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Emergency Management of Battlefield Injuries
Course Catalogue

Abstracts

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Emergency Management of Battlefield Injuries

Course Catalogue

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Imprint

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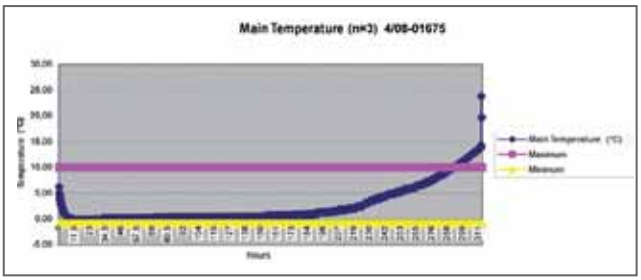
2 Conducted in August 2008 in Laboratory Section IV (Pharmacy) of the Military Medical Division of the German Bundeswehr in conformity with DIN EN ISO/IEC 17025



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Education and Training in the Centre of Excellence for Military Medicine – "Emergency Management of Battlefield Injuries"

One year after the inauguration of the Centre of Excellence for Military Medicine (MILMED COE) located in Budapest, HUN, the unit has achieved a solid position within the NATO Military Medical community. The program of work is in line with the needs identified by the MILMED COE steering nations. The respective projects are of urgent relevance for the evidence based transformation of medical support in mission and address various military medical shortfalls identified within the NATO. After having established the framework and the internal organization in 2010 this year is characterized by a constant improvement of the deliverable products and the integration of the near real time surveillance capability as a satellite branch in Munich, DEU.

One of the four main pillars of transformation in NATO is "Education and Training". Consequently military medical trainings and courses are one of the priorities of the MILMED COE. In 2010 the organization and methodology of those courses were piloted. Besides a content related evaluation the discussion about structure, schedule or location was initiated in order to optimize some identified weaknesses in the 2011 program .

The 2010 pilot course "Treatment of thoracic injuries" was extended to "Emergency Management of Battlefield Injuries (EMBI)" this year. The comprehensive management of a casualty from the point of injury in mission until rehabilitation in the home country challenges all military medical services involved in missions. However, in order to fulfill the expectations towards military medicine as outlined in the MC 326-3 (draft) military medical care needs to be as efficient and effective as required. In this context the outcome after the casualty's rehabilitation, i.e. the quality of life and health, will always be benchmarked not only within the military medical community but also against civilian health care standards. It is not breaking news that the health outcome quality is determined by the first measures applied to the casualty ("The fate of the wounded lays with those who apply the first dressing", Col. Nicholas Senn, 1844-1908). First aid provision, potentially including hemorrhage control and airway management by non-medical combatants, has to be complemented by standardized hand-over procedures to the medical rescue team, forward medical evacuation and first live and limb saving procedures in an appropriate medical unit. The next steps are stabilizing interventions to reach a (long-distance) air transport stability of the casualty for the strategic medical evacuation back home for definite treatment.

The EMBI course focuses on topics related to the steps from first aid to reaching long-distance air transport stability. Throughout the past years national EMBI approaches were further developed and improved significantly. The course offers a forum to discuss various issues and national standards, exchange experiences and thus help to reach a common understanding that is precondition for interoperability in any deployed multinational military medical unit. Students and lecturers provide advanced mission experience and are directly involved in EMBI either as care providers or as conceptual / operational planners. Theory, practice and simulation elements as a comprehensive course package and presented by senior consultants and experts encourage the participants to engage in active discussions, support team building and by this strengthen interoperability in military medicine.

Reading through the articles and abstracts in this EMBI edition of the MCIF might give some impressions of the recent course, maybe stimulate new ideas and hopefully encourage considering an active participation in the spring 2012 EMBI course.

Col. (MC) Dr. Thomas Harbaum (DEU)
Deputy Director and Chief of Staff, NATO Centre of Excellence for Military Medicine

[1]*Course Calendar on www.coemed.hu*
[2]*"Every effort should be made to ensure that medical care is based on internationally accepted best medical practice", MC 326-3 (draft)*

Opening speech

Ladies and Gentleman,
Dear Colleagues!

Let me start by extending to you all a very warm welcome to Budapest on the **Emergency Management of Battlefield Injuries course** conducted by the NATO Centre of Excellence for Military Medicine (MILMED COE) in co-operation with Bundeswehr Joint Medical Service, Interallied Confederation of Medical Reserve Officers (CIOMR), US Air Force Special Operations Surgical Team, Medical Faculty of University of Pécs, Hungarian National Ambulance and Emergency Service, Karl Storz Company, Canadian Aviation Electronics (CAE) Healthcare Company, Hungarian Military Medical Service and Military Hospital - State Health Centre.

The course was developed based on experiences of last year's **In-theatre emergency diagnosis and treatment of thoracic injuries course**; therefore I can see some familiar and a lot of new faces as well from quite a few Nations: Belarus, Germany, Hungary, The Netherlands and Sweden.

The NATO MILMED COE in accordance with its original concept and Programme of Work 2011 widened the curriculum, lecturers and participants of the course to involve as many Nations both NATO and Partners as possible together with civilian partners interested in military medicine; and conducts the course at its original venue in this very pleasant environment. This year's curriculum includes beside the very, I believe, interesting lectures and operational practice two workshops on airway management and simulation. Most of you are first time participants on this course, but I can recall my last year's memories and I can tell you that there is a huge change to a - by all of us desired - direction I am able to observe here.

I have the pleasure to inform you about the milestones MILMED COE has left behind through the year passed since the last course in the field of multinational military medical training. Number of new courses have been developed and conducted like Major Incident Medical Management and Support (MIMMS), Medical Standardization and NATO Medical Evaluation courses. Their NATO accreditation is ongoing and it is forecasted to be completed this year. Participants' feedbacks are always collected at all the courses to facilitate further course development. I hopefully do not need to stress that it has also utmost importance in this case as well as on all courses.

Based on these facts, I can tell you that the NATO MILMED COE has managed to keep its pace in the process of course/training development during the previous 10 months and in addition to it they extend their scope to exercise conduct, which is the third area of activities in military medical training beside trainings and courses. As you may know the Committee of the Chiefs of Military Medical Services in NATO (COMEDS) plenary will be conducted in Hungary this summer and a multinational medical exercise will be shown to the Surgeon Generals to emphasize the interoperability of NATO MILMED COE Sponsoring Nations in field conditions from First Aid to Primary Surgery. It was decided to develop a new training this year by the NATO MILMED COE aiming to train first responders' trainers, which will be piloted in autumn.

I am very happy to inform you that all courses have been accredited by the Budapest Semmelweis University awarding fifty credit points upon successful completion of examination tests. I am convinced that all of you will manage to make it. Course accreditation for registered nurses is also ongoing and will be available in the near future and it will also be applied for all MILMED COE courses.

Dear Attendees!
Let me speak about what the aim of this course is. It is simple to put in words:

This course provides theoretical knowledge for the emergency diagnosis and treatment of battlefield injuries, and it also provides practical skills needed to effectively manage them. It is a huge step from last year when we dealt only with thoracic injuries.

Standardization can be reached in the management of these kinds of injuries during the course looking into different national approaches, which may become commonly used in multinational environment. And this is the main goal: standardization at NATO level of different kind of procedures. The NATO MILMED COE is heavily involved in NATO standardization process and standardization of surgical training issues are in the loop for the next year, when the results of this week's discussions can be used and incorporated into NATO relevant documents.

I sentence my last words to emphasize that having a look around I can see colleagues from different nations that leads me to formulate the key of success for us: **multinationality in training and multinationality in operations.** I strongly believe that an important step was made on the field of surgical training by arranging this course.

Thank you for your kind attention and may I wish you fruitful discussions
and a successful course!

Lieutenant General (Ret) Dr. Laszlo SVÉD PhD
Course Mentor
Former HUN SG and COMEDS Chair
Deputy Director Rehabilitation
HUN Military Hospital – State Health Center

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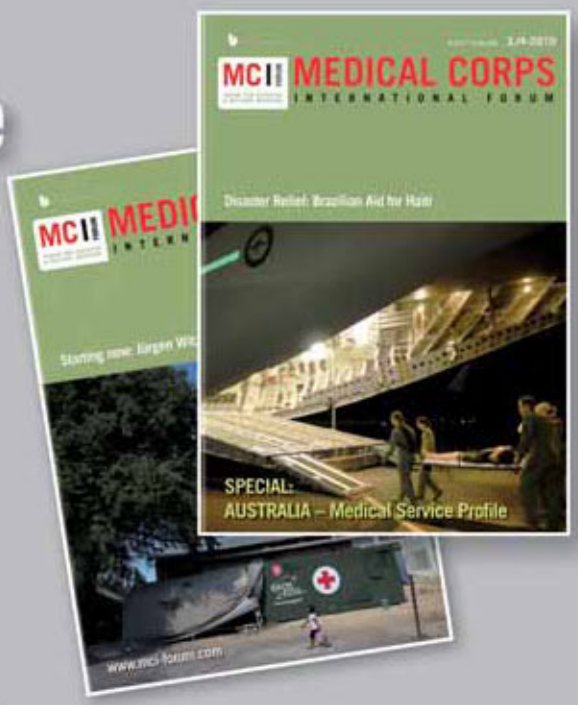

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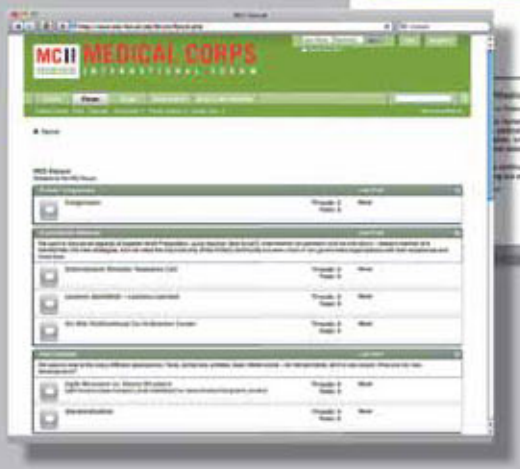

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NATO Centre of Excellence for Military Medicine
Emergency Management of Battlefield Injuries
COE-MED – M4 – 001
04–08 April 2011

OPR: COL Dr. László FAZEKAS; NATO MILMED COE
Co-OPR: LTC Dr. Sándor PELLEK; Military Hospital

Security Classification: NATO UNCLASSIFIED
Course Assistant: WO Jozsef Kiss MILMED COE

Monday, 04 April 2011
Main Classroom

0900-0910
MILMED COE **Welcome**

0915-0925
Course Opening
LTGEN ret. László Svéd MD PhD

0925-1025
History of chest injury; Development of treatment of non-cardiac thoracic injuries - from Korea to Iraq -
Prof Tamás Molnár F MD PhD

1025-1040 **Coffee Break**

1040-1140
Etiology of multiple injuries – combat injuries
COL Zsíros Lajos MD Phd

1140-1240
Crew resource management in deployed medical facilities: options and challenges
COL ret. Walter Henny MD

1240-1340 **Lunch**

1340-1440
Multiple and chest injuries - surgical principles of treatment
LTC Sándor Pellek MD

1440-1540
Shock - trauma management
LTC Tibor Pataki M.D.

