

Delayed Evaluation of Penetrating Neck Trauma during Operation Iraqi Freedom

NOTES

Charles J. Fox, MD, Washington, DC, Bethesda MD; David L. Gillespie, MD, Washington, DC; Sean D. O'Donnell, MD; Michael A. Weber, MD; Mitchell W. Cox, MD; Jason S. Hawksworth, MD; Chad M. Cryer; Norman M. Rich, MD, Bethesda, MD

Objective

The approach to penetrating trauma of the head and neck has undergone significant evolution and offers unique challenges during wartime. Military munitions produce complex injury patterns that challenge conventional diagnosis and management. Mass-casualty situations do not allow for routine exploration of all stable cervical blast injuries. The objective of this study is to review the delayed evaluation of combat-related penetrating neck trauma following evacuation to the United States.

Methods

From February 2003 through April 2005, consecutive patients with wartime-associated penetrating cervical trauma were evacuated to a single institution and prospectively entered into a database and retrospectively reviewed.

Results

Suspected vascular injury from penetrating neck trauma occurred in 63 patients. Thirty-three percent were zone II, 33% zone III, 11% zone I, and the remaining were diffuse injuries of multiple zones, including the lower face or posterior neck. Fifty (79%) patients were wounded by explosive devices, and 13 (21%) by high-velocity gunshot wounds. Nineteen (30%) had associated intracranial or cervical spine injury. Forty percent (26 of 63) had motor paralysis or a major neurologic deficit. Thirty-nine (62%) underwent immediate neck exploration. Twenty-one patients had 24 injuries requiring ligation (18), vein or primary repair (4), PTFE interposition (1), or patch angioplasty (1) to repair lacerations to the jugular vein or the carotid, vertebral, or innominate arteries before arriving in the United States. Delayed evaluation detected 12 additional occult injuries and one graft thrombosis in 11 patients. Management included observation or anticoagulation (5), vein or PTFE repair (3), coil embolization (2) or ligation (1). Indications for arteriography included an abnormal or indeterminant computed tomographic angiography (CTA) or penetrating injury to zone I or III. Color-flow Doppler ultrasonography was performed as an alternative to arteriography in 6 (10%) patients to evaluate a previous repair (3) or stable fragmentation injury (3). CTA was performed in 45 (71%) patients including six zone II injuries without exploration. Thirty-eight (60%) underwent diagnostic arteriography, detecting 4 pseudoaneurysms and 8 occlusions of the carotid or vertebral arteries. No occult venous injuries were noted. Nearly all occult injuries detected by arteriography had a negative or equivocal CTA.

Conclusions

Penetrating multiple fragment injury to the head and neck is common in wartime. Stable injuries may not require immediate neck exploration; however, careful reevaluation once in a tertiary center may reveal occult injuries. CTA is useful in the delayed evaluation but retained fragments produced suboptimal imaging in the zone of injury. Arteriography remains the "gold standard" for evaluation of cervical vascular injury and its use should be liberalized for combat injury. Endovascular techniques represent the single most important difference from prior conflicts.