

The Classic

Early Active Motion in Joint Pain and Stiffness

E. B. Mumford MD (1879–1961)

The 13th President of the AAOS 1944–1945

E. Bishop (“Bish”) Mumford was born in 1879 in Indiana [2] (most likely in or near New Harmony, the birthplace of both of his parents, who were committed to Robert Owen’s concept of that socialistic community established by Owen in 1826 [4]). He graduated from the University of Wisconsin in 1901 and Johns Hopkins in 1905. He obtained postgraduate training at Boston Children’s Hospital and Gouverneur’s Hospital (a hospital originally established to provide care for low income patients of color) in New York. He returned to Indiana to establish a practice in children’s orthopaedics. His practice was interrupted by WW I, where he served as a captain in a base hospital in France. He returned after the war and in 1920 opened the Indianapolis Industrial Clinic with Dr. Jay Reed. He later was appointed to the faculty at the Medical College of Indiana and was one of the first surgeons appointed to the James Whitcomb Riley Hospital for Crippled Children and the first surgeon appointed to the Veteran’s Administration Hospital of Indiana. He continued his appointments at these and other hospitals until his death.

Dr. Mumford was one of the founding members of the AAOS, and was one of eight members listed as attending the business meeting of the Clinical Orthopaedic Society, October 30, 1931, where the concept of a new national organization was discussed [1]. While the record is not entirely clear, Mumford apparently served on the Executive Committee of the AAOS from 1931 (when according to Heck the AAOS was chartered [3]) until 1944, then as President-Elect, President from 1945–1946, and continued on the Executive Committee until 1950 [2]; that being the case, he would have served on the Executive longer than any of the original founders (and perhaps longer than anyone since). He is the only AAOS President to have



Dr. E. Bishop Mumford is shown. Photograph is reproduced with permission and ©American Academy of Orthopaedic Surgeons. *Fifty Years of Progress*, 1983.

served two terms: at the written request of the Office of Defense Transportation in 1944, the January, 1945 meeting was canceled, and he remained President during the subsequent year, presiding over the 1946 meeting. He was active in the AOA and the Clinical Orthopaedic Society (he served as Secretary-Treasurer, Vice-President, and President in 1933, the year of the first meeting of the AAOS), as well as the Indianapolis Board of Health, the American College of Surgeons and other organizations. Among all of his many clinical responsibilities and activities in the 1930s, he found time to assume from his father the management of his family’s 5800 acre farm in Indiana.

The article we reproduce here expresses Mumford’s belief in early mobilization of injured joints. “The motion you gain through early mobilization of the joint,” he maintained, “you do not lose. The motion you lose through long fixation of the joint may be permanent.” This article, published in 1960,

undoubtedly reflected concepts he developed through his long experience with industrial injuries.

Richard A. Brand MD

References

1. Brown T. *The American Orthopaedic Association: A Centennial History*. Chicago, IL: The American Orthopaedic Association; 1987.
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3. Heck CV. *Fifty Years of Progress: In Recognition of the 50th Anniversary of the American Academy of Orthopaedic*

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4. Robert Owen. Wikipedia Web site. Available at: http://en.wikipedia.org/wiki/Robert_Owen. Accessed August 29, 2007.

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A fracture has been defined as a loss of continuity in a bone. To the laity the treatment is not difficult, consisting of the reduction of the fracture and a type of splintage to maintain this reduction during the period required for healing. However, the physician knows that the reduction and splintage are only too often minor factors in the end result and that the degree of permanent impairment may be determined entirely by the pain and the stiffness in the joint or joints adjacent to the fracture line.

Malalignment with faulty weight bearing and a non-union associated with tenderness and pain will cause impairment of a varying degree, but these conditions may be corrected through surgery. It is the pain and stiffness in the joints adjacent to the fracture line which is the more important, which can be prevented to a large degree and can be corrected through treatment based upon a thorough understanding of the tissue changes which cause the pain and a loss of motion in the joint.

Joint, as used in this discussion, is a skeletal articulation which permits motion. It is composed of *intra*-articular tissue, articular cartilage synovia, *extra*-articular tissues, capsule ligaments, tendons and other soft tissues.

In order to formulate a satisfactory form of treatment of any fracture which is associated with pain and stiffness in the joint, one must accept a concept of two basic changes in the joint tissues, both soft and bony, as the result of trauma. First, in fractures into or adjacent to joints, the soft tissues soon become infiltrated with a fluid which is of a plastic or adhesive type. Secondly, in order for two adjacent bones to become united by bony tissue, complete or incomplete, the adjacent bone surfaces must be free of cartilage or any fibrous tissue and raw bone surfaces must be in contact. Contact must be maintained for a sufficient time to permit solid bone healing, this being the basic and essential factor in any arthrodesis operation.

Exact composition of the fluid which infiltrates the soft tissue adjacent to the joint is unknown. However, clinical evidence shows that it is non-inflammatory and that unless

absorbed or dissipated it will create adhesions in the soft extra-articular tissues, limiting the motion in the joint and becoming a source of pain when the joint is mobilized. This fluid infiltration appears soon after the fracture occurs. It is Also shown clinically that this adhesive fluid will be dissipated by early *active* joint motion and the adjunct of heat and light massage.

If one accepts these changes in the extra- and intra-articular joint tissues the plan of treatment will be directed to the earliest active mobilization of the joint which is consistent with maintaining the reduction of the bone fragments through complete immobilization in the fracture line. Active motion is that degree of motion made by the patient which does not cause pain.

