AIR EVACUATION OF CASUALTIES IN SOUTH EAST ASIA.

By

Brigadier J. T. ROBINSON, O.B.E., M.D.,

[Received November 10, 1946.]

INTRODUCTION.

This article attempts to describe briefly the use and value of aircraft in the evacuation of casualties in the Burma Campaign.

The facts presented and the conclusions drawn can in no way be attributed to the personal experience of the author. They are written from official reports to which the writer had access in his capacity as D.D.M.S. H.Q., A.L.F.S.E.A. and from discussions and correspondence with individual officers who had a vast amount of practical experience in air evacuation in Burma.

The article is written in response to a request as it was felt that there were many readers who would be interested and who might find such an article informative and interesting.

When considering the task requested, the idea presented itself of obtaining a symposium of articles by those who were more fitted to deal with specific aspects of the problem. Such an idea, if implemented, had the advantage of relieving the author of a considerable amount of “devilining.” It was found, however, to be impracticable as all officers had left the theatre and were widely dispersed throughout the world. To collect material from them would have necessitated long delay and it is probable that this article would never have appeared.

The author does not attempt to go into all details connected with air evacuation as time and space do not permit. Many aspects of interest and importance are missing, notably the detailed ground organization and staff requirements at Corps Medical Centres, the training of medical and nursing personnel in emplaning and deplaning of casualties, communications, and the controversy in respect of secondary roles for aircraft used primarily for evacuation of casualties.

The author expresses the hope that this inadequate effort may stimulate readers who possess detailed practical experience of air evacuation to express their opinions in print on specific aspects of air evacuation to the education and benefit of the uninformed.

HISTORICAL.

In the early days of the Burma Campaign two main factors dictated the organization of medical evacuation. The first was the siting of hospitals so as to reduce evacuation to the minimum and the second was the control of evacuation so that it did not interfere with either the patient’s treatment or the work of the hospital to which he was admitted. It was obvious that a
patient could not be cured and moved at the same time and that a large hospital used for transit could not perform its proper function of curing the sick.

To meet these requirements, large hospitals were therefore sited as far forward as possible in order to reduce evacuation. The bed capacity of Field Ambulances and C.C.S.s was also increased and light equipment added so that these units functioned as small hospitals for urgent sick and battle casualties, taking up to three or four times their authorized holdings. From these beginnings there evolved the first light casualty hospital in South East Asia, the Indian Malaria Forward Treatment Unit, which fully justified its inception during the campaign.

The siege of Imphal put an end to the policy of siting large hospitals forward but, at the same time, established the necessity for air evacuation. The Medical authorities, notably Brigadier G. E. MacAlevey, D.D.M.S. 4 Corps, and Major-General T. O. Thompson, D.D.M.S. Eastern Army, were vividly aware of the advantages to be gained from air evacuation and pressed the Staff from the beginning of the Burma Campaign to provide aircraft. Due to their perseverance, aircraft, with certain limitations, were made available and were first used on an organized plan in the Arakan in 1943. From then on air evacuation became an essential part of the plan of campaign in Burma, where road and rail communications were difficult or non-existent and where the rapid advance of the army frequently necessitated leaving the country behind to revert to enemy hands for considerable periods. Air evacuation was planned in two phases:

Phase 1.—Evacuation from Divisional Medical Units in the most forward areas to the Corps Medical Centres located in the Corps area. These Divisional Units were often under continuous shell and mortar fire and frequently in range of small arms.

Phase 2.—Evacuation from Corps Medical Centres to Advanced Base Hospitals.

Evacuation from Divisional Medical Units was carried out by light aircraft of the following types:

L.5—known as the “Flying Jeep” or “Stenson” (American). This was a single seater high wing aeroplane with a low landing speed, capable of carrying 1 sitting casualty. A proportion of these aircraft were modified for carrying 1 lying casualty each. The stretcher was loaded in the rear cockpit by opening a panel in the wall of the fuselage. The patient was normally carried head foremost, but in cases with injuries of the lower limb necessitating the use of the Thomas’ splint, the stretcher was loaded head tailwards and the end of the Thomas’ splint threaded into the fuselage. This plane was very safe, possessing efficient landing brakes and an economic range of 100 miles.

