THE SUPINE POSITION IN EMERGENCY TREATMENT OF PATIENTS WITH FRACTURED SPINE

BY

GEOFFREY HYMAN, M.B., Ch.B., F.R.C.S.

Orthopaedic Registrar, General Infirmary at Leeds

The prone position for the transport and emergency treatment of fractures or fracture-dislocations of the dorso-lumbar region of the spine was advocated by Watson Jones in 1931 and has been widely adopted since. Most modern textbooks, however, while paying great attention to the pathology and final fixation of the injured spine, either omit emergency treatment or dismiss it in a few lines: this important part of the treatment is not even mentioned by one well-known authority on the treatment of fractures. The initial management of spinal injuries has its own peculiar difficulties, which must be emphasized. I shall endeavour to show that adoption of the prone position before final immobilization of the spine in plaster has many disadvantages and that use of the supine position, subject to the precautions to be described, is preferable.

With regard to the rationale of the prone position, it is advocated that because the spine is held hyperextended the fragments are unlikely to be displaced and to injure the cord or, if the cord is already injured, further damage will not take place. There are disadvantages, however.

Disadvantages of the Prone Position

Diagnosis of the Original Lesion.—Diagnosis of a fractured spine made either at the time of the accident or in the casualty department of a hospital may be incorrect. Fractured pelvis, with or without intra-abdominal complications, and fractured ribs have often been the cause of error, and on such occasions use of the prone position may be harmful. Moreover, in spite of insistent instructions to the contrary, a patient with a fractured cervical spine is occasionally brought into hospital in the prone position because of the association of this posture with the first-aid treatment of spinal injuries.

Associated Injuries.—The prone position is contra-indicated in the treatment of head injuries, fracture of the ribs or of the pelvis, fractured legs, and abdominal injuries, any of which may complicate the treatment of a fractured spine.

Transport.—If the prone position is used the patient is moved bodily on several occasions from one site to another without any adequate fixation of the spine. The number of transferences may vary from five to eight. The patient is first lifted from the ambulance trolley on to his bed, then subsequently from his bed on to the trolley again to be taken to the x-ray department. In most hospitals lateral radiographs of the spine cannot be taken satisfactorily with a portable x-ray machine and must be done in the x-ray department; four transferences will be required for radiographic purposes alone. After the patient has been wheeled back to the ward three more movements are necessary before he can be immobilized in plaster.

Nursing.—The prone position is not easy to maintain, and constant supervision is essential for its success. Nursing is much more difficult when the patient is prone, especially if acute retention supervenes and the patient has to be catheterized.

Comfort of the Patient.—The prone position is not well tolerated by many patients, who consequently lie curled up on their sides, and there is little doubt that they are far more comfortable when lying supine, and fixed in the manner to be described, than when they are prone. The advantages of the fixed supine position are more especially noticed in those patients with complications.

Treatment in the Supine Position by Means of a Special Frame

The frame first used was a modification of the Bradford frame. It was made of well-padded metal tubing covered with stout canvas in two detachable sections, with a six-inch gap between for nursing purposes, and was angulated opposite the dorso-lumbar region of the patient (the commonest site of the fracture) sufficiently to hyperextend the spine to about 25 degrees. Special webbing straps were used to fix the patient to the frame. One or two disadvantages became apparent in the use of the metal frame. The site of angulation could not easily be adapted to coincide with fractures other than those in the dorso-lumbar region. The metal bars sometimes obscured the laminae and spinous processes when a lateral radiograph was being taken. These difficulties have been overcome by means of a special wooden frame curved longitudinally (Fig. 1). The curve forms an arc of a circle, such that

FIG 1.—The curved wooden stretcher frame.

all regions of the spine of a patient lying supine are thrown into a moderate degree of hyperextension. The use of wood in the construction of the frame permits satisfactory radiography of the spine without disturbing the patient.

The Wooden Stretcher Frame

The side-pieces are of stout steam-bent ash with the extremities moulded to form the handles. The body of the frame is made of five-ply wood securely fixed to the side-pieces and following the same curve. An oval window with a shutter attachment on the under surface of the stretcher is placed in the midline at a suitable distance from the head end for nursing purposes (Fig. 2):

FIG. 2.—The inferior surface of the frame.

this measurement is thirty-four inches. Four webbing straps secure the patient to the frame; one is placed at the level of the nipple line, another at the level of the waist, one midway down the thighs, and a fourth midway down the tibiae. Two solid rubber wheels are fixed at each end and are so situated that a distance of twenty-one

inches separates the axle centres, thus enabling the stretcher to be used in the standard ambulances.

