CURRENT ORTHOPAEDIC MANAGEMENT

WILLIAM J. KANE, M.D.

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Edited by
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Dedication

To my wife, Elizabeth,

and

To my children, Kathleen, William, Stephen,

Patricia and Anne

Preface

The creation and development of *Current Orthopaedic Management* grew from the perception that there is a need among orthopaedic surgeons for a thorough but concise presentation of the handling of specific clinical problems. The audience to whom these sections are directed are clinical orthopaedists who are interested in reviewing current therapies available for well-defined diagnoses. Each contributor has been selected on the basis of his clinical experience and his significant contributions to the understanding of the subject. The contributors have been encouraged to present their specific preferences in management programs, but also to briefly review other approaches to management.

The discussed topics have been selected with deliberation, as it is my opinion that there are many frequently seen conditions that still present management difficulties and that there is less need to address management problems arising from exotic and unique situations.

Responsibility for the specific content lies with each contributor, but the selection of contributors has been the responsibility of the editor.

I would like to thank Muriel Hughes for secretarial help, and I would also like to acknowledge the help and support of the staff of Churchill Livingstone, especially Lewis Reines, in the production of this book.

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Chicago, Illinois

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SIR GEORGE M. BEDBROOK, O.B.E.

Questions

Q1 What is the first responsibility when coming upon the scene of an accident?

Q2 Following a spinal cord injury, what are the indications for urinary catheterization?

Q3 Why can spinal surgery be safely delayed until admission to a major neurosurgical/orthopaedic service?

Q4 With respect to injuries of the cervical spinal cord, what precautions regarding the prognosis should be understood?

The First Forty-eight Hours in the Care of the Acute Spinal Cord Injured Patient

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The routine admission and care of a patient in the first 48 hours is rarely ideal. Variations of "the theme" will occur, but "the theme" is fundamentally important. There are, in the first 48 hours, four stages of care and management:

A. Stage 1, occurring at the site of the accident and including first aid;
B. Stage 2, involving the arrangement of adequate transport, ideally to a comprehensive spinal unit;
C. Stage 3, admitting the patient to the resuscitation area either of a teaching hospital or a spinal unit;
D. Stage 4, consisting of the final admission and management in the spinal unit.

All communities with a population of one million or over should have well-organized units established in association with a teaching hospital.

Ideally, all patients should be transferred as quickly as possible to the nearest comprehensive spinal unit, which should be possible (in most developed areas) within a matter of 6 to 8 hours and certainly within the first 24 hours. Therefore, it is important that all medical practitioners know the site of the nearest comprehensive unit, so that patients injured with paraplegia or tetraplegia can be transferred quickly and efficiently. Telephonic and radio communication is readily available and should be used regularly to ensure an early admission and early advice from those who are more experienced than the initial practitioner. Admission to special units has been the greatest advance in the care of paraplegics and tetraplegics for over fifty years.

Early comprehensive care has cut down morbidity, increased the number of incomplete cases, and almost wiped out (in some areas) the iatrogenic complications of urinary tract infection, pressure sores, contractures and spasm, and unnecessary social dependency.

Stage 1

At The Scene of the Accident

Rarely does management of the site of the accident involve medical officers. However, medical officers are responsible for the education and expertise of first-aiders, medics, police, and fire brigade personnel who will be called upon to assist in the first hours after the accident. Of pri-

