast it off as a slough. Until it has been disposed of, healing may not take place.

THESE FACTORS DISTURB HEALING

Hemorrhage within the wound and the development of a hematoma may likewise disturb healing, simply by keeping wound borders apart, or because an infection may develop within the hematoma. Foreign bodies in the wound may lead to disturbed healing, some types worse than others, and removal is necessary; and the surgeon must remember that

suture materials are foreign bodies. Other local factors which are significant in wound healing are the condition of the local blood supply, edema and lymphatic obstruction, and the presence of dead spaces.

THE GOOD SURGEON IS CRAFTSMAN

Perhaps we have not stressed sufficiently the significance of good technique in the surgery of injury. A number of years ago I half apologetically wrote a paper on technique in the care of wounds and stressed certain elements in surgical technique, these being largely the precepts of gentle, careful surgery as taught by Halsted, Whipple and Koch. I am very much heartened to read Sir James Pater-son Ross' lecture on the "Principles of Surgical Technique," wherein he writes that a surgeon, "if he is any good, is a craftsman . . ." and that "surgery without craftsmanship is as dead as faith without works." What do we mean by technique and craftsmanship? We mean care and gentleness in handling tissues; we mean light retraction and avoidance of crushing and tearing; we mean careful sponging by mopping, not rubbing; we mean adequate hemostasis and point ligation of vessels; we mean dissection in tissue planes. We mean handling of living tissue with the respect due to delicate structures upon which we depend for wound healing.

There are certain general or physiologic conditions affecting the patient as a whole which affect the healing of wounds. The general nutrition of the patient is important, particularly with regard to protein and vitamins. While it is known that a high protein diet favors repair, there is evidence that excessive amounts of protein intake are not stored, but are excreted and hence there is apparently no virtue in feeding more protein than is needed to maintain a positive nitrogen balance. Vitamins, likewise, are valuable, especially vitamin C which, somehow or other, has some part to play in collagen formation; but A, D and B, likewise, seem helpful. Large amounts of fat in the diet appear to retard healing. Age has little effect on healing except to slow it up. Healing is adversely affected by certain metabolic diseases. The state of the patient's hydration may be important. We forget, in well nourished U.S.A., the significance of these nutritional factors in the care of injuries. Our complacency, however, would be sorely shaken if we were to be faced with a long period of protein and vitamin starvation.¹¹

Despite the great advances made in chemotherapy, antibiotics, and an increasing knowledge of the process of wound repair, treatment of open wounds

remains surgical. This consists essentially in wound excision, carried out as soon as possible after injury. It is a major surgical procedure carried out with care and precision. First, the surrounding area and then the wound are carefully washed and irrigated—no antiseptics are used. The surgeon should have clearly in mind the purpose of excision. One purpose is the removal of contaminated tissue, but the more important purpose is excision of tissue which cannot survive. Cleansing and irrigation of the wound will accomplish a great deal toward reducing the bacterial flora of the wound; they will not remove all contaminants. Excision will remove some more of the contaminants, but that is not the real value of excision. The real value of excision is the removal of nonviable tissue. A complete wound excision is seldom possible or necessary. In sharply cut superficial wounds a very minimum of excision is required, often none. In badly contused and crushed wounds, a complete excision is usually technically impossible.³ However, if the surgeon remembers that in carrying out excision his aim is to remove tissues destined to succumb, he has some guide as to his procedure. Every tissue is taken in turn, starting with the skin, and carefully excised if survival is doubtful. However, needless sacrifice is to be avoided; often little or no skin need be removed, and only so much of underlying tissues as are deprived of blood supply or are hopelessly damaged. Bones are never sacrificed unless the spicules are not attached to any soft tissue. Healthy tissues left behind can deal with a moderate amount of contamination provided they are not damaged by the introduction of antiseptics or other drugs.

ARE ANTIBIOTICS A PRIMARY NECESSITY?