The over-all length of the stretcher is eighty-two inches, the curved length of the body is seventy-three inches, the width nineteen inches, and the maximum depth twelve inches; thus it is large enough to accommodate any average adult male, most of the patients under discussion coming into this category. The weight of the frame is 21 lb., which is appreciably lighter than the regulation ambulance stretcher.

Method of Using the Frame

Any patient with a suspected spinal injury, whatever the complications or associated injuries may be, should be fixed on the frame as soon as possible after receiving the injury (Fig. 3). Transport is extremely simple, and there

FIG. 3.—Showing the patient strapped in position.

is no occasion to disturb the patient from this time until his spine is finally immobilized in plaster. Nursing problems are reduced to a minimum. The method described has been used at the General Infirmary at Leeds in all cases of suspected spinal injury, and has proved of real value. During the past two years eighty-two cases of suspected or definite spinal fracture have been treated in this manner from the time of their admission to hospital; fourteen of the patients were fixed on the wooden frame.

As yet the frame has not been used for cases before admission to hospital, but permission has been obtained from Dr. Jervis, the medical officer of health for Leeds, for it to be given a trial in the Leeds municipal ambulance service.

Conclusions

The supine position is to be preferred for the transport and emergency treatment of patients with fractured spines, provided that the spine is hyperextended and immobilized at this stage of the treatment.

A special frame should be used.

It is suggested that the method be adopted in first-aid treatment in mines and other centres where fractured spines are likely to occur, the frame being used instead of the customary stretcher. The frame may also find a place in the routine equipment of the larger ambulances.

I wish to thank Mr. Broomhead for his permission to use the method in the orthopaedic department of the General Infirmary at Leeds.

REFERENCE

Jones, R. Watson (1931). *British Medical Journal*, 1, 300.

Clinical Memoranda

Further Note on a Case of Chronic Leptospiral Meningitis

Two years ago I described a case of chronic leptospiral meningitis in which, by guinea-pig inoculation, the organism was recovered from the patient's cerebrospinal fluid and urine six and eight months respectively after the onset of the original attack of Weil's disease (Murgatroyd, 1937). These findings were so at variance with preconceived ideas that at first criticism was raised that the guinea-pig infections were perhaps extraneous infections such as described by Mason (1937), who recorded a fatal case of leptospiral jaundice in one of twelve guinea-pigs received from a dealer who ten days previously had had two or three of his stock animals attacked and killed by rats.

The criticism was dismissed for the following reasons. First, none of the animals maintained in the laboratory suffered from leptospirosis excepting those deliberately inoculated with material obtained from the patient or used for the subsequent passage of the strain. Secondly, during convalescence, inoculation of the patient's urine into guinea-pigs ceased to be followed by infection in the animals. Thirdly, after the administration of anti-leptospiral serum the patient progressively improved, whereas previously he was steadily deteriorating. Fourthly, the patient's original illness, the subsequent clinical condition, and the associated laboratory findings were in harmony with the diagnosis of a leptospiral infection and failed to confirm any alternative diagnosis.

CONFIRMATION OF THE DIAGNOSIS

Recently further confirmation has come to light. Some time ago—more than two years since treatment with immune serum—an opportunity arose of re-examining the patient, and his serum was then found by Major Brown to agglutinate leptospira to a titre of almost 1 in 1,000. It may be argued *a priori* that such a titre might represent passive immunity conferred by the original dose of immune serum. Schüffner (1934), however, found that the agglutination reaction remained negative after the administration of anti-leptospiral serum to patients who were not suffering from leptospirosis. Robertson (1938), recently discussing four cases of Weil's disease, also quotes Brown's opinion that the appearance of a strongly positive agglutination reaction in one of his cases after a negative finding two days earlier could not have been due to the immune serum given in the interim. In the present case not two days, but two years, had elapsed since serum was given, and there is some evidence, from the observations of Dean, Goldsworthy, and Broeck (1930), that heterologous serum disappears from the circulating blood with extreme rapidity. Furthermore, taking into account the dose and titre of the anti-leptospiral serum originally used for treatment, the resulting passive titre of the patient's blood would more likely have been 1 in 3 than 1 in 1,000, even assuming all the serum reached and remained in the patient's plasma.

There are no grounds, therefore, for believing that the patient's high titre represented passive immunity, while there is every reason for assuming that it resulted from active infection. This must not be thought to mean that the serum played no part in the patient's recovery. Indeed, the complete change in the course of events that followed its administration leaves no doubt that in some

A. W. Pot and H. Verhagen (*Nederl. Tijdschr. Geneesk.*, 1939, 83, 276) record the case of a woman, aged 44, in whom the clinical picture was that of hepatitis. *Bact. paratyphosum* A was cultivated from the bile obtained by duodenal intubation and after clinical recovery from the stools, but during the disease repeated bacteriological examinations of the faeces were negative.