L.1—otherwise known as “Vultee Vigilant.” This was a single engine, high wing, light monoplane, with a capacity for 1 pilot and 1 sitting case. A certain number were modified to carry 1 lying case. Certain large editions of this plane were capable of carrying 4 lying and 3 sitting or up to 8 sitting cases.
Air Evacuation of Casualties in South East Asia

C.64—known as the "Norseman." This was a single engine, high wing monoplane, carrying 4 lying and 4 sitting cases or 8 sitting cases.

*Tiger Moth.*—two seater biplane. Carried 1 sitting or 1 lying case in the rear cockpit according to whether or not the aircraft had been modified to deal with the latter. When so modified the patient was lowered in a Neill Robertson stretcher provided with the aircraft. The patient was unable to see out and required considerable reassurance before emplaning. This plane had no landing brakes, which proved a danger in high wind.

*Fox Moth.*—This plane did invaluable service in the Southern Arakan and in the evacuation of West Africans in the Kaladan. It was a single engined biplane flown from the rear cockpit. Forward of the latter and below was a four seater cabin, capable of carrying 4 sitting or 1 lying case, with attendants. It had good landing brakes.

**Available Forces and Control.**

Two squadrons of U.S.A.A.F. Air Commandos, each composed of thirty-one L.5s and four or five C.64s, were available throughout the campaign and were allotted on the basis of one squadron per Corps.

An additional flight consisting of twelve L.5s and three L.1s of the U.S.A.A.F. was available for part of the campaign, notably during the siege of Meiktila.

In the earlier phase of the campaign, R.A.F. "Moths" were attached to the U.S.A.A.F. Squadron.

A flight of R.A.F. L.5s belonging to 221 Group R.A.F. was employed in the evacuation of R.A.F. casualties, and their services were fully and willingly lent to the Army on many occasions.

These light aircraft were controlled by a Squadron Commander U.S.A.A.F. who worked in close liaison with the Corps Medical Authorities. Aircraft were allotted to "runs" as required and were at the disposal of the Medical Services.

They were based at Corps airstrips but flew to Divisional airstrips daily from first light (06.00 hours) to about 16.00 hours.

As a routine, the last aircraft from any given Divisional airstrip brought an estimate of the number of sorties required for the next day. This had the effect of limiting signal demands for aircraft to emergency requirements only.

**Airstrip Required.**

A ground strip of 500 yards by 30 yards was necessary to take all types of light aircraft used. Such airstrips were usually constructed by medical personnel of the Divisional Field Ambulance or by Staging Sections in accordance with specifications submitted by the Air Force authorities concerned. The location of the strips was signalled by the A.D.M.S. of the Division to the D.D.M.S. of the Corps. The latter then signalled the Squadron. It was usually not difficult to obtain suitable ground, though considerable work was required in removing bunds and clearing undergrowth. The ground was tested for suitability after clearance by driving a 15 cwt. lorry over it, and
small mounds were levelled. On occasions assistance was given by the Divisional Engineers.

Airstrips were marked with white strips, an "L" strip 3 feet by 3 feet by 1 foot being placed at each corner and white strips 6 feet by 1 foot being placed at 50-yard intervals to mark the external boundaries of the strips.

A "T" was placed on the left of the airstrip, half-way along, the long arm pointing towards the approaching aircraft. The factor governing the place of the "T" was tree clearance and not the direction of the prevailing wind.

The Divisional Medical Units were responsible for the reception, treatment and emplaning of all casualties. Fig. 1 illustrates a diagrammatical lay-out of an airstrip used at Thekigin in December, 1944.

When the strip was completed, a reconnaissance plane flew over the site in the early morning and photographed the area. If it was considered satisfactory for landing and take-off, the required number of planes flew over immediately. During the Meiktila-Rangoon advance the number of strips constructed was greater than that during a corresponding period at any other time, yet none of the strips was refused by the Squadrons.

Inter-communication.

