

The management of maxillofacial trauma during the Korean War – A coming of age of a specialty

Lieutenant Colonel Darryl C Tong RNZAMC¹, Professor Tom H Brooking PhD¹, Professor Robert Love MDS, PhD, FRACDS¹

Abstract

Background: The Korean War remains “the forgotten war” despite being the proving ground for such innovations as helicopter casualty evacuation and the Mobile Army Surgical Hospital (MASH), both of which would see much development and action in the Vietnam War.

The Korean War was also a turning point in the recognition of dentally qualified face and jaw surgeons who were to become “oral surgeons”. A fine reputation for military surgery was thus established during the Korean War and its importance continues on today.

Conflict of interest

The authors declare no conflict of interest and have not received any material or monetary gain in the preparation of this article.

Introduction

Often dubbed “The Forgotten War”, the Korean War (1950-1953) has never gained the publicity or media attention afforded to the Vietnam War despite involving more combatants from more nationalities (as part of a United Nations operation) and the very real threat of precipitating another global war with the potential for unrestricted use of nuclear weapons.

Whereas the Vietnam War has been given more exposure due to a number of Hollywood movies and a generation of anti-war protesters often symbolised by great music, the Korean War to this day remains largely unknown even in the face of key developments from that conflict such as the first jet-to-jet aircraft combat, the use of helicopters in casualty evacuation (CASEVAC) and the introduction of what is perhaps the only legacy of the Korean War in popular culture – the Mobile Army Surgical Hospital or MASH.

It may be forgivable to think that the Korean War was an American-only affair, especially when popular television shows such as *M*A*S*H* have conditioned viewers into thinking that it was perhaps the one and only such facility that operated in Korea. Judging from the combat casualties seen through the fabled 4077th MASH, only US soldiers and Marines were involved. During the course of the Korean War, the armed forces of twenty countries were represented in the conflict, ranging from the heavy weights such as the United States, China and the USSR, to smaller countries such as the Philippines, Luxembourg and Belgium.

Interestingly, this perception was not perpetuated in the original book by Richard Hooker, (the pseudonym for Dr Richard Hornberger, MD, general surgeon, US 8055th MASH), who describes a particularly heavy period of casualty influx over a two week period during which a number of soldiers from other nations were operated upon by the surgeons of the 4077th - soldiers from China, Puerto Rico, the Netherlands, Canada and Australia being mentioned¹. Medical support units from India, Denmark, Italy, Norway and Sweden were deployed during the conflict, the common policy being the deployment of medical support but not combat troops by the respective governments. The 60th Indian Field Ambulance and Surgical Unit attached to the Commonwealth Division was a good example of this non-combatant policy and they served with distinction, gaining a reputation second to none in treating friend and foe alike. The 60th Indian Field Ambulance performed over 2300 surgical operations and 5000 dental examinations from December 1950 to February 1954, seeing in excess of 200,000 patients during their deployment. Their professionalism and non-partisan attitude earned the unit great warmth and respect from UN forces and the civilian population^{2,3}.

The Commonwealth Division was supported by three separate Field Ambulances: 25 Canadian Field Ambulance, 26 Field Ambulance (UK) and 60th Indian Field Ambulance and Surgical Unit. Each Field Ambulance had a Field Surgical Team, a Field Transfusion Team, the UK and Canadian units having

the additional elements of a Motor Ambulance Convoy⁴. The FSTs were often incorporated with the larger US Army MASH units and evacuation of Commonwealth casualties was through the US 121st Evacuation Hospital near Seoul and then on to Japan.

The Korean War saw many developments in combat trauma surgery built upon experiences from the Second World War such as transfusion medicine, rapid CASEVAC and the evolution of vascular and cardi thoracic surgery. It may be argued that the role of dental surgeons in maxillofacial trauma became more formalised as a separate specialty during this conflict – a specialty that would eventually become oral and maxillofacial surgery. This article highlights some of the key developments in maxillofacial trauma management within the context of the Korean War.

The Mobile Army Surgical Hospital (MASH)

The concept of a mobile surgical treatment facility that could keep pace with combat units during operations is not new; the need for rapid medical support for critically injured soldiers was recognised during the Napoleonic Wars with the creation by Baron Dominique Larrey, the chief surgeon of the Imperial French Army, of horse-drawn “flying” ambulances⁵⁻⁷. Resembling the British Army model of the Casualty Clearing Station, the development of similar mobile surgical facilities by the US Armed Forces during the Second World War, known as Auxiliary Surgical Groups, proved their worth during the North African and European campaigns. Later renamed Mobile Auxiliary Surgical Hospitals, these units were the precursors of the Mobile Army Surgical Hospitals deployed during the Korean War. Definitive surgery was carried out at these facilities where experiences were not only built upon from previous conflicts but further refined and developed, with input from research teams and medical experts.