What about the introduction of antiseptics, chemotherapeutic drugs and of the antibiotics into the wound after excision? Will they improve the percentage of primary healing?

This problem has been studied with great thoroughness and intelligence by Hans Fuss,¹⁰ whose slender volume on wound care is a mine of information, critically presented. He has observed that few controlled series of cases have been published, and that most reports deal with clinical impressions or the results are listed according to ill defined criteria. Unfortunately, it is difficult to compare one series of cases with another since healing *per primum*, if very strictly interpreted, would mean absence of all

reaction, no redness about sutures, no constriction in the suture line, not even mild induration; and in how many recorded series do these strict criteria hold? Carefully controlled cases studied in Fuss' clinic have shown that the local implantation of sulfonamides or of penicillin does not materially change the end results of open wound care. There is found to be some reduction in the primary infections developing in wounds, but this is offset by an increased number of secondary infections and aseptic disturbances due to necrotic tissue, hemorrhage, etc. In the long run, therefore, local chemotherapy and antibiotics fail to improve end results. Others have been even less charitable than Fuss toward local chemo- and antibiotic therapy, and have pointed out the disadvantages and delay in healing which follow the local implantation; bleeding and capillary damage, as emphasized by Von Seemen and Schmid,²⁶ cannot be considered beneficial.

NO SUBSTITUTE FOR SURGICAL CARE

It has, of course, been repeatedly stressed by all who have written about these agents that they will not substitute for surgical care, but are simply adjuncts to it. These drugs will help to control the spread of infection from the wound site when they are administered by mouth, intramuscularly or intravenously, i.e., for their general effect. It has been pointed out that the advancing line of infectious invasion lies in living tissue³² about the wound and that to reach it in adequate concentration the drug must be carried in by the blood stream.

Actually, in the acute injury, well cared for, there is seldom need for the sulfa drugs or the antibiotics, either locally or systemically. Use of these agents systemically seems most indicated (with exception, of course, of established invasive infection) in those cases where there has been considerable crushing of tissue with lowered vitality even beyond areas of adequate excision. Wounds contaminated from the gastrointestinal, genitourinary and respiratory tracts, may contain invasive organisms which systemic chemotherapy may control. Patients undergoing emergency wound surgery in the presence of acute upper respiratory infections should have protection not because of the wound but to minimize the possibility of respiratory tract complications. Not all burns require chemotherapy, but those involving the mouth and neck, axilla and perineum, and extensive full-thickness

burns should as a rule receive antibiotic therapy.

It is my feeling that antibiotics are often used as a crutch to compensate for laxity of technique, and reluctance to take proper precautions in dressing wounds and in caring for them generally.

The use of the antibiotics has not been without its disadvantages.^{14,9} The development of sensitivity to certain of them, especially penicillin, has been disquieting and an occasional fatal reaction has been recorded.⁴ Others of these agents do not seem to have this tendency to so great an extent.

When given by mouth, certain of them lead to bowel disturbances, apparently as a result of changes in the intestinal flora, which may be more serious than the condition for which they were administered. Renal damage, granulocytopenia, thrombocytopenia, aplastic anemia have all been reported as having symptoms thought due to hypovitaminosis.

RESISTANCE IS INCREASING

It has been observed also that bacterial flora are developing resistance to antibiotics.^{21,18} Whether this is a matter of survival of resistant strains or development of resistance in old strains, or some other phenomenon, is not clear. Staphylococci especially have been studied and it has been found in hospitals that there is a marked increase in penicillin-resistant strains of Staphylococci with corresponding increase in cross infections due to these resistant strains.²³

There is probably nothing we can do to prevent the development of these resistant strains. We could probably slow up the process appreciably by less prophylactic use of the antibiotic drugs. However, it seems impossible to curb the use and to expect that critical judgment be used in prescribing the antibiotics, although we would do well to follow such offered in a recent *Lancet* editorial.⁸ The surgeon is besieged from all sides, and not just by the patient, to administer the drugs. During the early days of World War II, the statement was made by some of our leading surgeons that anyone who neglected to put sulfonilamide into a wound should be severely censured; to doubt its value was heresy. Before the war ended, Army directives came out strongly against the practice, although it has taken longer for the profession in general to give it up, and we still find these substances used extensively in civilian practice. It is much easier and simpler to smear on a salve than it is to take intelligent aseptic care.

