Don't Throw Away the Cane *

BY WALTER P. BLOUNT, M.D., MILWAUKEE, WISCONSIN

As the causes of premature death are conquered one by one, man is given a longer life in which to grow old gracefully. In the twilight years that his forefathers rarely knew, he needs help in seeing, hearing, chewing, and walking. Gradually we are coming to look upon eye glasses, hearing devices, and dentures as welcome aids to gracious living rather than as the stigmata of senility. They should be accepted eagerly as components of a richer life. The cane, too, should be restored to favor as a means of preventing fatigue and a halting gait, rather than maligned as a sign of deterioration.

The use of the cane in order to prevent strain upon an ailing hip or knee is not generally accepted. In the patient's mind there is a nice distinction between the permissible use of a stick postoperatively and the adoption of this humble support for no other reason than the relief of a slight physical infirmity. A fat lady may waddle like a duck when she laboriously walks a few steps, but she resents the suggestion that she carry a cane. She would look much better with a stick than with the limp; and with support she could walk enough to get some exercise. More walking would help with weight reduction. But no! she is not ready for a cane *yet!* The patient with residual disability after poliomyelitis and with a fatiguing, unsightly lurch needs a cane. Early degenerative hip disease may require no treatment other than weight reduction and a stick in the opposite hand; however it takes an impressive orthopaedic surgeon to sell the idea.

Pride is not always the major obstacle. There is no place for the stick in modern society. Man rarely walks. He rides in a car or a bus. The busses are crowded, and there is scarcely room in the modern car for the occupants to sit upright, without adding a stick. Your grandfather proudly rested his hands on the knob of a cane as he was driven behind good horses. He stepped out briskly with his stick at the end of the ride. Now man must limp between busses without benefit of a cane.

How our attitude toward the cane has changed! Earliest man demonstrated his superiority to the beasts by carrying a stick in order to beat them off. The staff became a spear. The soldier leaned on the shaft when tired. The shepherd enjoyed the support of his crook.

The artist and the cartoonist have given us the history of the cane. In the Egyptian tombs of the Sixth Dynasty (2830 B. C.) the crude staff was illustrated. The stick gradually became a popular accessory that served many purposes. The nobleman struck at stray dogs and cudgeled his slaves if they did not bow low enough. The cane became a symbol of power and aristocracy. Officialdom appeared with a mace or crosier. A jaunty stick was carried by men and women alike at the race track and at the watering place.

Following the publication in 1827 of the delightful medical biography, *The Gold-Headed Cane*, no well established doctor appeared in public without this symbol of his profession. The smooth polished stick was provided at the top with a hollow gold knob or crossbar containing aromatic vinegar. The man of science held this to his nose so that the fumes might protect him from the exhalations of the sick person. The cane descended to the doctor from Hermes or Mercurius, and, until our generation, it was as much a symbol of the healing art as was the caduceus. Now the doctor, as well as the patient, would rather suffer great discomfort than the indignity of carrying a cane.

The advertisements of fifty years ago rarely depicted a stylish person without a cane.

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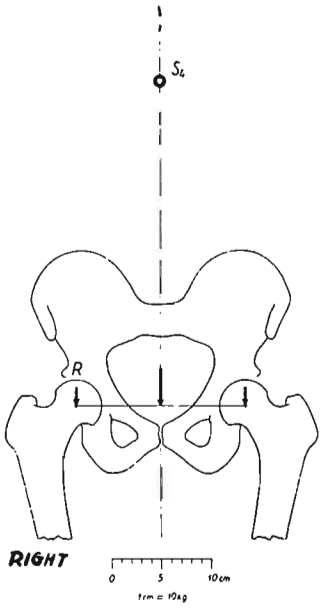

FIG. 1

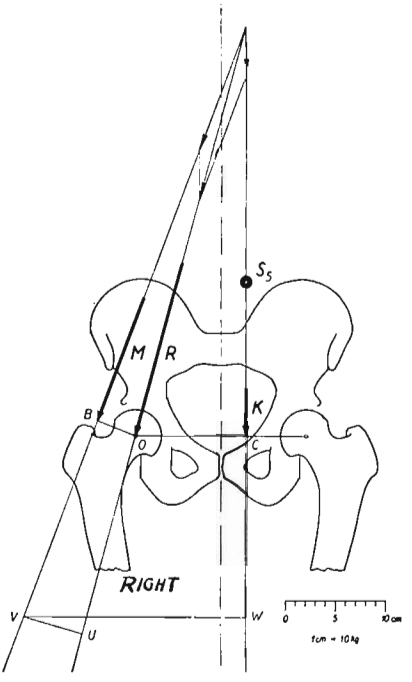

FIG. 2

Fig. 1: When the patient stands, the weight of the body above the lower extremities, *S4*, rests equally on the two normal hip joints. The static force on each hip, indicated by a short arrow, *R*, is one-half of the total superimposed weight. (From Pauwels [6]. Reproduced by permission of Ferdinand Enke Verlag.)

Fig. 2: (See also legend for Fig. 3.) Without moving the trunk or the pelvis the subject in Fig. 1 has lifted his left lower extremity by flexing the hip and knee as though the left lower extremity were in the swing phase of walking. The weight of the left lower extremity is added to that of the torso, head, and arms, increasing the total weight and moving the center of gravity of the body to the left to *S5*. The body weight that must be borne by the stationary right lower extremity is represented by the heavy line *K*. The abductors of the stationary right hip must pull downward on the right side of the pelvis at *B* (vector *M*) strongly enough to support and to maintain in equilibrium the weight *K*. The force downward on the fulcrum at *O*, the hip, is the sum of the vectors, *M* and *K*, expressed as *R*. The amounts of the downward pull by the abductors at *B* and the downward force at *C* are directly related to the relative length of the levers *B* to *O* and *O* to *C*. If *B* to *O* is one-third of *O* to *C*, the downward pull of the abductor muscles at *B*, expressed as *M*, must be three times the downward force at *C*, which is *K*, if the forces are to balance. The total pressure on the top of the femur, *R*, is the sum of *M* and *K*, or four times *K*. (From Pauwels.[6] Reproduced by permission of Ferdinand Enke Verlag.)

A man was not fully dressed without his stick. Today only a few of the famous characters in advertisements still carry canes.

At present, attractive walking sticks can be purchased at only a very few smart shops. Beautiful canes are collector's items or dust catchers in storage attics. A patient rarely displays the ornamented cane which he inherited from some distinguished ancestor. The modern varnished stick with a rubber tip is usually obtained from a brace shop or drug store. This utilitarian model is not esteemed as an accessory.

To become popular again, the stick must be both beautiful and efficient. It should hang from the forearm in order to free the hand, but it should remain within easy grasp. Canes might be sold like cars on the basis of novelty features. Hidden swords are no longer permissible, but many ancient cane accessories could be revived. Flashlights, bottles, umbrellas, and even built-in radios would be useful. Beautiful plastics could be combined with the newer alloys in order to increase the sales appeal.