The official channel for liaison between the squadron and the forward Medical Units was through the D.D.M.S. of the Corps, and personal contact was frequently made between the pilot and the forward troops. Often pilots were able to discuss the suitability of the strips with the officer in charge of the construction. The system adopted in the Fourteenth Army in which the Squadron worked under the D.D.M.S. of the Corps proved to be more satisfactory than that in which there was direct liaison between the forward area and the rear strip.
Air Evacuation of Casualties in South East Asia

Evacuation from Corps Medical Units.

Dakota aircraft (C.47) were in the main employed, but on occasions Commandos (C.64) were also used. The former carried 18 lying and 12 sitting or 30 sitting with normal personal kit. The Commandos were larger types of Dakotas and carried 24 lying and 8 sitting or 34 sitting cases.

Available Forces.

One squadron (24) of Dakota aircraft was employed constantly and solely for the fly-in or reinforcements and the air evacuation of casualties. In addition a variable number of store-carrying Dakotas and Commando aircraft was available and used for evacuating casualties on their return trips.

The aircraft employed were mixed R.A.F. (Transport Command) and U.S.A.A.F. (Combat Cargo Task Forces Bengal-Burma). The Army link with these authorities was through a Commander Army Air Transport Organization (C.A.A.T.O.) who was based at Comilla.

Operational Employment.

These aircraft had to cover the requirements of Corps and the L. of C., including districts, areas and sub-areas.

Estimates were made by the formation medical authorities by airfields giving the number of sorties required for each per diem. Estimates covered a fourteen-day working period and were submitted to the staff of the formation concerned seven days before the commencement of the fourteen-day period for which they were required. These demands were submitted through staff channels to Army H.Q. The latter submitted a consolidated demand to C.A.A.T.O. which included all formations.

From the estimated bids C.A.A.T.O. arranged to supply the number of aircraft required by airfields with H.Q. R.A.F. Transport Command and H.Q. C.C.T.F.

As a supplement to these fortnightly bids, there was an "S O S" service whereby, in cases of emergency, additional aircraft could be made available to any particular airfield or airfields at forty-eight hours' notice. These additional aircraft were demanded for specific days within the fortnightly period operative at the time of demand.

As the number of aircraft available was not always equal to the demands made, a system was adopted whereby the formations, airfields and medical units concerned were notified by signal of the numbers of aircraft available and their estimated time of arrival at each airfield.

This signal was made by C.A.A.T.O. on an "Emergency Operations" priority on the evening of the day before the flying of the sorties.

Aircraft were based at either Corps airstrips or at airfields in the Army area, depending on the terrain and weather conditions. During monsoon periods alternative routes had to be planned and new airstrips constructed.

The most cordial liaison existed between the Army and R.A.F. authorities to provide the maximum use of available aircraft in all types of weather.

All aircraft used for casualty evacuations were specially fitted to carry stretchers.
None of these aircraft were allotted for the sole purpose of casualty evacuation. They were usually employed on the outward run for the carriage of reinforcements, supplies and mail. Application was frequently made for ambulance aircraft for medical use only, but this was never permitted owing to the limited number of aircraft and consequent necessity for rigid economy in the utilization of those available for all purposes.

Airstrip Medical Organization.

Two airstrips were required, the first for the receipt of light aircraft bringing casualties from the forward areas, and the second the casualty evacuating strip for medium or heavy aircraft for further evacuation to advanced bases.

Both these strips were part of the same airfield, and the unloading and loading sites of both were located as near as possible. An arrangement of this kind allowed for the minimum use of road movement of casualties and the minimum requirement of ambulance cars. It further permitted one medical unit, under one control, being responsible for reception, treatment and further evacuation of casualties. It also allowed the simplest liaison to be maintained with airfield authorities.

The medical units on the airstrip were sited at least 400 yards from the strip, to which roads were made. Shade and air was considered, and the dust clouds thrown up by aircraft moving on dirt strips avoided.

The following medical units were employed on these airstrips:—(a) Field Ambulances; (b) Indian Staging Sections (Combined); (c) Casualty Air Evacuation Units (C.A.E.U.) R.A.F.

The employment of field ambulances tended to immobilize a unit which in the battle plans was earmarked for the support of Corps troops.