When the antibiotics are indicated we are advised to administer them in large enough doses to control



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the infection quickly so as to prevent the development of resistance. It is pointed out that two or more antibiotics in combination will often be more effective more quickly than one alone.^{19, 20} We are also advised to hold back one of the antibiotics (e.g. Bacitracin) as a reserve for use when all others fail.

These measures, of course, are only stop-gaps since it will only be a matter of time until the present bacterial flora, to which we are exposed, will have developed more or less immunity to our present-day drugs. Undoubtedly, this struggle of bacteria and man has been going on for centuries. As we develop resistance to one strain, another takes its place. We must keep developing new agents to cope with different bacterial strains, for as Paracelsus said, "New diseases require new remedies."

Tetanus protection should be given in practically all open wounds by the use of toxoid or antitoxin. Gas bacillus infections, however, are a matter of adequate surgical excision. The various sera are of little practical value.

Several other phases of primary wound care are basic. Adequate hemostasis is important since blood clots favor the growth of bacteria which would otherwise be destroyed by the tissues. As much as possible of the bleeding should be controlled by

compression with a warm moist sponge, but any bleeding not thus controlled should be controlled by ligation. Ligation should be carried out with fine ligatures (preferably nonabsorbable), and only the bleeding point should be grasped and tied off. Following operation, a compression dressing, carefully applied, will help to control capillary oozing; but this dressing must not be put on with the idea of controlling hemorrhage that should be controlled by ligation.

Repair of nerves and tendons may or may not be carried out, depending upon the nature of the wound, time since injury, and the training of the surgeon. Joint capsules, if opened, should be closed after proper cleansing. I do not care, at this time, however, to go into the various indications and contraindications for deep primary repair, since we are discussing broad general principles.

PRIMARY CLOSURE DEPENDS ON CIRCUMSTANCES

Whether or not the surgeon closes the wound primarily will depend upon the circumstances. In general, in civilian practice, in wounds seen within eight hours, primary closure is indicated, by suture, skin grafts or flaps, or, if necessary, some combination thereof. Where, for some reason, primary closure seems contraindicated, as, for example, an excessive number of casualties and inadequacy of medical personnel, the wound is dressed with fine mesh gauze and a compression dressing for secondary closure four or five days later. This procedure of secondary closure is seldom required in civilian practice except under conditions of mass casualties.¹² If we are to be properly "briefed" for care of mass casualties, the indications for secondary suture should be understood. Here we must recognize the valuable and tireless efforts of Colonel Joseph Shaeffer²⁷ who has consistently stressed the principles of open wound care as applied to mass casualty problems. Adequate excision and decompression as advocated by Shaeffer will be the basis of emergency surgical care if atomic bombing occurs.

"Inflamed and injured tissues need rest."¹⁵ This principle of care is usually scrupulously followed in the case of fractures and dislocations, but is often neglected for soft tissue wounds alone. The hand and forearm should be splinted in the position of function unless fractures or tendon repair contraindicate. Patients with lower extremity injuries are usually better off in bed for a few days; and, with

wounds of any extent, on crutches until healing has gotten a good start. The leg and foot, likewise, should be splinted in the position of function, i.e., with the foot at right angles to the leg and without eversion or inversion of the ankle. The presence of fractures, of course, will require splinting and periods of immobilization differing from those required for soft tissue injuries alone.

Elevation of the part, likewise, is a principle of care, especially applicable to the upper extremities, but also met by bed rest in lower extremity wounds.

