of both loose on the sterile field, or to use test-tubes to keep them in place. The first method
does not prevent the two instruments from slipping down and becoming contaminated; the
second proved too costly, because test-tubes broke and were hard to replace. Therefore, the
holder* was constructed out of aluminum (Fig. 1). To fasten it in place, one has merely to
pull the sterile sheet through the two oblong holes and clip the two tips of the sheet together
with a short clamp (Fig. 2). To clear the clamp from the operative field, its handle should be
pushed behind the free ends of the tubes. In this fashion the holder can be hung up secure,
firm, and wherever desired.

THE "SPLIT MATTRESS BED" IN THE CARE OF SPINAL CORD INJURIES

CAPTAIN JOHN S. CHAFFEE, M.C., A.U.S.
A.A.F. Regional and Convalescent Hospital, Miami Beach, Florida

(Received for publication November 13, 1945)

One of the greatest problems in the treatment of spinal cord injuries is the care of decubitus
ulcers and the management of the urinary catheter. Munro, with his vast experience in the
prevention and handling of decubitus ulcers, has emphasized the following cardinal rules:
frequent turning of the patient; the maintenance of tightly drawn dry sheets beneath the
skin; keeping the skin clean, massaged and dry; and the avoidance of all heretofore suggested
contraptions, such as doughnuts, air mattresses, sawdust beds, Bradford frames, et cetera.
Others have stressed the importance of maintaining a normal plasma protein level.

Unfortunately, the vicissitudes of war with its attendant nursing shortage do not permit
of such ideal care for these often forgotten patients in army and civilian hospitals. The author
has observed 34 overseas returnees with complete transverse myelitis from spinal cord injuries
at levels ranging from the 4th cervical to the 2nd lumbar vertebra. All but one of these pa-
tients displayed decubitus ulcers varying from 4 to 12 cm. in diameter and depth from skin
maceration to bony sacrum and ilium. The sad commentary from most of these patients was
that they had not been turned frequently in some stage of their convalescence, either at over-
seas installations or during the 2 to 7 days required for their evacuation by air. Since the
patients were anesthetic below the level of the lesion they did not complain and, in fact, dis-
couraged frequent turning. None of these patients had bed sores on the anterior surface of
the body for the reason that they had not been placed in the prone position. The explanation
that these patients commonly gave for this probably echoes the impressions of the profes-
sion, namely, that imperfect drainage of the bladder occurs in the face-down position be-
cause of the pressure of the body lying on the urinary catheter or rubber tubing.

A most satisfactory and simplified method of utilizing the valuable face-down position
in cases of transverse myelitis has been developed. It may be called the "split mattress bed"
and is prepared as follows (Fig. 1). Two regular thin felt mattresses are folded in the center
and placed at opposite ends over the springs of any hospital bed with 8 inches' separation
from each other. These are covered separately with tightly drawn sheets. Next, two firm,
thin pillows, preferably of straw, are rolled tightly and placed about 6 inches apart in the
groove between the mattresses. Thus a rectangular space measuring about 8X6 inches is
formed in which the genitalia are suspended and the catheter permitted to descend directly
between the bed springs into a bottle placed on the floor. The indwelling, suprapubic, or
perineal catheter can be adapted equally well to this arrangement. Only a short rubber tube
is required between the catheter and the bottle.

At first this method was born of necessity to avoid pressure on severe decubitus ulcers
of the posterior and lateral aspects of the body. Trial disclosed that it was by far the best
position for these patients. After initial reassurance the patients are surprised to find that
they can live comfortably in the prone position. It is most gratifying that the bed sores

* Tec. 4 H. Perrin of the 94th Evacuation Hospital made the holder from parts of a German plane.
respond favorably to the absence of pressure. In this series of cases no medicinal ingredients were applied locally to the ulcers inasmuch as it was felt that the simple avoidance of pressure is the basic principle in their treatment. Upon arrival of the patients all devitalized tissue was carefully dissected away in order to favor drainage and prevent continued infection. The ulcer beds were lavaged daily of any accumulated exudate with \( \frac{1}{2} \) strength hydrogen peroxide or normal saline solutions. A cradle is used to prevent bedding from touching the buttocks or heels. Of all patients treated in this manner there was either complete healing with epithelization in those who remained in the hospital over 2 months or there was visible filling of the ulcers by healthy granulations in transient patients observed 5 to 10 days. The patients were unanimously enthusiastic about the method. This same principle was ideally

adapted by the author in the rail transportation of a patient 1800 miles by folding 2 Pullman mattresses. A basin placed directly at the groove beneath the mattresses and under the suspended genitalia was emptied of urine at intervals.

