Victims of war

Surgical principles must not be forgotten (again)!

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Severe injuries to the limbs are common in wars and natural disasters, and most of them occur in developing countries with weak health-care systems. The International Committee of the Red Cross (ICRC) has gained a vast amount of experience in treating the war-wounded in this context. Basic principles for wound management, safe and simple methods for fracture-holding and amputation techniques adapted to missile and explosive injuries have proven successful. More than 81,000 amputees have been fitted with artificial limbs in ICRC workshops since 1979, but the needs are far greater. In an attempt to limit the effects of war, the ICRC promotes compliance with international humanitarian law, supports preventive activities such as the campaign to ban anti-personnel landmines, and strives to raise awareness of the implications of fast-developing weapon technologies.

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Last century saw the birth of a now worldwide movement as a reaction to war: the Red Cross. Its aim was to care for the wounded in armed conflicts, and to make this possible a set of rules had to be drawn up to protect both the victims and those who came to their aid. These rules are known as international humanitarian law. In our century, after two world wars, this body of law has been further developed to protect all non-combatants, notably by means of the four Geneva Conventions of 1949, and their Additional Protocols of 1977. To imagine that the first decade of the coming century will be free of armed conflict is unfortunately an unrealistic dream. Thousands of wounded will have to be treated, often in countries with limited possibilities for providing adequate surgical care and rehabilitation. The millions of landmines lying in wait for an innocent foot to step on them will continue to place a heavy burden on already weak health-care systems, apart from the appalling consequences for the individual.

The International Committee of the Red Cross (ICRC) has been given a mandate by the States party to the Geneva Conventions to protect and assist the victims of armed conflict. One of its major tasks is to care for the war-wounded, either by providing support for existing health facilities or by setting up its own hospitals where none are functioning because of the conflict. The ICRC has acquired a vast amount of experience in treating the war-wounded, mainly in field hospitals in Asia and Africa. Since 1991 the organization has been systematically collecting data on its activities. To date, around 28,000 war-wounded have been registered, with details of their injuries and the treatment they received. This has given us a clear picture of some fundamental needs common to all war-wounded, expressed in the form of basic surgical principles. The experience of many surgeons has shown that these principles cannot be transgressed. They do not run counter to the remarkable recent advances in the science and technology of trauma care; they serve as both a baseline for and a complement to those advances. We feel it to be our duty to ensure that these basic principles are not forgotten in the next century.

Incidence

It is difficult to obtain reliable data about numbers of war-wounded and mortality rates from developed countries with organized armies; and from disorganized guerrilla forces it is impossible.

Some examples

At the end of this century, about 35 armed conflicts are going on around the world (Sollenberg 1997). Some have continued for years (Sri Lanka, Somalia) and some for decades (Afghanistan, southern Sudan).

In 1990 there may have been as many as 500,000 deaths due to war injuries (Murray and Lopez 1997). In 1996 there were more than 17,500 deaths in wars in the world (Sollenberg 1997).

In the Vietnam war, 15–20% of US troops were "killed in action" (Bellamy 1996).

Wounds to the extremities account for between 50% and 70% of all injuries (Bellamy 1996).

In Afghanistan in 1997, 5,028 war-wounded were treated in five major hospitals receiving ICRC support. Of these, 972 had landmine injuries. Unknown numbers were treated in other health facilities.

In Cambodia, where the war officially ended in 1991, mines continue to injure and kill both soldiers and civilians. A total of 1,358 such injuries were recorded in 1997 (Cambodian Red Cross, personal communication).

Worldwide, the estimated number of mine injuries per year is 26,000.

Figure 1. Traction ward in ICRC hospital, Quetta, Pakistan.

Mortality

For limb wounds, mortality is low and is related to general condition of the patient on arrival at the hospital, which in turn depends on the severity of the injury, the blood loss sustained, pre-existing anaemia and the time lapse between injury and treatment. A patient arriving in satisfactory general condition has a good chance of survival provided he is given proper treatment to avoid infectious complications.

The mortality rate in hospital for all war-wounded in the US army was 8% in World War I, 4.5% in World War II and 3.6% in the Vietnam war. Improved evacuation and medical care were probably responsible for this decrease in mortality. In ICRC hospitals mortality rates range from 2.3% to 6.4%, depending on the context (Coupland 1994). In World War II, 23% of all deaths were due to wounds of the extremities, but in the Vietnam war only 6.4% (Carey 1987).

Morbidity

War-wounded soldiers are usually young and healthy, without degenerative diseases of the musculo-skeletal system or arteriosclerosis which might interfere with the healing process and rehabilitation. But in guerrilla warfare in which whole villages and towns come under attack, elderly persons also will be injured. And anti-personnel mines make no distinction between soldiers and civilians.

Even if most injuries to the limbs are not life-threatening, they are of major importance just by sheer numbers. They will all require dressing materials, analgesics and antibiotics, and often crutches, wheelchairs and artificial limbs. The fractures caused by missiles are mostly complicated, with extensive soft tissue damage, and heavily contaminated.

