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Management Guidelines for Emergency Trauma in Children

JuniOrtho Symposium at EPOSNA Annual Meeting, May 4th 2017

We all know that the world is nowadays the tragic theatre of many conflicts that produce thousands of civil victims, and among them lots of children.
We also know that the western world has been severely hit by terrorism in the last few years, and we remember each single tragedy with grief. Focusing on Europe, some days ago another suicide dramatic attack took place in Manchester (UK) during the concert of the American pop singer Ariana Grande: 22 victims, most of them teenagers and girls - the youngest was only 8 years old, and 120 injured people. Besides, we'll never forget that France on Nov. 13th 2015 suffered a dramatic multi-site attack at the Bataclan Theatre, the stadium and some restaurants in and near Paris, in which 129 people died and 415 were injured.
On July 14th 2016, during the attack of a cargo truck driver that ran over scores of people while celebrating the Bastille Day along the Nice Promenade, 86 people died (10 were children) and 434 were injured. 56 wounded children were admitted into the nearby hospital: 6 of them absolute emergency - 2 died in hospital.

The analysis of this last Nice experience gave the start to the symposium organized by Orthofix (thru its new division JuniOrtho) entitled *"Management guidelines for emergency trauma in children"*, which took place during the EPOSNA meeting in Barcelona (May 3-6, 2017) with the participation of about 150 trauma and pediatric surgeons from 24 countries in the world.

The symposium was opened with a welcome address by Silvio Bellesini, Orthofix global marketing manager pediatrics and deformity correction, who introduced the symposium moderator Prof. Pierre Lascombes - chief of pediatric orthopedic surgery at the University of Geneva, Switzerland and past president of EPOS, and the speakers - all expert pediatric orthopedic surgeons. Together they tried to answer three fundamental questions regarding emergency pediatric trauma management:

1. What is necessary and how to stabilize safely and quickly the bones of children during an extreme emergency situation, such as a terrorist attack?

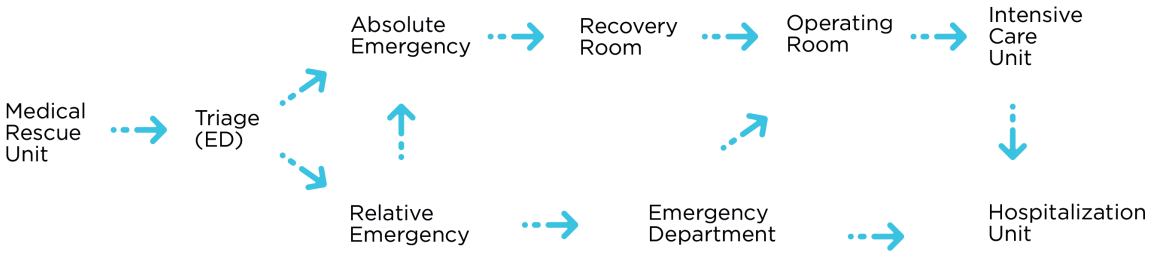
2. Is it important to have a medical emergency "White Plan"?

3. Is specific training necessary for surgeons and emergency care teams who have to act in a quick, effective and safe way?

First speaker was dr. **Joachim Lauen**, a pediatric orthopedic surgeon from BGU Murnau Hospital, Germany – one of the largest trauma centers in the country, 120 surgeons, with a well defined emergency protocol. He put in evidence how children bones are different from adults' ones: their healing capacity is at maximum level, contractures are rare as well as thrombotic complications, often malalignments self-correct during growth, according to the child's age. The "Murnau Protocol" for children recommends anatomical reduction and if needed a reposition stable osteosynthesis, plus additional castings, and/or slings, in case of displaced, unstable and physeal fractures. Their preferred methods are K-wires and ESIN (elastic stable intramedullary nailing), leaving external fixation to the most severe cases (e.g. open fractures). His personal, suggested rule is ***"do your best with the technique you are most familiar with"***.

Second speaker was dr. **Franck Launay** from the Timone Children Hospital, Marseille, France. A trauma center must be fully operational, with an effective emergency response plan (White Plan) in place, well-known by the hospital staff before the potential attack. Emergency management consists essentially of two phases: pre-hospital and in-hospital. Both have to follow a precise schedule of actions. The organization process of a trauma center starts from the medical rescue units and is followed by triage to ensure targeted aid according to the severity of injuries, and to provide the most effective care for the greatest number of patients. Priority 1) Absolute emergency – Victims with injuries, compromising vital functions, which require immediate stabilization measures as shown below.