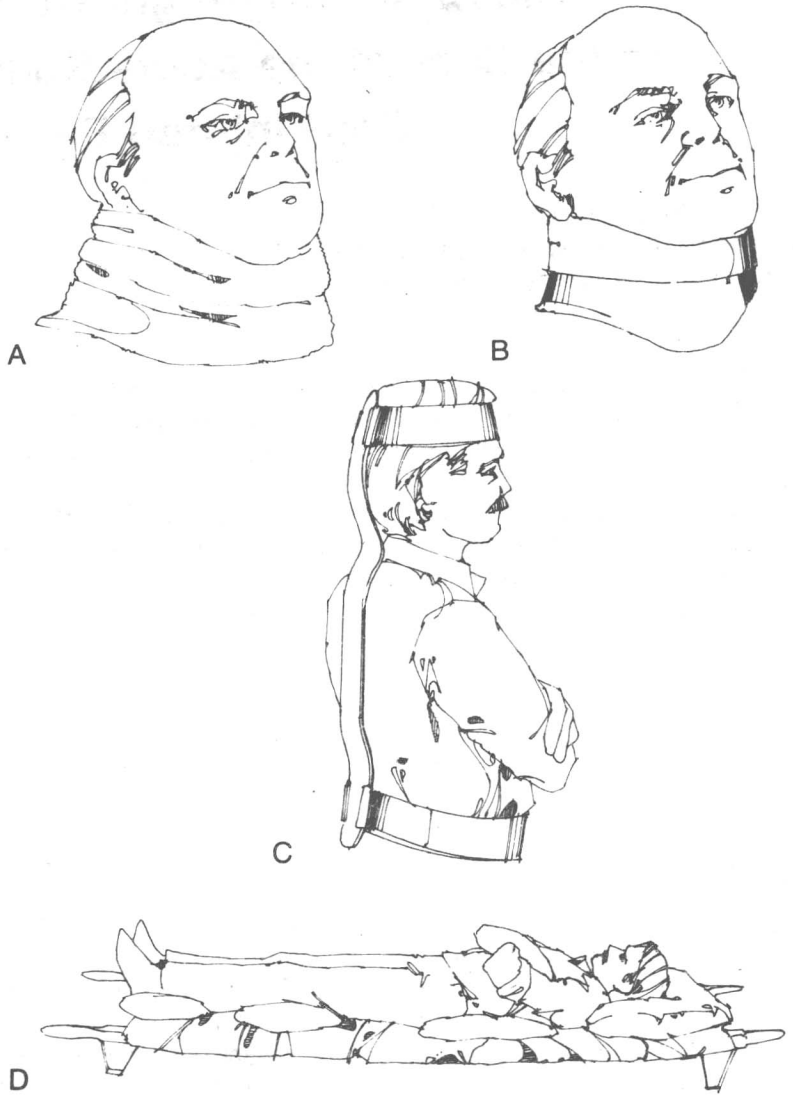

FIGURE 1. Temporary splints for the neck: a. Soft articles. b. Using some rigid collars. c. Using the Jordan cervical splint. d. The patient adequately postured with pillows for the fractured lumbodorsal spine.

mary importance is the assessment of danger to both the person concerned and also to the first-aider or other personnel responsible for early management. As soon as the scene of the accident has been assessed and the patient removed from the source of danger, treatment can commence. Care must be taken to flag highways and avoid falling masonry.

Patients die after injury from two causes, blood loss and airway obstruction, as well as from the severity of the accident. Early resuscitation, given even before extraction from the crumpled vehicle or from under masonry, involves:

A. Maintaining an airway, paying careful attention to the position of the jaw and tongue, propping up the jaw, and, if necessary, bringing the tongue forward;
B. Stopping blood loss by local pressure;
C. Applying a neck splint if a neck fracture is suspected (Figs. 1a, b, c).

During initial observation, questions such as, "Was the patient wearing a seat belt? Is the patient still in the vehicle? Were drugs or alcohol involved?," are all important to future management. Having effectively looked after the airway and stopped any blood loss, the first-aider should extract the patient as carefully and gently as possible from the debris of the accident and place him in a convenient locality out of the heat, sun, rain or snow, where first aid can be undertaken.

It is also important to remember that at any stage in the management, access to additional expertise may be possible since, in some parts of the world, flying squads now make emergency calls. Such multidisciplinary crews have helped immeasurably in saving life, reducing morbidity, reducing cerebral anoxia, and in the case of spinal cord injuries, even reducing the number of cases that become complete.

First Aid. Having overcome the problems of asphyxia and blood loss, and having ensured that the airway is cleared of any foreign bodies, the first-aider or paramedic has the responsibility of diagnosis.