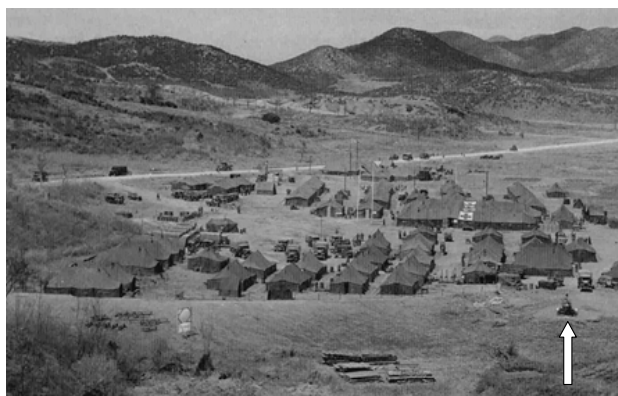


Figure 1. US 8055th MASH, Korea 1951. The fictional 4077th MASH was loosely based on this unit. Note the tented facilities and the helicopter in the foreground on the lower right (arrowed). (Public domain image courtesy of www.koreanwar-educator.org)

This represented a paradigm shift away from damage control surgery, as often the MASH was the highest echelon surgical facility available in-country and with difficult terrain, unpredictable weather and an unpredictable tactical environment, further rearward casualty evacuation to a larger facility was not always possible (Figure 1).

Each MASH operated five surgical tables in shifts and had an ambulance platoon and four helicopters attached to it for resupply, patient movements and evacuation. It had a 200-bed capacity with a surge capacity of a further 140 beds. Rearward evacuation by strategic medical evacuation (STRATEVAC) was to Japan, Europe or the continental United States of America. MASH units were originally intended to provide support at divisional level with one MASH unit per division. As more nations contributed combat troops however during the course of the war, MASH units were soon supporting a number of divisions with some units receiving more than 400 patients in a single 24-hour period^{6,7}. During the first two years of the Korean War, the MASH units lived up to their name by being truly mobile – the US 8076th MASH moved on average every three weeks during 1951⁸. In the later stages of the war however with a more static combat frontline, the MASH units rarely moved and replaced their tented facilities with hard standing structures.

The Korean War was the proving ground for the MASH concept and the success of these units in providing valuable experience and research in trauma surgery has certainly benefited the delivery of civilian trauma care. MASH units were deployed during Vietnam and the first Gulf War (OPERATIONS DESERT SHIELD and DESERT STORM). The last MASH unit (US 212th MASH) was decommissioned in 2006, providing over 60-years' worth of lessons for both military and civilian trauma practice.

Helicopter medical evacuation

Rapid medical evacuation to a treatment facility during the Korean War was hampered by several factors, including not only the tactical situation but also the rugged terrain and poor roads which made transport by land extremely difficult and slow. Although the prolific use of helicopters in combat and other tasks was yet to occur (namely Vietnam), the use of helicopters during the Korean War initially was in the Search and Rescue (SAR) role of retrieving downed pilots. Requests however became more frequent for casualty evacuation from combat units near the frontline and soon these SAR helicopters found a new role as casualty evacuation (CASEVAC) platforms. The terminology of CASEVAC should not be confused with medical evacuation or MEDEVAC as the roles

are different – CASEVAC denotes the evacuation of a casualty by non-medical personnel using a non-standardised or non-dedicated vehicle to move the patient from the combat zone, whereas MEDEVAC involves a standardised, dedicated platform for patient evacuation often with attendant medical personnel rendering medical treatment en route⁹.

The primary helicopter used for MEDEVAC during the Korean War by US Army medical services was the Bell H13D/E, a small helicopter easily recognised by the large Plexiglas bubble canopy and open lattice-work tail assembly with a top speed of 100 mph (160 km/h) and maximum range of 300 miles (approx. 480 km) (Figure 2).



Figure 2. Iconic: aeromedical evacuation by helicopter during the Korean War. (Public domain image courtesy of www.bell47helicopterassociation.org)

This helicopter is readily identifiable as it is featured in the opening sequences to both the film and television versions of *M*A*S*H* showing a pair of Bell H13s en route to the 4077th MASH with patient litters attached to the external skids. The experience of these patients was indeed a test of fortitude, being exposed to cold temperatures, rotor downwash, transfer from one type of stretcher to another and finally a bumpy ride aboard a jeep or truck to the resuscitation tent at the MASH¹⁰. Interestingly, the overall importance of helicopters was disproportionally exaggerated in the Korean War, perhaps mainly due to their novelty at the time. Helicopters only carried approximately 4% of all hospital admissions during the Korean War, the bulk of casualties being evacuated by the overburdened motor ambulance convoys or by railway¹¹. According to US Army data on 10,000 casualties, 40% were evacuated within one hour of wounding and 70% within 3 hours¹². There is no doubt that the combination of a rapid CASEVAC system to a forward deployed surgical unit such as a MASH, saved many lives which in the previous wars would have been lost due to the time delay between patient evacuation and surgical intervention. The main impact of these innovations

would not be felt until the Vietnam War with the regular use of helicopters in a dedicated MEDEVAC capacity⁷.