Following a serious injury or an operation on a hip, most patients of sixty or seventy years should continue the use of a support indefinitely in order to protect the injured part from further insult. They would gladly do so were it not for vanity and for public opinion. The injured workman is not permitted to return to any job as long as he is using a support,

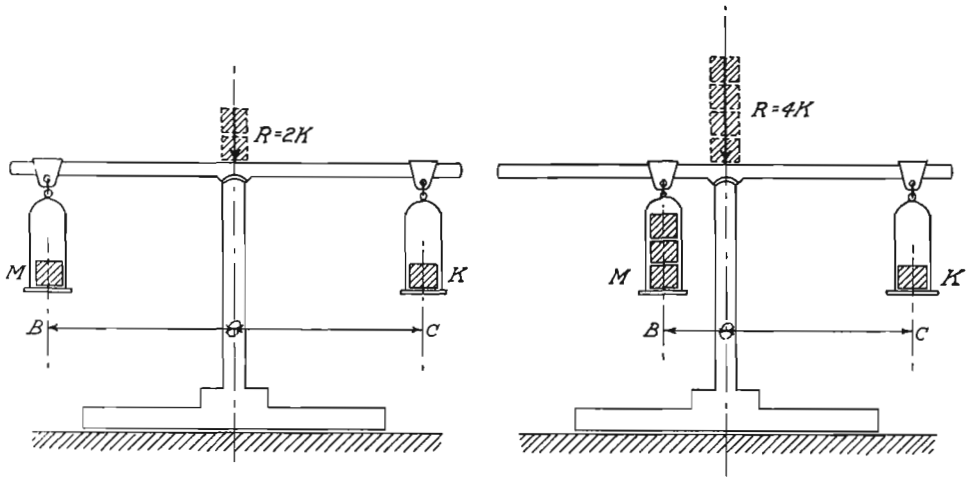

FIG. 3

Fig. 3: The forces operating at the hip are well illustrated by the simple balance. In this pair of drawings, as well as in Fig. 4 and in the diagrams of the hip, it is agreed that, for absolute accuracy in establishing a complete system according to the laws of physics, the forces represented by the vector R should have the arrow pointing upward to represent the upward thrust of the femur. Throughout these illustrations, this arrow has been reversed to point downward in accordance with the orthopaedic concept of downward pressure on the hip, rather than upward pressure of the femur against the pelvis.

Consider that the column which supports this balance has been provided with some kind of a device for measuring the total weight which is resting on the fulcrum. In this series of drawings, the force designated by the letter M, represents the force exerted by muscles to counterbalance the weight K. The total weight upon the column of this balance must equal the weights at M and K. For the sake of simplicity, the weight of the balance beam and its accessory equipment will be disregarded. On the left, the superimposed weight R, which is equal to two K, is divided equally at M and K — the perfectly balanced condition when the normal human body is standing erect.

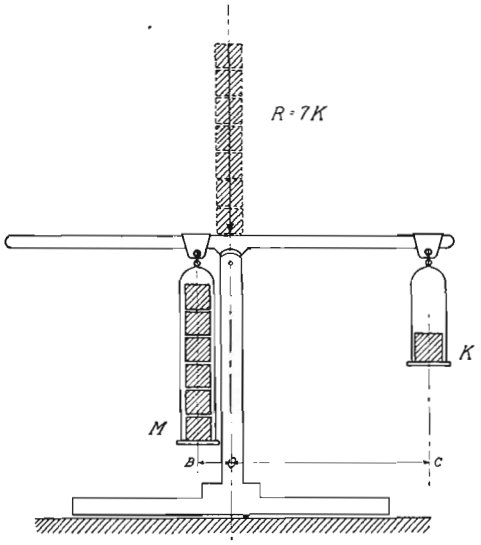

FIG. 4

In the same type of diagram on the right, the approximate hypothetical relationships are represented when one lever is shortened as in our last hip schema (Fig. 2). The lever arm, B to O, is one-third the length of the lever arm O to C. In order to balance the weight K, it is now necessary for the weight M to be three times the weight K in order to maintain equilibrium. This means that the center column supporting the balance beam must now withstand pressure four times that of K. (Redrawn from Pauwels [7])

Fig. 4: (See also legend for Fig. 3.) The lever B to O is one-sixth of the length of the lever O to C. It will now take six times the weight K applied at M in order to balance the weight K. The weight R, supported by the column, will be the sum of M and K, or seven times K. This represents diagrammatically what happens when the hip is in marked valgus position. (Redrawn from Pauwels [7])

so he abandons his cane while he still needs it. We must counteract this prejudice. Let us start a movement to *employ the cane carriers.* We must educate the doctors, patients, employers, and the general public to turn back to the old order and to look upon the stick as a good friend. Here are some scientific reasons why it is needed.

To review the mechanics of the hip, let us start with a diagram (Fig. 1) taken from the much quoted, but little read, monograph of Pauwels, published in German in 1935.[6] It represents the weight of the body above the lower extremities resting equally on the two normal hip joints. The static force on each hip is one-half of the total superimposed