Treatment modalities

The aim of war surgery is both to save lives and to improve the quality of survival. Proper wound care combined with antibiotics and antitetanus prophylaxis will prevent infectious complications. An infected limb wound means more suffering, a longer hospital stay and more operations; and the patient may end up being amputated at a level higher than necessary for the original injury.

The basic principles for wound management, with complete initial wound excision and delayed primary closure, should be followed to avoid infections (Gray 1994). These principles have been known for centuries, but have to be re-learned by each new generation of surgeons treating war-wounded, as was the case during the recent war in Bosnia-Herzegovina (Duric 1996).

For fracture-holding the ICRC recommends plaster of Paris and traction, which are methods that are safe and simple to apply (Figure 1). For special indications external fixators are used. Internal fixation is never used, because all war wounds are by their nature infected (Rowley 1996).

Amputations are common, especially in countries where anti-personnel landmines are deployed. The mechanism of the mine explosion drives mud and grass up into the leg and the level of amputation may finally have to be much higher than the initial assessment of the wound might suggest. The amputation level will depend on the location of the injury, but also on the time lapse between injury and treatment. After bullet injuries, the risk of having an above-knee amputation is four times higher than having a below-knee amputation for patients arriving more than 24 hours after injury (Molde and Samnegard 1997).

Figure 2. ICRC limbfitting centre in Kabul, Afganistan.

In the ICRC context, patients with missile injuries to the limbs have a mean hospital stay of 25 days if there is no fracture, 29 days if there is a simple fracture without comminution, but 50 days if there is a complicated fracture. The corresponding figure for abdominal injuries is 19.5 days. The most horrendous and difficult wounds result from mine explosions; according to ICRC data 28% of mine-injured patients end up with an amputation of the lower limb, as compared with 1.6% of patients injured by bullets and 2.4% of those wounded by fragments (Molde and Samnegard 1997). The number of blood units needed per 100 wounded is 34 for fragment injuries, 40 for bullet injuries, but 100 for mine injuries (Eshaya-Chauvin and Coupland 1992). For 100 patients who underwent amputation after mine explosions, 345 units of blood were needed (Korver 1993).

Rehabilitation

To restore function is a challenge for anyone treating war-wounded. Training after operations for war injuries should start immediately, and a skilled physiotherapist is an indispensable team member.

Crutches and artificial limbs are constantly in demand. In developing countries, the ICRC produces prostheses using polypropylene, a material that is cheap and easy to handle. The ICRC runs 18 limb-fitting centres in eight countries around the world, training local staff to work independently with the aim of handing over the projects to the governments concerned once the conflict is over. But even though more than 81,000 amputees have been fitted with artificial limbs by the ICRC in 21 countries since 1979, the majority of amputees in these countries might never get a prosthesis. The prosthesis is supplied free of charge, but the production cost is between US$ 100 and 300, depending on the salary level in the country (Figure 2).

Impact on society

The costs are connected not only with surgical treatment and rehabilitation. A woman who has sustained an amputation of the lower limb will probably never get married, and few disabled persons will find work. They will be a burden on their families or on society. Areas suspected of being infested with landmines cannot be cultivated and access to water points, market places or health facilities may be cut off.

Preventive action

The most obvious preventive measure would be for human beings to stop using weapons against each other, but this does not seem to be a realistic prospect. What has been done by law is to restrict the use of arms to purely military actions, providing protection for civilians and the wounded (Geneva Conventions and their Additional Protocols). In addition, certain weapons have been prohibited because of their abhorrent effects (dum-dum bullets, blinding laser weapons, chemical and biological weapons).

The campaign to ban anti-personnel landmines has been successful, and in 1997 the coalition of non-governmental agencies, the International Campaign to Ban Landmines (ICBL), was awarded the Nobel Peace Prize. To date, 124 States have signed the Ottawa treaty which bans the production, transfer, stockpiling and use of anti-personnel landmines. Most countries affected by the problem run mine-awareness and mine-clearance programs to help prevent further injuries from landmines. Recently the ICRC launched a new initiative known as the SIrUS Project. This aims to involve health professionals in an objective and professional way in the debate as to which weapons inflict "superfluous injury or unnecessary suffering". It is, in its simplest form, an attempt to apply preventive medicine in the domain of weapon design.

Prospects for the coming decade

ICRC will continue its work to limit the effects of war, in the following major areas:

- promotion and implementation of international hu-

manitarian law (the Geneva Conventions and their Additional Protocols, and also the Ottawa treaty);
- care for war-wounded by
  - *treating* war-wounded in areas of the world where the health-care system has been disrupted owing to the conflict,
  - *informing* surgeons around the world about the basic principles of wound management based on the documented experience of the ICRC,
  - *setting up* limb-fitting centres and providing artificial limbs and other walking aids,
  - *training* local staff to perform the necessary surgery and to give proper postoperative care, including physical rehabilitation and the production of prostheses;
- support for preventive activities such as mine-awareness campaigns and mine clearance.

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