ROAD ACCIDENTS AND THE FAMILY DOCTOR

Extrication of Trapped Casualties

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One of the most demanding situations the rescue services have to face is that of the seriously injured casualty who has become trapped in a smashed-up vehicle. Faced with this situation most emergency services will welcome the appearance of a doctor at the scene. Nevertheless, it can also make difficult demands on the doctor as well unless he knows a little of the procedures of the rescue services.

Any doctor who has to put up a drip or intubate a patient is greatly helped if the ambulance staff are familiar with the medical equipment being used. In the same way, if the doctor knows a little about the rescue equipment and its uses he will be able to fit into the team more closely and will be able to continue medical attention without hindering the extrication of the casualty. From the rescue services' point of view the great value of having a doctor at the scene is that they can leave the assessment of the patient to him and concentrate on their main task of releasing the patient.

Role of Fire Service

In some areas of Britain the police provide special rescue equipment vehicles; in a few areas the ambulance service has its own, but usually it is the fire service that provides this equipment. In 1968 the fire service answered 60,481 special service calls (as opposed to 188,045 fire calls) and many of these involved road accident rescue.

There are many reasons why the fire service should be used in road accident rescue, not the least of which is that at many accidents there is a risk of fire from electrical short circuiting, petrol spillage, etc. Fortunately, major fires are rare at road accidents, accounting for less than 2% of road fatalities. Nevertheless, when the smell of petrol is strong the presence of the fire-fighting team is most reassuring.

At the scene of the accident several men are required to operate the rescue equipment and they need to work as a team in the laying out of all the necessary tools. Obviously each team member must know exactly what each piece of equipment will do and how quickly and where it is kept on the rescue vehicle; he must also be skilled in its use in dismembering a wide variety of vehicles.

Because of the cost, size, and weight of a comprehensive set of this equipment it cannot be carried in the emergency ambulance. Moreover, if the equipment were to be kept on the ambulance the removal of the casualty to hospital would have to be delayed while the equipment was repacked. Using this equipment necessitates the operator wearing protective clothing, such as industrial gloves and goggles, to avoid minor injuries such as a cut finger or a foreign body in the eye which would hold up the work. The operator will almost certainly get his hands dirty and therefore not be the person of choice to handle first-aid dressings. When the casualty has been released the equipment may be required to make the crashed car safe—for example, by disconnecting the battery.

In Bath, when there is any suspicion of a casualty being trapped this information will be passed on, usually via the

G.P.O. "999" direct line, and an ambulance, the emergency equipment vehicle, a water tender (a fire engine carrying 400 gallons of water and fire-fighting equipment), the fire officer in his staff car, and a doctor with his medical equipment will set out for the scene of the accident. All are in direct communication with the control room by radio telephone, and while on their way to the accident can have further directions passed to them, such as a more precise location of the crash.

Emergency Equipment

The emergency equipment vehicle is a modified four-wheel drive Landrover. It has a built-in generator for powering a wide range of electrical tools and three powerful floodlights. It also carries a wide range of portable hydraulic apparatus as well as ordinary hand tools and oxyacetylene cutting equipment; the vehicle itself is fitted with a power winch. Drums of cable allow the equipment to be operated at distances of more than 100 yards (91 metres) from the vehicle with ease. When it is realized that every single item of equipment carried has been used for rescue procedures in the last eighteen months it becomes apparent that nothing less will suffice for covering all situations.

Some units are powered by compressed air instead of electricity, and some may even be powered by their own tiny petrol engines. Nevertheless, basically the cutting part of the tools are the same. With this equipment a car can be taken apart fairly rapidly and a few examples of test timings for cutting through various structures will give an indication of the value of this equipment:

Item to be Cut Through	Tool	Time Taken (secs.)
Steering column	Sabresaw	20
Gearstick		30
Pedal lever		30
2 seat mounts or back supports		20
Windscreen or door pillar	Abrasive disc cutter	50
	Hydraulically operated shears	25
Car bonnet (to reach battery)	Electric metal shears	20

FIG. 1.—Blackhawk hydraulic shears.

