POST-OPERATIVE REDINTEGRATION IN FEMUR PROSTHESIS CASES

Filed Sept. 17, 1953

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

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[Signature]
The present invention relates to a phase of post-operative treatment in cases of femur fracture, and more particularly in cases where the head and neck of the femur have been replaced by a prosthesis.

When the head of the large bone in the thigh of an individual, that is the femur, is broken so that it cannot be repaired, an operation may be performed, removing the head and the neck of the femur and inserting an Ilizarov prosthesis made of a special cobalt-chromium alloy, commercially available under the trade name Vitalium, corresponding to an exact configuration of the portion of the bone which it replaces. In order to restore to normal hip function following the operation, it is necessary, of course, for the incised tissue, and more especially the capsule of the joint of the operated hip, to heal properly. Unless the involved leg is allowed to rest in a manner to relieve sutures of undue tension the prosthesis may break the sutures and dislocate the hip.

It is therefore an important object of the present invention to provide an effective method and means for post-operative redintegration in femur prosthesis cases.

Another object of the invention is to provide a novel method for utilizing the sound leg of a post-operative femur prosthesis patient to maintain the operated leg in proper position until healing has progressed at least to the point of removal of the sutures from the external aspects of the wound.

A further object of the invention is to provide novel apparatus for maintaining the involved leg of a post-operative femur prosthesis patient in proper position for redintegration.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of certain preferred embodiments thereof taken in conjunction with the accompanying drawings wherein:

Figure 1 is a more or less schematic illustration of the lower extremities of a post-operative femur prosthesis patient, demonstrating practice of the present invention with the aid of a preferred embodiment of a novel orthopedic appliance provided for the purpose.

Figure 2 is an enlarged fragmentary sectional elevational detail view taken through the appliance substantially on the line II—I of Figure 1.

Figure 3 is a fragmentary sectional elevational view taken substantially along the line III—III of Figure 2.

Figure 4 is a more or less schematic illustration of the lower extremities of a post-operative femur prosthesis patient, demonstrating a modified application of the appliance, and

Figure 5 is a bottom plan view of the foot of the patient, as illustrated in Figure 4, looking substantially in the direction of the arrows on line V—V of Figure 4.

Having reference to Figure 1, there is shown schematically the conditions prevailing and following a hip prosthesis operation wherein the hip socket in the patient's pelvic arch A has fitted thereinto the head of a prosthesis P attached as a replacement for the head of the femur of the involved leg of the patient. The external aspects of the hip wound incident to the operation are closed by a line of removable sutures S.

In order to promote successful healing of the wound and more particularly the capsule of the joint of the operated hip the femur P should be maintained in such a position that the prosthesis P will remain as nearly as practicable in proper normal functional relation to the pelvic arch. This is accomplished, according to the present invention, without complete demobilization of the affected leg but by effecting a novel cooperative position-maintaining relationship between the operated leg and the sound leg of the patient. To this end, prior to the patient regaining consciousness, or prior to the wearing off of spinal anesthesia, the patient's legs are abducted, extended, internally rotated and relatively connected to retain this position during healing of the wound. As then observed, the patient appears to be lying with the legs fully extended as far apart from each other as possible and with the toes pointed generally toward each other.

However, the post-operative position of the legs, just described, is difficult to maintain even by a person who has no injury or operation, even for a short length of time. It is an extremely difficult position for an individual who has had a hip prosthesis inserted. Accordingly, an appliance 10 has been provided which is constructed and arranged to be secured to and between the legs of the patient in a manner to afford a comfortable, substantially counter-balanced relationship that will hold the prosthesis in substantially optimum functional relation with respect to the pelvic arch so that the surrounding and supportive tissue will heal properly for prompt redintegration of the joint. To a large extent the practical success of the present method has been due to the relief from strain upon the sutures retaining the incised tissue until healing has progressed beyond the need for the sutures.