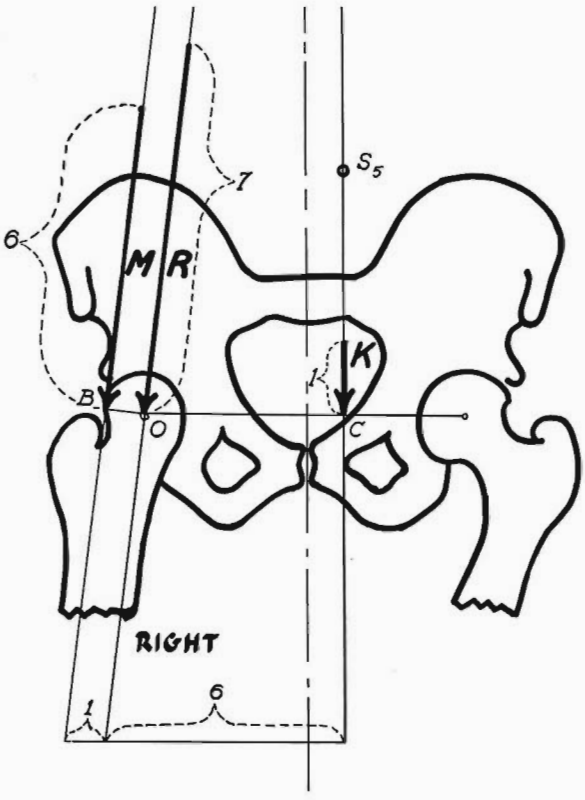

FIG. 5

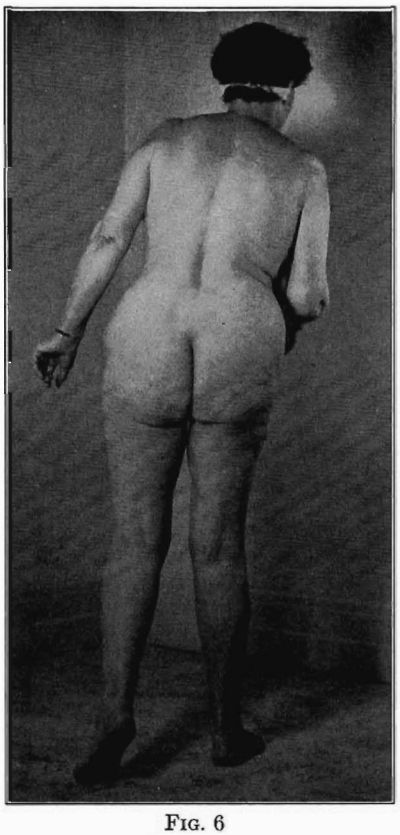

FIG. 6

Fig. 5: The valgus hip is represented schematically on the right. The pull of the abductors at B is at the end of an abnormally short lever arm, B to O, which is only one-sixth of O to C. The pull downward at B must be six times K in order to maintain equilibrium when the left foot is raised. The total pressure on the stationary right hip is seven times K.

Fig. 6: When there is a valgus deformity of the right hip, the patient actually reduces the pressure on the head of the femur by listing the trunk to the right as she steps on the right foot. This displaces the center of gravity to the right so as to require much less pull of the abductor muscles on the right, and consequently much less force on the head of the right femur.

weight, or less than one-third of the total body weight. Muscles are relaxed, and muscle pull is not a factor.

In Figure 2, one must suppose that the same patient (facing the reader with the right side clearly marked) has lifted his left lower extremity by flexing the hip and knee as though the extremity were in the swing phase of walking. He has not moved the trunk or pelvis. The weight of the left lower extremity is added to that of the torso, head, and arms, increasing the total weight and moving the center of gravity of the body to the left. In this hypothetical and simplified schema, the actual force that is exerted upon the head of the right femur comprises not only this superimposed weight, but the total force that is momentarily required to maintain the balance of the pelvis as the left limb is lifted. The abductors of the stationary right hip must pull downward on the right side of the pelvis strongly enough to maintain equilibrium. The force downward on the hip is the sum of the vectors M and K. The amounts of the downward pull by the abductors and the downward force of gravity are directly related to the relative length of the levers. If B to O is one-third of O to C, it is obvious that the downward pull of the abductor muscles must be three times the force of gravity in order to maintain balance. Then the total pressure on the head of the femur is four times that of the superimposed weight.

With the use of a simple balance (Fig. 3), we can illustrate the mechanics of the forces as they affect the load on the head of the femur. On the left is the perfectly balanced condi-

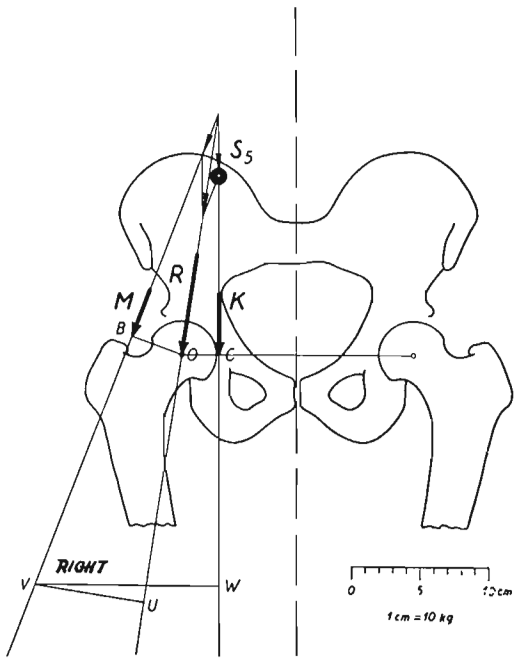

FIG. 7

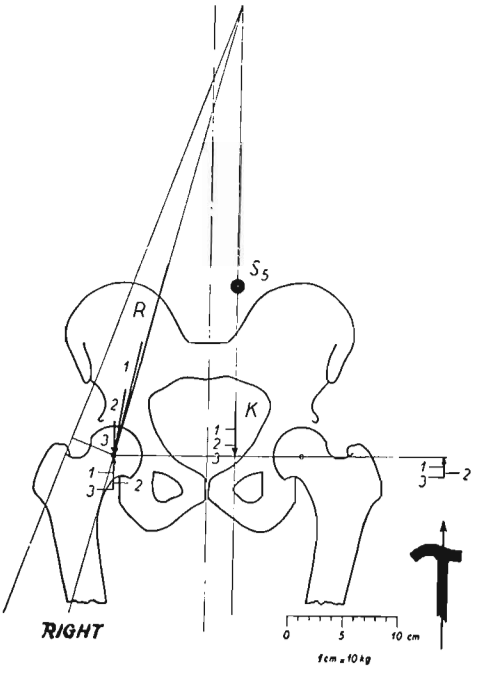

FIG. 8

Fig. 7: In this hip schema, the trunk is listed to the right. The center of gravity, *S5*, is shifted to the right. The lever arm, *O* to *C*, is reduced to less than the lever arm *O* to *B*. There is less pull required of the abductor muscles than the actual body weight so that *M* is less than *K*. The total force, *R*, on the femoral head is only slightly in excess of the superimposed weight. (From Pauwels [6]. Reproduced by permission of Ferdinand Enke Verlag.)

Fig. 8: In the subject studied in the companion Table I, without a stick, the force designated *R* is 385 pounds. A cane used in the left hand supports the body weight, *K*, without requiring as much pull of the abductor muscles. The cane works through a long lever so that a moderate push on the stick greatly relieves the pressure on the hip. Here and in Table I, the various lines labeled 1, 2, and 3 refer to relationships in this average case with varying forces on the cane, while the levers remain constant in length. (From Pauwels [6]. Reproduced by permission of Ferdinand Enke Verlag.)

TABLE I

(See Figure 8)

	Pounds Pressure on Cane	Pounds Pressure on Femoral Head
R	0	385
1	20	220
2	33	113
3	38	66

tion when the normal human body is standing erect and motionless; the superimposed weight is divided equally between the two hips. In the same type of diagram on the right is represented the approximate hypothetical relationships when one lever is shortened, as in our last hip schema (Fig. 2).

In Figure 4, the relative length of the levers is shown even more unequal in order to represent diagrammatically the situation with the hip in marked valgus position.

The valgus hip is represented in a schematic drawing (Fig. 5). The pull of the abductors is almost twice that if the angle of the femoral neck were normal.

The foregoing is only a hypothetical analysis of forces. In actual life, the patient with a valgus hip limps (Fig. 6), and the force on the right hip is reduced. As weight is borne upon the right lower extremity, the trunk is shifted to the right with an abnormal list so

that the center of gravity is displaced to the right. The result is the characteristic waddle of the fat man or the limp of the man with coxa valga.

