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Anaesthetist in Salalah

Experience in a field surgical team

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Army and Royal Air Force field surgical teams have worked in rotation in Salalah for several years to provide medical and surgical facilities for United Kingdom Servicemen and the forces of the Sultan of Oman.[1] The author was anaesthetist to the R.A.F. field surgical team from 1 July until 1 November, 1975. The team comprised two surgeons, one anaesthetist and fifteen theatre, ward, laboratory and administrative staff. The facilities available have undergone gradual improvement and at the present time include resuscitation, theatre, ward and outpatient buildings. In addition there is a small laboratory and X-ray wing. One ward was adapted for use as an intensive care unit. Due to the scarcity of specialised surgical facilities in that part of the middle east the team often had to undertake reconstructive surgery and the rehabilitation of patients who could not be referred to specialist centres in the U.K. or elsewhere. Assistance to the local medical services was afforded by performing more routine emergency and elective surgical treatment during periods of quiet military activity.

Sixty-six battle casualty and 100 non-battle casualty emergencies were evacuated to the Field Surgical Team during the period (Table I). Eleven battle casualties and two of the other cases died before admission. Two battle casualties died after admission but all the other cases survived.

Table I. Casualties evacuated to the Field Surgical Team from 1 July to 1 November 1975

	Gunshot wounds	Mines	Shrapnel	Non-battle casualty emergencies	Total
Recovered	20	20	13	98	151
Died after admission	1	0	1	0	2
Died before admission	9	0	2	2	13
Totals	30	20	16	100	166

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Anaesthetic techniques

One hundred and seventy-two general and 69 local anaesthetic procedures were carried out during the 4 months. Eighty-five of these were for primary or secondary procedures on battle casualties (Table 2).

Table 2. Anaesthetic procedures in the Field Surgical Team from 1 July to 1 November 1975

	Battle casualties		Other emergency and elective procedures	Total
	Primary procedures	Secondary procedures		
General anaesthesia	50	21	101	172
Local anaesthesia	5	9	55	69
Totals	55	30	156	241

Most techniques used by the anaesthetist in a general hospital were available but the extended lines of supply and communication meant that the use of compressed gases had to be reserved for major or complicated cases.

Brachial plexus blocks, femoral blocks, spinal analgesia and other local techniques were used as often as possible.

Many procedures did not require complete relaxation and could be undertaken using an intravenous method. An althesin–pentazocine neuroleptic technique or intravenous ketamine were used for the majority of these.

The low flow rates required to supplement oxygen by the Haloxair portable anaesthetic machine[2] proved to be a considerable advantage.

Althesin, with its advantages of convenience of storage, preparation for use and a short post-operative recovery period, was used almost exclusively as an induction agent.

Cases involving major surgical procedures or complications such as haemorrhagic shock were induced with ketamine or althesin and mechanically ventilated using nitrous oxide, oxygen and intravenous pentazocine.

As in other emergency situations there were times when text book methods had to be discarded. Such an occasion was when difficulty in control of haemorrhage meant that the correct time to induce anaesthesia was before the blood loss had been fully replaced in order to prevent a deteriorating clinical situation.

Battle casualties

The first 2 months of the tour took place during the monsoon season and close encounters resulted in high velocity gunshot injuries at short range with the well-known effects of gross tissue destruction. During the second 2 months anti-vehicle and anti-personnel mine injuries and shrapnel injuries occurred more frequently.

Reception, resuscitation and immediate treatment

Evacuation of casualties by helicopter often resulted in their arrival within an hour

Fig. 1. Evacuation by helicopter.

of injury (Fig. 1). The resuscitation block lay adjacent to the landing pad so that initial assessment and resuscitation could be immediately undertaken by three teams each comprising a doctor and two assistants. The senior surgeon made an overall assessment of individual priority and the anaesthetist took responsibility for the resuscitation of major casualties. Each casualty received a numbered wrist band and a folder containing case notes and relevant laboratory request forms. Blood was withdrawn for initial haemoglobin level and cross-match and intramuscular benzylpenicillin 600 mg and tetanus toxoid 0·5 ml were routinely administered unless contraindicated. If further casualties arrived and a doctor was not available, two theatre technicians were competent to set up intravenous infusions and pass an endotracheal tube if required.

Chest injuries. Apparatus for endotracheal suction and intubation and mechanical ventilation were present in the resuscitation block, theatre and intensive care unit. An intercostal apical drainage tube could be inserted immediately if a tension pneumothorax was suspected.

An Astrup machine for blood-gas analysis had been available previously but infrequent use and servicing had resulted in poor reliability. Contrary to previous experience[3] the author felt that this apparatus, though desirable, was by no means essential in a field situation. An increased call on clinical judgement in the assessment of increased intra-pulmonary shunt, hypoventilation, flail chest or other respiratory problems proved a rewarding and usually successful experience.

Head injuries. Serious head injuries were managed by an initial intravenous dose of dexamethasone 12 mg and endotracheal intubation and hyperventilation at an early stage when indicated.

Haemorrhagic shock. A temporary saline infusion was often established prior to admission and, if necessary, this was replaced by a central venous catheter. A subclavian technique was normally used and occasionally when this was not successful the internal jugular route was used.

If clinical shock was present a minimum blood volume loss of 25% was assumed and 2000 ml of Ringer lactate were rapidly infused. The patient was then re-assessed and 500 ml of dextran 70 started. A further 3000–4000 ml of Ringer lactate and 500 ml of dextran 70 were often given before the use of blood was considered. A liberal

approach was used for intra-operative fluid administration and 10 ml/kg body weight/hour of Compound Sodium lactate injection BP (Ringer-lactate) was normally given for maintenance requirements.

