The 1986 Terrorist Bombing Experience in Paris

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Between December 7, 1985 and September 17, 1986, eleven terrorist bomb explosions took place in Paris. Thirteen people died immediately, 255 others were injured. Forty were treated on-site and were not hospitalized, 205 were subjected to triage and stabilization and were then hospitalized. These latter 205 patients are analyzed in this study. None of them died during transportation, and seven eventually died in hospitals. Forty-seven per cent of all victims suffered from multiple injuries. All deaths except one occurred in the polytraumatized group. The policy of subjecting victims of terrorist bomb explosions to triage and stabilization before hospitalization is compared to the so-called "scoop and run" technique, more generally applied in mass casualty situations. Its limitations and advantages are discussed.

THE FIRST NATO report on international terrorism, issued in 1987 (Table 1) shows a tenfold increase in the numbers of terrorist incidents between 1968 and 1980, reaching at some points epidemic proportions. No country has proved to be totally immune to this modern plague. France is no exception. In Paris, during a 10-month period, from December 7, 1985 to September 17, 1986, eleven bomb explosions produced 13 dead and 255 wounded victims. In five of these incidents, the number of victims exceeded 30, creating a real mass-casualty situation. In similar situations around the world, the prevalent policy in the past has been characterized as "scoop and run." In Paris, the standard procedure on-site was to first "triage" the victims and stabilize them. Only then were they dispatched in small numbers to all available hospitals. This policy, with its limitations and its advantages, will be discussed based on the analysis of the charts of 205 hospitalized victims. This work, along with previous reports, may contribute to a better understanding of these injuries that are similar to those sustained in war, and of the policies and procedures that are used to minimize their consequences.

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Patients and Methods

Types of Explosions

During a 10-month period, from December 7, 1985 to September 17, 1986, 14 terrorist bombings attempts occurred in Paris, three of which failed. The eleven other attempts that actually detonated were due to "homemade" devices containing only a few pounds of TNT or a TNT equivalent. The aim of terrorists was not to kill but to maim as many people as possible in order to gain news media attention. Only two explosions took place in the open air. The nine others occurred inside buildings, in closed spaces packed with people, with the bombs generally placed on or close to the floor. This is one of the factors explaining the relative severity of the observed lesions.

Number of Victims

Officially, 268 people were victims of these bombings. Thirteen died on-site, 205 were hospitalized, and 40 who were only slightly injured were treated locally or as hospital out-patients. The average casualty number per bombing is roughly one dead and 23 wounded. But in five of these incidents, the explosions created a real mass-casualty situation, with 30 or more victims requiring medical attention at the same place and at the same time (Table 2).

On-Site Primary Treatment

After each bombing, rescue teams from either the fire department (pompiers) or special emergency units (SAMU) detached from Parisian teaching hospitals were sent to the scenes. Each of the rescue teams included not

only emergency medical technicians (EMTs), but also physicians, young intensivists called "reanimateurs." Means of transportation, both ambulances and helicopters, were plentiful, and radio communications, centrally controlled, allowed direct contact with all hospital centers. Doctors at the scenes knew how many and what type of patients could be sent to each hospital. At the other end, waiting hospital teams learned in advance what patients they would receive and when.

A triage area was immediately set up in the most appropriate nearby area. The slightly injured victims were evaluated and treated on-site and were then sent home, preventing unnecessary overcrowding of hospital facilities.

For the most seriously injured victims, clinical examination and resuscitation were intiated on-site. Rescue teams had full equipment for resuscitation, material for intubation, and assisted ventilation, various fluids including O Negative blood. The resuscitation initiated on-site was continued during transportation to the hospital. Simultaneously, a standard chart was filled for each of these patients with name, address, age, sex, description of lesions, blood pressure, pulse rate, initial treatment, and degree of priority (there were only two categories: seriously or slightly injured). Copies of these charts were kept either at the fire department medical center, or at the SAMU hospital centers. Two hundred and five of these charts had enough information to assess the type and severity of the wound, the primary treatment that was established, and the specific hospital where the patient was hospitalized.

No records concerning the 13 victims who died on-site were kept by the rescue teams. The bodies were transported to the morgue by the police. Results of autopsies were not available because police investigations are still being conducted.

Age and Sex of Victims

The sexes of the victims were nearly equally represented; there were 99 men and 106 women. The mean age was 34.5 years, with overall age ranging from a few months to 89 years (Fig. 1).

