D-DAY ON BOARD A TANK LANDING SHIP: MEAT, CHEESE AND BLOOD TRANSFUSION

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Abstract

Tank Landing Ships were used as evacuation station hospitals during D-Day of World War Two. This historical vignette describes how difficulties were overcome in blood transfusion and trauma surgery aboard these ships. Their place in the evacuation chain is discussed in relation to previous experiences in military medicine.

Introduction

The organizational strategy for the assault on the beaches of Normandy on D-Day during World War II depended on an enormous mobilisation of the Allied Medical Services. The main aim of these services was skilled first aid for all those injured during the operation as well as life-saving surgery for those who needed it until they could be safely evacuated back to the British shores. Each assault division was allocated three field ambulances. Each ambulance provided support for assault battalions and also manned an advanced dressing station for each brigade. Furthermore, each assault division was accompanied by two beach groups, each comprising two dressing stations with field surgical units, field transfusion units and extra surgical teams. The field dressing stations doubled up as beach dressing stations as well as a casualty evacuation points (Figure 1).

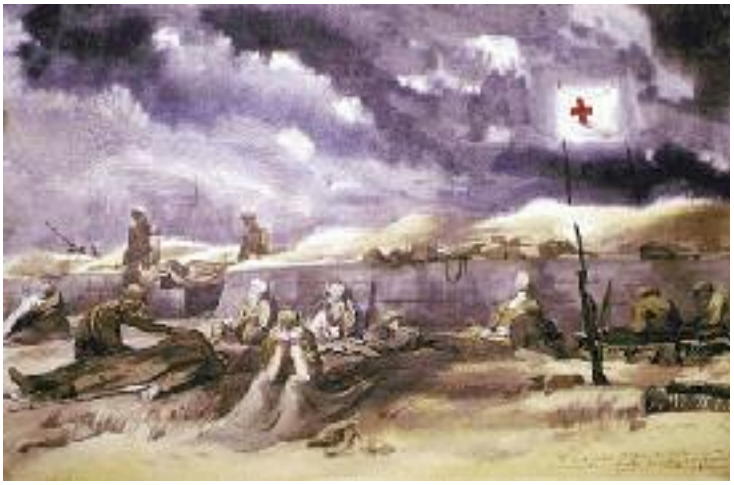

Figure 1 ***First Aid Station on the Beach*** *Watercolour painting by Mitchell Jamieson, June 1944*

Tank Landing Ships (TLS)

Evacuation points were near the beach. This proximity to evacuation craft served the aim of evacuating no less than 100% of those deemed able of being evacuated to medically manned TLS (also known as LST, landing ship tanks). In the British sector 70 TLSs were fitted for casualty evacuation; 30 were medically manned by the Royal Army Medical Corps and 40 by the Royal Navy. These ships had adjustable racks in order to carry 3-tier stretchers on either side of the tank deck, up to a total of 144 stretchers. At the after end of the tank deck a small dressing station was rigged with canvas and light tubular framework, measuring 18'x 8'x 8', and on the after bulkhead were arranged heating, lighting and hot and cold water with drainage, to form the after wall of the dressing station. The troop deck, however, could handle a further 100-150 walking wounded (Figure 2).