The Casualty Air Evacuating Units of the Royal Air Force were well provided with personnel, medical stores and equipment. Since they possessed only British personnel they were a disadvantage in the Burma Campaign where the bulk of casualties were Indian troops. These units were not available until late in the campaign and of the total number of casualties only a minor portion passed through these units. They were never employed forward of Corps Evacuation Centres.

At all these units "triage" of casualties was carried out, i.e. the reception, sorting and classification into those requiring and fit for air evacuation to Advanced Base Hospitals, those for admission to Corps Medical Centres, and those unfit for further evacuation.

The minimum bed capacity was 50 but was capable of expansion up to 200. All casualties could be held, treated and fed up to two or three days, and abdominals up to ten days.

A minimum of five ambulance cars was considered necessary.

Selection of Casualties for Air Evacuation.

The advice of pilots was of considerable assistance in the selection of suitable cases, since flying conditions, such as altitude and "bumpiness" and the availability of oxygen had to be taken into account. With this information, normal clinical judgment was sufficient to ensure a correct choice of case.
Air Evacuation of Casualties in South East Asia

All cases on arrival at the most forward Medical Units were given first-aid treatment, including control and prevention of shock.

It was found that most casualties stood air evacuation well with the exception of the following cases:

(a) *Scrub Typhus.*—Scrub typhus cases presented a definite risk, particularly in the first ten days of the disease. Even after short, smooth, low altitude flights, it was found that their condition deteriorated and several died. In most of these post-mortem examinations showed multiple venous thromboses, particularly of the lungs and, less frequently, of the lower limbs.

Fortunately the incidence of scrub typhus fell progressively after the end of the monsoon, and as the campaign progressed.

(b) *Eye Injuries.*—Interocular lesions were liable to further damage by flying at high altitudes and/or in “bumpy” conditions.

(c) *Chest Cases.*—Few pneumonia, pleural effusions or lung abscesses required evacuation, but those evacuated stood the journey well if suitable weather conditions were selected. Perforating wounds of the chest with hæmorrhax or pneumothorax and partial or complete collapse of a lobe were, however, definitely a bad risk and were retained on the ground as long as possible.

(d) *Ear Cases.*—Acute suppurative conditions of the middle ear and their internal ear complications sustained a definite risk of aggravation.

(e) *Anaemia Cases.*—Cases of anæmia travelled badly and were held till their hæmoglobin level was above 50 per cent.

**AIRCRAFT REQUIRED.**

In the Arakan during February, 1944, the following air evacuation took place:

*By light aircraft from forward airstrips, 637.*

*By medium aircraft (C.47) from Bawli/Ramu area to Comilla, 765.*

The force operating was four divisions, each with a strength of about 20,000. In the period January 30 to February 26 their estimated total casualties were 1,913, of which 998 were wounded, giving a percentage *per mensem:* Wounded, 1·25 per cent; total casualties, 2·39 per cent (including killed, wounded, sick and missing).

Thus in a total of approximately 1,000 casualties over 600 were transported by light aircraft, which was equivalent to 2 per 1,000 per day. This figure of 600 included some sick as well as wounded, especially from 81 West African Division, who were for a while entirely dependent on these light planes.

The conclusion reached by D.M.S. 21 Army Group (Major-General T. O. Thompson) was that for a campaign of moderate intensity in a healthy area (sick rate less than 3 per 1,000 per day), the number of cases which required lift were as follows:

*By light aircraft, 0·8 per cent of strength *per mensem.*

*By medium aircraft, 0·95 per cent of strength *per mensem.*

As the campaign progressed, fighting had to take place in areas where malaria and typhus were endemic and where sick rates were high. Inexperienced
troops suffered heavier casualties from malaria in the early phases of a campaign. This was evident from a consideration of the different rates in Divisions fighting at the same time and on the same terrain. Such differences were due to different standards of anti-malaria discipline. This situation increased the number of casualties requiring evacuation by air, and by March, 1945, evacuation in the Fourteenth Army by light aircraft had averaged from 1,000 to 1,100 weekly.