The clinical state was assessed by close observation of peripheral perfusion, central venous pressure, urine output and blood pressure. A fall in haemoglobin to a minimum of 5g/dl was considered adequate for tissue oxygen requirements until the early postoperative period. In practice this method proved successful and no cases of acute renal failure or pulmonary oedema occurred. In addition the hazards of administering uncross-matched blood were avoided.[4,5]

Disseminated intravascular coagulation. This is a well-recognised clinical syndrome occurring in major trauma. A provisional diagnosis was made on the basis of absent or delayed and friable whole blood clotting and a depressed platelet count. In view of the controversy still surrounding the use of epsilon-amino-caproic-acid and heparin[6] and the absence of a haematologist, a conservative regime was adopted using fresh blood and fibrinogen. Both of the casualties who died after admission had clinical disseminated intravascular coagulation.

The first had a blast injury to the head with multiple compound skull fractures and he would not have been expected to survive in the absence of a coagulation disorder.

The second casualty sustained seven separate gunshot wounds to the thorax, abdomen and pelvis. It was suspected that defibrination had started prior to admission and despite a massive transfusion including fresh blood and fibrinogen bleeding continued from all operative sites throughout a 5 hour operation resulting in his death half an hour later.

Maxillo-facial injuries. These occurred in isolation or in association with other major injuries.

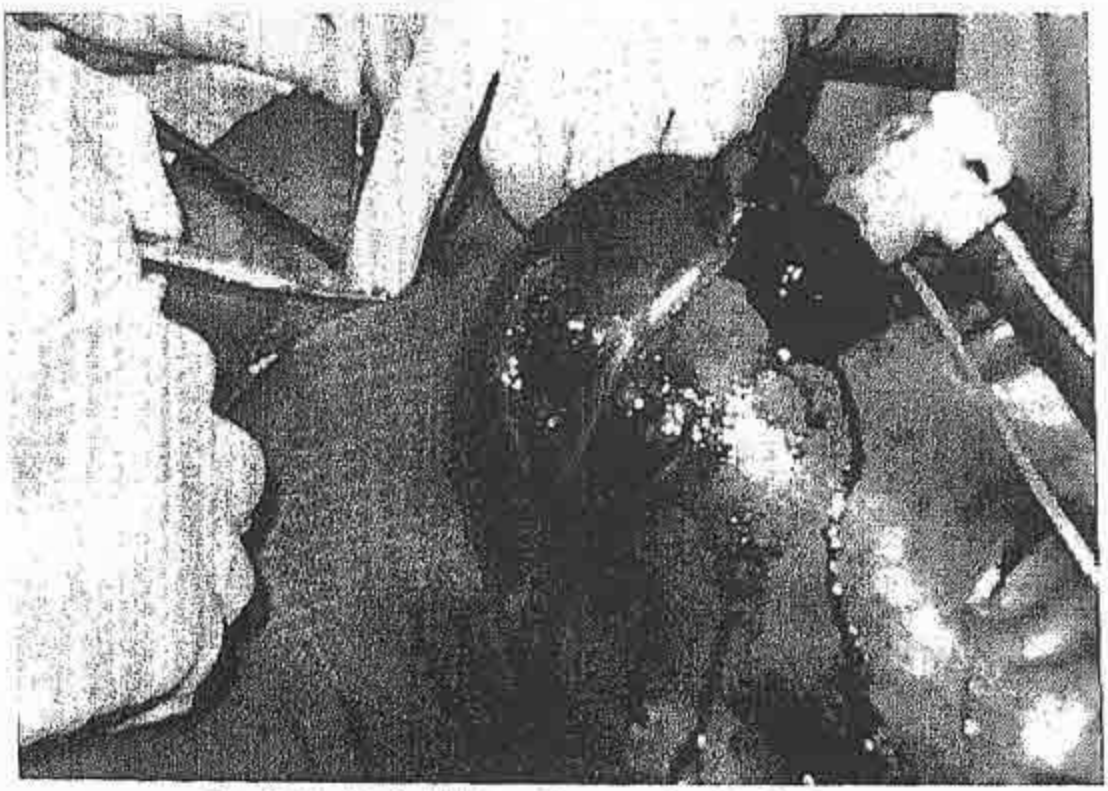

Fig. 2. Maxillo-facial injury. The case described in the text.

One case presented a particular problem of intubation. He had received a close range gunshot wound of the mandible causing multiple fractures and creating a sledge hammer blow effect. The patient had found that the only way to maintain his airway was to support himself with his hands in a prone position.

It proved impossible to control the bleeding. A rapid intravenous infusion of Ringer-lactate was started and after pre-oxygenation, anaesthesia was induced in the prone position by intravenous ketamine 200 mg and this was followed by suxamethonium 80 mg and the application of cricoid pressure. The patient was then turned onto his side and an endotracheal tube was inserted. Haemostasis was secured and a tracheostomy was carried out prior to wound excision and toilet (Fig. 2). The tracheostomy was closed 2 weeks later and the patient made a successful recovery.

Conclusion

Continued experience in a field surgical team confirms previous findings that by good first aid, rapid evacuation of casualties and the use of advanced techniques of resuscitation and anaesthesia a high survival rate of casualties can be achieved.[7,8] Anaesthetic equipment for a single anaesthetist should be portable and simple to maintain and should, if possible, include an electrocardiogram monitor, a cardiac defibrillator and at least two mechanical ventilators whose operation is not dependent on compressed gases.

Summary

A tour of 4 months with a static Field Surgical Team supporting military operations is described. Some of the problems of resuscitation and anaesthesia which were encountered are discussed.

The anaesthetist's training in intensive care and the management of acute medical problems have a major part to play in a field hospital particularly in an isolated area. The management of coagulation disorders remains a major problem.

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