1550- **Ice breaker**
1,5 floor MILMED COE

Tuesday, 05 April 2011
Main Classroom

0815-0945
Evidence based approach to treatment timelines on the battlefield and new approaches in training of military surgeons
LTC Prof Dr. Christian Willy M.D

0945-1000 **Coffee Break**

1000-1100
Management of diagnostic procedures - Possibilities of intervention
Ágnes Stefán MD

1100-1200
Prehospital management of polytraumatised patients
László Gorove MD

1200-1245 **Lunch**

1245-1345
Ventilation management - prevention of ARDS
COL Laszló Nagy M.D.

1345-1415 **Coffee Break**
Discussion with MG Dr. Ingo Patschke

1415-1515
Advanced Trauma Life Support (ATLS)
László Hetzman T. MD

1800-2100
Non-hosted Course dinner
Trófea Grill Restaurant

Wednesday, 06 April 2011
Main Classroom

0900-0945
New aspects in airway management
LTC Dr. Andreas Schwartz

0945-1100
Workshop - airway management
LTC Dr. Andreas Schwartz
& Karl Storz GmbH

1115-1215
IED related trauma – what's different? The surgeon's view
COL Dr. Erwin Kollig

1215-1315 **Lunch**

1315-1445
Lessons learned from ISAF – teach the teachers (incl. surgical do's and don'ts)
COL Dr. Erwin Kollig

1445-1500 **Coffee Break**

1500-1600
Abdominal Trauma: Damage control surgery and temporary abdominal closure
COL Prof. Dr. Peter Becker

Thursday, 07 April 2011
Military Hospital - State Health Centre Pathology

0700-1100
Practical Training
LTC Sándor Pellek M.D.

1100-1130T ravel to MILMED COE

1130-1230 **Lunch**

1230-1430
Workshop - Simulation
CAE Healthcare Company

1430-
Visit to Hospital in the rock

Friday, 08 April 2011
Main Classroom

0900-1030
US Air Force Special Operations Surgical Team: A SOF Role 2 Capability
LTC Beals, Kristen J USAF AFSOC

1030-1045 **Coffee Break**

1045-1145
Impairments of blast injuries
LTC Levente Várhelyi M.D.

1215-1315 **Lunch**

1145-1245
Pain management / relief of chest injuries
LTC Tibor Pataki M.D.

1245-1330
Test

History of Chest Injury.
Development of treatment of non-cardiac thoracic injuries from Korea to Iraq Wars

Prof Dr Tamas F Molnar PhD, FETCS

Aim: A comprehensive overview is provided how present protocols/rules/state of art of military chest trauma treatment has been built up. The lecture covers the experience gained in the armed conflicts of the near past. A mutual dependence is highlighted between medico-military and civilian trauma care of chest wounds. An organ specific step by step syllabus is followed by the discussion of training/future.

As every soldier keep an eye on what military history teaches, similarily a good surgeon should be aware of the previous steps of development of his/her art in order to avoid repeating previous mishaps, mistakes and failures. Moreover, critical knowledge of the past is a key element in building up new methods, ideas. There is no present and therefore no future without the live pulsation and tactible presence of the past.

Importance of question: Chest wounds are responsible of 25-35% of KIAs and DOW. Lethality of Battlefield Chest Wounds: Immediate death: 65-70% (KIA). 10-15% of survivors die of complications (DOW). Scoring: „preventable death": of modern combat death: 60-65% haemorrhage of extremities 30-35% tension ptx/htx - 5-6% upper/central airway obstruction.

Treatment of chest injuries before the Korean War: Mortality from thoracic injury has diminished considerably in the last century. It was far above 50 % prior to the Great War, was 25% in 1914-18. Thoracic empyema was drained (Bülau's drain) and irrigated. The dogma of transcostal approach lived long after the WW I. Lack of standardization obstacled the development of anaesthesia, "sine qua non" of chest surgery. In WW II previous dogmas such as pure tapping, and air replacement were proposed but failed. Mortality of thoracic injuries decreased to 10%. Haemothorax required early and repeated thoracentesis without air replacement. PEEP endotracheal anesthesia provided advantage for the US/UK Forces, along with access to Penicillin. Wet lung as pathology was identified, routine toilet bronchoscopy was introduced. Physiotherapy regained its importance. The proportion of major thoracic operations increased mainly in the US Army medical services with very good results.

Korean War (1950–1953) Chest was involved in about 30-40% of the total killed-in-action (KIAs), a number roughly identical to WW1 data. Incidence of chest wounds was 19%. Overall thoracic injury mortality has fallen to 5%. Decision on a thoracotomy was made easier at the base hospitals (MASH) Rapid evacuation was the key. Specialised chest centres were erected. Concept of multi-organ failure and Disseminated Intravascular Coagulaopathy were identified. Early In the war thoracic empyema followed 25-30% of cases, but it decreased to 9%, as the haemothorax was approached by a more aggressive attitude. Surgical decortication was liberally used. Antibiotics were quantum satis. Overenthusiasm of thoracotomy and operative evacuation of haemothorax was due to the advent of more sophisticated anaesthesia.

Vietnam War (1959–1975) Incidence of chest wounds was 7.2%. Mortality of chest wounds decreased significantly, due to a logistic system. (MEDEVAC) Extensive lung contusions caused by high velocity projectiles were approached by a more aggressive operative attitude in the later Vietnam period. The Korean lesson of thoracotomy abuse had been learnt and tube thoracostomy regained its role. Thoracotomies in Vietnam: 14-21% of all penetrating chest wounds. The Da Nang Syndrome and Adult Respiratory Distress Syndrome were revealed, and extensive research data and field experience were collected. Empyema has remained a challenge. The 5.6 % mortality recorded during the Vietnam War was largerly accounted for by the 20% mortality of tracheo-bronchial injuries.

Middle East Wars The Vietnam War experiences were applied. Here, the incidence of chest wounds was 6% as a result of body armour. In the Six Days War (1967) and in the Yom Kippur War (1973) more than 90% of the chest cases were treated by tube-thoracostomy alone. Zakharia made an exception: (70% thoracotomy) during the Lebanon War (1982). Overall general preference went for less proactive attitude: ie drainage. Shrapnel and high velocity missile wounds predominated the conflicts.

Iran-Iraq War (1980-88) and 1st Gulf War (1990–91) Accessible data are scanty, but a 6:1 - 10:1 tube thoracostomy (drainage) thoracotomy ratio was reported. Personal reports favour open access if explosives caused the injury. Lung injury and sequelses prevailed to haemorrhage both in mortality and morbidity. Chest surgery experiences of First Gulf War (Coalition Forces) supported a conservative approach.

Balkan wars (1991–1995): Secondary mortality from chest wound was about 2%. Third generation antibiotics, CT and chest ultrasonograpy, have changed

the attitude swinging towards a more conservative primary approach again but without unnecesary hesitation in timing of intervention. Lung alone injuries seen in tertiary referral centers: 78% penetrating, 22% non-penetrating. 60% - explosives. Gunshot 37%. Thoracotomy: 23% of all cases: lobectomy/pn'y: 1.8%. But: Thoracophrenolaparotomy: 5%. Results: 93% Cured, 5% delayed treatment, 1.7% died. However, 30% of patients with pulmonary injuries have multiple lesions and 70% of chest injured patients have pulmonary lesions in varying extent. For „lung only" injuries drainage was the main method. Limit: 6-7 days. Croatian forces preferred to perform thoracotomies but cumulative experience reduced these numbers. Key: rapid transportation, case centralization. Mortality in isolated chest wound was 0.8-2% .Complications: Bronchopneumia 6% atelectasis 5% empyema 4%. Sepsis 5%. Distribution of mortality: haemorrhage/shock 1/3 septic 2/3rd.

Iraq (2nd Gulf War and after) and Afghanistan (2003–10) The proportion of thoracic wounds is in a decrease from Vietnam. An explosive mechanism accounted for 65-78% of injuries. With the transition from maneuver to insurgency warfare, fragmentation weapons dominated gunshot wounds (2:1), with increased KIA (up to 20%) and DOW (up to 5%) as well. More multiple injuries were encountered with body zones/cavities affected in average above 2. Mortality of penetrating chest wounds (6-14%) can go up to 55% with transdiaphragmatic injuries or combination with extrathoracic lesions. Damage control policy, discussed by S Pellek's review on NATO emergency care system focuses on blunt thoracic injuries. Tube thoracosotomy prevails: 40-80%. Chest injury 10-15% requires definite operative repair/major surgery. Morbidity 25%. Mortality is 7-9% for all, 6-8 in blunt, and 1-2% in penetrating injuries but can go up 17 - 20% for associated organ injuries. Similarly, thoracic trauma compromises 10-15% of all civilian traumas, 25% of all fatalities, due to trauma. Blunt/penetrating ratio: 2:1. Indicaton for thoracotomy: uncontrollable haemorrhage. Lobectomy: 1.6-1.8%, pneumonectomy is rarity. (0.5-1.1%). Kabul experience with penetrating chest wound: minority of gunshots. (30% ptx, 60% hptx, 3% htx required ICC in 70%. Thoracotomy vs sternotomy: 24/2 additional laparatomies. Transfusion: 27%. Mortality 9.1%, (Hameorrhage/septic: 1:2). Stab wound derived management algorythm seems applicable regardless to the origin of the injury. Endovascular treatment of traumatic thoracic aortic injuries is on the rise. Conservativism is supported by successful use of Recombinant Activated Coagulation Factor VII in patients with penetrating thoracic injuries. Emergency Room Thoracotomy (ERT) important as thoracic injuries are the primary/contributing factor in up to 75% of all trauma related deaths. There is a shift from nearly obligatory procedure to patient selection. Last Chance method of resuscitation: 14% survived of ERT for penetrating chest injury.