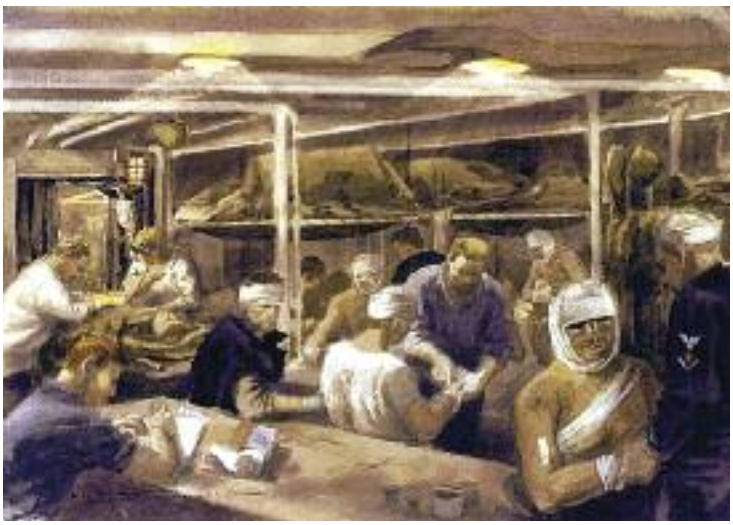

Figure 2 ***Wounded Being Treated Aboard LST*** *Watercolour painting by Mitchell Jamieson, June 1944*

The crew of such ships had undergone simulation training in Britain and were efficient in converting the ship's load (tanks and vehicles) to a reception bay for casualties on reaching the French coast. Similarly, they would convert the ship back to its original form after evacuating the casualties to the British coast reception centres (Figure 3), so as to then carry further supplies to France [1]. Training included a naval medical liaison officer who was to be stationed to each beach to assist the smooth operation of the evacuation, since it was not possible for TLS to beach. Therefore the loading would often need to be done from craft or amphibious DUKW vehicles (pronounced 'duck').

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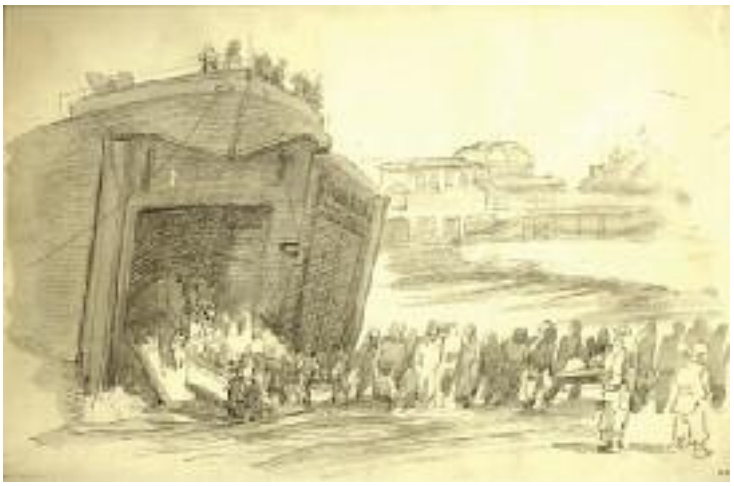

Figure 3 ***LST Discharging British Wounded*** *by Mitchell Jamieson, circa 1944, in charcoal and wash*

The use of resuscitation fluid upon TLS involved dried plasma or serum, because of their relative ease of preservation-without the need for careful refrigeration and withstanding the effects of constant vibration. Blood was also carried but had the problems of susceptibility to irregular refrigeration, vibration and inadequate asepsis. Thus the hazards of haemolysis and infection were in addition to the risks of inaccurate blood grouping. Freshly drawn blood from personnel with known blood groups was encouraged as was its use after an agglutination test with the proposed recipient's blood. A special kit was issued by the Royal Navy Blood Transfusion Service (Box 1). Furthermore, the use of blood over serum or plasma was reserved in cases of: septic shock; massive blood loss; persistent shock after 3 bottles of plasma; recurrent hypotension after initial transfusion; intraoperatively and postoperatively.