It is possible to make a large opening in the side of the car by forcing the front door back against the front wing, and then removing the pillar on which the rear door hinges by cutting it at the top and bottom. This could all be done comfortably in only two minutes. Similarly by cutting the two

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windscreen pillars and door pillars the roof can then be lifted and "hinged" back, by bending the rear pillars, in a matter of two to three minutes. Even with proper equipment, however, it can still take at least half an hour to release the casualty completely.

FIG. 2.—Electric padsaw—Sabresaw.

With these facts the doctor can assess a situation. If, say, a person has a fractured spine a spinal board can be fitted in the knowledge that, even though the car has been badly damaged and deformed, a part of it can be easily cut away to allow the casualty to be removed gently and with adequate support from both sides. In fact, wherever possible it is preferable to remove parts of the vehicle from around the injured patient, so that he has to be moved as little as possible until he can be lifted out and on to a stretcher as one continuous operation.

In some situations, however, moving the patient a little enables him to be freed more quickly. A typical example is that of a lorry driver with a fractured femur or tibia and fibula and who is also trapped by the foot under a pedal. The pedal controls present a difficult problem. Access to them is usually very limited from inside the cab, and unless the cutter can be held steadily the blade can easily be broken. Bolt cutters cannot safely be used to cut through the stem of the foot pedal, as this is usually made of cast steel, and so often the approach has to be made from the underside of the vehicle, or by cutting a hole through the front of the cab.

FIG. 3.—Commercial vehicle collision.

This is a situation in which the doctor may properly decide that a small amount of manipulation of the leg would be permissible to allow the foot to slip from under the pedal. Analgesia may well be required, and at this point the limitations of morphine or pethidine become very obvious. The patient is sitting up—a position which will exaggerate any effects of hypotension—and may have associated head, chest, or abdominal injuries. A small dose of the drug intravenously will give very little analgesic effect, but a larger dose—whose effects may well last for several hours—is strongly contraindicated. This is where an inhalant analgesic like Entonox (50% oxygen and 50% nitrous oxide) can be of such value. It will provide a potent analgesic effect within a few minutes, and when the patient has been moved can be discontinued if necessary. This enables the

patient to be moved with little pain, splinted adequately, and, with an intravenous infusion running, the journey to hospital can then be made with much less haste.

FIG. 4.—Cab of above after driver cut free.

FIG. 5.—Shows winch holding out front of cab.

Inflatable Splints

The use of inflatable splints is often questioned in the presence of sharp metal or broken glass. In practice, however, it is rare for the splint to be punctured; even so, a reel of Sellotape "X" should always be included in the set of splints, as a patch of this makes a very reliable puncture repair that can be applied immediately and the splint reinflated.

The technique of putting up an intravenous infusion has been described in the earlier article (8 November, p. 348). It has been found most helpful to use one of the Baxter giving sets that allows pumping by hand compression of the lower chamber. This was found especially useful at a crash recently in Bath.

A fertilizer lorry tipped up on an estate car, trapping the driver and one of the four passengers. All were removed fairly easily except the driver, who was trapped between the steering wheel and

the back of the front bench seat, which had rammed forward. The roof of the car was crushed down by fertilizer that had spilled out of the lorry, and this had also run in through the broken side window and buried the driver up to the waist. The patient was beginning to look shocked before the roof could even be cut off, so a drip was put up. In this situation, until the roof could be taken off, the drip would not run on its own, as the bottle was at the same level as the patient's head. Nevertheless, gentle hand pumping allowed the infusion to continue until such time as the bottle could be raised. This case was also interesting in that as well as using the cutting equipment hydraulic (Flexiforce) equipment was employed. This is a kit that can be assembled in many different ways, allowing widely differing gaps or structures to be pushed apart or even crushed together. In this instance it was used between the dashboard and the rear of the seat to bend the seat back and release the patient.