Organ specific approach – synthesis of the past 20 years and present experiences:

Chest Wall: debridement, pack-cover-occlude and drain. (Arteficial Ventilation?) Delayed closure (Plastic surgery?) *Pleura:* haemo(pneumo)thorax – drainage / Heimlich Valve

Lung parenchyma: general damage: unusual to require surgery. 70-80% drains alone. Anatomic lung resection after blunt injury is distinctly uncommon (0.5%). Resection: Lung sparing techiques, ie. nonanatomic stapled resections, tractotomy. Indication: Haemorrhage or persistent air leak impairing ventilation. Hilar control: mobilization of central vessels and/or cross clamping. Mortality: 30-50%. *Tracheal repair:* Injuries to the trachea/main stem bronchi are uncommon in patients who survive to reach the hospital – Rigid bronchoscopy> stenting / right thoracotomy. Primary aim: secured airway: ventillation/profuse bleeding: excluding the area. Endotracheal tube, below the bifurcation: selective intubation- no rush, buy time. *Esophageal injuries* – commonest cervical. Treat early and agressively: Cervical: primary repair. Caveat: thrachea. Upper-middle third: right thoracotomy. (4th-5th interspace). Distal third: left thoracotomy. Op: oesophagus mobilization sparingly. Single layer absorbable and butressed with surrounding viable tissue. If the patient is in extremis, wide draine, nasogastric tubes. Stenting is an option via oe-gastroscopy. *Trans Mediatinal GSW:* if stable, investigate. If unstable, explore. Vessels Traumatic rupture of the thoracic aorta: 80-90% dies on spot. Severe deceleration (blunt) or direct hits are non-survivable.Initial management is beta blockers. Immediate repair via left posterolateral thoracotomy, with cardiopulmonary bypass standby. Majority requires interposition graft 15-20% might be treated with primary anastomosis. Endovascular stent grafting is gaining popularity with encouraging short term results. *Postoperative/posttrauma thoracic empyema:* best treated by prevention. Evacuation is a valid indication of VATS in Trauma Care. Decortication, thoracoplasty/thoracostomy should be considered, also.

Training, future: A civilian survey of trauma victims in UK showed that around 5% of polytrauma patients came under the care of thoracic surgeons proving a clear need for Trauma/Orthopedic surgeons and generalists to have good grounding in thoracic procedures. The Belfast experience with missile injuries of the chest reveals parallels between thoracic battle injuries versus civilian injuries. Scoop and run or stay and play?

Conclusion: Relative simplicity of the operative procedures and low number of trained hands limit the role of superspecialists. The medico-military relevance of civilian practice is, that providing proper thoracic surgical experience to trainees/trauma surgeons is to be preferred to superspecialisation.

Take Home Message: "All the circumstances of war surgery thus do violence to civilian concepts of traumatic surgery. The equality of organizational and professional management is the first basic difference. The second is the time lag introduced by the military necessity of evacuation. The third is the necessity for constant movement of the wounded man, and the fourth — treatment by a number of different surgeons at different places instead of by a single surgeon in one place — is inherent in the third. These are all undesirable factors, and on the surface they seem to militate against good surgical care. Indeed, when the over-all circumstances of warfare are added to them, they appear to make more ideal surgical treatment impossible. Yet this was not true in the war we have just finished fighting, nor need it ever be true. Short cuts and measures of expediency are frequently necessary in military surgery, but compromises with surgical adequacy are not." —

Michael E. DeBakey, MD Presented at Massachusetts General Hospital Boston, October 1946

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Crew resource management in deployed medical facilities: options and challenges

Col (ret) Walter Henny MD

For organizational reasons Dutch military medical personnel is divided in 2 groups: the specialists (doctors, nurses, technicians) who are working on a full time basis in civilian hospitals; and general duty personnel who live and work in barracks.

Both groups are teamed up only relatively shortly before deployment. As a consequence, in particular general duty personnel has to be carefully trained, in order to

- make them medically proficient,
- prepare them for seamlessly intermeshing with the specialist group.

To that end the Dutch Armed Forces have developed a 4-tier training schedule.

During the first stage training consists of studying and working in skills labs.

Stages 2 thru 4 are almost entirely scenario-driven, with ever increasing complexity. Feed-back sessions are an essential part of the training paradigm; much attention is paid to both crew resourses mangement ("team work") and medical proficiency.

This approach has turned to be very effective, as experiences from the AOR in Iraq and Afghanistan have shown; recently a comparable traininig approach was introduced in civilian hospitals; again with considerable success.

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Multiple and chest injuries - surgical principles of treatment

LTC Sandor Pellek MD

Aim: The medical challenges are often more complicated than just a simple clinical case problem in operational area. Their solution requires not only clinical skills, but also effective communication, cool head and confidence. The author discusses here blunt thoracic injuries with focus on multinational medical task force. Professional surgical challenges in operation area sometimes play a joke on the physicians, but with well built multinational teamwork they can be managed.

Description: Our experiences were acquired in Afghanistan between 2003-2006 (Kabul, ROLE 3 German Hospital, ROLE-2 Greek Hospital). The author evaluates therapeutical strategies and outcome of severe trauma patients with thoracic basket and reports early and late effects of thoracic wall visceral coating of severe chest wall injury and polytrauma. Damage control management is a general term including all activities concerning medical treatment, communication and evacuation starting from primary damage control surgery and ending with definitive medical care. Damage control resuscitation comprises all resuscitative, anaesthesiologic and intensive care activities concerning damage control management, will provide ongoing critical care monitoring and treatment. Damage control surgery is one component of the overall management of the severely traumatized patient. It includes those techniques that are used to save life or limb in the potentially unstable patient. It is used in conjunction with other anaesthetic and intensive care techniques for the overall management of the trauma patient. This type of care will be provided at any level of surgical facility. The theory of damage control was developed in an effort to improve outcome in patients with vascular and multiorgan injuries, who had 40%–60% morbidity rates. The principles of the first 'damage control' procedure are control of haemorrhage, prevention of contamination and protection from further injury. Damage control of chest injuries has a different philosophy than that of abdominal injuries. Damage control in the abdomen consists primarily of multiple staged operations with abbreviated closures. Damage control in the chest consists of different technical manoeuvres to use quicker and technically less demanding operations to achieve the same goal. Only a small percentage of trauma patients require damage control measures and early identification of these cases produces optimal results. The principles of the first 'damage control' procedure are control of haemorrhage, prevention of contamination and protection from further injury. The conventional sequence of the management of trauma surgery was to bring the patient to the operating room after initial resuscitation and then to operate for complete repair of the injuries. Even patients with multiple complex injuries were operated more aggressively over a prolonged period of time for definitive primary repair.

Thoracic trauma is a very important cause of mortality in the trauma patient, the complex thoracic injuries require stabilization techniques which guarantee the survival of patient with surgical correction, and implementation of the concept of «damage control». Regarding thorax it includes emergency room thoracotomy, tractotomy and vascular control pulmonary hilium and chest wall stabilisation.

Chest wall trauma the most common chest injury occurs in about 40 % of all patients admitted with torso injuries. The vital role played by blunt chest trauma in the outcome after multiple injuries indicated by the fact that polytraumatized patients with severe thoracic trauma have a higher mortality rate than patients with the same injury severity without thoracic trauma. Blunt chest trauma frequently appears in patients with multiple traumas. In polytraumatized patients thoracic injuries have significant influence on the treatment strategy, not only in the emergency room but also in the intensive care unit.Therefore it is crucial for the treating physician to promptly make the correct diag-

nosis and to quantify the severity of the injury.Within the broad category of thoracic trauma, there are many different types of injuries. Mortality rate (18 %) markedly decreased in patients with stable hemodynamic status despite a relatively high ISS (Injury Severity Score). Patients with persistent hemodynamic instability had a mortality rate of 18 %. As such, it is a source of morbidity and mortality and an additional expense for the institutions that take care about these patients. Mortality is significantly decreased by primary definitive treatment (debridement, stabilisation). The most common associated visceral injury is myocardial contusion, which can lead to significant arrhythmias and hemodynamic instability. More fractured ribs lead to progression of pathophysiologic findings, including ventilation / perfusion abnormalities, increase of respiratoric work, hypoxemia and decrease in the functional residual capacity. It is especially common that multiple rib fractures result in flail chest. The bellows action of the chest wall muscles reduced leading to further abnormalities in ventilation. If the flail segment is large enough, this segment may collapse during inspiration. There may be associated atelectasis and shunting of blood in the larger contusions, either of the chest wall or the lung. The chest wall defect contributes to decrease in compliance and increase in airway resistance, associated decrease in pulmonary diffusion and increase of respiratory work. Blood trapped within the pleural space impairs its own absorption and acts as an ideal culture media for bacterial proliferation. Posttraumatic empyema remains a significant clinical problem occurring in 2-10 % of victims with thoracic trauma. Many of the factors responsible for the development of posttraumatic empyema are preventable and iatrogenic in nature. Thus treatment of patients in extremis must be focused on aggressive resuscitation and surgical intervention without extensive diagnostic procedures to effectively control lethal haemorrhage. Chest x-ray has limited value and use in the diagnosis of the chest wall injury. In our experience up to 50 % of rib fracture are not evident on plain x-ray. Thus, a reliable CT – independent from classification of the severity of thoracic trauma is essential. Thoracic wall visceral coating is disorganised during dislocated fractures of bony chest wall resulting in the communication of intra- and extrathoracic fields. Fractures of the clavicle are common and rarely cause major pathophysiologic changes. Although painful, they usually do not embarrass ventilation and only rarely are associated with major vessel laceration. Cardiopulmonary performance is reduced by the detachment of inerf fibrosus sheet. Adequate treatment could be accomplished by careful preoperative diagnosis, surgical operation and high level intensive care. The scapula is uncommonly fractured. It is protected by a thick coat of muscles and lies in protected position. Therefore, fracures of the scapula are associated with a significant amount of kinetic energy imparted to that portion of the body and should make the clinician suspicious about significant injuries. The combination of multiple injuries and thoracic wall disorganisation often represents a devastating injury pattern. Decollement is observed in 75 % as part of multiple injuries. Thoracic decollement occurred 3.5 % in our retrospective studies. The bleeding source and the paradox movement of the chest could be misleading and the occurrence of bacterial infection could make the disease serious. Primary definitive treatment was initiated during the observation of intrathoracic space occupying mass, primary decompression and decollement verified by CT. Contamination of retained hemothorax is derived from several sources, including tube thoracostomy, pneumonia or from the mechanical injury itself. The combination of tube thoracostomy and retained blood within the pleural space is implicated in most cases of posttraumatic empyema. The diagnosis of posttraumatic empyema involves the use of clinical parameters and imaging studies. Chest CT is the most useful imaging modality and has a high degree of sensitivity and specificity but must also be correlated with clinical findings of leucocytosis, high CRP, fever and often respiratory dysfunction. Effective treatment of posttraumatic empyema focuses on effective decortications and complete re-expansion of the involved lung. This can be achieved physically either at the time of thoracostomy or thoracoscopy (VATS) or chemically through the use of fibrinolytic agents. Thoracotomy with decortications is the most successful form of therapy and the rate of morbidity associated with this procedure is decreasing. Thoracoscopy with decortications is technically more difficult to perform and more successful when performed early. The CT – independent from classification of thoracic trauma is reliable and to be performed quickly in the emergency room. This will facilitate adequate treatment of thoracic trauma and the prevention of secondary complications. In our experience, operative stabilisation has minimized the duration of mechanical ventilation and number of consequent complications. The rationale is to minimize ventilator time when a chest wall injury is the primary reason for its use. The condition of visceral coating defines the treatment strategy during severe thoracic injury treatment similar to extremity injuries. Parenchymal lung function can be assessed by CT, oxygen tension to fractional inspired oxygen ratio, shunt fraction and compliance but most of these require invasive monitoring and are performed in the intensive care unit. The source of bleeding must be defined in visceral coating injuries during the treatment of therapy resistant hemothorax.