- *Serum: 5 MRC bottles of dried human serum
- *Saline: 5 MRC bottles of physiological saline solution
- *Citrate: 2 MRC bottles of 100cc of 3% disodium citrate solution
- 3 tins of a sterile transfusion giving set and swabs
- 1 tin with 2 sterile donor taking sets and swabs
- Blood grouping equipment:
  - 1 needle
  - 1 tile
  - 3 glass pipettes and rubber treat
  - 3 x 5cc empty screw-cap bottles
  - 2 corked oxalated tubes
  - *1 x 6 oz. bottle of physiological saline solution
  - *1 x 6 oz. bottle of 3% citrate solution
  - *1 x 6 oz. distilled water
  - 2 x 25cc ampoules dried anti-B dried grouping serum
  - 2 x 0.25cc ampoules dried anti-A dried grouping serum
- 1 sterile syringe
- 1 tourniquet
- 2 x 2cc ampoules 2% Novutox solution and file
- 1 x 1oz. screw cap bottle of Dettol
- 2 conical centrifuge tubes
- 1 centrifuge fan attachment complete

(*sterile material)

Box 1. Royal Navy Blood Transfusion Service: contents of the transfusion equipment unit box.

His Majesty's Tank Landing Ship No. 363

Such a ship was 'His Majesty's (HM) TLS No. 363; it had three medical officers, fifteen sick berth attendants and sixteen specially trained Royal Marines and Seamen.

As expected, a lot of the wounded being evacuated were in need of urgent resuscitation (Figure 4). Rough seas added to the adventure as gaining venous access, often by cutdown, in a shocked and peripherally shutdown patient was always a challenge even in the most skilled hands. Blood for transfusion could be damaged from the shaking and vibration on board, especially during rough seas and whilst beaching, from near misses of enemy shell fire and the ship's own anti-aircraft fire. For these reasons it was decided that blood more than fourteen days old and/or having undergone two trips across the Channel would be discarded.

Figure 4 ***Casualties on LST****, by Mitchell Jamieson, circa 1944, in charcoal & wash*

Case illustration

Surgeon Lieutenant-Commander R. N. Martin describes in the Inter-Allied conferences on war medicine [1] the case of a soldier with a severe compound fracture of the distal third of the femur who was brought aboard TLS 363 with a tourniquet that had been applied on the field. The patient was in haemorrhagic shock and resuscitation started immediately with the tourniquet being removed. While initially there was no further bleeding, after a blood transfusion he started re-bleeding from his wound and the tourniquet was re-applied. It was impossible to secure with haemostats the bleeding vessels in the depths of the wound, so his haemodynamic status deteriorated until his pulse was irrecordable. A rubber bulb from a scent spray was used to accelerate the transfusion, and a transfusion was set up on the other arm too, accelerated in the same manner. After 4 pints he was able to have surgical toilet of his wound under pentothal anaesthesia; the lower two perforating branches of the profunda femoris artery were ligated and the limb put in a Tobruk plaster. After a total of 5 pints of blood transfusion, he was eventually transferred to a hospital 3 miles from the disembarkation point.

On board, blood for transfusion required temperature regulation (40-42 °F). On H.M. TLS No. 363 blood was initially kept in the same refrigerators as meat and cheese supplies for the crew. Despite the temperature indicator being within the required range, it was soon discovered that blood was "aging" more rapidly than anticipated. Complicated scientific speculations and theories related to sea vibration were abandoned when it was realised that the main reason was the personnel's frequent demand for cheese and meat, and hence their frequent opening and closing of the refrigerators, which did not allow a stabilisation in temperature. The problem was easily addressed with separate fridge compartments, one dedicated to blood, serum, plasma and penicillin, and the rest for cheese, meat and other supplies.

On arriving at the French coast, reception of casualties could easily reach 300 per ship. Treatment depended on speed and therefore on triage: stretchers were left on deck to be triaged even after disembarkation and cases in need of resuscitation were marked with an "R" on their foreheads and sent to the resuscitation ward. This ward consisted of nearly thirty stretcher brackets nearest to the operating theatre. It was attended by 2 "resus-teams" each with one medical officer and an operating assistant.

Decisions to resuscitate needed to be swift and unambiguous- there was little or no time to return to reassess anyone and judgment was solely based on clinical examination. There was neither equipment nor time for on-board detailed blood pressure, blood concentration or shock curve measurements, while many did not even use their stethoscope in the midst of the noise. The best criteria were the injured patient's pulse, colour, warmth and alertness.