Oral and maxillofacial trauma

Face and jaw surgeons (a generic descriptor) during the Korean War used techniques learnt from their Second World War counterparts, just as those surgeons had consolidated lessons from their predecessors in the First World War. The Second World War introduced antibiotics into routine surgical care, allowing the primary closure of wounds which would have been left open to prevent infection, but due to the excellent blood supply to the head, face and neck region, primary wound closure was usually not as risky compared to an open leg wound or abdomen for example. Adjunctive antibiotic therapy also allowed the routine use of intra-osseous wires in fracture management of both the mandible and midface, with open reduction of mandible fractures to visualise the bony injuries performed more frequently¹³⁻¹⁶. The mainstay of immobilising jaw fractures remained intermaxillary fixation using stainless steel wires, with external fixation being utilised for both mandible and midfacial fractures using frames. The overall incidence of head, face and neck (HFN) injuries in the Korean War was approximately 16%, comparable to that seen in the First World War among British and American casualties but much higher than the 4% incidence during the Second World War¹⁷. However, the actual patterns of facial wounds sustained by the servicemen during the Korean War were more comparable to those seen in the Second World War, which is not altogether surprising considering the weaponry causing the injuries was from the same era.

Although the fundamental surgical techniques employed by face and jaw surgeons during the Korean war were no different from those used in the latter part of the Second World War, two major surgical advances in maxillofacial war injuries arose from the Korean War, namely the routine primary closure of facial soft tissue wounds and the routine use of open reduction and internal fixation techniques made possible by the use of systemic antibiotics and earlier access to definitive surgery^{6,7,10,12}.

Whereas surgical techniques may have not changed dramatically, a subtle evolutionary step occurred during this period in terms of the specialty of face and jaw surgery. Plastic surgery remained the senior partner but dentists with surgical training for the face and jaws were now recognised as “oral surgeons” as opposed to “dental surgeons” in previous conflicts. This may have been a subtlety, but in terms of recognition and acknowledgment that a dental specialty had a primary role in the surgical management of

face and jaw trauma, the change in title had far reaching consequences¹⁸. This change in name also reflected a change in status with the creation of the American Board of Oral Surgery in 1946 being one such example of increased professional stature, incorporating education, training and professional aspects under one organisation¹⁹. In time the specialty would undergo another evolutionary name change in keeping with the scope of practice beyond the oral cavity – that of Oral and Maxillofacial Surgery. For those performing surgery in the combat zone however, quasi-political name changes are largely irrelevant and meaningless if the quality of the surgery and the professionalism of the surgeons is not maintained. Oral surgeons in the Korean War were confronted with face and jaw injuries as horrendous and devastating as those seen in previous conflicts. Two contemporary papers published in the surgical literature show some outstanding results and it is interesting to note that both soft and hard tissue repair were performed by the oral surgeon (dentally qualified) as opposed to the traditional soft tissue repair by a plastic surgeon and hard tissue repair by the dental surgeon modelled on the Gillies-Kelsey Fry model during the First World War²⁰⁻²². Oral surgeons were also more likely to be deployed to forward surgical units and were treating injuries at a much earlier stage than their counterparts in plastic surgery, who by nature of their more lengthy reconstructive procedures were more appropriately based at a general hospital facility. This is still the case today with oral and maxillofacial surgeons being deployed within the combat zone in level III facilities alongside general surgeons, orthopaedic surgeons and neurosurgeons⁹.

The fact that oral and maxillofacial surgeons may be considered as force multipliers is put into practice in Afghanistan today where the surgical scope may by necessity be expanded to basic neurosurgery, eye surgery and neck exploration, not to mention primary assistance with general or orthopaedic procedures²³. Furthermore, oral surgeons during the Korean War were often employed as secondary airway specialists working alongside nurse anaesthetists under the supervision of the anaesthesiologist (consultant anaesthetist).

This example of having to assume multiple roles when needed reflects the nature of trauma surgery in a combat zone with a combination of unique factors to contend with such as the tactical environment, limited resources both in material and personnel and multiple severe injuries presenting in the same patient. Specialist-area surgeons may not always be available for deployment, placing a greater need for pre-deployment training and “up-skilling” in other surgical areas, dictated in part by what trauma patterns are expected for that theatre of war. Compared to their civilian counterparts, military surgeons require a broader skill set and have a different mentality in order to adapt to a fluid tactical environment and potential shortfalls in materiel and equipment^{24,25}.