Let us see what happens in our hip schema when the patient limps (Fig. 7). With the trunk listing to the right, the center of gravity is shifted to the right. The lever arm *O* to *C*

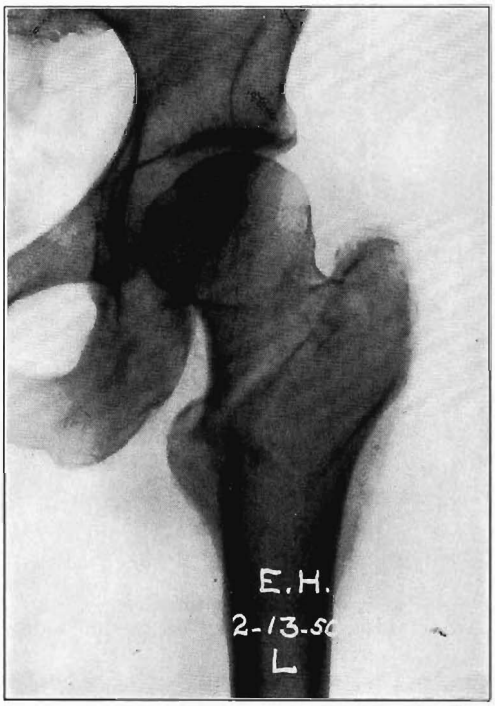

FIG. 9-A

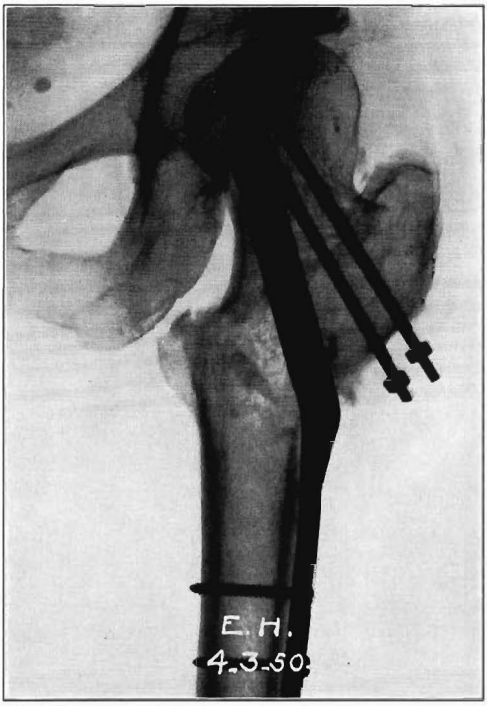

FIG. 9-B

Fig. 9-A: E. H. Roentgenogram made on February 13, 1950. A trochanteric fracture in a female, age forty-six, had been reduced and is in the valgus position.

Fig. 9-B: Roentgenogram made on April 3, 1950. Secure internal fixation was obtained with a V blade-plate which held the relationship of the head and neck of the femur to the shaft in the valgus position, and two Moore nails which fastened the trochanter to the neck. Bony union was prompt. There was no threat of coxa vara. The patient walked with crutches soon after the operation.

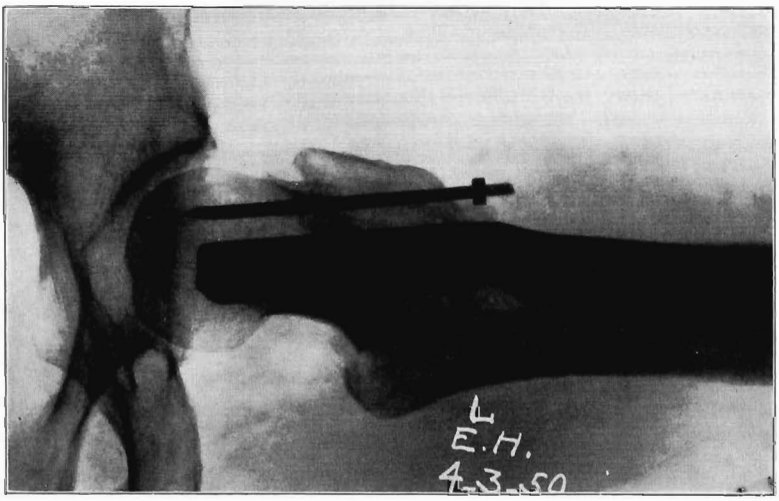

FIG. 9-C

Fig. 9-C: Roentgenogram made on April 3, 1950. The reduction and fixation were satisfactory as seen in the lateral roentgenogram.

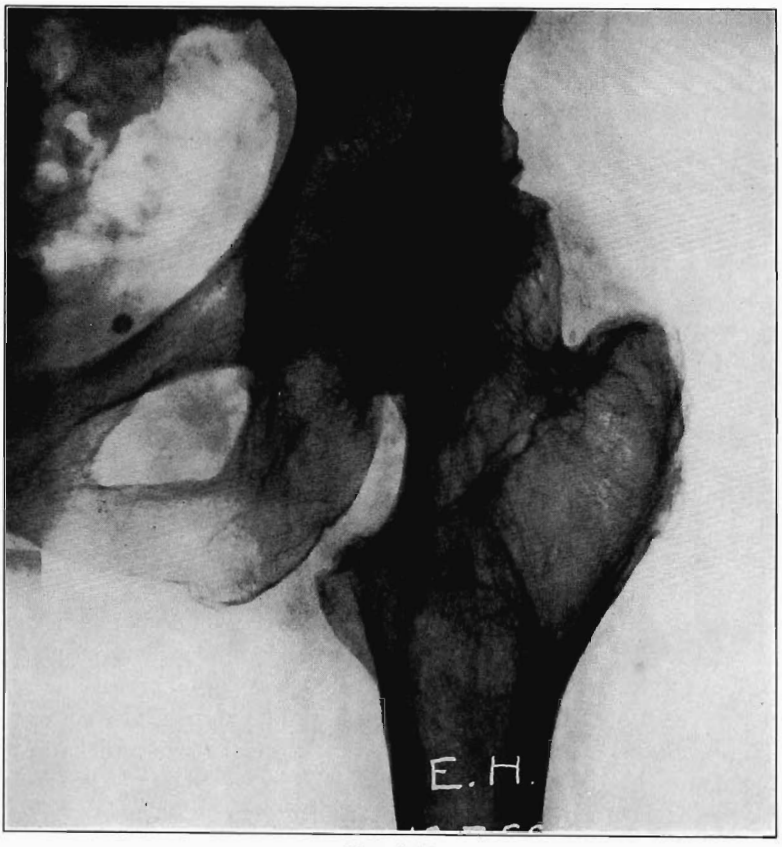

FIG. 9-D

Roentgenogram made on December 7, 1955. Avascular necrosis appeared two and one-half years after the fracture, and two years after the patient had abandoned crutches. With the use of crutches for one year, the head was revascularized. Roentgenogram shows the appearance of the hip five years after healing of the fracture. She uses a cane in the right hand. There has been no change in the last two years. Hip motions are only slightly restricted. There is discomfort with changes of weather or overactivity.

is reduced to less than the lever arm O to B, and less pull of the abductor muscles is required than that which would be required by the actual body weight. The total force on the femoral head is only slightly in excess of the superimposed weight.