INSTRUCT LAY PUBLIC

I have gone over very briefly some of the principles of care of open injuries. These injuries and the problems connected with their care have assumed increasing interest and importance. Accidents take about 100,000 lives a year, cause 400,000 to 500,000 severe injuries, and probably total close to 10,000,000 injuries in the aggregate. No other single cause of "illness" approaches trauma in its magnitude. Injuries occur on the highway, in the factory, in the home, on the farm,²⁸ in the school; no one is immune. Fortunately, most injuries are trivial and lead to little or no disability, particularly if a few basic principles of care are followed in their management. We are subjected to propaganda for this or that cause, this or that disease; perhaps we should start a campaign to acquaint the lay public with a few basic facts concerning open wounds. Surely the public can appreciate the basic principles of open wound care as well as the Boy and Girl Scouts understand the principles of first aid. It has been assumed that they could understand the use of the tourniquet which has only recently been demoted from its position in first-aid manuals, the indications for its use proving too puzzling even for the experts to standardize. Surely the much simpler principles of first aid and possibly even the first stage of care of small open wounds could be taught to young adults. We are faced with the threat of nuclear war and, certainly, if an atom war comes, we would find ourselves in very much stronger position if our youngsters, under supervision, could possibly take initial care—cleanse and splint—of the thousands of less serious casualties which would be seen. If the less serious wounds could be held off 24 hours or so, the more serious but savable casualties could receive life-saving professional aid.

If we are to improve the care of open wounds we

must be set up and organized to do so.¹ An injured patient must receive adequate first aid, he must be transported safely within a reasonably short period of time to a place where proper facilities and personnel are available to render initial care regardless of time of day or day of week. Extensive wounds and small injuries must be treated alike and have the benefit of expert care. Training in the handling of injuries should receive more and more attention. Fortunately, some of our medical schools and teaching hospitals are making special effort to give residents and interns adequate experience in the treatment of injury. The old system whereby the Emergency Room has been staffed by the youngest and least experienced house staff members is changing. Care of the injured patient must be the direct responsibility of an experienced member of the attending staff. Beatty and Pulaski² have gone a step farther at Tripler Army Hospital and have set up a Trauma Ward. Here prompt efficient treatment is given, and excellent personnel training is afforded.

WHY NOT HOSPITALS FOR TRAUMA?

We cannot be content with the setting up of facilities in the large centers. Unfortunately, trauma has been dignified by honorable status in only a few of our large centers and teaching hospitals. So far as I know there is nothing in this country similar to Böhler's accident hospital in Vienna. A few such institutions scattered throughout the United States with capable supervision could train young surgeons in the care of injury and serve a real function as centers for the special study of injury and its treatment. Other conditions have their special hospitals and training centers. Why not trauma? Every hospital throughout the country is now confronted with problems of injury, many severe, often multiple; and must be prepared to meet them. The young men and women whom we turn out of our schools and hospitals must be given training that enables them to care for these patients. The MEND* program is attacking the problem at undergraduate level but we must carry it farther. Just at present we still have many surgeons throughout the country who have had experience of trauma in our past two wars, and they have done much to train young men and to guide the care of injuries in hospitals throughout the country. However, this group is getting older and the job must be taken over by the schools and teaching hospitals. We cannot claim that now the wars are over, the need for such training is past.

*Medical Education for National Defense.

(Continued on page 80)

Denton A. Cooley, M.D., F.A.C.S., Houston, Texas. Procurable from American College of Surgeons, Motion Picture Library, 40 East Erie Street, Chicago 11, Illinois. For general and vascular surgeons.

Excisional treatment of aortic aneurysms is the method of choice wherever conditions permit its satisfactory application. The actual surgical approach, however, varies, depending upon the nature and location of the lesion. This film demonstrates a method suitable for sacciform aneurysms of the ascending aorta without necessitating interruption of aortic flow.

The patient is a 57-year-old man with a syphilitic aneurysm of the aorta protruding through the anterior chest wall. Through an anterior intercostal incision, the neck of the aneurysm is isolated, tangentially clamped, and excised. Aortorrhaphy is done with multiple interrupted silk sutures, and the operation results in complete recovery.