In the conscious patient a history can be obtained and questions asked. In the unconscious patient, obtaining information is more difficult. Complete diagnostic examination of the patient should include observation and then palpation of bony eminences, seeking areas of tenderness, noting the lack of tone in the paralyzed limbs in contradistinction to the non-paralyzed areas, and noticing the associated injuries of fractures of the pelvis, fractures of the long bones, and visceral injuries. The first-aider must make a diagnosis and come to the conclusion that here is a patient with a fracture of the cervical spine with tetraplegia or here is a patient with a fracture of the lumbar spine with paraplegia. The first-aider must also note whether or not there has been any incontinence of urine and/or faeces.[7]

And bystanders or other attendants should be carefully "managed" and given jobs to do. One or more attendants should make certain that there is no further danger. Another attendant should be sent off with messages for urgent transport and asked to report back as quickly as possible, and a third given instructions on how to carry out part of the management.

Management.[1] Great gentleness should be maintained throughout all of the management activities. Unless the first-aider is alone and unable to look after an unconscious, supine patient, the patient should be left lying on his back. Then the patient should be gently turned in one movement (as far as possible) into the coma or Sims position, allowing the tongue to fall forward and thus enabling the first-aider to go about the business of further care. If the patient is in the prone position, he should be so left unless it seriously interferes with care and diagnosis. Careful removal of all foreign material caught in clothing, and even the removal

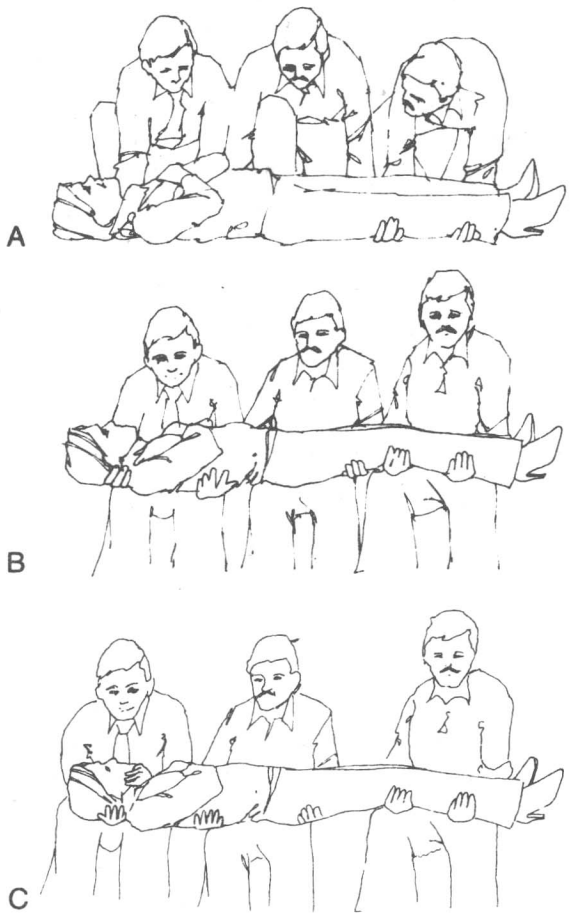

FIGURE 2. Correct procedure for lifting the spinal accident casualty: a and b. For the paraplegic. (For the tetraplegic an extra person is needed to maintain traction.) c. The chin is being supported.

of outer clothes will help so that there is no foreign material to cause further problems. This clothing can then be used to effectively make up cushions which should be padded into the lumbar column and also into the cervical curve, making certain that normal posture is maintained (Fig. 1d). Throughout this postural management, which is so fundamental to the care of paraplegics, airway patency must be maintained. As soon as equipment is available then an ordinary rubber airway can be used if needed in the unconscious patient.

Splinting of the associated injuries should usually be undertaken with prepared splints, bandages, and cotton wool. The arrival of a flying squad will mean that immediately more adequate care can be given, such as:

A. The use of an intratracheal tube and suction of the nasopharynx to remove any further foreign material;

B. The use of an intravenous line with blood substitutes to overcome problems of shock;
C. The use of prepared splints, e.g., the Jordan cervical collar;
D. The use of leg bandages to help relieve neurogenic and hypovolemic shock.

The aim of all management must be to posture the patient in a comfortable normal position, preventing further mobility, in the cervical column by traction and in the lumbar column by adequate lateral splinting.