The major principles of damage control for thoracic injuries:

a. emergency centre thoracotomy is a damage control prototype
b. postero-lateral thoracotomy is the empiric incision of choice

c. wedge, non-anatomically stapled lung resections, pulmonary tractotomy, and en masse lobectomy/ pneumonectomy, chest wall stabilisation with Judet principle are pulmonary damage control procedures
d. the chest may require en masse closure of muscles or patch closure of the wound.
e. packing thus has a limited role in thoracic damage control.
f. intravascular shunts and ligation are common thoracic vascular damage control techniques
g. new technology, an increased role for cardiopulmonary bypass and cardiac assistance may develop. (pECLA –pumpless extracorporal lung assist, intraaortic balloon pump)
h. severe brain injury and ARDS (ICP stabilisation, good neurological function!)

High-energy blunt trauma resulting in severe injury often involves multiple systems. To manage such traumas multispecialty team led by trauma surgeon and including thoracic, vascular, abdominal surgeon, orthopaedics and increasingly interventional radiologist is required. The focus on haemorrhage control and the angiographer gives unique access to vascular structures and provides interventional radiology with an important and increasingly recognised role in the treatment of patient with hemodynamic instability. Suspected myocardial contusion increases the possibilities of subsequent complications, most commonly represented by cardiogenic shock. Hypotension is to be resuscitated with fluid replacement. In case of insufficient volume replacement inotropic agents and even IABP (Intra Aortic Balloon Pump) have been utilized with success to reverse the hypotensive state. Surgery may have to be delayed in patients with cardiogenic shock until stabilization is accomplished. Acute massive haemoptysis is a rare complication of pulmonary injury and contusion and is particularly difficult to manage. Recently, recombinant activated coagulation factor VII (rVIIa, NovoSeven) has been proposed as an adjuvant therapy for exsanguinating trauma patients with coagulopathy. This urgency is embodied in the concept of damage control, which consists of staged surgical intervention with a focus on controlling haemorrhage and contamination, rapid resuscitation and second surgery for definitive repair. The development of stent-graft technology has enlarged the scope of interventional therapy with involvement of interventional radiographer, in order to include the rapid and definitive repair of conduit vessel injury. Effort should be made to terminate the septical focus because of lung stereotype reaction ability. Effective intensive therapy can be achieved by precise and timely diagnostic sequence and treatment strategy.

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Traumatic Shock

Lt Col Tibor Pataki MD FRCA DEAA

Aim: The participant will learn about the basis of development of traumatic shock. The presentation details the various treatment strategies, their complications and how to avoid them.

Description:

Shock

- generalized, progressive tissue perfusion deficit of sudden onset and of multiple etiology
- main pathophysiological feature: tissue ischemia when untreated leads to irreversible cell damage / death

Types of shock

- hypovolemic (exsanguination, ileus, burns)
- cardiogenic (AMI, arrhytmias, cardiac contusion)
- obstructive (pericardial effusion, tension pneumothorax, air emboli)
- distributive (spinal shock, septic shock, anaphylaxis)

Blunt torso trauma and hypotension „mediastinal shock"

- tension pneumothorax
- pericardial effusion
- cardiac contusion
- air embolism

concealed bleeding

- peritoneum
- retroperitoneum
- hemothorax
- pelvis / other

Estimating blood loss

# humerus	(100 - 800 ml)
# forearm	(400 - 500 ml)
# pelvis	(500 - 5000 ml)
# femur	(300 - 2000 ml)
# leg	(100 - 1000 ml)
ruptured spleen	(1000 - 2000 ml)
ruptured liver	(1000 - 3000 ml)
hemothorax	(500 - 2000 ml)
# lumbar spine	(500 - 1000 ml)

Dynamics of fluid replacement 1

Goals of early fluid resuscitation (until stopping continuing blood loss) :

- systBP 80-90 mmHg (MAP 50-60 mmHg)
  → permissive hypotension – just acceptable organ perfusion
  prevention of blood loss ↑ (higher values in the elderly and CNS trauma)
- pulse oxymeter should work - just

- Hb around 80 g/l
- core temperature > 35 oC
- prevention of lactate ↑

Dynamics of fluid replacement 2

- fluid replacement too aggressive:

blood loss ↑ dilution ↑ acidosis ↑ hypothermia ↑

- suggestion: crystalloid 1000 ml rapidly – assessing vital parameters – lack of improvement means continuing blood loss

CONTINUOUS EVALUATION OF RESPONSE TO FLUID RESUSCITATION IS MANDATORY

Dynamics of fluid replacement 3

Goals of late resuscitation (bleeding under controll) :

- systBP > 100 mmHg
- Hb appropriate to patient
- normalizing coagulation
- lactate < 2 mM/l
- BE < - 5 mM/l
- normothermia
- diuresis 0.5 - 1 ml/kg/h

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Evidence-based Approach to Treatment Timelines on the Battlefield – Update 2011

Prof. Dr. med. Christian Willy, LtCol

Introduction:

There are no published studies directly addressing the issue of what is an acceptable timeline from point of wounding to surgical intervention within the military context. Up to now the proximal threshold has been determined by personal opinion, tactical, logistic and practical imperatives rather than by clinical demands. Current advances aimed to stretch timelines from wounding to surgical intervention formulating e.g.: „Using the different experiences and the outcome of the discussions, it was concluded that there is not one "golden" medical emergency system, there are no "golden" timelines, and no "golden" skills. A medical system should be flexible and be able to adjust on each specific, local situation." Or „Wounded soldiers need to be undergoing surgery in the operating theatres of ... large centres within three hours of wounding." However, there is a need to create an update about the sensfullness of the concept of the „golden hour" again based on a review of all relevant military and civilian studies where timelines have been quoted and to reach a number of statements to state the perceived ideal upper limits from point of wounding to holistic and realistic surgical care in modern war.

Methods:

Medline search, 1947 – 2011. Keywords: „trauma", „military", „hemorrhage", „military surgery", „combat", „timelines", „golden hour".

Results:

There are only few articles dealing with the concept of „golden hour" within the military setting. There are no comparative studies like randomized or other controlled studies. Nevertheless, there are some papers, based on an higher degree of evidence-based medicine. One strong recommendation is published in 2007 by a panel group consisting of participants of 12 countries, creating an European guideline. This group formulated a strong recommendation based on high-quality evidence and supported by other articles, that it is necessary to operate the critically injured patient as soon as possible. The literature shows two approaches to prove the need of the golden hour for the critically injured patient - the epidemiological and the pathophysiological approach. In data collections of injured patients is reported, that a doubling of the time from wounding to surgical care (30 min to 59 min) in critically injured american casualties in two periods of Operation Iraqui Freedom was associated with an increase in both killed in action (KIA) and died of wound (DOW) rates over these time frames, that each 3 minutes in the emergency department before laparotomy for hypotensive patients bleeding from abdominal injuries increases the mortality by 1%, that a total time to present the patient to surgical care of more then 60 minutes resulted in a significant increase of mortality. Furthermore, in a multicenter study, 11 major trauma centers in Australia created postulations for a continental guideline. They could show in a group of critically injured patients from a pelvic trauma associated by severe bleeding that effectice surgical procedures should be done within 90 minutes. A different approach is the pathophysiological analysis calculating the relationship between systolic blood pressure and mortality rates in the literature. The analysis shows a clear relationship which underlines the urgency to stop the bleeding. Additionally, Eastridge and his group demonstrated, using the biggest trauma data bank worldwide, that there was an increase of 5% in mortality for every 10 mmHg decrement in systemic blood pressure. Discussing timelines there are authors who formulate „... that soldiers begin to die at four hours ..." without any clear scientific basis. Additionally, in the ALLIED JOINT MEDICAL SUPPORT DOCTRINE there are no clear definitions of the terms „damage control surgery" (DCS) and „primary surgery". It is unclear why Primary Surgery must be provided as soon as possible. It is unclear why DCS should save „limb or function".

Conclusion:

- Time is Life
- The critically injured patient has to be presented as soon as possible to damage control surgery! To prevent death there must be an upper limit of 60 – 90 minutes from wounding to surgical surgical haemorrhage control.
- There is a need for a principal medical planning timeline (like a MAXIME): „60 minutes" between Injury and OR. We should not toach the golden hour of shock in trauma - it is the good GHOST for our bleeding soldiers.
- We should not adapt timelines to resources.
- Future research has to help on scene to identify the critically injured, e.g. by telemetric data transfer.
- Further critical research analysing a NATO-wide trauma registry has to work on the scientific fundament of decisions about future timelines on the battlefield.

