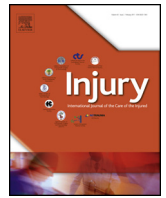




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Original article

Terrorist attacks in Paris: Surgical trauma experience in a referral center



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ABSTRACT

Background: On November 13th, 2015, terrorist bomb explosions and gunshots occurred in Paris, France, with 129 people immediately killed, and more than 300 being injured. This article describes the staff organization, surgical management, and patterns of injuries in casualties who were referred to the Teaching European Hospital Georges Pompidou.

Methods: This study is a retrospective analysis of the pre-hospital response and the in-hospital response in our referral trauma center. Data for patient flow, resource use, patterns of injuries and outcomes were obtained by the review of electronic hospital records.

Results: Forty-one patients were referred to our center, and 22 requiring surgery were hospitalized for >24 h. From November 14th at 0:41 A.M. to November 15th at 1:10 A.M., 23 surgical interventions were performed on 22 casualties. Gunshot injuries and/or shrapnel wounds were found in 45%, fractures in 45%, head trauma in 4.5%, and abdominal injuries in 14%. Soft-tissue and musculoskeletal injuries predominated in 77% of cases, peripheral nerve injury was identified in 30%. The mortality rate was 0% at last follow up.

Conclusion: Rapid staff and logistical response, immediate access to operating rooms, and multidisciplinary surgical care delivery led to excellent short-term outcomes, with no in-hospital death and only one patient being still hospitalized 45 days after the initial event.

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Introduction

On November 13th, 2015, terrorist bomb explosions and gunshots in four bars and restaurants, and the Bataclan concert

room occurred in Paris, France, with 129 people immediately killed, and 302 being injured [1]. The public hospital organization (Assistance Publique – Hôpitaux de Paris) had to manage an unusual flow of patients with gunshot injuries, with the need to mobilize all available pre-hospital units and referral trauma surgery centers [1]. Notably, gunshot injuries are rare in other countries such as France, in part due to a policy on firearms sales different to that of the US.

In contrast with the “scoop and run” strategy of mobile emergency units in various Western countries [2], severe trauma patients in France are managed by pre-hospital medical units (SAMU, *service d'aide médicale d'urgence*) allowing on-site medical advanced life support measures, prior to a transfer to referral centers for trauma surgery [3–5].

The Teaching European Hospital Georges Pompidou is one of the major trauma centers in Paris, with a Department of Traumatology and Orthopaedic Surgery divided in two units: one specialized in upper limb and peripheral nerve surgery, and the second one specialized in spine surgery and general orthopaedics. The medical staff encompasses: 15 senior surgeons (including 4 full professors, 1 associate professor, 7 assistant professors and 3 part-time practitioners), 9 residents and 15 medical students.

During usual night shift periods, two separate teams are set: one on duty, onsite, including a senior surgeon, a resident and a medical student (from one of the two units), and a second senior surgeon (from the other unit, on call). For the past two years, the average surgical activity during a night shift period included 3 surgical interventions. Overall, 10 gunshot injuries were managed annually in our institution during the same period.

We herein report on the adjustments made to the organization of our units, the initial management of patients referred to our center, the epidemiology of injuries observed in this patient series, and the subsequent radiological, surgical and critical care resources mobilized in this setting.

Materials and methods

From November 13th 2015 to November 15th 2015, all consecutive patients injured during the multisite terrorist attacks in Paris i) entering the emergency unit or the critical care unit of Teaching European Hospital Georges Pompidou (Paris, France), and ii) requiring surgery, were included in this study. Individual electronic medical records were retrospectively analysed, with a follow-up until December 31st, 2015.

The following outcomes were examined for each patient: age and gender; time of arrival, time of surgery, number and duration of surgical interventions; pre- and post-operative diagnoses; need for transfusion, antibiotics, and imaging procedures other than conventional X-rays; somatic and psychological follow-up; and persisting complications one month after admission. Descriptive

Table 1

Time of admission, time to surgery and duration of the first surgical intervention^a (n = 22).

Time parameter	Results
Time of admission	
11:30–0:00	1 (4%)
00:00–1:00	0
1:00–2:00	7 (32%)
2:00–3:00	14 (64%)
Time to surgery: median (range)	11h37 (15 min–22 h48)
Duration of surgery: median (range)	1h42 (12 min–7 h45)

^a Four patients required more than one surgical intervention (median 1, range: 1–12).

statistics were used to analyze patients' characteristics (median, range, and percentages) using Microsoft Excel 2003.

Regarding adjustments made to the usual organization of the Trauma and Orthopedic Surgery Department and the management of medical and paramedical staff, a dedicated staff meeting was held on November 18th, 2015 to collect individual data on solicited and unsolicited interventions of the staff members during the study period.

The study was approved by the local review board, and conducted according to good clinical practice and applicable laws, and the declaration of Helsinki.

Results

Department organization and staff management

On November 13th, 2015, the information that critically injured patients would promptly be transferred by the SAMU to our institution was transmitted to the night shift team by phone calls from the SAMU regulatory crisis unit from 10:30 P.M.

From November 13th 10:45 P.M., the senior orthopedic surgeon on call, and another two senior orthopedic surgeons were contacted by the senior orthopedic surgeon on duty, as well as a plastic surgeon, in order to manage patients during the first night. As well, four scrub nurses were contacted by phone and joined the surgical team on duty during the same period.

In addition, four senior surgeons, three residents and three medical students – informed of the critical situation by phone, Whatsapp and Facebook groups or by TV channels – spontaneously joined our hospital from 11:15 P.M. on November 13th, aiming to strengthen the surgical team. Using Facebook, the medical students set a rotation planning for the following two days.

Overall, four operating rooms were used simultaneously and continuously for the first 48 h, including one room shared with vascular and visceral surgery teams.

Both chair professors held a staff meeting dedicated to the management of patients who had not yet undergone surgery on November 14th, 09:00 A.M., in order to prioritize surgical interventions, in view of clinical observations, and performed or pending imaging procedures. In addition, night shifts and team rotations were re-organized during this staff meeting, in order to allow each team member to take rest. Anticipating the increase of

Table 2

Patients' characteristics (n = 22).

Characteristic	Observation
Age (years): median (range)	37 (24–60)
Gender: M/F (n)	12/10
Pre-operative diagnosis: n	
ULI	13
LLI	22
Visceral injury	3
TI	4
Facial injury	1
Occipital fracture (not requiring neurosurgery)	1
Post-operative diagnosis	
Soft tissue injury/wound debridement	14 LLI/7 ULI
Fracture/functional treatment	2 LLI/2 ULI/2 TI
Fracture/ORIF	5 LLI/2 ULI
Fracture/external fixation	1
Hand injury with tendon repair	2
Hemostasis Splenectomy	1
Gastrointestinal perforation	2
Hemopneumothorax	2
Foreign body	10

Abbreviations: ULI, upper limb injury; LLI, lower limb injury; TI, thoracic injury; ORIF, open reduction fracture with internal fixation.

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