**Light Aircraft.**

As a result of experience the Medical Authorities considered that one squadron of light aircraft (32) was necessary for each fighting division operating in Burma where sick rates varied from 5 to 10 per cent according to the terrain and period of the year. Highest sick rates were recorded in March and July. A daily lift of 36 casualties over an average range of 50 miles was required.

It was considered that each aircraft should be capable of lifting from one to three casualties and carrying at least one stretcher.

**Medium Aircraft.**

One squadron capable of lifting 48 casualties per day over an average distance of 150 miles was considered necessary.

**COMMENTS.**

**Use of Light Aircraft.**

Casualty evacuation was the primary role of all squadrons. Though this was never laid down officially by any higher authority, the fact that casualty evacuation was the first task was accepted by the Squadron Commanders and the Medical Branch at Corps Headquarters. This view was not held throughout the Corps and no authority for employing light aircraft on the primary task of casualty evacuation was laid down by any higher formation. It was generally the opinion that unless definite authoritative orders were laid down to Squadron Commanders and aircraft were specially allotted for casualty evacuation, these aircraft might be dissipated on secondary tasks for which other aircraft should be allotted. All aircraft were employed in secondary tasks but except in the case of flying in of emergency medical supplies, these secondary tasks were never allowed to interfere with evacuation of casualties.

Such secondary tasks were:

(a) The emergency flying in of medical supplies, especially whole blood.

(b) Flying in reinforcements, mail, food, and ammunition, and items of personal kit. These trips were always part of a casualty evacuation sortie.

(c) Transporting V.I.P. within the Corps area. Frequent demands for transport to and from forward areas were refused. The Squadron Commanders agreed that facilities should be given only to General Officers and those with a request from Corps or Divisional H.Q.

(d) Spotting for artillery.

(e) Dropping and picking up messages.

(f) Reconnaissance flights.
The service was uniformly excellent. The highest degree of co-operation existed between the U.S.A.A.F. and the Army Medical Authorities. A very deep debt of gratitude is owed to the personnel of the U.S.A.A.F. squadrons for their unfailing readiness to undertake any task required of them, and there is no question that many British and Indian soldiers owe their lives and limbs to the courage and endurance of these pilots.

Equally cordial were the relations between the Royal Air Force and Army Medical Authorities, and the same tribute is due to the pilots of the R.A.F. Light Aircraft.

The types of aircraft were well suited to the purpose, but it was considered that a higher proportion of C.64s would be an improvement, as would the modification of all L.5s to take lying casualties.

The allotment of aircraft was insufficient in that where Corps were adequately served, no cover was available for Army troops. Experience proved that additional aircraft were required for the evacuation to Army Medical Centres, when these were established, and for the evacuation of casualties from forces engaged in operations directly under Army Command.

It was impracticable to direct aircraft from the Corps allotment for such purposes, due to the difficulties of maintaining such detached aircraft.

It was estimated that one self-contained flight of 24 L.5s aircraft was required for "Army needs."

Supplies of special fuel (74 octane) were required for L.5s, L.1s and C.64s and had to be planned for by "Q" Services at all times, since these aircraft would not fly with safety on any substitute fuel.

Use of Medium Aircraft.

The fact that no aircraft were allotted for the sole purpose of casualty evacuation raised certain difficulties which must be mentioned. These were as follows:—

(a) The unavoidable last-minute alteration or cancellation of scheduled sorties on account of weather conditions at the base, en route, or at the forward areas. This constituted a major difficulty during the monsoon, but was of no major importance at other times.

(b) Faulty briefing of pilots at base. This resulted in the non-arrival or late arrival of aircraft, or the arrival of excessive numbers of aircraft at the same place and time, and led to unavoidable delay in the loading or to unnecessary haste in loading and to inconvenience to the evacuating medical unit. Worse still casualties were sometimes kept waiting for long periods on hot and dusty airstrips. Occasionally they had to return to the evacuating medical unit and await evacuation until the following day.

(c) Delay in signal communications. Although the signals were all made on "emergency operations" priority, they could not be despatched until the evening of the previous day, when the numbers of aircraft available could be assessed. Further delay was caused by the fact that all signals were made in cipher, and had of necessity to be routed through the nearest formation where they could be deciphered before delivery to the airfield and medical unit.
requiring the information. As a result signals were sometimes received after, and never more than a little before, the estimated time of arrival of the aircraft. It was generally felt that this defect would be overcome by: (i) The use of code, enabling ciphers to be omitted; (ii) the provision of a signals link (preferably wireless) between medical centres and the nearest formation H.Q.

