Armoured Fighting Vehicle Injuries in Peacetime

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SUMMARY: A year-long prospective study of injuries caused by armoured fighting vehicles on exercises in West Germany revealed that 2 soldiers were killed. Another 41 needed hospital admission for treatment of injuries of the lower limb (16), upper limb (15), head (8) and back (2).

Tank loader/signallers were peculiarly susceptible to severe leg injuries, due to the ankle being trapped and twisted by the turret rotating within the hull. Insecure, falling hatch covers accounted for many of the hand, head and back injuries.

Soldiers in training need to be made more aware of these particular hazards. Reduced caution would make injuries such as these more common during armoured warfare, and their statistics should be included in casualty estimates.

Introduction

Injuries sustained during armoured warfare have been well documented, but there have been only sporadic reports about injuries related to armoured fighting vehicles (AFVs) in peacetime. For this reason, a prospective study was conducted at the British Military Hospital (BMH) Hannover, West Germany, to assess all patients admitted with injuries caused directly by AFVs, during a complete annual cycle of military training.

Methods

BMH Hannover is suitably located for this study as it receives, directly or indirectly, all the casualties from the British Army of the Rhine's two main armoured training areas, around Hohn/Soltau and Hildesheim. (Any soldier initially admitted to a local Krankenhaus is transferred to the BMH before being returned to duty).

For a one year period 1987-1988, data was obtained about each AFV casualty on admission, and the treatment he received was documented. Mortality details were obtained from Headquarters British Army of the Rhine (Coull - personal communication).

Results

Two soldiers were killed and 41 required hospital admission for treatment of their injuries. Both deaths occurred at the site of injury. A driver of a Chieftain tank died from asphyxia and drowning when his tank drove into a deep, water-filled depression while moving tactically across country at night. The second was the driver of a tracked reconnaissance vehicle (CVR(T)), which skidded off the road on a bend and struck a tree. He sustained a complete transection of the ascending limb of his aortic arch, associated with large bilateral haemothoraces and a fractured sternum.

Of the 41 casualties, 16 (39%) had principally suffered lower limb injuries, 15 (37%) upper limb injuries, 8 (19%) head injuries, and 2 (5%) back injuries (Tables 1-4). Although abdominal injuries have previously been reported in AFV accidents(1), none occurred during this study. Table 5 shows injuries according to Corps.

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Table 1
Lower Limb Injuries

Serial	Vehicle	Injury	Cause
1	Challenger	# L tibia	Rotating turret
2	Challenger	# R tibia/fibula	Rotating turret
3	Challenger	# R tibia/fibula	Rotating turret
4	Chieftain	# tibia/fibula	Rotating turret
5	Chieftain	Bruised R leg	Rotating turret
6	Challenger	Sprained R ankle	Rotating turret
7	Challenger	Crushed/bruised R foot	Rotating turret
8	Chieftain ARV	# L tibia/fibula	Fascines rolled
9	Minelayer	Amputated L toes 4, 5	Plough ran over boot
10	Minelayer	Amputated toe 3	Plough ran over boot
11	Challenger	# L metatarsal EHL tendon divided	Crushed under power pack
12	432/Landrover	Torn R femoral vein	Crushed between vehicles
13	Challenger	Metal foreign body L thigh	Track changing
14	Challenger	Twisted L knee	Fall
15	Challenger	Bruised knee	Road wheel fell
16	439	Bruised knee	Fell into open hatch

Thirty nine of the 41 casualties (95%) were Private soldiers or junior non-commissioned officers (JNCO's). Only 2 senior NCO's were injured, and none of the casualties were officers.

Seven severe leg injuries were sustained by loaders/signallers inside their tanks, due to the same mechanism: a boot being trapped between the ammunition storage bins in the hull and the turret floor as the turret began to rotate. The right leg was more frequently injured than the left. Four fractured tibiae were confirmed by X-ray and these were treated in plaster, or by operative

fixation. The remaining 3 soldiers' ankles were badly sprained or bruised.

The NCO trapped between a Landrover and an armoured personnel carrier (AFV 432) was admitted with an expanding haematoma in his groin; at operation there was profuse bleeding from a hole in his femoral vein, but this was sutured successfully without the need for a graft.

Two sappers had mine ploughs run over their boots, amputating toes.

Of the 15 upper limb injuries, 13 involved the hand only, and featured crushed or fractured fingers. Seven were caused by falling hatch covers. The left hand was injured on 10 occasions, and the right only twice (one was unrecorded). Three soldiers lost fingers, one following the onset of dry gangrene.