Types of Injuries

Severity of injuries. The 205 hospitalized victims whose cases were studied were classified into two groups: 1) severely wounded victims (n = 40, seven of whom later died) and 2) slightly injured. (n = 165).

The Abbreviated Injury Scale (AIS) and the Injury Severity Score (ISS) were calculated. The average ISS for the surviving patients was 14.82, and was 39.80 for the seven who died during hospitalization (Fig. 2).

Locations of injuries. The distribution of injuries on the body is not parallel to the surface percentage of each body region. The head and neck (12% of body surface) were involved in 19.3% of the injuries; the trunk (27% of body surface) was involved in 12.8% of the injuries; the upper limbs (22% of body surface) were involved in 23.5% of the injuries, and the lower limbs (39% of body surface) were involved in 44.4% of the injuries (Table 3).

TABLE 1. *International Terrorism: First NATO Report (1987)*

	1968–1980	1973–1983
Incidents	Tenfold increase	5075
Victims		
Dead		3689
Injured		7991

Polytrauma. Ninety-six patients (47%) suffered from multiple injuries. The 205 patients presented 355 lesions. Per patient, in the entire series, 1.8 body regions were involved by the trauma, and in the 40 most severly wounded victims, an average of 5.6 body regions were traumatized.

Skin lesions. These were the most common injuries. Two hundred ninety-five were recorded, mainly abrasions, lacerations, and burns due to the flash itself. The first two types represent 47% of all skin lesions; flashburns (34% of all skin lesions) were generally superficial and limited in size, with only four patients being referred to a burn center. But the first bombing (December 7, 1985) showed a different pattern. Two bombs were connected with camping gas bottles. An actual fire developed, and 33 of 35 victims presented burns. Twenty requested treatment in a burn center.

Fractures. Fifty-four patients presented with fractures. Thirty-three of these fractures were closed, 21 were open. They were localized on the head and neck (eleven), the thorax (two), the upper limbs (18), and the lower limbs (23). On the upper limbs, six of the fractures were proximal (arm), twelve were distal (forearm and hand). On the lower

TABLE 2. *Bomb Locations: Victim Numbers*

Date	Location (Indoor/Outdoor)	No. of Injured Victims	No. of Dead	More Than 30 Victims*
12-07-1985	Indoor	35		X
2-03-1986	Indoor	8		
2-04-1986	Outdoor	3		
2-05-1986	Indoor	9		
3-17-1986	Indoor	10		
3-20-1986	Indoor	28	2	X
9-08-1986	Indoor	18	1	
9-12-1986	Indoor	41		X
9-14-1986	Indoor	1	2	
9-15-1986	Indoor	51	1	X
9-17-1986	Indoor	51	7	X
Total		255	13	

* Incidents involving more than 30 victims.

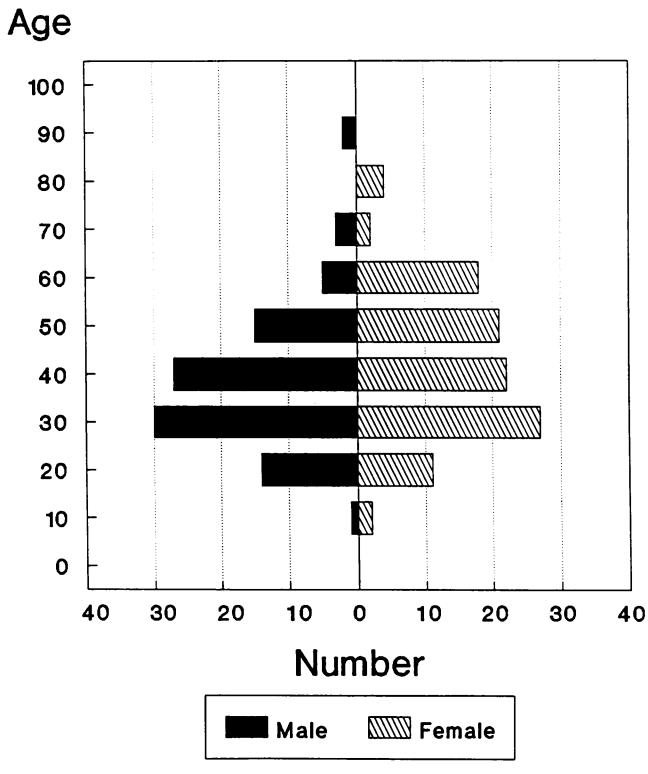

FIG. 1. Age and sex of victims.

limb, only one fracture involved the femur, whereas the 22 others were distal (Table 4).

