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Military Experts Provide Civilian Surgeons with Guidance on Handling Bomb Blast Injuries

Hospitals all over the world, need to be aware of how to treat emergency blast injuries and military surgeons can provide valuable knowledge and advice to their civilian counterparts based on their experience of battlefield injuries. That is the driving force behind two papers published online by BJS, the British Journal of Surgery.

"The current inquest into the 2005 London bombings -- and the recent international security alerts -- provide a timely reminder that surgeons could be called on at a moment's notice to deal with blast injuries" says consultant surgeon Mr Jonothan Earnshaw, joint Editor-in-Chief of the journal. "That is why we believe that these papers are required reading for any surgeons who could find themselves dealing with the aftermath of a terrorist attack."

Military surgeons from the Royal Centre for Defence Medicine at the Queen Elizabeth Hospital Birmingham, UK, reviewed all cases of vascular trauma in battle injured service personnel over a five-year period ending January, 2008. They used data collated by the Joint Theatre Trauma Registry, which covers all members of HM Armed Forces who have received acute trauma care as a result of the conflicts in Iraq and Afghanistan.

They found that 110 of the 1,203 patients sustained injuries to named vessels and that 60 per cent died before there was an opportunity for surgical intervention, including all 25 patients, who sustained major vascular injuries to the abdomen or thorax.

Just under half of the 76 soldiers who suffered vascular injuries to their upper or lower limbs survived long enough for surgery, with one post-operative death among the 37 patients. Interventions on 38 limbs included 15 amputations, four vessel litigations and 19 definitive limb revascularization procedures. Four of these latter procedures were not successful, leading to three further amputations.

"Amputation or vessel litigation is often required to control damage or save the lives of operable, but critically injured, patients with extremity injuries, but good limb salvage rates can be achieved in casualties able to withstand revascularization" says co-author Lieutenant Colonel Nigel Tai. "Despite marked progress in battlefield trauma care, surgery is rarely an option in vascular injuries to the torso."

The authors say that their study has led to a number of conclusions regarding military vascular injuries:

Torso vascular injuries are highly lethal and very few patients will survive long enough for surgery.

While neck wounds are less immediately fatal, the number of patients dying after surgery is high when the major cause of the injury is a blast or multiple vessels are injured.

Peripheral vascular injuries are less fatal, but often occur in conjunction with trauma to other vital organs and that combination can lead to death.

Casualties with isolated extremity vascular injuries will usually survive to reach hospital, if the bleeding has been controlled, and less than half of cases will have anatomic and physiologic factors that indicate immediate amputation. Limb revascularization can often be carried out successfully when such factors are not present.

In their paper, on abdominal trauma in primary blast injury (PBI) Lieutenant Colonel Jeff Garner and colleagues from the Rotherham NHS Foundation Trust, UK, reviewed 61 research papers. Nine of these provided sufficient information to enable them to calculate the incidence of abdominal PBI.

"Blast injuries are not common in civilian settings and poorly understood by most clinicians who work outside areas of active warfare" says Lieutenant Colonel Garner.

"Primary blast injuries result from the interaction of the blast wave with the body and typically affect gas-containing organs such as the ears, lungs and the gastrointestinal tract. The aim of our study was to investigate injuries sustained to the abdomen following primary blast exposure."

Key findings of the review included:

Secondary abdominal blast injury from penetrating fragments and pulmonary PBI are more common in blast injuries and of greater concern than abdominal PBI in most circumstances.

However, abdominal PBI has the potential for significant death and illness, as problems may present many days after blast exposure. For example, a gastrointestinal mural haematoma may perforate up to 14 days after injury.

Experimental evidence exists to help surgeons decide which mural haematomas is at most risk of delayed perforation and need to be resected to minimize this risk.

The incidence of abdominal PBI rates in survivors following air blasts ranged from 1.3 to 33 per cent, with an overall incidence of three per cent. Incidence rates were higher when blasts took place in enclosed spaces (6.7 per cent) than open spaces (5.6 per cent) and could reach up to 69 per cent in underwater blasts.

The terminal ileum and caecum were the most commonly affected organs.

Surgical treatment of abdominal PBI is similar to abdominal trauma resulting from other causes.

"Over the past two decades, we have witnessed mass casualty bombings across the world" says Lieutenant Colonel Garner. "These incidents underline the importance of civilian surgeons having a good understanding of the pathophysiology of blast injuries. Studying injuries sustained during armed conflicts provides valuable insight into this area of emergency medicine."