As a result of these difficulties, commanders of medical units often refused to send casualties to the airfields until a firm confirmation of the expected time of arrival of the aircraft was received by them. This refusal was in the best interests of the casualties, but caused delays in the loading and turn round of the aircraft when these arrived without warning or were ill-spaced. Precious sorties were thus lost, and friction engendered among personnel.

It is only fair to say that an appreciation of these difficulties was, and could only be, acquired gradually, and it was not until the end of the campaign that a clear account of them was presented to C.A.A.T.O.

(d) No permanent medical or nursing staff was available for the aircraft, and, when required, they had to be provided by the evacuating medical unit.

Airstrip Medical Staff.

It was obvious that whatever medical unit is employed must be capable of unloading from aircraft, sorting casualties, attending those awaiting evacuation, and loading of heavy aircraft all at the same time. For this purpose it was essential to have an adequate number of non-medical officers or British N.C.O.s, and an efficient inter-communication system between ground control staff and the airfield evacuation unit, also between the latter and the medical centre. Such communication was generally by telephone and worked well. Adequate water supply, cooking facilities and latrine accommodation had to be provided. A jeep was considered essential for the Officer commanding the medical unit.

Five ambulance cars for a Corps airstrip was considered the minimum required. A platoon of an Indian Stretcher Bearer Company proved invaluable for the loading and unloading of aircraft.

Welfare Service.

It was agreed that some form of Welfare Service such as Red Cross, Toc H or WAS(B) Mobile Canteen should be attached to the medical unit on the airstrip.

Evacuation of Infectious Cases.

On one occasion the evacuation of some cholera cases was refused on the grounds that U.S.A.A.F. regulations forbade the carriage of infectious cases. No such regulations, it is understood, were made by the R.A.F.

Apart from the need for uniformity of regulations between the Services concerned, there does not seem to be any objection to the carriage of all types of infectious diseases by air, provided that aircrews are effectively protected by appropriate inoculation or vaccination; that arrangements for the disinfection of the aircraft after use are available where necessary; that suitable containers for infectious excreta are made available; and that efficient arrangements are made for the isolation of infectious cases at the evacuating units, in transit, and at the receiving airfield.
CONCLUSION.

The main lessons learned from the Burma Campaign concerning casualty air evacuation were:—

(a) The absolute necessity of light aircraft being allotted for purely medical purposes and being under the direct control of the Army Medical Administration of the Formation.

(b) That the Army Medical Units must staff the forward airstrips. These strips are on Field Ambulance level, and in the Burma Campaign were constructed often within a few hours of the occupation of the ground by forward troops. Though the duty of manning these strips devolved on Field Ambulances and Staging Sections, there is need for either special small Mobile Evacuation Units or the use of the Field Medical Company for these duties. In either case, the essential is they should be Army units and under the strict command of Medical Administrative Officers.

(c) The necessity for a minimum number of ambulance transport aircraft to be devoted to medical purposes only and equipped as hospital planes. Such planes must be staffed by medical personnel and there must be a pool of medical personnel for employment with such aircraft when evacuating.

SUMMARY.

A brief description of air evacuation of casualties in the Burma Campaign has been given. Experiences gained in the use of light and medium aircraft in the evacuation of casualties have been noted and the necessity for allocating such aircraft solely to the Army Medical Services for the primary task of casualty evacuation has been stressed. A brief note has been included on the experiences gained in the selection of casualties for air evacuation.

ACKNOWLEDGMENTS.

I have to thank Major-General W. E. Tyndall, C.B., C.B.E., M.C., Director of Medical Services, Allied Land Forces, South East Asia, for permission to forward this article.

It is impossible to mention by name the individuals who contributed notes and reports and who by verbal discussion largely contributed to the material for the above article. If any such individuals should read this, it is hoped that they will accept this as a personal acknowledgment to them.