Ear blast injuries. One hundred sixty-two patients with or without clinical symptoms were checked systematically by otoscopy. In thirty-nine of the patients (24%), ear blast lesions (hemorrhages and/or perforations) were identified. Twenty-seven of the patients (16.7%) had a perforated ear drum, and one out of five of these perforations were bilateral. In the group of the most severly wounded victims, 27 of 40 patients had signs of blast ear, including 14 perforations.

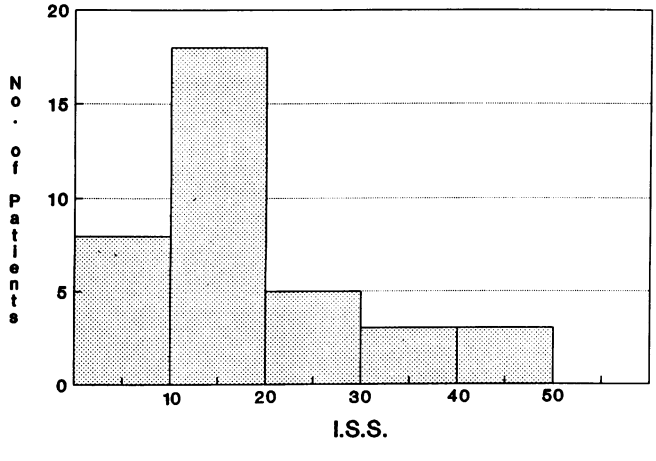

FIG. 2. ISS in severely wounded victims.

TABLE 3. *Distribution of Injuries: Comparison with Body Surface*

Region	Body Surface %	Lesions %
Head/neck	12	19.3
Trunk	27	12.8
Upper limb	22	23.5
Lower limb	39	44.4

Lung blast injuries. Six patients (less than 3%) were considered as suffering from lung blast. In addition, three patients presented with other types of thoracic disorders: one hemopneumothorax, one pneumomediastinum, and one pulmonary contusion.

Eye lesions. Twelve patients (5.7%) presented with eye lesions. All twelve were of the group of the most severly wounded victims. Most of the injuries were due to flying debris. Six were superficial and did not result in sight loss. Six of the injuries were very severe; there was one traumatic bilateral enucleation, two unilateral enucleations, one blast eye with intraoccular hemorrhage, and two perforations with intraoccular foreign body, each resulting in partial or total sight loss.

Traumatic amputations. Five patients suffered six of these traumatic amputations. Two involved the thigh, one the forearm, one the foot, and one patient lost a leg and a forearm. These traumatic amputations, directly caused by the explosion, require a very high energy tranfer. That explains why all those victims presented severe associated injuries, in addition to their limb loss. Three of them died from these associated lesions, one during the first 24 hours, the second on the tenth postoperative day, and the third on the 49th postoperative day.

Abdominal injuries. Eight patients presented with abdominal injuries. Three suffered from nonpenetrating wounds. The other five had intra-abdominal lesions, with severe hepatic lacerations in two patients.

Central nervous system injuries. Eleven cases of head trauma were recorded. Three patients had an open fracture of the skull and presented with intracranial foreign bodies. The eight others had contusions with intracranial hemorrhage.

TABLE 4. *Fractures*

Localization	Total	Closed	Open
Head/neck	11	8	3
Trunk	2	2	0
Upper limb	18	14	4
Arm	6	5	1
Forearm	2	1	1
Hand	10	8	2
Lower limb	23	9	14
Thigh	1	1	0
Leg	14	1	13
Foot	8	7	1
	54	33	21

Results

We looked at results exclusively in terms of survival or death, not in terms of sequelae. Despite the fact that the victims were not rushed immediately to the nearest hospital and that time was taken to stabilize them first (or perhaps because of this), no patient died during transportation. Seven died in hospitals:

1) A twenty-four-year-old man, comatous, with multiple skull fractures, multiple facial fractures, bilateral eye enucleation, neck wound, and massive facial bleeding. He died during surgery.

2) A forty-five-year-old woman with facial trauma, right eye enucleation, traumatic amputation of right forearm, open wound of the right hypocondrium, and multiple hepatic lacerations. She died immediately after surgery.