- There is a need to overwork the definitions of DCS and Primary Surgery in NATO documents.

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New Approaches in Training of Military Surgeons

Prof. Dr. med. Christian Willy, LtCol

In 2010, the world witnessed 32 wars and other armed conflicts. Epidemiological analyses of mechanisms and patterns of injury of soldiers sent into these conflicts can be utilised to identify the expertise that is required for military surgeons in a combat setting. In addition, these data provide important parameters to adjust medical infrastructure and training requirements for future Military Surgeons. Since 1992 the German Bundeswehr has been deployed for securing peace and peacekeeping abroad. Today in 2011, the German Bundeswehr runs a combat support hospital (Role 3) in Mazar-e-Sharif in Northern Afghanistan providing a multidisciplinary capability profile. Furthermore, there are two Role 2 medical treatment facilities (rescue centres) in Kunduz and Feyzabad for life saving procedures and damage control operations in order to enable rapid evacuation to a higher level of care. Epidemiological analyses of injury patterns and mechanisms have shown that 2,299 soldiers of the coalition forces have been killed in Afghanistan until January 15th 2011. Of these, 21,4% died in non-hostile action (2010). The leading causes of injury were explosive devices (up to 60%) followed by gunshot wounds. Chest or abdominal injuries (40%) and traumatic brain injuries (35%) were the main causes of death for soldiers killed in action.

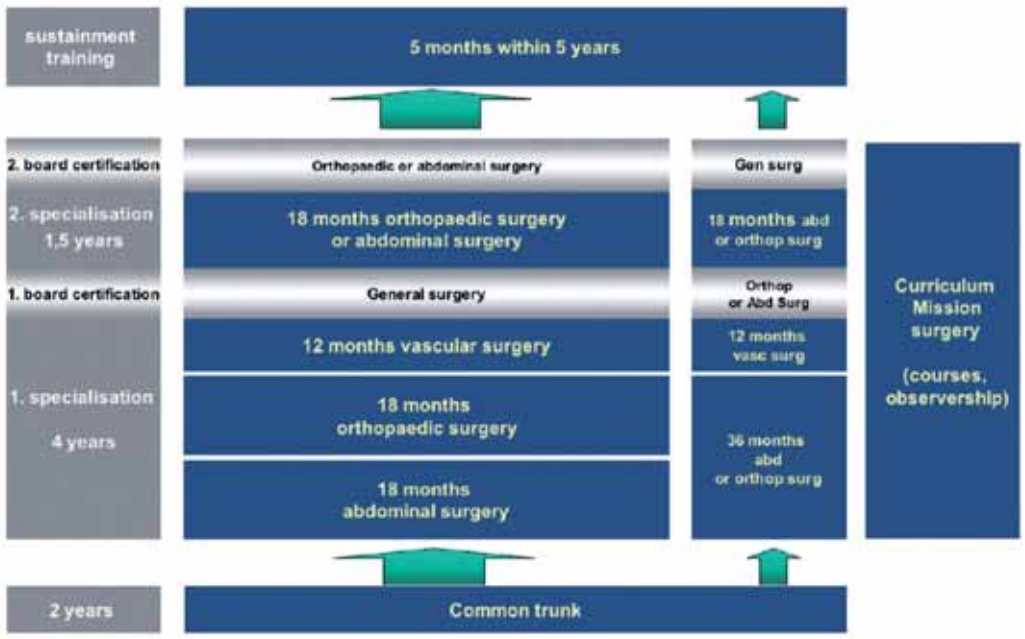
The analysis of all surgical procedures performed in Northern Afghanistan demonstrates that most of the patients who underwent surgery until 2009 were local civilians. Most of these operations involved osteosynthesis and soft tissue débridement. Due to the recently aggrevated tactical situation within the theatre a significant increase of mass casualty (MASCAL) situations and combat related injuries was noticed. The casualties in this military conflict present with injury patterns that are not seen in routine surgical practice at home.

The German Bundeswehr Joint Medical Service need to adapt to the challenges represented by the act instituted in 2004 for the purpose of reforming the German health system (Gesundheitsmodernisierungsgesetz). There are necessarily consequences as the result with regard to the qualifications and training that future military surgeons will require. A concept is outlined in this part of the article that, when implemented, will ensure that surgical personnel trained in accordance with the needs of the current civilian qualification requirements will be available for service abroad, while the new generation of surgeons will be adequately prepared to adapt to the changing health market and have the skills necessary to conform to civilian medical requirements long term.

In an era of increasing surgical sub-specialization the deployed military surgeon needs to acquire and maintain a wide range of skills including a variety of surgical fields. In order to create this kind of military surgeon the so-called "DUO plus" model (Fig. 1) for the training of military surgeons (specialization general surgery plus a second sub-specialization either in visceral surgery or orthopedics/trauma surgery) has been developed in the Joint Medical Service of the German Bundeswehr. Other relevant skills, such as emergency neurotraumatology, battlefield surgery with integrated oral and craniomaxillofacial surgery, and emergency gynecology are also integrated into this concept and will be addressed in special courses:

Courses/Tutorials and the theoretical training programme: Additional (therefore DUOplus) medical and military-relevant skills will be taught in courses provided during the training programme; these will include:

- Sonography (during “common trunk”) and emergency room treatment (e.g. Advanced Trauma Life Support (ATLS®)
- Basic osteosynthesis techniques according to Osteosynthesis Working Group (AO, Arbeitsgemeinschaft für Osteosynthesefragen) (during “common trunk”)
- Course Emergency Neurotraumatology in the field (during specialist training)



Future training programme for military surgeons based on the so-called "DUOplus" model (specialisation in general surgery plus second specialisation – either visceral surgery or orthopaedic/trauma surgery).

- Emergency and acute care surgery courses (e.g. battlefield surgery courses with integrated orofacial maxillary and neurotraumatological components, course in gynaecology, DSTC® course, penetrating trauma surgery course in foreign countries (after qualification as a specialist in general surgery).

Log books have to be kept in accordance with the training curricula to register the progress of training. Teaching personnel will document the completion of each training phase by medical officers. On successful completion of the programme, medical officers will be officially appointed as Medical Officer "Einsatzchirurg" by their commanding officers. This appointment will be for a maximum of five years and it will be necessary to renew it after this period:

Requirements for the Preservation of Competence. Once the trainees have acquired a qualification as a military surgeon, it will be necessary for them to practice extensively in their particular disciplines long term. If they are to preserve the acquired skills, regular practice in those disciplines in which they are not routinely engaged as part of their work will be necessary. The general plan is to require that they participate in five-month refresher programmes every five years. On successful completion of each refresher programme, the appointments of military surgeons will be extended for a further five years. Refresher programmes will require participation in visiting surgeons' programmes in the complementary surgical disciplines in order to retain the essential skills in them (e.g. an orthopedic surgeon will be required to receive training in the disciplines of thoracic, visceral and vascular surgery). It is not of primary importance whether this takes the form of participation in relevant surgical operations (e.g. the visceral surgeon would participate in combat relevant arterial reconstructions undertaken by the department of vascular surgery) or several weeks of experience of working as a visiting surgeon. The focus will be placed on the acquirement of the related skills (diagnosis, indication, approach technique, arterial vessel reconstruction by means of bypass, vascular anastomosis and suture techniques). In order to ensure that surgeons retain their skills and their appointments, they will also be required to repeat the field surgery and battlefield surgery courses in a five-year cycle. Specifically, these will be the courses in neurotraumatology, battlefield surgery with integrated orofacial maxillary and neurotraumatological components, participation in visiting surgeons' programmes and e.g. the DSTC® course

On successful completion of this training program military surgeons will be officially appointed as "Einsatzchirurg" for a duration of 5 years. After this time it will be obligatory to renew this „combat ready" status. The refresher programs will require participation in visiting physician programs in the complementary surgical disciplines in order to retain the essential specific skills.

Keywords:
Combat injuries, military surgery, injury patterns, training program

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Radiological Management of Polytrauma Patient and Possibilities of Interventions

Aniko Palotas, Gabor Forrai PhD, Ágnes Stefán MD

Aim:

In this presentation we would like to present the radiological diagnostic strategy and examination protocols in polytrauma patient. We show diagnostic modalities that provide the quickest and most accurate diagnosis of a wide range of injuries in the mentioned cases. We summarise the thoracic injuries, their radiological signs, and facilities of intervention.

Description:

The standard definition of polytrauma is not sufficiently objective; there are at least two injured body regions of which one is potentially fatal. It is important to emphasise that, the clinical management of major trauma patient is team-work. Close cooperation is needed among specialists, such as ED, traumatologist, anaesthesiologist, radiologist etc. Good polytrauma imaging is more than giving an accurate description of specific injuries, and requires highly efficient logistic, diagnostic algorithms and examination protocols.

The available diagnostic modalities for the accurate diagnosis are usually the conventional radiography, ultrasound, MDCT and catheter angiography. Although MRI is the most accurate modality in diagnosis of the injuries of brain and spine, it is rarely used because it is a slow examination. For the observation of a seriously injured patient MR compatible equipments are needed and off duty this examination isn't accessible. The role of conventional radiography / X-ray/ in this setting has steadily decreased, while the use of whole body MDCT has become more common.

Ultrasound in cases of major trauma is usually performed by a FAST examination. This type of examination provides a quick overview of the peritoneal cavity, pleural and pericardial spaces to detect free fluid. US can help to determine whether immediate surgery is needed. When this examination is performed correctly by an experienced doctor, it takes no more than 5-10 min.

MDCT is the chosen imaging method in hemodinamically stable trauma patient. These scanners rapidly produce high-resolution scans of large region, such these examinations include the head, cervical spine and from thorax to pelvis. The injection of contrast material is essential to detect injuries of thorax, abdomen and pelvis. Furthermore multiplanar and volumetric CT images provide improved visualisation of injuries and increased understanding of trauma-related diseases.

Injuries to the thorax are the third most common injury in trauma patient, besides injuries of the head and extremities. The chest radiograph is usually obtained as the initial imaging evaluation. This examination frequently underestimates the severity and extent of chest trauma. CT is far more sensitive than radiograph for detection of pulmonary, pleural and osseous abnormalities, and essential to assess pericardial fluid, airway and esophageal injuries. CT can document sites of active thoracic bleeding or vascular injury and can play a valuable role in delineating the trajectory of penetrating injury. Angiography remains a potential problem solver for uncertain CT results, to stop bleeding, and for planning and guiding endovascular stent-graft placement.