Summary

The Korean War saw several innovations both in military and medical areas including the use of systemic antibiotics which allowed primary closure of facial wounds and the routine management of mandibular fractures by open reduction and internal fixation. The overall numbers of HFN injuries was comparable to the First World War with similarities in trench fighting, but the actual patterns of injuries were closer to those seen during the Second World War. Furthermore, the mortality rate became lower in part due to early medical evacuation and close medical support for definitive surgery.

Oral surgery during the Korean War became a stand-alone surgical specialty showing that dentally qualified clinicians could manage complex facial injuries involving both soft and hard tissues and that from this experience, the use of oral and maxillofacial surgeons in forward deployed military surgical facilities continues today with surgeons providing technical expertise beyond the head and neck region.

*Authors' affiliations: 1. University of Otago, Dunedin, NZ
Contact author: Lieutenant Colonel Darryl C Tong
RNZAMC, Department of Oral Diagnostic and Surgical
Sciences, University of Otago, PO Box 647, Dunedin, NZ
Email: darryl.tong@otago.ac.nz*

References

1. Hooker R. M*A*S*H. New York: Pocket Books, 1971.
2. Carew A. The Korean War: the story of the fighting Commonwealth regiments. London: Pan Books, 1970.
3. Schafer E. Indian 60th Field Hospital and Surgical Unit. In Sandler S (editor) The Korean War: an encyclopedia (Military History of the United States, Volume 4). New York: Garland Publishers, 1995, 145-146.
4. Bricknell MCM. The evolution of casualty evacuation in the British Army in the 20th Century (Part 3) – 1945 to present. *J R Army Med Corps* 2003, 149: 85-95.
5. Bishop WJ. The Early History of Surgery. New York: Barnes and Noble, 1960, 144-146.
6. Woodard SC (2003). The story of the Mobile Army Surgical Hospital. *Mil Med* 168: 503-513.
7. King B, Jatoi I (2005). The Mobile Army Surgical Hospital (MASH): a military and surgical legacy. *J Natl Med Assoc* 97: 648-656.
8. Apel OF, Apel P. MASH: An Army Surgeon in Korea. Lexington: University Press of Kentucky, 1998, 35.
9. Burris DG, Dougherty PJ, Elliot DC et al. (editors): Emergency War Surgery, 3rd US edition, Washington DC: Borden Institute, 2004, Chapter 4.
10. Driscoll RS. US Army medical helicopters in the Korean War. *Mil Med*, 2001,166: 290-296.
11. Cowdrey AE. Medical service in the Korean War. In Sandler S (editor) The Korean War: an encyclopedia (Military History of the United States, Volume 4). New York: Garland Publishers, 1995, 220-224.
12. Triplett RG, Kelly JF. Historical perspective. In Kelly JF (editor) Management of war injuries to the jaws and related structures. Washington DC: US Government Printing Office, 1977, 11-14.
13. Adams WM. Internal wiring fixation of facial fractures. *Surgery*, 1942, 12: 523-540.
14. Peer LA. Plastic surgery for 1942. *Arch Otolaryngol*, 1943, 38: 171-189.
15. Kazanjian VH. Advances in maxillofacial surgery during the past half century. *J Oral Surg*, 1955, 13: 97-102.
16. Rowe NL. The history of the treatment of maxillofacial trauma. *Ann R Coll Surg Engl*, 1971, 49: 329-349.
17. Dobson JE, Newell MJ, Shepherd JP. Trends in maxillofacial injuries in war-time (1914-1986). *Brit J Oral Maxillofac Surg*, 1989, 27: 441-450.
18. Erich JB, Austin LT. Traumatic Injuries of Facial Bones. Philadelphia: WB Saunders, 1944.
19. American Association of Oral and Maxillofacial Surgeons. The building of a specialty: Oral and Maxillofacial Surgery in the United States. *J Oral Maxillofac Surg*, 1989, 47 (Supplement 2):33-36.
20. Cook TJ. The role of the oral surgeon in a general hospital in war. *J Oral Surg*, 1951, 9: 3-17.
21. Kwapis BW. Early management of maxillofacial war injuries. *J Oral Surg*, 1954, 12: 293-309.
22. Pound R. Gillies: Surgeon Extraordinary. London: Michael Joseph Ltd, 1964.
23. Keith KM. High energy facial injuries. In: Nessen SC, Lounsbury DE, Hetz SP (eds.) War Surgery in Afghanistan and Iraq. Washington DC: Borden Institute, 2008, 74-81.
24. Lieber A, Dusel W, Doll D. Must military surgeons also be field surgeons? *Med Corps Int Fourm*, 2010, 48-52.
25. Sakaforas GH, Peros G. Principles of war surgery: current concepts and future perspectives. *Am J Emerg Med*, 2008, 480-489.