Perhaps the most tricky situation of all is when one vehicle is partly on top of another and has to be lifted. This requires more specialized equipment, but sometimes the need for this can be avoided. In a recent crash a sports car ended up almost completely under a coach. One of the casualties was successfully removed through a hole cut in the floor of the coach by the firemen. Very occasionally it will be necessary for the doctor to crawl under a vehicle to examine a patient, and hence it is wise to carry a polyethylene sheet. It takes up only a very small space in the medical box but will keep one's clothes clean if oil has leaked out of a broken sump or if the vehicle has left the road and is on muddy ground.

Fire Hazards

Virtually the only hazard that a doctor (or ambulance man) can introduce at the scene of an accident is from the use of oxygen. This has been discussed at length with fire officers and would seem to present little of a problem. Perhaps the only tool that might present a fire hazard is the abrasive grinder that throws out a shower of sparks as it cuts. Tests carried out at our fire station confirm that these sparks will ignite petrol, so it may be as well to be extra cautious with oxygen when these cutters are used. The other situation where oxygen should definitely not be used is when there is smouldering behind the dash from electric short-circuiting. In the presence of oxygen this could well burst into flames. Entonox, however, being administered by demand valve as opposed to oxygen by free flow, should present much less oxygen "spillage."

Cutting metal will generate heat, and when possible asbestos blankets are used to shield the patient. However, cooling can also be produced easily by running cold water via a hose reel from the water tender on to the part of the metal being cut. The noise generated by both the power unit and the effect of cutting panels of metal could alarm the patient. Nevertheless, if the scene is well illuminated at night, and if the doctor reassures the patient and explains what is about to happen before cutting starts, then noise has never been found to cause any distress. The use of this equipment will usually allow even a badly crushed limb to be freed, thus avoiding the need for amputation as a means of releasing the patient. Even if amputation should prove necessary it may be only a question of completing a partial traumatic amputation. A tourniquet should be available just in case, and it might also prove useful to control severe bleeding in a limb still trapped and inaccessible for wound dressing.

When called to road accidents in a rural area the doctor may well arrive at the scene first, and a few practical points have emerged from personal experience. It is important to emphasize the usual advice about protecting the scene. A powerful hand torch is invaluable at night, especially when a vehicle has left the road. In approaching the vehicle ensure that it has not brought down any electricity poles, and beware especially of fences that have been torn down leaving barbed wire in long grass. Make sure that the vehicle is not going to roll if already leaning at an angle. A small crowbar kept in the spare wheel locker will often allow a door to be prised open to enable the casualties to be reached. Finally, if there is any smell of burning first turn off the ignition and then try to locate the smell. The three most common sources are from the hot exhaust pipe under the car scorching grass or foliage from a hedge; smouldering electrical wiring behind the dashboard; or something amiss in the engine compartment.

A small fire extinguisher of the dry-powder type should always be carried in the car and kept in a convenient place. Extreme caution should be observed with these, however, if they are used in the passenger compartment of the vehicle. They will send out a dense cloud of powder and could asphyxiate the occupants. Similarly some other chemical types could produce toxic by-products which would be harmful if breathed in an enclosed space. The fire brigade will usually use carbon dioxide extinguishers in this situation, and hence, pending their arrival, it may be advisable when anyone is trapped to smother the smouldering with loose earth or a blanket and try to disconnect the battery.

Even if the doctor is prepared to disconnect the battery either by unscrewing a terminal or by cutting through one of the main leads, it may not always be easy to find. Some cars have the battery under a seat, others under the bonnet, and yet others in the rear, with the petrol tank in the front compartment. In the last-mentioned case impact may, fortunately rarely, rupture the tank and allow considerable quantities of petrol to escape as well.

Finally, try to persuade one of the occupants to tell you how many people there were in the car. Not infrequently occupants are ejected some distance from the vehicle, and they may be the most seriously injured.

Undoubtedly doctors will become more involved in road accident work in the future. Not only will they be able to treat these patients and have the satisfaction of making a definite contribution towards their eventual recovery, but with the experience of attending road accidents they will be able to improve the training of the ambulance staff.

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