The Prevention of Pressure Sores

A.N.

Exton-Smith

London

Author's address: Dr. A. N. Exton-Smith, Whittington Hospital, Highgate Wing, Dartmouth Park Hill, London, N. 19 (England)

There are many factors, both intrinsic and extrinsic, concerned in the causation of pressure sores. Intrinsic factors are related to the general condition of the patient including his physical and mental state and particular aspects determined by the nature of his illness. Extrinsic factors influencing the occurrence of pressure sores include the measures employed for the relief of pressure, the frequency and standard of nursing attention, local applications to the pressure areas, contact of urine with the skin in the case of incontinent patients, infection, humidity, and the materials used in the manufacture of the mattress, mackintosh and drawsheet.

Whatever be the relative importance of the various components the fundamental factor leading to tissue damage is the pressure transmitted from the underlying surface to the bony prominences through the skin, subcutaneous tissues and muscle. Husain (1953) has shown that low pressure maintained for long periods of time produces more tissue damage than high pressure for short periods. In health a standing man can tolerate on the soles of his feet pressure in excess of his systemic blood pressure without ill-effects. Irrespective of the position of the body the discomfort which arises from the compression of the skin and subcutaneous tissues readily initiates changes in posture with consequent relief from pressure. Thus the limit of tolerance to pressure is rarely exceeded in the normal active person.

In illness, however, the protective mechanism may be ineffective or absent. Sensory disturbances, mental apathy, clouding of consciousness or coma, motor paralysis or very poor physical condition may all lead to a lack of response to the stimuli arising

6 Gerontologia Clinica, Vol. 3, No. 2, 1961

66

Exton-Smith, The Prevention of Pressure Sores

from the ischaemic skin area. The general condition of the patient and the nature of his illness also determine the ability of the body to tolerate pressure. Failing peripheral circulation, arteriosclerotic narrowing or obstruction of vessels and anaemia reduce the threshold level of pressure which can be withstood. Thus many of the factors influencing the occurrence of pressure sores are inter-related. Exton-Smith and Norton (1960) in a study of 300 patients have shown that the incidence of pressure sores can be directly related to the general condition of the patient as assessed by a simple scoring system which takes into account the patient's physical and mental state, his activity, his ability to change position in bed unaided, and the degree of incontinence when this exists. Thus in the nursing care of elderly patients in hospital particular attention must be given to those with a low assessment score, since in these patients not only will the tissues tolerate pressure badly, but owing to lack of movement the pressure is likely to be long-sustained by one part of the body.

In certain specialized departments, for example in spinal centres treating paraplegics, all patients nursed in bed are at risk since if pressure is not relieved by frequent change of position bedsores will inevitably develop. In geriatric wards those patients particularly at risk can be ascertained by an assessment of their general condition on the basis of a scoring system or by a study of the number of spontaneous movements patients make and hence their ability to change their own position. An investigation of these restless movements has been carried out (using a modification of the apparatus described by Cox and Marley, 1959), during a 7-hour period at night. Some patients were found to make no detectable movements from the time the apparatus was switched on at 10 p.m. to the end of the observation period at 5 a.m. These patients developed pressure sores unless active prophylactic measures were instituted. Other patients, however, were shown to make several hundred restless movements during the night and for them no further means of changing their position was required.

In geriatric medicine it is recognized that the most effective measure in the prophylaxis of pressure sores is the restoration of independent activity so that the patient spends the minimum possible time in bed. When such rehabilitation cannot be achieved and the patient remains bedfast or if the nature of the illness requires that he be nursed in bed then means of changing his position either mechani-

Exton-Smith, The Prevention of Pressure Sores

67

cally or by frequent nursing attention must be available. Moreover, the most prolonged periods of sustained pressure are likely to occur at night during sleep. There is a natural reluctance on the part of nurses to change the position of patients who are sleeping soundly. Sometimes such nursing attention leads to noisy outbursts which disturb the sleep of other patients in the ward. The use of the alternating pressure mattress, which changes the position of pressure mechanically, obviates this difficulty.

Bedford, Cosin, McCarthy and Scott have studied experimentally the use of this alternating pressure mattress with particular reference to the inflating pressures required for patients of varying weights and nursed in different positions. The results of their investigations are reported on pp. 69–82. Failure of earlier models of the ripple mattress can be attributed partly to mechanical failures and partly to insufficient pressures for heavy patients or when the lateral position or sitting position is used. Cosin and his colleagues recommend a possible selection of 3 inflating pressures of 50, 70 and 90 mm of mercury; they also draw attention to the dangers of the sitting position which is commonly used for patients with cardiac or respiratory disease. Reichel has demonstrated that even raising the head of the bed by a few inches may so increase the shearing force over the sacral area that large areas of tissue are deprived of blood supply in immobile patients nursed on their backs. The extensive undermining area of tissue necrosis in bedsores is secondary to shearing forces rather than to infection.

The various tissues can tolerate pressure in differing degrees. Both Husain and Groth (1942) have shown that the skin is more resistant to the effects of pressure than either the subcutaneous fat or muscle. Extensive necrosis in muscle may have developed at a stage when the overlying skin merely shows erythema. Groth distinguishes two types of bedsore: the superficial or benign and the deep or malignant which starts in the muscle and spreads to the surface. In the aetiology of superficial sores pressure is again an important agent, but there are in addition a number of other factors such as urinary incontinence, friction and superficial abrasions as well as unsuitable materials used for drawsheets. Even some of the traditional applications used in the treatment of the pressure areas must be regarded with suspicion. Spirit applied to the skin reduces the fat

content and is harmful. Bettley (1960) has drawn attention to the injurious effects of soap applied frequently or rubbed into the

68

Exton-Smith, The Prevention of Pressure Sores

skin. Of the large variety of local applications the silicone creams at present enjoy popularity.

Apart from their water-repellent properties at least some of their value may be due to the consequent reduction in the use of soap and to the relief of pressure during the time the patient is turned to permit massage of the cream into the skin. Whatever be the relative merits of the various applications their use can influence only the incidence of the less serious, superficial type of sore and in the prevention of the deep bedsore relief of pressure remains the essential problem.

References

Bettley, F. R.: Effects of soap on the skin. Brit. med. J. i: 1675 (1960).

Cosin, L. Z.† McCarthy, T. F. and Scott, B. O.: The alternating pressure mattress. Geront. clin. 3: 69 (1961). Cox, G. H. and Marley, E.: The estimation of mobility during rest or sleep. J. Neurol.

Neurosurg. Psychiat. 22: 57 (1959). Exton-Smith, A. N. and Norton, D.: Prevention and treatment of pressure sores. Lancet i:

389 (1960). Groth, K. E.: Experimental study of decubital ulcer. Acta chir. scand. 87: Suppl. 76

(1942). Husain, T.: Experimental study of pressure effects on the tissues. J. Path. Bact. 66: 347

(1953). Reichel, S. M.: Shearing force as a factor in decubitus ulcers in paraplegics. J. amer.

med. Ass. 166: 762 (1958).