The response to pain in the hip is similar; the result is an antalgic limp. The torso lists to the affected side when weight is borne on this hip in order to reduce the downward force on the femoral head and thus to reduce the pain. In our diagram, if the list is exaggerated enough to shift the weight so that K coincides with R, no pull at all is necessary on the abductor muscles. This type of limp is familiar in the patient with completely paralyzed abductor muscles.

Limping, as a means of relieving stress on a hip, may be tolerated in an energetic child, but it is not a desirable gait for an adult. Constant lurching of the torso is fatiguing; it produces excessive strain on the lumbar spine and causes backache. Above all, it is unsightly. The patient does not want to limp! In his sporadic attempts to reduce the lurch, the patient with a normal femoral angle repeatedly increases the pressure on the femoral head up to four times that of the body weight. The man with a valgus femoral neck applies even more force with each step. Rapid deterioration of the hip is inevitable.

The patient of the wise orthopaedic surgeon walks with crutches for six months after a fracture of the neck of the femur. He uses a stick for a longer time — the wiser the doctor, the longer the time. If his medical adviser, his physical therapist, his friends, and his

pride finally drive him to abandon the cane while he still needs one, he limps. He limps in a subconscious effort to reduce the strain on a weakened hip. If there is free motion at the joint, he lists to the same side in order to reduce the pressure on the top of the femoral head, as we have just shown. If there is restricted motion, he cannot shift his body weight but he hurries to remove the weight from the painful hip joint. When his pride makes him reduce the limp to a minimum, the excessive force pressing on the aging hip takes its toll in producing degenerative changes. He should not have thrown away the stick.

As Pauwels has shown so well (Fig. 8), the use of a cane in the left hand reduces the pressure on the right femoral head without the need for limping. The support afforded by the stick greatly lessens the pull required of the abductor muscles in helping to support the body weight. The cane works through a long lever, so that a moderate push on the stick greatly relieves the strain on the hip. The relative forces are shown in Table I. Pauwels estimated that during the stance phase of walking, without the support of a cane, an average person exerts a static force of 385 pounds on the stationary hip. This weight can be reduced to 220 pounds by pushing down on a stick with the opposite hand the equivalent of 20 pounds. The cane is really an efficient mechanical device.

Trochanteric fractures, as well as subcapital fractures, will heal more promptly if reduced in some degree of valgus (Fig. 9-A). So far as it goes, this principle is a good one. With secure internal fixation (Fig. 9-B), a woman, forty-six years old, walked with crutches soon after the operation. Reduction and fixation were satisfactory as seen in the lateral roentgenogram (Fig. 9-C). In the valgus position, bony union was prompt, and there was little danger of coxa vara.

The fallacy in the proposition is this. The position of valgus that ensures rapid healing also reduces the lateral lever in the system of forces that have been discussed and greatly increases the pressure that is brought to bear on the hip as soon as cane or crutches are discarded. A very high percentage of trochanteric fractures that heal in valgus result in avascular necrosis of the femoral head (Fig. 9-D), a rare complication if this fracture heals with the normal amount of varus, that is, with an abductor lever arm of normal length. In the case illustrated, pain and limp appeared several years after the fracture. The patient walked with crutches for one year, and the symptoms disappeared. There was no appreciable change as seen in roentgenograms in two years. An arthroplasty was suggested elsewhere and may be desirable in the future. However, with a cane she has no pain and does not limp. Hip motion is only slightly restricted. She should not throw away the cane!

Consider the seventy-year-old grandmother who is being treated for an impacted fracture of the neck of the femur in valgus position or the seventy-three-year-old lady with arthritis and a vertical fracture of the neck of the femur whose right hip is shown in Figure 10-A. We obtained satisfactory reduction and valgus position by simultaneous osteotomy, closed reduction, and fixation with Moore pins (Fig. 10-B)[2]. If either of these ladies knew of the likelihood of avascular necrosis developing, neither would abandon the support which offers some assurance of preserving the function of the hip; neither would throw away the cane.

At first the patient is timid about abandoning support. An optimistic prognosis from the orthopaedic surgeon encourages him to get rid of his cane. The doctor wants to prove the success of his treatment to the critical world and the patient is inspired to show that he is wholly well again by discarding all support. If the patient is thirty or forty, he should strive for rapid complete recovery; if he is sixty or seventy, he should adopt a cane until several years' observation have proved that the circulation of the femoral head has been wholly re-established. Giving up the stick should not be used as a proof of recovery.

The doctor says to the patient, "You may discontinue the cane as soon as you feel strong enough". No one asks if the femoral head is strong enough; often it is not. The roentgenogram may give evidence of good healing; but doctor, treat the patient, not the picture. The hip may hold out for a year or two and then give up; degenerative changes

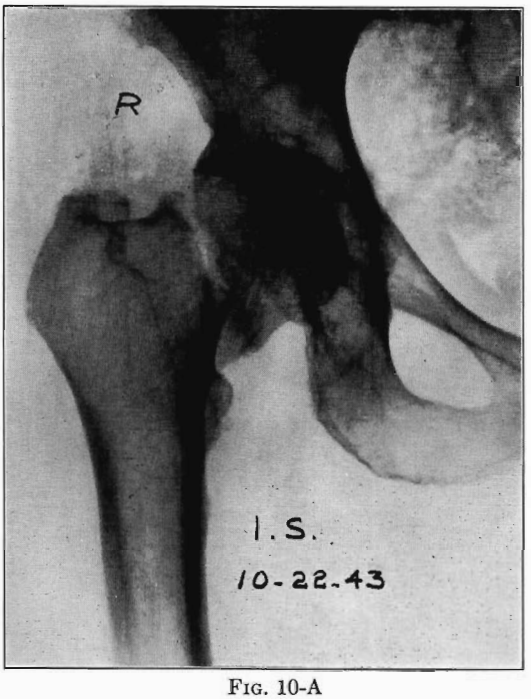

FIG. 10-A

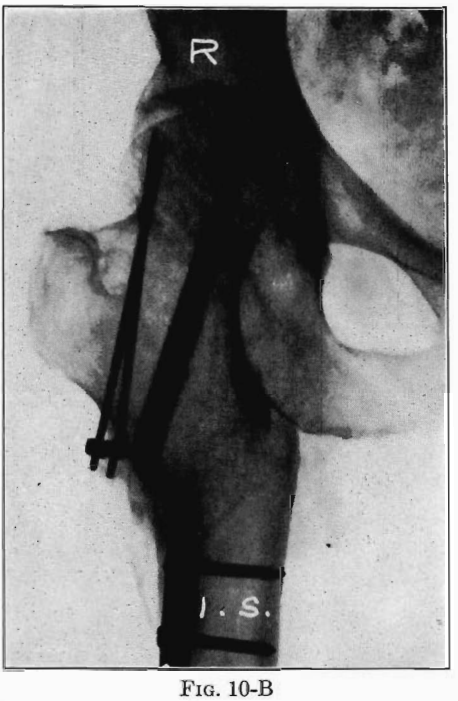

FIG. 10-B

Fig. 10-A: I. S. Roentgenogram made October 22, 1943, shows vertical fracture of the neck of the femur in a female, age seventy-three, with generalized atrophic arthritis of moderate grade. Simultaneous osteotomy, closed reduction, and fixation with Moore pins were indicated in order to assure prompt healing and an ultimate good functional result.