Reaction Within Joint

The term “traumatic arthritis” has often been used to explain the condition in and about the joints which results in joint pain and loss of joint motion. The term indicates an inflammatory reaction *within* the joint, and with some degree of destruction of the articulating cartilage of adjacent bones of the joint—this inflammatory reaction being the result of trauma to the intra-articular tissue. However, it is recognized that pain and stiffness in a joint can result from a fracture even when the joint surface is not involved in the fracture line. This will be seen in fractures of the shaft of the femur in which pain and stiffness in the knee joint result. Also it will be observed in fractures of the surgical neck of the humerus, Furthermore, it is only in rare comminuted joint fractures that the articulating cartilage of two adjacent joint bones are so disturbed as to create a condition to permit any degree of arthrodesis. One must question the existence of traumatic arthritis.

Accepting the premise that stiffness and pain in joints are due to extra-articular changes and that intra-articular conditions are not factors in impairment, the treatment of a

fracture is to so mobilize the fracture, that early immobilization of the joint associated with fractures is contraindicated until consistent physiotherapy has been followed over a long period of time without adequate relief. The arthrodesis may relieve the pain but does not restore motion in the joint.

Immobilization of Fracture Line

After reduction of a fracture, Immobilization in the fracture line should be maintained for a period of one week to ten days before any active motion in the joint is begun. In this time the early reparative bone changes which are so important for bone healing will produce the early precallus tissue. This tissue will glue together the bone fragments to a certain degree, perhaps sufficiently to maintain reduction unless undue stress or strain is thrown against the fracture line. In the lower extremities weight-bearing is contraindicated until healing is well advanced. During this period any reaction of the plastic elements of the fluid will be of a mild degree and may be corrected by early active mobilization of the joint.

It is a surgical axiom that passive forcible mobilization of joints is contraindicated when adhesions of the extra-articular tissues cause a loss of joint function. Such adhesions should be stretched or lengthened by either continuous (rubber bands) or repeated gentle, active resistant exercises of the joint over a period of weeks or months. Work done in rehabilitation centers is most important and of great value. To tear or lacerate strong fibrous adhesive bands under anesthesia or by forcible passive motion will only result in a period of increased pain and create adhesions of greater density and thus more loss of motion.

The motion you gain through early mobilization of the joint you do not lose. The motion you lose through long fixation of the joint may be permanent.

Case Reports

Case 1. A comminuted fracture of the humerus, supracondylar, with fracture lines involving the elbow joint. The extremity was placed in balanced traction with the elbow extended to 45 degrees. Without anesthesia the fragments were molded through gentle lateral pressure. This moulding was repeated for several until the x-rays showed satisfactory, although not complete, reduction of the fracture. Active motion of the elbow was begun on the third day with the extremity remaining in balanced traction.

Figure 1 (not shown) shows the end result of the bone healing at the end of 15 years. The patient reports that she has almost complete function in the elbow without pain.

Case 2. A severe comminuted supracondylar fracture of the humerus involving the elbow joint. It was not possible to obtain a satisfactory reduction with the extremity in balanced traction. The fracture lines were exposed through a posterior approach (Van Gordon type) and the fragments were approximated and position maintained by wire sutures. The extremity was placed in balanced traction and active motion started the second day.

Figure 2 (not shown) shows the final bone healing after 13 years. The patient writes that he has but little, if any, lots of function and no pain in the elbow joint.

Case 3. A fracture of the lower portion of the tibia at a level of the epiphyseal line. When first seen by me there was a most satisfactory reduction of the fracture line. (Figure 3, not shown) The leg had been in a plaster splint extending from above the knee to the toes for 11 weeks. Upon removal of the splint the ankle and the foot were found to be swollen to an extreme degree and the entire foot was of a dark beefy red color. Very little motion was possible in the ankle joint. There was a large decubitus beneath the head of the first metatarsal due to cast pressure.

After 30 weeks of daily and persistent treatment in the physiotherapy rehabilitation center with active motion the foot regained almost normal size and 90% of function had returned. At the end of this period weight-bearing was without pain. There has, however, persisted some swelling of the entire leg to a mild degree.

This case illustrates that the pain and loss of function was not due to an intra-articular change in the tissues, but to extra-articular tissue changes and that return of function and loss of pain can follow active motions and other forms of physiotherapy, although the period of convalescence may be long.

Case 4. Fracture-dislocation of the ankle. In this case there was a fracture of each malleolus with a lateral and posterior dislocation of the ankle joint; although the wound was not compounded there was considerable damage to the soft tissues. Reduction under anesthesia gave a satisfactory restitution to the ankle joint. Immobilization was maintained, by plaster of paris for one week. At the end of this period active mobilization of the ankle was begun. Partial weight-bearing was permitted after one month. The end result was full function in the ankle. Some discomfort was present for two months. At present he is walking without a cane or crutch and has played golf and the end result is 90% of function in the ankle and foot.

Case 5. This was a complete posterior dislocation of the elbow with an associated fracture of the coronoid process

and of the olecranon. Open reduction to stabilize the fracture did not prevent the recurrence of the dislocation. The arm was placed in balanced traction. Active motion maintained the motion in the elbow joint during the period of healing of the fractures and of the extensive lacerations

of the extra-articular tissues. The end result was 75% motion, without pain, in the elbow joint.

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