Penetrating injuries to the chest can be caused by stabbing or gunshot wounds. All stab wounds are considered as low energy injuries. Unlike injury to the chest wall, pleura, and lung transmediastinal knife and gunshot wounds that enter within the tight confines of mediastinum are associated with injuries to vital structures. Usually, as compared to low energy stab wounds, gunshot tracks create large amounts of hemorrhage, air, bone and metal fragments.

Radiological intervention in patients, who have sustained thoracic trauma has evolved significantly in the past decade. The classic approach to the repair of contained rupture due to blunt thoracic trauma is open surgical repair. The use of endovascular techniques in blunt and penetrating trauma is likely to expand because of the significant advantages that these techniques offer contrary to open repair. The potential advantages of these techniques include speed, reduced anaesthetic time, lowered morbidity, such as blood loss, paraplegia and level of invasiveness, and decreased mortality. Continuous improvements in stent graft technology have facilitated the use of endovascular techniques for definitive treatment of traumatic vascular injury.

In conclusion the multislice CT is the first modality in the imaging of polytrauma patient and chest injury. This possibility not only leads to accurate diagnosis, but also helps to plan the therapeutical interventions.

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Prehospital management of severely injured trauma patients, based on the ITLS® principles

Cpt. Eleonora Kovacs MD

Aim:

My presentation is intended to give a global overview on the updated principles of on-scene prehospital care of severely injured trauma patients highlighting those who have suffered life threatening chest injuries.

For the severely injured patient survival is time dependent. That is why it is essential to use a planned, logical and sequential manner in rapid assessment, resuscitation, stabilization and transportation of trauma patients.

Our goal is to keep "the platinum 10 minutes" in prehospital care of severe trauma patients by using an internationally accepted evidence based method and standard as defined for example by International Trauma Life Support® (ITLS®)

Description:

Trauma is the leading cause of death for individuals between 5 and 45 years of age and remains the fourth leading cause of death for all ages combined

Trauma accounts for 10% of all death. In 2002 800 000 deaths were due to trauma in Europe (8,3% of all death). Half of the early death occurs on scene and 30% in the first 24 hours of the hospital phase. Half of the early death is due to CNS injuries while the other 30-50% is due to major bleeding. Experience shows 48% of early death is potentially preventable by an early and adequately secured airway, the adequate treatment of critical chest injury and correct shock therapy.

Since traumatic injuries mostly affect the young and otherwise healthy population, it is essential for all emergency medical personnel to learn more about this disease to treat its effect and decrease its incidence.

For the severely injured patient, survival is time-dependent. The survival rate partly depends on the time within which the severely injured patient can have access to an operating room. The highest survival rate was achieved if the patient arrived in an operating room within one hour. This is referred as the "Golden Hour". The "Golden Hour" begins at the moment of the injury event. In the prehospital setting you do not have a "Golden Hour", rather a "platinum 10 minutes" in which you have to identify live patients, make treatment decisions and begin to move patients to the appropriate medical facility.

According to studies the survival rate of critically injured trauma patients was worse when ALS- level EMS teams provided on-scene treatment when compared to BLS teams. This is mainly due to the time spent on scene. Performance of advanced interventions requires more time. Unfortunately these interventions are not always life-saving, but unduly elongate the time spent on scene.

Based on the previous statements the need for organized trauma systems and protocols is obvious in order to carry out a correct patient assessment, resuscitation, stabilization and transportation within a short timeframe. Every action must have a lifesaving purpose. Any actions that increase scene time but are not potentially lifesaving must be omitted.

"International Trauma Life Support® is a global organization dedicated to preventing death and disability from trauma through education and emergency trauma care."

It was founded in 1985 on the name Basic Trauma Life Support®. ITLS® adopted its new name in 2005 to reflect its global role and impact. It is accepted internationally as the standard training course for prehospital trauma care. Today ITLS has more than 75 chapters and training centres worldwide. The following ITLS courses exist:

ITLS Basic and Advanced, ITLS Access, ITLS Military, ITLS Paediatric, instructor and refresher courses.

The first ITLS Advanced course was organized in October 2007 in Hungary. Colleagues from the ITLS Germany chapter came to train us thanks to the invitation of Dr László Gorove, deputy director of the Hungarian National Ambulance Service (HNAS). Courses are held 3-times a year in Hungary. There are now more than 120 doctors and paramedics working in prehospital care who have completed the course. A new HNAS guideline focused on the prehospital care of severely

injured patients was published in December 2008. This guideline incorporates the ITLS principles.

ITLS patient assessment is the base of making correct decisions in order to provide the best care for critically injured patients on scene. The **ITLS Primary Survey** is made up of the *Scene Size-up* (following standard precautions- such as using personal protective equipment, finding a safe place for stopping the ambulance vehicle etc, taking into account scene hazards, doing an initial triage, sizing up and calling for more help or equipment if needed, assess the mechanism of injury) and an *Initial Assessment and Rapid Trauma Survey*. We must have all the equipment we need in hand as we get out of the ambulance on scene. These are: personal protection equipment, backboard with strapping and head motion-restriction device, cervical collar, airway kit (oxygen, masks, basic and advanced airway equipment, BVM, suction), Trauma box (adult or paediatric containing stethoscope, dressings, pleural decompression set, tourniquets)

The *Initial Assessment* is a very brief exam of LOC, general impressions and (c)ABCs. The *Rapid Trauma Survey* is a structured, rapid head-to-toe exam to determine if *immediately life threatening* conditions exist and to identify those patients who should have immediate transport. While this is carried out, one team member should take a brief patient history according to "SAMPLE".

You will see *Rapid Trauma Survey* in detail on a figure and in practice on a video.

If the mechanism of injury is not generalized (car crash, fall from a height etc.) and a patient is conscious a *Focused Exam* could be carried out instead of the *Rapid Trauma Survey*.

If we have a trauma patient in a critical state we need to perform an **Ongoing Exam** every 5 minutes to recheck vital signs and anything which could have changed, including: neck for JVD, trachea dislocation, breath sounds, heart sounds, abdomen, brief neurology (LOC, pupils, GCS) identified injuries and the interventions we made before.

If we have time en route to hospital we have to perform a **Secondary Survey** to detect all injuries, not only the life threatening ones.

If we complete the *Initial Assessment* and *Rapid Trauma Survey* or *Focused Exam*, enough information is available to decide if a critical situation is present. If this is the case, our patient is a "load-go-and treat" patient. This means the patient needs to be transported immediately to the nearest, appropriate medical facility. Most treatment interventions will be done during transport. Patients are "load-go and treat" if they have any of the following:

Initial Assessment findings: altered mental status, abnormal respiration, abnormal circulation (shock, uncontrolled bleeding)

Signs discovered while performing *Rapid Trauma Survey:* Abnormal chest exam (flail chest, open ("sucking") wound, tension PTX, massive haemothorax), tender, distended abdomen, pelvic instability, bilateral femur fractures. Significant mechanism of injury and /or poor general health of the patient may lead to a decision to treat the patient as "load-go-and treat" even if he or she was found to be stable after performing the ITLS Primary Survey.

The following life-saving procedures are done at scene, parallel to the ITLS Primary Survey. These tasks can be delegated to team members:

- Manage the airway
- Assist ventilation
- Administer oxygen
- Begin CPR (if applicable)
- Control major external bleeding
- Seal sucking chest wound
- Stabilize flail chest
- Decompress tPTX
- stabilize impaled objects
- complete packaging of the patient (Spine motion restriction device)

In the table you can see a brief summary of prehospital interventions in case of severe trauma on the levels of ABCDE-approach.

Airway	Secure airway. Always start with the most simple and fastest methods (manoeuvres, OT, NT devices, suction), choose advanced interventions if previous ones have failed. If ET intubation is needed (ie. GCS=<8), perform it en route if the patient has a secure airway with basic interventions and can be ventilated with BMV while completing the Primary Survey.
Breathing	Decompress tPTX if applicable. Assist ventilation (if RR <8 or ineffective). The appropriate rate is 8-10/min. If signs of cerebral herniation (TBI) (after correcting hypotension and/or hypoxia): a slight hyperventilation (20/min in adults) could be favourable (etCO2: between 25 - 30 Hgmm). Give high-flow oxygen through non-rebreather mask if breathing laboured, consider administering high-flow oxygen to all severely injured patients.
Circulation	Control external bleeding: bandage, direct pressure, splinting extremities. *Low volume shock (blood loss)*: Position the patient. Control bleeding, Give oxygen, ensure early transport. If bleeding has been controlled: insert a large-bore iv line and give a bolus of 20ml/kg

	fluid, then reassess, repeat bolus if needed. Monitor patient (EKG, NiBP, spO2, etCO2). Repeat Ongoing Exam If bleeding cannot be controlled: External bleeding: direct pressure on the bleeding site, position the patient/extremity, and apply tourniquets, hemostatic agents, high flow oxygen and rapid transport. En route IV access, crystalloid infusion (small boluses: 2ml/kg) according to "permissive hypotension": target systolic BP: 80-90Hgmm (palpable peripheral pulse) except for patient with history of hypertension or patients with TBI+shock). Consider using fluids containing hypertonic saline (such as HyperHAES®). Monitor patient (EKG, NiBP, spO2, etCO2) Repeat Ongoing Exam Internal bleeding: See uncontrolled external bleeding
Disability (Neurology)	*Severe head injury* (GCS<9) + shock: stabilize ABC: O2 saturation must be kept above 95%. Give volume (20ml/kg) target syst BP:110-120Hgmm (keep CPP>60Hgmm). Consider using fluids containing hypertonic saline (such as HyperHAES®). Record baseline observations, carry out frequent Ongoing Exams (MS-LOC, GCS, pupils) Check blood glucose if altered mental status! *Spinal injury:* Stabilize ABC, if neurogenic shock, give 20ml/kg fluid, consider vasopressors. Proper spine motion restriction is important.
Environment, Exposure	Proper packaging of the patient is essential to prevent hypothermia and its complication known as the "deadly triad"

At the end my presentation I will highlight the role of prehospital emergency professionals and summarize the application of ITLS principles in the proper treatment of the trauma patient who has suffered a SEVERE CHEST INJURY.