One observation which needs further confirmation is that decubitus ulcers did not develop on the anterior surface of the body in patients who were maintained in the face-down position for many days at a time, and shifted only momentarily for routine nursing care. Exceptions occurred in 2 patients who were severely debilitated, and had extensive lateral and posterior pelvic ulcers and marked nutritional hypoproteinemia. Restoration of their plasma proteins and alternate utilization of all 4 reclining positions led to complete healing of the decubitus ulcers on the anterior body surface of one patient and decided improvement in another before he was transferred. A 26-year-old male with complete transverse myelitis from a fracture dislocation at the midthoracic spine remained in the prone position on the split mattress bed for 10 months without the development of an ulcer on the anterior surface of his body. He left this position only for brief intervals on alternate days when he was placed on his side for attention to his catheter. In explanation, it might be conjectured that there are fewer bony prominences anteriorly. The costal cage is in a constant state of movement
and the pubis is suspended in the space formed by the split in the mattress. Thus, only the anterior superior spine of the ilium and the patella remain to exert pressure. Even the elbow is spared. If it is desired to relieve pressure from the anterior superior spines, the rolled pillows may be removed alternately so that intervals of freedom from pressure contact are possible.

Some advantages of the “split mattress bed” with the patient in the prone position are:

1. Nursing care is simplified. The patient may forget his catheter as it is out of his sight, and if leakage around the catheter occurs, it does not dampen the bedding but drips into a receptacle on the floor. When the catheter is no longer required, as in the case of the automatic bladder, the urine passes through the split in the bedding into the receptacle under the bed. In this instance it is wise to remove a few underlying bed spring wires. The apprehension of catching the urine in the urinal to avoid soiling the bedding is thus eliminated.

2. Involuntary defecation is managed without soiling the bed because the feces is easily collected from the crease of the upward-faced buttocks. Enemas are satisfactorily given to the patient in the prone position.

3. Of all the recumbent body positions, bladder drainage is the most satisfactory in the face-down position because of the effect of gravity aided by the dependent location of the catheter orifice. When the split mattress method is used there is no pressure of the body on rubber tubing to impede the free flow of urine. Urinary stagnation is thus minimized.

4. If it is desired to alter the patient’s position even in the presence of decubitus ulcers on the hip or sacrum, this may be accomplished by lying on the side with the area of the ulceration suspended in the mattress space or on the sacrum in like manner. This avoids pressure on these areas but is not recommended for prolonged periods because of the rubber-doughnut effect which is created.

5. Foot-drop is avoided by either suspending the foot over the end of the mattress or by placing a pillow beneath the legs with the knees slightly flexed.

6. Mild hyperextension of the spine is maintained and this may be increased by supports placed beneath the chest.

7. The patient in the prone position will instinctively move his arms and shoulders frequently to change the position of his head, chest and upper extremities. In this manner the patient unconsciously exercises his arms and shoulder girdle muscles far more than he would by lying passively on his back or side, and in fact probably exercises more in 24 hours than he would by the sporadic use of dumb-bells and overhanging bars. Patients who have spent many months in the face-down position support themselves on their elbows for hours while reading, with the head held as high as one foot above the mattress. A healthy individual unaccustomed to this would find it difficult to do for more than 15 minutes. The importance of this detail lies in the fact that the development of many of these same muscles is essential in the successful utilization of crutches and braces in their rehabilitation program. Further, alternating the head from side to side aids in preventing stiffening of the cervical spine.

The patient who is placed in the face-down position will find variation by shifting a soft pillow beneath his chest and a small pillow about his head. Eventually, however, he will find that a small pillow for his rotated head, or no pillow at all, is the most comfortable arrangement. Patients may comfortably eat, read, and sleep in the prone position. Initial insistence by the physician and nurses during the first few days that the prone position be maintained will usually be necessary until the patient realizes that it is to his advantage and comfort to live face down.

SUMMARY

1) The “split mattress bed” may be readily constructed of equipment available in any hospital.

2) With the patient lying prone on this bed, pressure on the hips and sacrum is obviated while urinary drainage is encouraged and simplified.
3) Frequent turning of the patient is desirable in the prevention and treatment of bedsores in cases of spinal cord injury. When this is impossible, however, the prone position can best be tolerated for prolonged periods by the patient, inasmuch as decubitus ulcers are less apt to develop on the anterior surface of the body.

4) Nursing care of patients with transverse myelitis is greatly simplified by the use of the "split mattress bed."

REFERENCES