Fig. 10-B: Roentgenogram made April 10, 1946, two and one-half years after the roentgenogram seen in Fig. 10-A. The fracture had been reduced and immobilized by two Moore pins. The osteotomy had been secured by a blade-plate which penetrated the fracture site. No avascular necrosis developed.

(Figs. 10-A and 10-B are reproduced by permission from *Instructional Course Lectures* of The American Academy of Orthopaedic Surgeons, 1952, Vol. IX, p. 23.)

supervene. Most surgeons insist that a patient with a hip fracture walk with crutches for six to nine months. But is that long enough? The avascular necroses come on one to five years later. Why?

Have any surgeons seen avascular necrosis with sequestration and deformity develop in a patient who still walked with crutches? Stimulated by the brilliant research and the advice of our late Honorary Member, Dallas Phemister, I have insisted upon two years or more of crutch-walking for several patients with early avascular necrosis. Adequate circulation was re-established in most of the femoral heads. Perhaps prolonged support would reduce the incidence of this complication. It is worth trying! The prevention of avascular necrosis is much more desirable than an attempted cure. Why throw away the cane?

The use of an artificial femoral head is justifiable only in patients who have a relatively short life expectancy. Even in this group, most patients should prolong the usefulness of the endoprosthesis by the permanent use of a stick in the opposite hand. The surgeon should tell the patient frankly, "This makeshift hip is good for five years if you are enough of an acrobat to walk without a cane; it is good for ten years if you are smart enough to cut down on the stress that you put on this artificial joint." My figures are subject to revision when further clinical research has shown how long the average endoprosthesis will function satisfactorily.

If one must use a substitute for the upper end of the femur, the normal length of the femoral neck should be preserved, if possible, so that the abductors will work efficiently. When the abductor lever arm is reduced because of a short neck or because of valgus

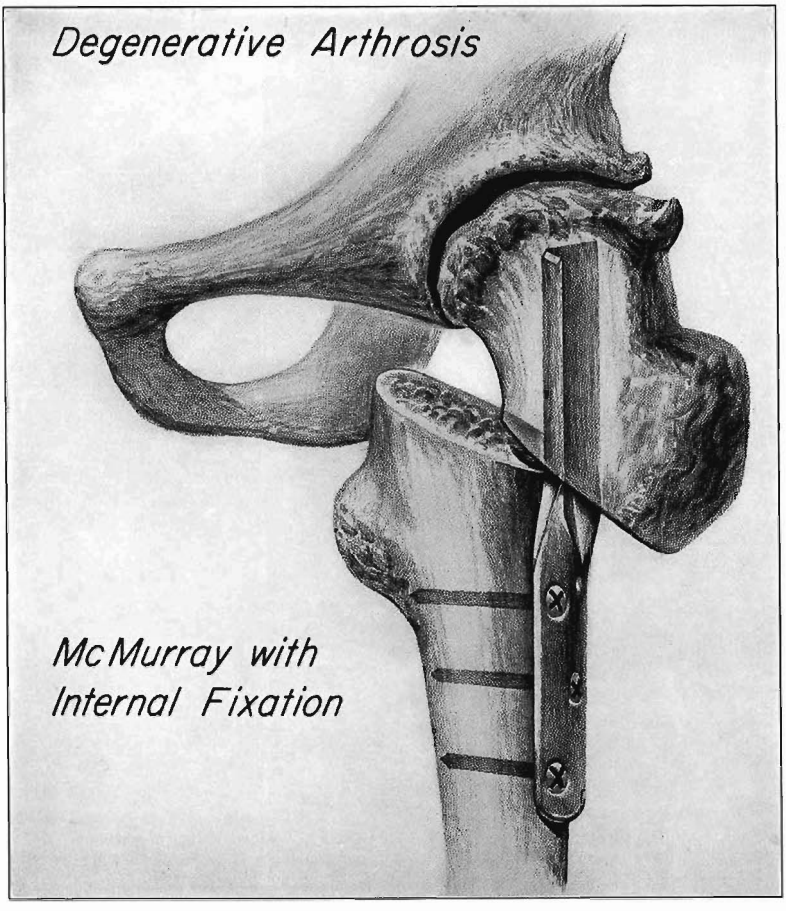

FIG. 11

The technique of the displacement (McMurray) osteotomy with straight V blade-plate fixation. A flexion deformity of 15 degrees, adduction of 25 degrees, and outward rotation of 10 degrees can be corrected without bending the blade-plate and without using one with angulation in the sagittal plane. If the proximal end of the femur is normally dense, no external fixation is necessary.

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position, the additional strain on the artificial hip joint must be relieved by the use of a stick. If the bone is abnormally soft or if the shaft of the endoprosthesis is loose, all surgeons will agree that the use of a cane is necessary. Is it not wise, therefore, to protect most freshly inserted endoprostheses from the start, before complications appear?

I should rather be remembered as a *thoughtful* surgeon than as a *bold* one. I submit that a well planned sequence of lesser operations with long intervals between, and the use of a cane as needed, may prove better for the patient and productive of a more desirable end result than some more heroic surgical procedure. There is a tendency among orthopaedic surgeons to exchange simple methods for dramatic treatment that will not require the use of the cane. The surgeon looks for a single, definitive, bridge-burning operation that will cure the patient completely for the rest of his life. Too often, this goal is not reached. The patient still needs the stick (or even crutches) after this heroic operation. If a satisfactory arthroplasty or reconstruction operation is performed, how much better it would be for most patients to urge the continued use of a cane in order to preserve the function of the reshaped bone by taking the strain off the hip for years, not for months only.