If we arrive on scene and perform a proper Scene Size-up we have to think about chest injuries according to the mechanism of injury.

The major symptoms of chest injury are shortness of breath and chest pain. On inspection we can find hemoptysis, cyanosis, distended neck veins, tracheal deviation, asymmetrical chest movement, chest wall contusion, wounds, subcutaneous emphysema and shock. Palpation may reveal tenderness, instability and crepitation. Listen to the lung fields for the presence and equality of breath sounds.

Life threatening thoracic injuries should be identified during the **ITLS Primary Survey:**

airway obstruction, open pneumothorax, flail chest, tension pneumothorax, massive haemothorax and cardiac tamponade.

In case of upper abdominal injuries chest injury could also present.

Other life-threating injuries are more likely to be detected during the **ITLS Secondary Survey** or in the hospital. These are: myocardial contusion, traumatic aortic rupture, tracheal or bronchial tree injury, diaphragmatic tears, esophageal injury and pulmonary contusion.

In the on-scene treatment of severe chest injuries we have to secure the airway, assist ventilation if needed, give high-flow oxygen, decompress decompensated tPTX using large bore IV canule (14G) or a special set (Pleurocath®), close sucking chest wound with a plastic dressing (produce a flutter valve or use special one-way valve chest seal (Asherman Chest Seal®), stabilize flail chest with bulk dressings or infusion sack taped to the chest wall, stabilize impaled objects (such as knife in penetrating injury). Patients suspicious for massive haemothorax or signs of cardiac tamponade have to be rapidly transported to the operating room, on–scene treatment could be symptomatic only.

We need to initiate rapid transport while notification of the targeted medical facility is essential. En route we insert a large bore IV line and initiate infusion therapy which should be applied according to "permissive hypotension". The patient needs to be monitored en route (ECG for arrhythmias, P, NiBP, spO2, etCO2) The Ongoing Exam should be completed every 5 minutes in order to record and treat any deterioration in the patient's condition.

Conclusion:

Time is important in the on-scene treatment of severely injured trauma patients. Applying organized trauma systems and protocols help us to carry out a correct patient assessment, resuscitation, stabilization and transportation within a short timeframe.

Every action must have lifesaving purpose. Any actions that increase scene time but are not potentially lifesaving must be omitted. If you fail something twice do not attempt it a 3rd time! Use the simplest and fastest method first to ensure the best for your patient within the shortest time.

Training and courses are essential to keep up with guidelines and recommendations and practice is important to be well-trained and up-dated.

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Advanced trauma life support

Laszlo T. Hetzman MD

Aim:

After the lecture (especially after completing an ATLS® course) the student should be able to see, manage severe trauma in a universal way, by a common knowledge, approved by the ACS (American College of Surgeons), avoiding any major mistakes and doing what is best for the trauma patient according to our current knowledge.

Description:

ATLS® (Advanced Trauma Life Support) was born in 1976, the idea came from an unfortunate, tragic incident. James K. Styner MD, an orthopaedic surgeon, after crash landing his own plane in Nebraska with his family on board, he had to face the real trauma service in the U.S. at that time. His wife died instantly after the crash, and 3 out of his 4 kids were severely injured. On the field he provided what he could with basic medical equipment and brought his kids to the nearest hospital. To his surprise the hospital was totally incapable to handle trauma, even on a very basic level. So, he gave up his carrier as an orthopaedic surgeon and started out

the courses, known today as ATLS®. The first course was held in 1980, nowadays the ATLS® is an ACS (American College of Surgeons) approved course, every 4 years they refresh the ATLS® knowledge according to current trauma science and renew all the course materials.

The main goal of ATLS® was to create or reinvent the current trauma service provided by doctors in hospitals. The idea was to equipe each person with the full knowledge to be able to alone, support a trauma patient in a professional way. Basically the course was made for doctors who should be able to manage severe trauma. The course gives a universal language to those who work with trauma patients, might it be a trauma surgeon, general surgeon, anaesthesiologist or emergency physician.

The course teaches the way to examine, treat and re-evaluate in a time and severity centered way. The patient management has been divided into two parts, the primary and the secondary survey part. In the primary survey, the most important steps are to manage life threatening conditions such as airway obstruction, tension pneumothorax, heavy bleeding, etc., in a time sensitive coreography. We treat first, what kills first as they say. We start with airway, breathing, circulation, disability and finally exposure. These give the well known ABCDE of the primary survey. At this stage we use only limited equipment. After the necessary life saving surgeries, only on a hemodynamically stable patient we can continue to the secondary survey. This latter is a top to toe examination, this stage we get a very detailed picture of the patient's current condition and injuries after solving the immediate life threatening diseases in the primary survey, the key is always the hemodynamic stability. Instability in this matter is usually the indication for surgery, in opposite a stable patient can undergo a lot more examinations and usually ends up without surgery, in observation.

In the ATLS® knowledge you will find special parts on pregnant women, kids, elderly, hostile environment, also you will find a special edition on Prehospital Trauma Life Support (PHTLS®) and even a military PHTLS®. So, altogether these deal with trauma in all scenarios and situations.

It is also well known that countries having regular ATLS® courses, have the best mortality rates in trauma, and the decrease in this ratio could easily be recognized in countries joining the ATLS® family. Finally, I think everyone with any interest in trauma management should complete a real ATLS® course to ensure the maximum efficiency and safety of patient management, this lecture is to shed light on all you will miss if you do not attend one in the future.

References, Bibliography and WebPages: ATLS® student course manual 7th and 8th editions

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New aspects in airway management

LtCol Dr. med. Andreas Schwartz

Several new technical devices to facilitate airway management had been introduced within the last years. This includes different extraglottic devices, fiberoptics and video-technology.

Due to the fact that mismanagement of airway leads to fatal consequences, like hypoxia or dead in up to 85% and the fact that 75% of these cases had been estimated as avoidable we are forced to find new aspects in airway management.

Therefore it is important to estimate airway-management as a global issue, including awareness of the problem, the provision of a situation adapted airway-algorithm and the familiarisation with new technical aspects. The implementation of an algorithmus adapted to the own setting is essential. In military scenarios airway management will be found in multiple varieties concerning skills of the provider and levels of threat so that a "one-fits-all" solution can not be recommended.

In prehospital settings difficult airway will be found more frequently. The incidence "difficult airway" (Cormack & Lehane 3-4) can be found in 3,9% in elective in-hospital induction and in 15,2 - 19,2% in emergency prehospital settings.

New technical aspects include several extraglottic devices and videolaryngoscopy.

Extraglottic devices are meanwhile recommended by several professional societies like the American Society of Anaesthesiologists (ASA), the Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin (DGAI) and the European Resuscitation Council (ERC). The advantage is that they may be inserted blind, provide improved Airway-protection with a sufficient seperation of airway and intestinal tract. The success rate of CPR (ROSC) is improved compared with mask ventilation due to the increased number of chest-compressions. The incidence of aspiration is decreased.

Main limitations in application of extraglottic devices are reduced mouth-opening and obstructed glottic access by foreign bodies, swelling or tumor. Adaequate positioning and sufficient ventilation must be verified. The optimal application depends more on the experience of the provider than the type of extraglottic device. For successful usage one device should be implemented, a device with possibility of endotracheal intubation should be considered.

With videolaryngoscope-technology the optical visualisation of the larynx is facilitated. Current data indicates that the proven advantage of the in-hospital use of videolaryngoscopes may be transferred to prehospital setting The advantage compared to conventionally laryngoscopy is that the need of a direct optical axis to visualize the larynx is not essential any more. Some studies describes difficulties with Intubation despite good visualization. This carries the dangerous pretension of an easy intubation and the solved problem of the difficult airway.

To define the optimal profile required for a videolaryngoscope different technical requirements must be met. The "perfect" Videolaryngoscope should fulfil a number of requirements for this special setting.

It must fit for all categories of patients. The blade should be designed in a way that allows both, indirect and direct laryngoscopy. The use of a "Macintosh-like" blade design offers advantages in the prehospital setting.

The monitor should be small and handy, low of weight and resistant against artefacts, blinding effects caused by bright light, direct solar irradiation or rain reflexion. The device must be suitable for the daily use in any aspect. It must be reliable, operational ready without any time delay, resistant against environmental influences and be easy and safe to use and operate for any user even under stress conditions. The energy source must be reliable, long acting, robust and keep its energy regardless of environmental changes. Hygienic simplicity must be balanced against costs and environmental matters. "The videolaryngoscope" that fulfils all expectations is not jet found.

The us of Videolaryngoscopy does neither replace a functional difficult-airway-algorithm nor the practical experience in management of difficult airways.

Despite many technical progresses the management of the difficult airway remains still a challenging task.

LtCol Dr. med. Andreas Schwartz
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The Open Abdomen 2011 in War and Catastrophes: Indication, Strategies, and Modern Temporary Closure Techniques

Col. Prof. Dr. Horst Peter Becker, MBA

In war and catastrophes, abdominal injuries occur in 10-15% of the cases. A greater part of them sustain life-threatening injuries requiring damage control procedures including the open abdomen. Over the last 15 years, the contemporary strategies to treat the open abdomen have increased the overall survival rate of the patients. Systematic intensive care and modern wound manage¬ment in conjunction with a plastic barrier to protect the viscera and topical negative pressure on the soft tissues have reduced the development of lethal complications. The aim of the lecture to be presented is to give a systematic overview of the indications and the different technical solutions for the open abdominal treatment with respect to war and disaster situations. The literature selected for this review shows that the surgical handling of the exposed bowel, the choice of the material for temporary coverage and early progressive closure of the defect are crucial for the prevention of fistulas and further complications. At present, surgeons worldwide have adopted these principles leading to an increase of primary or delayed closure rates. This progress in surgical techniques has influenced the methods of war and catastrophy surgery as well.

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Thursday 07 April 2011

Cadaver practice session

Laszlo T. Hetzman MD.
Sandor Pellek MD

Aim:

To provide hands on experience for all students on cadavers to practice invasive procedures.