Triage and step forwards



Priority 2) Relative emergency – Victims with injuries, with retained vital functions, but with the risk of developing life-threatening complications immediately ahead. They require urgent medical assistance, but not the immediate one, see diagram below.

His first practical tips are: 1) ***"One must have a triage in front of the ED"*** (Emergency Department) where well experienced and highly qualified professionals are able to operate in a safe, efficient and quick way, and 2) ***"Keep your eggs in different baskets"*** (*surgical equipments must be available in different medical facilities in case of multi-site attacks*).

Urgent surgical procedures are hemostasis, revascularization, reduction of dislocation, aponevrotomy and bone fixation - which has to be fast (as there are many other cases to manage!). If the external fixation is required, the equipment must be sterile; but given that in emergency there is no time to sterilize it, the best choice is to store sterile pediatric kits ready to use.

One thing to improve in emergency care system is human resources management (staff training, staff rotation, staff in reserve) and the best way to achieve it is – again - specific training. Therefore, his last personal suggestion is: ***"One cannot predict the unpredictable, but can be trained to face it"*** (quoting Patrick Lagadec from Polytechnic School in Paris)

Third speaker was dr. **Jean-Damien Métaizeau** a pediatric othopedic surgeon from CHU, Centre Hospitalier Universitaire Dijon Bourgogne, France. He explained that if in a normal situation the surgeon looks for the best stabilization, in emergency mass trauma the medical doctor aims to the quickest and safest stabilization, not the perfect one. Cast and traction are not good in

mass trauma; plating and rigid nailing are too long procedures. According to his experience, the best method is flexible nailing - smaller diameter than usual, stainless steel, not much bending. With this procedure the well-trained surgeon should use an open approach; not a traction for femur; no need to care for balance; the nails shouldn't be cut too short. One can use flexible nailing also in association with external fixation, which is quick and safe, but not always so easy or available (as quite often hospitals don't have enough fixators in stock).
His suggested, personal rule is ***"Keep it simple and quick"***.

In the audience there was dr. **Virginie Rampal** a pediatric orthopedist born and raised in Nice, who works in Lenval Foundation Hospital, an ultramodern structure and one of the only two major pediatric centers in southern France. The hospital is located in sight of the sea, just on the beach, a few blocks farther west on the promenade site of the terrorist attack. Dr. Rampal was on-call that night. Like everyone else, she did not know of the attack, but rushed to the emergency room: the wounded were already filling the chairs, or lying on the floor, some with open fractures, most of them children. More were coming in, some carried in their parents' arms. She helped with triage, went into surgery, back to triage, working without resting. The pediatric injuries were mainly crush injures: thorax, pelvis, limbs. Some huge trauma (head), a few vital urgencies.
Dr. Rampal was invited by prof. Lascombes to indicate what had worked well that night and what should be improved, according to her experience. She said that communication had worked well - GPS, social media and networks for calling volunteers, sharing info etc. Pediatric equipments, fixators, number of beds, technical services were enough: they had expected some sort of emergency situation for the just concluded Euro 2016 soccer tournament, but nothing dramatic had happened.
And also the role of nurses in managing the psychological aspects was fundamental. Some children felt totally lost – no name/identity, no parents with them. But psychological support can be also useful for the nurses themselves, who are strictly in touch with the wounded children, and this is terribly stressing.
Her personal suggestion, based on this live experience is: ***"You cannot always rely on what is available in other hospitals; in some emergency situations you have to do with what you have"***.

During the following open debate, prof. Lascombes and dr. Lauen pointed out the precious role of the army - especially trained to manage dramatic emergency events - with the possibility to use helicopters and other means of transport in case of blocked roads.

At the end of their speeches, the experts didn't forget to quote and thank the other colleagues who shared with them their emergency experiences - physicians, X rays technicians, nurses, paramedics. All professional people who worked restlessly with them to treat and save the injured children.

Regarding the three initial questions, both speakers and participants fully agreed about the importance:

1. To have an effective medical emergency "White Plan"

2. To train human resources (both medical and care/technical staff) involved in emergency management, with practical training and frequent simulations

3. To keep necessary and sufficient surgical equipments in stock - sterile and ready to use – even in different hospital/medical facilities in case of multi-site attacks.

A couple of last but not less fundamental questions were raised by the participants at the conclusion of the symposium: what else is still missing, and what can be done more - in terms of contents' transfer, innovative tools, specialized and technical training - to make more effective the pediatric mass trauma management in the next future. The research of practical, shared answers should become the objective of the future scientific meetings and/or dedicated medical/surgical educational initiatives supported by Orthofix.

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