Degenerative arthrosis of a single hip is a good example of what I am talking about. As

the articular cartilage wears out, nature gradually produces marginal osteophytes and fibrous periarthritis that stiffens the joint. The hip that is ankylosed by nature is pulled inexorably into deformity long before motion in flexion is much limited. The patient can sit comfortably, but when he gets up to walk, the adduction-flexion deformity puts an

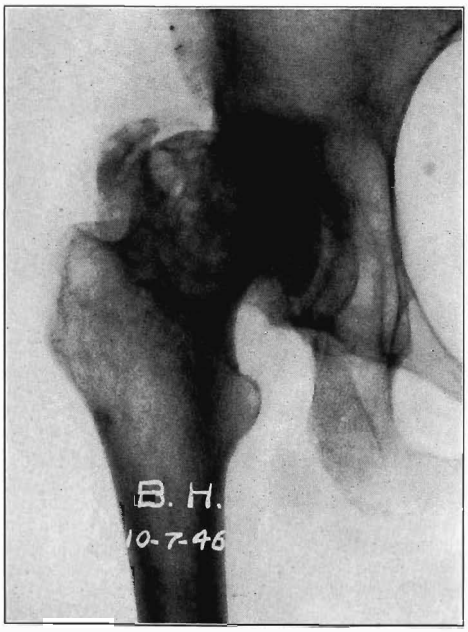

FIG. 12-A

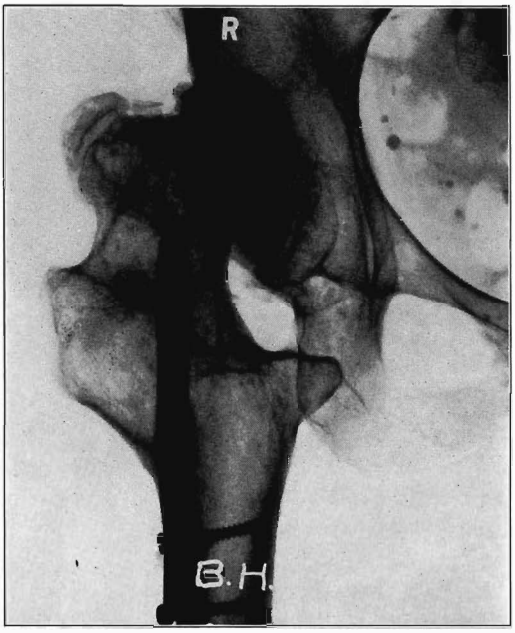

FIG. 12-B

Fig. 12-A: B. H., a female, fifty years old. Roentgenogram made on October 7, 1946, showed degenerative changes in the right hip of long standing. There were increasing pain and limp. The patient could not walk fifty feet without severe pain. The Trendelenberg sign was positive on the right side. This hip was suitable for a displacement osteotomy.

Fig. 12-B: Roentgenogram made on January 4, 1956, ten years following displacement osteotomy and internal fixation. The patient walked with crutches soon after the operation. No external fixation was used. Flexion of 90 degrees was preserved so that the patient could sit. Extension and abduction were regained, permitting erect standing and walking, with only a slight limp. Weight was borne partially on the medial projection of the distal fragment, thus reducing the force on the hip [5]. Note the reestablishment of the joint interval. In ten years, there had been no worsening of the degenerative changes seen in the roentgenogram illustrated in Fig. 12-A.

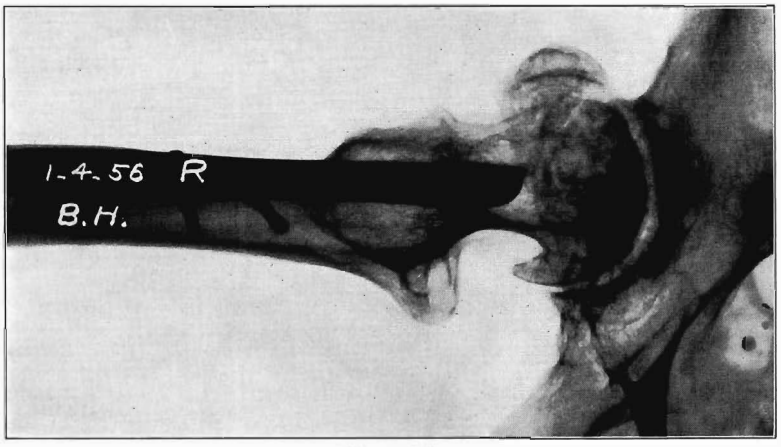

FIG. 12-C

Roentgenogram made on January 4, 1956. The joint interval looks even better in this lateral roentgenogram. It is important that the proper alignment be maintained by internal fixation. A straight V blade-plate is now used instead of the gouge-shaped blade.

FIG. 13-A

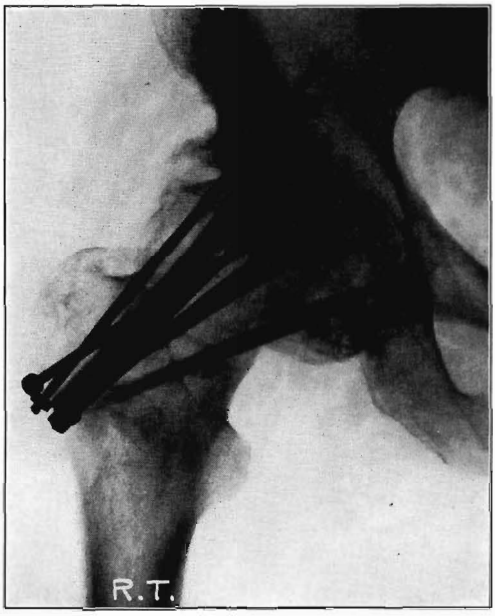

FIG. 13-B

Fig. 13-A: R. T., a male, age fifty-two. Roentgenogram made May 11, 1953, showed advanced degenerative arthrosis of the right hip. There was marked restriction of motion and there was only 20 degrees of flexion. There was an adduction-external rotation deformity. This hip was suitable for arthrodesis. The lumbar spine had gradually become accustomed to increased demands.

Fig. 13-B: A roentgenogram made July 22, 1953, two months after a pin-and-dowel arthrodesis. The hip has been brought into flexion of 30 degrees, neutral abduction-adduction, and less external rotation. In this position, the hip was nailed solidly and two grafts from the bone bank were driven across the joint line. This was done through a lateral approach without opening the hip joint.

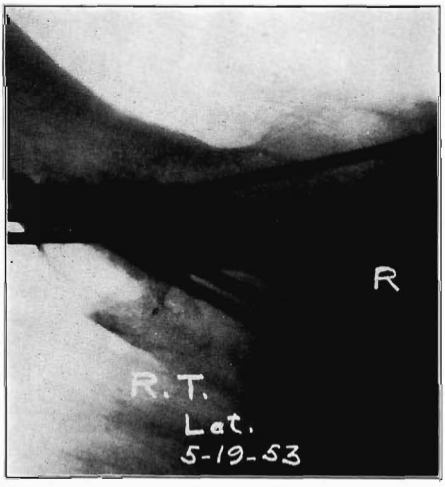

FIG. 13-C

FIG. 13-D

Fig. 13-C: In the lateral roentgenogram, made on May 19, 1953 the pins are shown to be widely dispersed, giving extremely secure fixation. With a hip of average bone density, no external fixation is necessary. At the present time, one massive homogenous graft is employed at the inferior margin of the neck, together with five or six one-eighth-inch pins spread out in the superior and posterior portions of the acetabulum. The operation is satisfactory, even without the graft, but fusion is slower in becoming solid. The method should *not* be employed if there is more than 30 degrees of motion.