When treatment has been completed and transport is imminent, the person in charge should coordinate assistant care by ensuring that assistants understand their responsibilities when lifting the patient, using either a blanket lift or a stretcher (if the latter is available) (Figs. 2a, b, c and 3a, b, c, d). At this stage the trained first-aider will have some idea as to what force had occurred. Examination should pose the questions: "Was this an extension injury? Was this a flexion injury?" An injury to the forehead is an extension injury; an injury of the occiput is a flexion injury. The first-aider should also be able to postulate whether the fracture dislocation is stable or unstable, even though all fracture dislocations and injuries to the spine must be presumed to be unstable until proven otherwise by further clinical examination and radiological assessment.

When transport arrives (usually ambulance), the ambulance officers must be correctly informed so that a full and accurate account of the injured person is recorded verbally and in writing. Transport is usually arranged to the nearest medical establishment or hospital. This may not always be in the patient's interest. However, in general terms it will be best to go to the nearest medical facility. Occasionally the patient can be taken direct to the spinal unit if this is in the near vicinity, but regularly the patient goes to the nearest district hospital where emergency facilities are available. This is usually well known by the ambulance officers whose service may be based on such an emergency service. At this stage, little or no care of the viscera is necessary, except in cases where gross incontinence may have occurred and then the first-aider can clean the perineal area—cleaning from the perineum backwards with a clean rag or suitable toilet paper.

Stage 2

Transport

As already stated, transport must be carefully arranged, not necessarily to the nearest hospital but to the most appropriate area where careful medical examination can be undertaken. Further transport can then be arranged as quickly as possible direct to a comprehensive spinal unit where trained personnel will be present. Transport may be undertaken by ambulance or by fixed-wing aircraft or helicopter, depending on the type of injury and distance to be transported. Associated injuries may also affect the type of transport, e.g., associated severe head injuries may preclude the use of poorly pressurized aircraft.

Attendants in Transport. It is important to have trained personnel to help with transport arrangements and thus emergency service nurses (or