3) A twenty-six-year-old man with isolated lung blast. He died after 24 hours in the ICU.

4) A sixty-two-year-old woman with multiple superficial wounds and lung blast. She died after 24 hours in the ICU.

5) A twenty-nine-year-old man, comatous, with open skull fractures, blast lung, and multiple open limb fractures. He died on the ninth postoperative day.

6) A twenty-year-old woman with head trauma, traumatic amputation of right thigh, open fractures of left thigh and right arm, and lung blast. She died on the tenth postoperative day.

7) A forty-nine-year-old man with chest trauma, open abdominal wound, liver and transverse colon lacerations, traumatic amputation of left leg, and open fracture of right leg. He died on the 49th postoperative day of renal, lung, and cardiac failure.

Discussion

Magnitude of the Problem

In terms of victim numbers, terrorism has not yet reached the magnitude of conventional wars, or even the level of death toll caused by motor vehicle accidents in western countries.

The 1987 NATO Report, the first of its kind, on what is labelled international (*vs.* national) terrorism records approximately 5000 incidents in which approximately 10,000 people were killed or injured during a 10-year period (Table 1).

In Belfast, during the worst three years of the civil war, 1,500 people were victims of terrorist actions.[1] Five hundred victims were seen over 4 years in Jerusalem,[2] and as previously stated, 268 were seen over a 10-month period in Paris. The important point is that, at any given time, terrorist bombing can create a mass-casualty situation, which is difficult to manage in peace-time. We know that, depending on the amount of explosives used, the number of victims can be far higher than the numbers we encountered in Paris. In Bologna on August 2, 1980, a bomb explosion inside the railway station resulted in 293 victims, including 73 deaths.[3] Dealing efficiently with this kind of situation requires exceptionally good disaster preplanning.

Percentage of Deaths at the Disaster Site

Victims' deaths at the scene accounted for 5% of the casualties in Paris. This percentage is directly related to the amount of explosive used. In the Beirut bombings of the American and French Military Headquarters in October 1983, the explosives were in the ton-range *versus* the kilo-range of those in Paris. The ratio of dead to wounded was far higher: 224 immediate deaths and 112 injured survivors among the Americans, and 54 deaths and 22 injured survivors among the French. The Bologna incident, where the bomb was made of approximately 20 kg of TNT, shows that a similar ratio can also be observed when terrorism is aimed at civilian populations.

Policy of Primary Care

When a mass-casualty situation occurs, two basic, opposite responses are usually seen: "Scoop and run all the victims to the nearest hospital" or "Triage and stabilize the victims first, then dispatch them, while continuing rescusitation, into the various available hospitals." The "scoop and run" policy has usually been applied during war-time between the battlefield and the first echelon of triage and treatment. Surprisingly, during peace-time, it has also been adopted everywhere in the United Kingdom, in Italy, as well as in the Middle East.[4,5] For instance, after the detonation of a bomb at the Old Bailey, within 60 minutes, 160 people were brought to the St. Barthelomew's Hospital, from which most of them were rapidly released because they did not need hospitalization.[6]

In Paris, the opposite response to terrorist bombings has been adopted, because this policy of "stabilize first" with physicians on the scene has been established for many years throughout France for every kind of outdoor emergency—most notably car accidents. The system, tested every day, runs smoothly. It has not been too difficult to extend its activity in limited mass-casualty situations.

This "Parisian" policy has its own limitations. It not only requires a large amount of means of transportation and a great number of trained EMTs, but also a large number of trained young emergency doctors. The adequacy of needs and means proved to work well in situations where the number of victims was between 20 and 60. If the figures had been ten times greater, it would have probably been impossible to make it work as efficiently. Is this technique superior to the "scoop and run"approach? The answer will probably never be deter-

TABLE 5. *Distribution of Skin Lesions: Comparison with Gunshots*

Body Region	Bombing (Paris) (%)	Gunshots (Northern Ireland) (%)
Head/neck	19.3	12.2
Trunk	12.8	40.5
Upper limb	23.5	27.7
Lower limb	44.4	25.7

mined by randomized studies. It has obvious advantages: 1) no overcrowding of hospital facilities with patients who do not need hospitalization; 2) no loss of time for those who require a specific treatment—a "triaged" neurologic patient, for instance, can be sent directly to a neurosurgery department or a burned victim to a burn center; 3) the load of patients for each hospital can be minimized if all hospitals are involved; and 4) in each center, alerted teams are waiting for the few arriving patients, and each patient will receive maximum attention in the minimum amount of time.