Fig. 13-D: Roentgenogram made on October 28, 1955, two years after fusion operation. Union of the hip was solid and the grafts were well incorporated. There was no reaction about the metal. This patient left the hospital on crutches two weeks after the operation. The hip had fused solidly in five months, but a cane was used for two months longer. Since that time, no support was necessary. An arthrodesed hip is one of the few postoperative situations that requires no cane. The patient had no back pain. The lumbar spine had gradually become accustomed to the increased mobility. Knee motion was never restricted, and the patient had the endurance which only arthrodesis can provide.

increased strain on both the ailing hip and the low back. He cannot list over in an antalgic limp, so he hurries to remove the weight from the painful hip.

A cane and an anodyne may be all that are necessary to keep him going until an arthrodesis is indicated, as I shall point out later. He may need a neurectomy or physical therapy or both, and probably he should reduce his weight. But if the pain and the deformity are excessive, how logical it is to perform a displacement osteotomy of the femur near the hip joint (Fig. 11). This operation corrects the deformity and thus relieves the pain caused by strain on the hip and the low back. Weight is borne on the distal segment[5], so that there is less pressure on the joint and greatly increased stability. Motion in flexion is preserved.

The same cut of the osteotome that corrects the mechanics of the hip relieves the arthritic ache, as was observed by J. Forbes Mackenzie of Melbourne, Australia, twenty years ago. He showed that drilling, or cutting a hole in the cortex of the bone near the hip or knee joint, relieved the pain of osteo-arthritis, often for many years. Since Mackenzie's observation, numerous new operations have been done for the relief of pain and disability. Many of the more complicated have depended for their temporary success on the simple fact that the cortex of the bone is cut near the joint.

B. H., a fifty-year-old female had a hip that was suitable for displacement osteotomy (Fig. 12-A). The Trendelenberg sign was positive on the right, and the patient could not walk fifty feet without severe pain (Fig. 12-B). Internal fixation of the osteotomized femur allowed prompt crutch-walking with partial weight-bearing. Flexion was preserved so that the patient could sit. Regained extension and abduction permitted erect standing and walking. Proper alignment as shown in the lateral roentgenogram (Fig. 12-C) is important. B. H. is well satisfied after ten years. There has been no significant change as seen in the roentgenograms. She does not tire with normal walking, and she says that she has no pain. She scarcely limps. She promises to use a cane if pain returns. I should like to have her use one now.

In such patients, there is ample hip motion in flexion in order to prevent further strain of the low back. If the motion is slowly lost over the years, the lumbar spine is gradually accustomed to increased demands. Usually the patient thinks that he sits well because he bends at the hip. He is surprised later when he is informed that he has only 20 degrees of actual flexion of the hip joint. He has been sitting by flexing his lumbar spine.

In the patient who has been carried along with a cane and conservative treatment (Fig. 13-A), or in the patient who has had a previous displacement osteotomy, enough pain may gradually develop in the stiffening hip to justify surgery. If there is only one joint involved, he may at this time be offered an arthrodesis.[2] With motion almost gone, a permanent cure is obtained by means of pin-and-dowel fixation of the unopened hip joint.

Desirable flexion of about 30 degrees is maintained. The hip is brought into less external rotation and into neutral abduction or is left in slight adduction, if the legs are of equal length. The aching is again relieved, according to Mackenzie's principle, and is permanently eliminated by obliterating motion (Fig. 13-B). The pins should be widely dispersed as seen in the lateral roentgenogram (Fig. 13-C). External support is unnecessary with bone of average density.

R. T. left the hospital on crutches after two weeks. The hip was fused solidly in five months, but he used a support for two months longer. The appearance of the hip two years later is shown in Figure 13-D.

The lumbar spine was already limber because of the gradually increasing demands put upon it by the stiffening hip joint. There was little postoperative backache and the patient was ambulatory with crutches soon after the operation. Free motion of the knee, which was much more important than motion at the hip, was maintained because the use of a cast was avoided. He was left with good function and freedom from pain. He has the

endurance which only an arthrodesis can provide. A cane is unnecessary. Even if this had been his second operation, the patient would have been hospitalized for a total of not more than four or five weeks.

A pin-and-dowel fusion does not work well when there is free motion. An attempt to arthrodese the hip ten years previously would have required an extensive arthrotomy with external fixation of the knee and back, as well as of the hip, for a prolonged period. After this enforced rest, the lumbar spine would have been called upon suddenly for activity far beyond any previous motion of these rusty vertebral joints. Pain in the low back would have been inevitable.

Arthrodesis of the hip, one of the most valuable procedures for the relief of disease, pain, or disability of the hip has fallen into disrepute in adults because of subsequent back pain in poorly selected cases. If the operative procedures are taken in logical sequence, with intermittent use of a cane, nature will help with the treatment, and arthrodesis of the hip need not be limited to children and to young adults.

Lest you think that I am just reminiscing about old-fashioned operations, let me remind you that medicine as a whole has advanced more in the last fifty years than in all preceding historic time. This is certainly true for the specialty of orthopaedics. It is with the greatest satisfaction that I review the most welcome changes that have occurred in my brief span: better treatment of fractures, particularly of the femur, the humerus, the spine, and the calcaneus, tremendous reduction of the incidence of osteomyelitis and bone tuberculosis, the diagnosis and treatment of the protruded intervertebral disc as a cause for intractable back pain and sciatica, the use of endoprostheses in selected hip disorders, and now a successful campaign against poliomyelitis.

In the near future, I look for a substantial reduction in the number of congenital deformities and in the incidence of cerebral palsy and traffic and industrial accidents. Inequalities of leg length will be controlled from the time of their appearance. Most scolioses will be prevented, and the few remaining will be intelligently and effectively treated by the average orthopaedic surgeon. The Orthopaedic Research and Education Foundation, with the help of all of us, will have a significant part in achieving these and other gains.

I hope that the next decade will see the elimination of avoidable complications in the fractures of childhood—the complications that are due to the lack of understanding of the effect of growth on fracture healing and of fracture healing on growth. This implies the knowledge that fractures in children are different. Finally I hope, that in our progressively more Utopian existence, a glorified cane will regain some of its previous popularity and will assume its proper role in the intelligent prevention and follow-up care of many orthopaedic conditions. The fallacy of our generation, "You don't need a cane", will be supplanted by the slogan, "Don't throw away the cane".

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