One soldier crushed his forearm between the tank turret roof and the breech of the gun, developed compartment syndrome and suffered necrosis of his

Table 2
Upper Limb Injuries

Serial	Vehicle	Injury	Cause
1	432	Crushed R index tip	Falling hatch
2	432	# R distal phalanx	Falling hatch
3	Sultan	Crushed L finger tips Dry gangrene	Falling hatch
4	Stalwart	Open # L distal phalanx	Falling hatch
5	Spartan	Open # L middle phalanx	Falling hatch
6	Chieftain	Open # L phalanges	Falling hatch
7	432	# L proximal phalanx	Falling hatch
8	-	L 4,5 EDL tendon division	Crushed beneath power pack
9	Chieftain	Compartment syndrome Necrotic L EDL tendon	Forearm crushed between gun and turret roof
10	Abbott	Amputated L distal phalanx Flexion contractures	Fingertips crushed beneath gun barrel
11	432	Amputated L fingertips 3,4	Shut in rear door
12	Ferret	Open # L distal phalanx 5	Trapped between 2 vehicles
13	CVR/T	Crush # L metacarpal 5	Road wheel fell
14	432	# scaphoid	Fall
15	432	Bruised R shoulder	Fall

extensor digitorum longus tendon, which required grafting.

Five of the 8 head injuries were admitted for observation only. The 2 open skull fractures had cerebrospinal fluid rhinorrhoea; both received antibiotic prophylaxis and healed spontaneously. There were no head injury complications.

Table 3
Head Injuries

Serial	Vehicle	Injury	Cause
1	Chieftain	CSF rhinorrhoea, open #	Struck head in turret
2	432	CSF rhinorrhoea, # nose	Falling hatch
3	432	Loss of consciousness	Falling hatch
4	432	Concussion	Falling hatch
5	Challenger	Periorbital bruising	Falling hatch
6	432	Loss of consciousness	Struck head on door
7	Challenger	Loss of consciousness	Fall
8	432	Burns	Scalded with coolant

Table 4
Back Injuries

Serial	Vehicle	Injury	Cause
1	432	Compression # T4 & 5 vert	Hatch fell on head
2	Chieftain	Bruised back	Tank skidded off road

Table 5
Injuries by Corps

	RAC	INF	RE	RA	Others	Total
Lower limb	10	1	3	0	2	16
Upper limb	2	5	2	3	3	15
Head/back	4	5	1	0	0	10
Total	16	11	6	3	5	41

Key: RAC = Royal Armoured Corps
INF = Infantry
RE = Royal Engineers
RA = Royal Artillery

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Discussion

This total number of casualties is not large if one considers the tens of thousands of troops using these training areas during the one year period under study. However, 2 soldiers died and many of the 41 injured required prolonged hospital treatment, whilst their units were deprived of valuable manpower. Young soldiers feature more prominently in these casualty statistics than their preponderance in the field explains. Lack of experience is clearly relevant.

Falling hatches account for many of the upper limb, head and back injuries. Although all soldiers are aware of the risk from hatch covers, they still do not always secure the covers correctly and greater care is needed. Lower limb injuries cause more concern during casualty evacuation and because of the long period of disablement. This study exposes the risk to tank signallers/loaders from trapping their feet between the turret floor and the adjacent ammunition stowage bins in the hull of the tank, as the turret begins to traverse. Making these crewmen properly aware of his hazard should reduce the incidence of such severe leg fractures. Additionally, a suitable procedural amendment could require the tank commander and gunner to warn the signaller/loader whenever they were about to traverse the turret.

This mechanism of injury is not confined to British

tanks, and a similar problem has been reported in the American M1 Abrams. Silver(2) describes 5 examples where, once again, the injury was only sustained by the crewman in the loader's position. Damage was always confined to the foot (small bone fractures, ligament sprains, and soft tissue crush injury) and the leg was spared.

The risk of death and injury is omnipresent on peacetime exercises, especially when armoured vehicles are involved. The 2 fatalities in this series were probably unavoidable, but many of the injuries are preventable: the rotating turret and the insecure hatch are particular hazards. In time of armed conflict, reduced caution would lead to many more accidental injuries, and these figures should be included in casualty estimates.

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REFERENCES

1. KIRBY N G. Ruptured intestine in armoured personnel carrier accidents. *J R Army Med Corps* 1969; **115**: 70-72.
2. SILVER S M. Tank turret crush injuries of the foot. *Milit Med* 1987; **152**: 467-469.

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