Is this policy able to save more lives than the other? It is difficult to prove, but it is possible. Considering that 50% of those who died during the first hour[7] died of bleeding, immediate blood transfusion may save a few victims who would be dead on arrival (DOA) without it. It is worth remembering that none of the Parisian victims, including the most lethally wounded, died during transportation. One patient arrived in our hospital with, among other injuries, a traumatic thigh amputation. He had received 10 units of blood at the disaster site and during transportation to the hospital.

Severity of Wounds—Trauma Scores

As we have seen, during triage on-site, the 255 injured victims were assigned to one of three categories: 1) severely injured—requiring hospitalization, 2) slightly injured—requiring hospitalization, 3) slightly injured—not requiring hospitalization.

Eighty-four per cent of all recorded victims required hospitalization. This percentage is higher than that of other incidents previously reported. In addition to the amount of the explosives, the fact that nine out of eleven explosions occurred inside buildings in closed spaces explains the relative severity of the wounds encountered. This is corroborated by the recorded trauma scores. The median ISS for the surviving patients was 14.82 (and 39.88 for the seven who died during hospitalization), higher than the median ISS value of eight recorded after the Bologna bombing. These Trauma scores represent a valuable epidemiologic tool in assessing the extent of such disasters and allowing comparison. But the severity of trauma due to bombing may be underestimated by these trauma scores when dealing with lung blast. The 26-year-old patient who suffered almost exclusively from lung blast had an ISS of 13. He nevertheless died rapidly of his blast injury.

Specificity of Bombing-Induced Lesions

Bombings induce specific lesions, such as those due to the primary effect of blast. Fortunately, lung blast is rare, but even as an isolated lesion can cause death. On the other hand, the ear is very sensitive to blast effects, and thus is a very good indicator of blast injuries. Like others, we have not seen any severe lung blast injury in a victim totally free of ear blast injury. When suspecting lung blast it is worth checking the ear drums, and conversely, if ear blast injury is found, evaluate carefully for lung blast.[8]

Another striking characteristic is the injury distributions, with a high percentage of head and neck lesions and few trunk lesions. On the other hand, gunshot injuries[9] have a distribution which fits the body surface percentage (Table 5).

Polytrauma—Polyagression

Polytraumas are frequent with bombings. We mentioned that per patient, 5.4 body regions were injured in the most severely wounded group. With bombing, in addition to being mechanically traumatized, victims may also be suffering from what can be termed polyagression—that is, the combination of trauma, burns, blast syndrome, and crush syndrome. No crush syndrome was observed in Paris because no building collapsed, but cases were referred to us after the 1983 Beirut explosion.

Specificity of Surgical Care

The injuries seen after terrorist bombings are similar to those treated in wartime: multiple contaminated wounds containing various debris and fragments. The wound debridement in these patients is necessary to prevent sepsis, as it is in "war surgery."

Rules that apply in war surgery, such as delayed skin closure or the use of external fixation for open fractures, also apply here. Most of these "war-type" patients were hospitalized in civilian hospitals. Our study fortunately shows a widespread awareness among civilian surgeons of those war surgery rules. This is not surprising, because in recent years a real desire to hear about war surgery principles has developed in the civilian surgical community. Terrorist bombings have been an incentive , along with the fact that numerous physicians have been involved in war situations with organizations such as the Red Cross, Physicians without Borders, and Doctors of the World. Courses on "Catastrophy Medicine" (including catastrophy surgery) are now organized in several medical schools. And recently, the French Association of Surgeons has been

asking military surgeons to give lectures on war surgery topics during its annual Surgical Congress.

Hospital Needs

An analysis of the injuries shows a great need for general surgery, orthopedic surgery, neurosurgery, and ICU facilities. In addition, bombings create a crucial need for plastic, nose, and throat (ENT), and eye surgery. Surgeons from these specialties must be available immediately, at least for advice, in each hospital where the victims are to be hospitalized.

Sequelae

At the end of 1986, a woman who had been left paraplegic after a terrorist incident created an Association for the Victims of Terrorist Actions. This association pressed for a change in the legislation concerning insurance and hospital cost coverage for the victims of such actions. The change was rapidly obtained. Data are now available through the association, not only concerning physical disabilities, but also psychological disorders experienced by the victims, which have been recently largely publicized in the press.

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