Description:

A cadaver practice session (including 4 cadavers for 4 small groups), for practicing invasive clinical techniques with supervision of experienced instructors. Practices included the following:

- vein preparation
- i.o. line insertion (sternal, malleolar, tibial)
- central line insertion
- emergency conicotomy
- needle chest decompression
- pericardiocentesis
- thoracostomy
- chest tube insertion
- emergency thoracotomy

References, Bibliography and WebPages:

ATLS® student course manual 7th and 8th editions
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US Air Force Special Operations Surgical Team: A SOF Role 2 Capability

LtCol Kristen J. Beals, USAF, MC, FACS

The US Air Force Special Operations Command (AFSOC) has developed highly mobile, small unit surgical and critical care evacuation teams that can be rapidly deployed for contingency operations into austere environments. These teams are trained to augment any SOF force across the full-spectrum of missions they may execute. I will introduce these teams, the Special Operations Surgical Team (SOST) and Special Operations Critical Care Evacuation Team (SOCCET), give a brief history of their development and past missions, and discuss their future in NATO and coalition operations.

LtCol Kristen J. Beals, USAF, MC, FACS
General Surgeon-Landstuhl Regional Medical Center

Impairments of blast injuries

LTC L. Várhelyi, MD

Purpose

Nowadays, the importance of blast injuries is growing due to local war conflicts and expanding terrorism. The main source of injuries are explosive devices and antipersonnel mines on war scenes and terroristic attack sites. In peacetime industrial and military accidents and petards cause te most of blast injuries.

Authors present the types of blasts, characterisctics and types from primary to quinary blast injuries. The principles of treatment are also presented. The purpose is to perform immediate life saving and damage control also at mass casualty care. These procedures need surgical trauma teams with wide ICU surroundings.

Material and methods

As members of SFOR, ISAF and KFOR military medical forces the authors present number of blast casualties of missions in Afghanistan and former Yugoslavia and some cases with blast injuries in Hungary in peacetime. The sources of war injuries were improvised explosive devices, suicide bombs, rocket propelled grenades and land mines. In some cases manufactured petards and home made explosive materials caused injuries. Our standardized practice of blast injuries is also presented. Multiple injuries at blast determine the priorities and steps of treatment:

1. Anti-shock procedures, monitoring. Ventillation, tracheostomy if necessary. Massive fluid therapy (colloids, cristalloids). Investigation of lung injuries (CXR, CT scan). Chest tube if necessary.
2. Investigation of bleeding sources
3. In case of penetrating injury an inmediate exploration. Stop bleedings.
4. Surgical treatment of limb injuries

Results

Prehospital care performed by MedEvac after triage and the early damage control surgery for life saving by experienced trauma teams resulted diminished mortality at blast survived patients.

Conclusion

Due to growing number of blast survived patients the special training of treatment of blast injuries must be a part of trauma education for both physicians and paramedics.

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Thoracic Injuries / Thoracotomy: Pain Relief

Lt Col Tibor Pataki MD FRCA DEAA

Aim: The participant will learn about the detrimental effects of pain and about the importance of effective multimodal pain relief. The presentation gives detailed guidelines of the various analgesic methods.

Description:

- *Pain after thoracic injuries*
- fractured ribs
- thoracotomy incision – one of the most intense painful stimuli
- chest drains – pleura, chest wall
- coughing

CRITICALLY IMPORTANT: MULTIMODAL ANALGESIA

- *Negative effects of pain*
- Increases postoperative catabolism
- Elicits a neuroendocrine stress response resulting in: immunosuppression
  increased oxygen consumption → myocardial ischemia
  delaying reestablishment of GI motility
- Inhibits patients' movements / coughing

- Significant connection between intensity of acute postoperative pain and occurence of *chronic* postoperative pain → 22 - 67% after thoracotomies!

- *Multimodal pain relief*
- Systemic opiates
- Paracetamol
- NSAIDs (non steroid antiinflammatory drugs)
- Local anesthetic agents
- Local anesthetics and opiates

- *Patient controlled analgesia*
- Loading dose (titrating individual requirements)
- Bolus (mg): morphine 1-2, pethidine 10, tramadol 10, fentanyl 0.02
- Lock out time: 5 min
- Continuous infusion: usually not set
- 4 hrs maximum dose: morphine 30 mg (equipotent doses)
- Antiemetic agents:

haloperidol	2 mg,
ondansetron	4 mg
droperidol	2.5 mg / 50 ml

SEDATION MONITORING NECESSARY

- Local anesthetic agents
- *epidural*
- the gold standard
- bilateral
- hypotension possible
- dural puncture
- intravasal administration
- contraindicated in coagulopathy
- Th 4 – 8
- 6 – 8 ml / 5-7 segments
- 0.2 – 0.3 % ropivacaine
- 0.125 – 0.25 % bupivacaine

- *paravertebral*
- gaining popularity
- unilateral
- hypotension rarely
- pneumothorax
- ED/intrathecal puncture
- intravasal administration
- not?
- 15 ml / 5 segments
- same agents

- *Spinal opiates - continuous infusion*
- Lipophilic agents are easy to titrate:
  fentanyl 2 - 5 µg / ml, sufentanil 0.5 - 1 µg / ml
  + 0.125 % bupivacaine or 0.2 % ropivacaine
  6 - 10 ml / h
- *PCEA*
  continuous infusion 4 - 5 ml / h
  bolus 2 - 3 mls
  lock out time 10 - 20 mins

- *Epidural catheter and anticoagulation*
- ticlodipin : 10 – 14 days pause
- clopidogrel : 7 days pause
- LMWH : 12 hrs pause (insertion / removal)
- INR < 1.5
- acetylsalicylic acid: no effects

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NATO Centre of Excellence for Military Medicine (MILMED COE)

The change of the security environment caused the need of accelerated adaptation of NATO to the new global security threats. In this process and due to limited national resources the individual countries aim to develop and build certain forces and core capabilities, which are given for the benefit of other members of the Alliance. The important step from "Multinationality" to "Interoperability" is the central precondition for a burden sharing in future NATO deployments. Maybe even more as for the other forces this is valid for the military services of the Alliance. Not only budgetary reasons but also unambiguous stakeholders' expectations towards the high quality of military medical support in mission require a joint approach based on the commitment of the nations. In this context the MILMED COE is one valuable asset to foster multinational solutions and to enhance future interoperability within the Medical Services of NATO.

MILMED COE Vision and Mission

The mission of the MILMED COE is:

- To be a state-of-the-art knowledge centre and serve as a primary source of expertise of NATO's medical community in all relevant aspects of medical support to operations.
- To support and assist the Strategic and Force Commands, the NATO nations and other civil and military bodies by facilitating medical support to operations through subject matter expertise in the following areas:
- Medical Training and Evaluation
- Medical LL focusing on tactical aspects
- Standards development and custodianship

Medical training and education

Within the NATO MILMED COE the Training Branch is one of the three medical branches. It is responsible for Education, Training, Exercises and Validation.

The Branch plans, organizes and conducts courses, trainings; furthermore it is able to support the NATO MILMED COE Sponsoring Nations with contribution to plans of medical related exercises. Beside the aforementioned, the branch is able to support NATO and Nations with Mobile Training Teams, Military-Medical Subject Matter Experts and development of distance learning system.

Trainings and Courses

In accordance with its mission and Programme of Work the Training Branch offers several valuable military medical courses and trainings for NATO/PFP/Other Nations. The actual offers, dates and terms of reference are available at www.coemed.hu webpage or more information can be requested from Training Branch Chief, training@coemed.hu.

The courses and trainings are open for all medical personnel assigned to NATO/EU/UN deployment or positions closely connected to multinational cooperation at the area of military medicine. The courses and trainings are accredited by Semmelweis Medical University (Budapest, Hungary); their NATO accreditation is in progress.

NATO Centre of Excellence for Military Medicine
Actual Courses and Training 2011 - 2012

Emergency Management of Battlefield Injuries Course (COE-MED – M4 – 001)

Description: The course focuses on the clinical aspects of management and treatment of trauma casualties in missions. Within the course the curriculum include an airway management workshop and a practical training on cadavers.
Target Audience: Medical doctors and nurses to NATO/EU/UN deployments dealing with emergency management of wounded
Dates: 4-8 APR 2011 26-30 MARCH 2012

Major Incident Medical Management and Support (MIMMS) Course* (COE-MED – M4 – 002)

Description: In case of a major incident (disaster), it is of great advantage or even necessity if all personnel involved in the medical support of such a major incident apply the same standardized procedures and techniques. This course was established to find a NATO Standard Approach for dealing with major incidents. The course focuses to provide the knowledge and skills needed to effectively manage the scene of a major casualty incident in a military environment.
Target Audience: Military Officers, Warrant Officers and Senior NCOs or civilian equivalents of an arm likely to be involved in the management of major incidents.
Dates: 17-19 MAY 2011 and 25-27 OCT 2011 20-24 FEB 2012 and 24-28 SEPT 2012

NATO Medical Evaluation (MEDEVAL) Course (COE-MED – M4 – 003)

Description: Future medical support to NATO forces will be mostly provided in a multinational approach due to limited national resources. Thus it has to meet qualitative and quantitative standards acceptable to all participating nations and to be delivered sustainably. The mentioned standards are capability based and described in the AMedP-27 as the baseline for certification of Multinational Medical Units (MMU). The NATO Medical Evaluation (MEDEVAL) Course is mandatory for Multinational Medical Unit (MMU) Multinational Evaluation Team (MET) Members.
Target Audience: Appropriately qualified staff from NATO Command/Force Structure, Lead Nation (LN) and Troop Contributing Nations (TCNs) primarily involved in evaluation and certification of MMU assigned to a NATO Command. In addition anyone involved in military medical education, training and evaluation.
Dates: 21-25 FEB 2011 and 26-30 SEPT 2011 20-24 FEB 2012 and 24-28 SEPT 2012

Medical Standardization Course (COE-MED – M4 – 004)

Description: The course focuses the NATO doctrine development and standardization process with details on medical related matters
Target Audience: Medical personnel primarily engaged in national medical doctrine development and standardization; NATO COMEDS Working Group (WG) delegates; medical standardization specialists from NATO/EU bodies; other interested audience.
Dates: 22-23 MAY 2012

First Responder Training

Description: The training preparing the instructor responsible for organize and conduct the training of military personnel involved in management of battle casualties with trauma at advanced first aid level (airway management, hemorrhage control etc.)
Target Audience: Appointed trainers dealing non- medical personnel for deployment in NATO/EU/UN missions.
Dates: 20-23 MARCH and 4-6 SEPT 2012

** According to ACO directive 83-1: "... Where there are multiple casualties, Major Incident Medical Management and Support (MIMMS) principles are to be used..." For more information please visit: www.coemed.hu*

Authors *(in order of appearance)*

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