Blood was reserved for the patients who were in shock as well as for the badly burnt. Decision to transfuse on triage was different to its civilian hospital counterpart. Blood was not "wasted" on only mildly "shocked" patients who might have benefited but could also have done without it or on patients who were unlikely to recover. An average transfusion amount was 2-3 pints and venous access was often achieved via the open route on the leg. In severely shocked casualties surgery was necessary following transfusion. An optimum time to operate was considered from near the end of the transfusion and up to an hour later, though such evidence was largely anecdotal.

Discussion

In the light of past war experiences, such as the Motor Ambulance Convoy of the Boer War [2], the function of the tank landing ships manifests an adaptation as well as an advance in the evolution of casualty evacuation. It translated the lessons on land from the ambulance trains of the First World War to the necessities of the amphibious terrain, from land to sea and to land again, used during the D-Day effort (Figure 5). It consolidated the presence and reinforced the work of the Casualty Clearing Stations within the evacuation chain by receiving as well as treating casualties without necessarily waiting "until fit for further transport"(3); skilled medical manpower was ready to continue on board the work started on land. It sharpened the skills of triage when the clinical prioritisation for evacuation and treatment afloat were dependent on the added difficulties of operating amidst rough sea and bombshells.

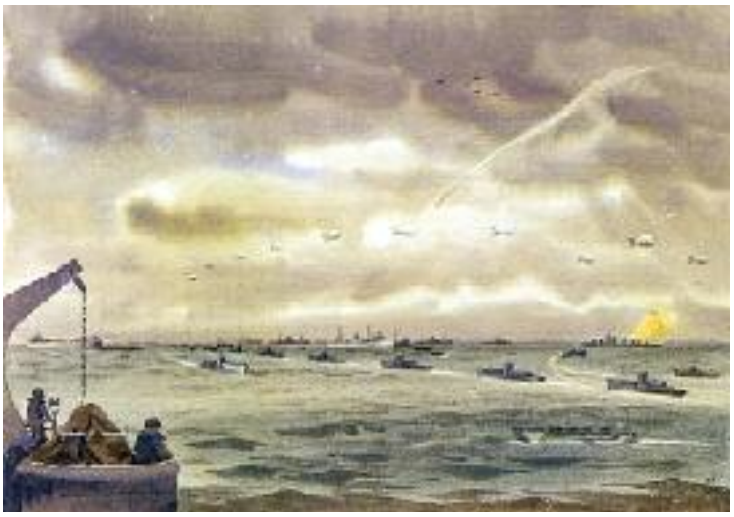

Figure 5 ***Morning of D-Day from LST****, by Mitchell Jamieson in watercolour, June 1944*

Transfusion on board the Tank Landing Ships helped save servicemen's lives. The adverse conditions on board these makeshift floating hospitals encouraged improvisation and modification in the application of resuscitation. Blood transfusion advances encouraged the courageous attempts of operating at sea on previously "immovable surgical emergencies" which would otherwise be confined to land-based stations; although few, such cases helped in revisiting the prognosis of difficult wound surgery while also contributing to the evolution of the organisation and administration of modern-day emergency trauma services [4].

On D-Day itself H.M. TLS No. 363 carried 187 casualties from evacuation stations on the Normandy coast, more than on the later days of the invasion. It served the route for more than 24 days and transfused hundreds of soldiers. While on board mortality was 0.5% and no adverse reactions to transfusion were witnessed, although follow up cards were issued only to very few patients. A small piece of the medical mobilisation for the D-Day landings, each tank landing ship contributed to this gallant page of medical military but also global history.

Acknowledgements

The illustrations in this article are reproduced from 'The Invasion of Normandy: The wounded' collection at the Naval Historical Center (www.history.navy.mil)

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