EXCISION OF HUGE SACROCOCYGEAL MENINGOCELE (INCLUSION CYST)

One reel, 250 feet, silent, color, 1955. Running time: 10 m. By Patrick H. Hanley, M.D., F.A.C.S., New Orleans, Louisiana. Procurable from Photog-

raphy Department, Ochsner Clinic, New Orleans, Louisiana. For general surgeons.

The film shows a newborn infant with a huge sacrococcygeal meningocele 8 to 10 inches in diameter displacing the anus anteriorly and inferiorly. With presentation of the external anal sphincter, anus and rectum, the technique of excising the huge mass without doing a colostomy is illustrated.

LYMPHOPATHIA GRANULOMA VENEREUM PROCTECTOMY ABDOMINO-ENDO-ANAL ANASTOMOSIS

One reel, 850 feet, silent, color, 1955. Running time: 32 m. By Patrick H. Hanley, M.D., F.A.C.S., New Orleans, Louisiana. Procurable from Photography Department, Ochsner Clinic, New Orleans, Louisiana. For proctologists and general surgeons.

A patient with a rectal stricture due to lymphopathia granuloma venereum is shown. The abdominal phase of the operation consists in mobilization of the rectum from the sacrum and vagina to the level of the levator ani muscles. The endo-anal phase includes excision of the lower rectal mucosa from below the dentate line to above the level of the levator ani muscles, pulling the rectum through the anus and anastomosing the normal colon to the perianal skin and subcutaneous external sphincter muscle.

Treatment of Open Wounds (Continued from page 38)

Statistics on the incidence of injury prove otherwise. The surgeon who cares for injuries in areas removed from immediately available specialists⁷ must be well grounded in the basic care of all injuries and he must have at hand equipment to care for them.

The Trauma Oration for 1955 by Frank Berry dealt with the medical management of mass casualties. During the past year the regional programs of the College have stressed the care of mass casualties, not only those due to civilian disasters, but also those from modern warfare; and have stressed the need to prepare for warfare. It is high time these warnings are heeded and that we think along the lines laid down in these programs.

The important thing is that we become trauma conscious; that we recognize the need for more and better training in the handling of injuries. If some of the diseases for which special campaigns have been set up caused one tenth the mortality, misery,

financial loss and disability that trauma does, or if we were threatened with an epidemic one thousandth as serious as nuclear warfare, the country would go hysterical in campaigns to eradicate the disease and to train doctors in its management. Those of us in the profession who appreciate the problem must do all we can to acquaint the public with its magnitude.

As for the actual therapy of open injuries, Zintel³² has summed up the problem quite well when he writes, "Every surgeon should be honest enough with himself to realize that more wound infections occur in wounds because of rough handling of tissues, indiscreet use of suture material and the failure to remove devitalized tissue than from the lack of specific supportive and antibacterial therapy."

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Professional Collaboration *(Continued from page 44)*

Mutual understanding and respect appeared. Close friendships developed. Many officers acquired a remarkable understanding of new technical developments. Many civilians became adept in the subtle aspects of the art of war. There was teamwork of the highest order, and out of it evolved a new concept of national conflict. The course of joint development has proceeded since the war, somewhat haltingly at times, but with continuing momentum, until it has now resulted in a situation which is entirely new in the world, and in which all great war is absurd and obsolete, an unmitigated disease which must be avoided by all means for it would

be fatal to civilization, rather than the last resort of diplomacy, to be indulged in when the risks appear justified.

Why was there this extraordinary transformation in the relations between two professional groups? Primarily because there was a war on, and men suppressed their prejudices and their preferences in the general national fervor, and in the determination to serve well in a time of common peril. But the two groups, thus forcibly brought together, discovered that many of their prejudices and judgments were based on myth. And each group found, in the other, unsuspected qualities of character