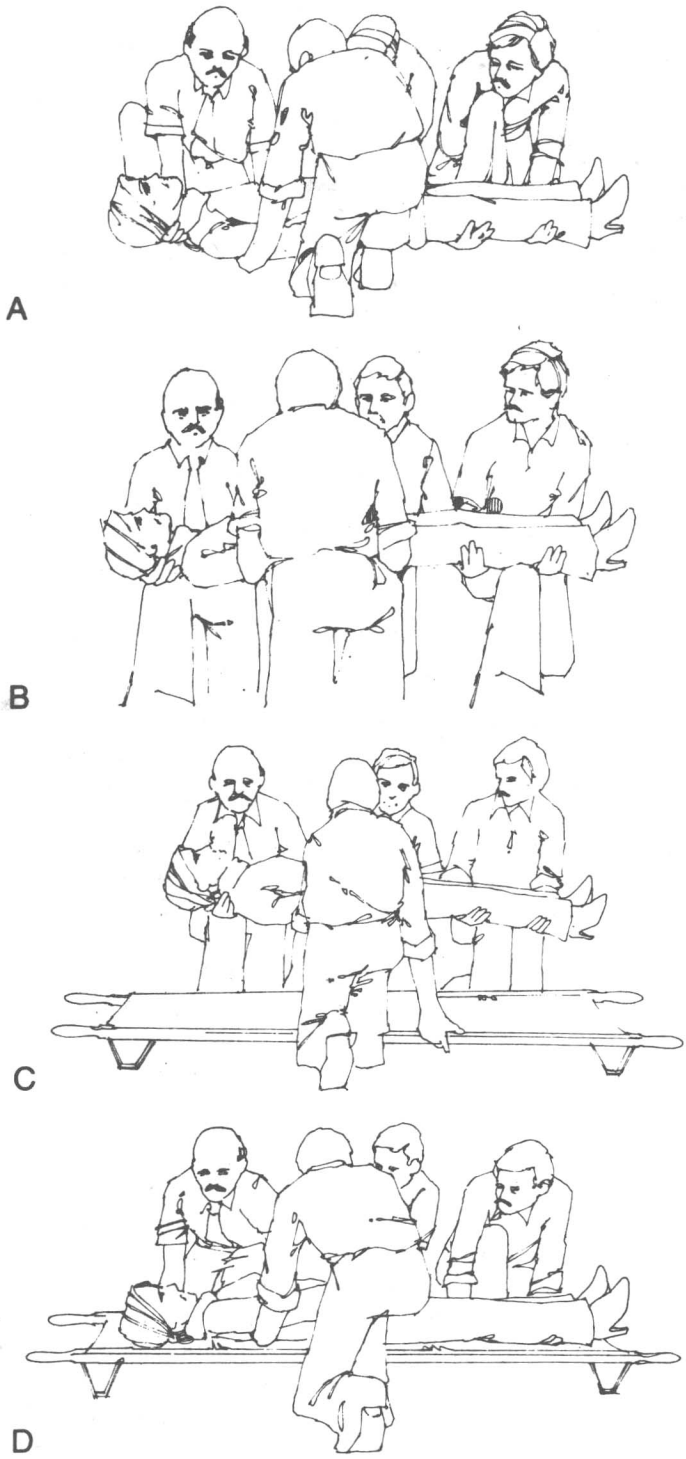

FIGURE 3. The correct sequence for lifting a patient with a fractured spine on to a stretcher when preparing for transport.

emergency service paramedics) will be of great assistance. By this time the nearest medical center will have been notified and the patient should be transported within the first hours after the accident (Figs. 3a, b, c, d.)

The first medical person to see the patient has the important responsibility of making a full and accurate diagnosis while maintaining resuscitation care. *A full record of such diagnostic findings is needed.* The first physician must know his own capacity to look after the patient, and (particularly in the case of spinal injuries) know the location of the nearest comprehensive unit, for the patient will never be more fit for transport to a comprehensive unit than soon after the accident. He must first make an adequate diagnosis through careful clinical examination. The patient's clothes should be removed and his condition observed by palpation, auscultation, special examinations, and turning the patient over with a log roll to inspect the back (Figs. 4a, b, c), to carefully complete

FIGURE 4. The sequence for turning the spinally injured person, maintaining the spinal traction as required and effectively holding the trunk rigid. Arrows denote traction on cervical spine.

the neurological examination. Resuscitative measures such as airway suction, and further care of the intratracheal tube (if such is necessary) must be completed.

The physician must then arrange transport to a comprehensive unit or if a comprehensive unit is not available, to the nearest major teaching hospital with a major resuscitation area. If transport is to be undertaken by road, trained personnel must travel in the ambulance, having the availability of suction, oxygen, and drugs for adequate medication en route so that blood pressure can be maintained and oxygen can be used for resuscitative measures. Nothing is more detrimental to the spinal injured patient with paraplegia than to be allowed to become hypotensive and anoxic for this may indeed cause an incomplete case to become complete.

If the patient is to be transferred to a comprehensive unit within 8 hours of the accident and does not have a distended bladder, then no visceral interference is to be undertaken. If, on the other hand, the patient is being transported over a long period of time, or already has an extended bladder, strict aseptic catheterization should be undertaken. Sometimes the physician can remove the catheter if the patient is being admitted to an adequate unit, or he may decide to leave the catheter in with a sealed bag drainage (Fig. 5). Full instructions must be given to either nurse or driver, or nurse and pilot, and then the patient despatched as soon as is practical. The physician must telephone the next port of call, giving the estimated time of arrival and the patient's injuries, and asking that specialized personnel be notified before the patient's arrival. It should be stressed that although such management is urgent, there is no undue haste, and to wait a half an hour, while the patient's condition improves, through more adequate maintenance of the airway and satisfactory administration of oxygen, will sometimes mean less difficulty in transport.

Stage 3

Admission to a Resuscitation Area or to a Spinal Unit

On admission to a spinal unit, the consultant on duty should have already been notified and either be waiting or be "on call." After the patient is admitted, the officer-in-charge should make a further clinical examination lasting from half to three-quarters of an hour, using X-rays as part of the diagnostic procedure. *A comparison with the original examination* will aid management of the case.

A neurological examination is an essential part of diagnosis and prognosis, and should include, first, a detailed neurological study of motor function, using the Medical Research Council's test of motor strength in all muscle groups, and second, a sensory examination, using the posterior column sensation of light touch and vibration sense and spino thalamic column sensation of pain and/or temperature. Having accurately marked this out both on skin surface and diagram, then the reflexes must be taken. A full and accurate estimation will then be available. Irregular