According to the present invention, the appliance comprises a pair of preferably identical leg-engaging side bars 11, each of a length to extend substantially between the ankle and knee of the leg. Preferably medially connecting the side bars 11 is a connecting or crossbar assembly which is constructed to be longitudinally adjustable to meet various patient requirements for spreading of the patient's legs. Herein the crossbar comprises a pair of similar disconnected rod portions 12, preferably identically constructed and connected to the respective side bars 11. The crossbar rod 12 has the adjacent portions thereof threaded and threadedly connected thereto respective turnbuckle frames 13 having their contiguous ends relatively rotatably connected by means of a suitable swivel connector 14. Thereby, while the turnbuckle members 13 are relatively rotatable about their axes for respective longitudinal adjustment of the threaded rod members 12, the turnbuckle members are held against longitudinal displacement.

Connection of the side bars 11 to the respective crossbar rods 12 is preferably effected in a manner to enable substantially free rocking movement of the side bars about a transverse axis, limited swiveling movement about the axis of the attached cross bar rod 12, and only slight rocking movement of the side bar about its axis. To this end, the inner medial side portion of the side bar 11 in each instance is provided with an attachment lug structure 15 (2 and 3) provided with a spherical socket 17 within which is slidably engaged a complementary spherical head 18 on the connected end of the associated crossbar rod 12.

In order to facilitate assembly of the spherical head 18 in its socket 17, the joint or knuckle boss 15 is slotted on its axis and parallel to the associated side bar 11.
This provides a pair of ears 19 between which the spherical head or knob 18 is engaged in more or less universal joint relation.

Rocking of the side bar 11 about a transverse axis is enabled by the slot in the knuckle boss 15 affording a clearance 20 between the ears 19 accommodating the crossbar rod 12 during relative rocking movement of the connected side bar about said transverse axis.

Limit upon swiveling movement of the side bar 11 relative to the attached crossbar rod 12 is effected by means of a pair of longitudinally extending oppositely laterally projecting stop ears 21 formed on the rod adjacent and contiguous to juncture of the rod integrally in one piece with the ball joint head 18. The width of the stop ears or wings 21 is substantially less than the diameter of the rod 12 so that there is some swivel movement of the side bar about the ball joint but less than 90° in opposite swiveling directions as limited by engagement of the joint ears 19 with the stop ears or wings 21.

In order to enable slight rocking movement of the side bars 11 about their axis, the neck portions of the crossbar rod 12 adjacent juncture with the connecting ball head 18 thereof, and between the stop ears or wings 21, are tapered to a reduced diameter as shown at 22.

About each of the side bars 11 is preferably secured an orthopedic under felt or other padding 23.

In applying the appliance 10, the connecting or crossbar is generally adjusted to the length deemed proper for the particular case involved. The patient's legs are then abducted, extended and the lower extremities bilaterally internally rotated and the side bars 11 are strapped onto the respective legs between the knee and ankle on preferably the inside medial surface of the legs. The straps may conveniently comprise respective upper and lower bands 24 and 25 of adhesive tape wrapped about the side bars 11 and the respective legs of the patient, thereby anchoring the side bars in place with the legs. Following this, if optimum abduction of the legs has not been initially attained, further adjustment can be effected by means of either or both of the swivelly-connected turnbuckle members 13.

Where for any reason the appliance can not be applied to the insides of the lower extremities of the legs as shown in Figure 1, or post-operatively the patient indicates discomfort or displeasure with mid-leg application of the appliance 10, attachment of the appliance as indicated in Figures 4 and 5 may be alternatively employed. This comprises applying shoes 27, which may be the patient's own, to the feet and then attaching the side bars 11 to the bottoms of the shoes. The shoe laces should be tied to avoid escape of the feet. The legs are abducted, extended and then rotated inwards. The crossbars are placed posterior to the inwardly rotated malleolus bilaterally. Adhesive tape of substantial width, such as approximately three inches wide, is then wound over the shoes from behind and with the soles of the shoes resting on the long axis of the side bars which have previously been rotated through an arc of about 120° and with the connecting or crossbar at about the level of the ankles. The attaching adhesive tape is passed under and around the ankle and connecting bar to the side bars at the juncture in a substantially figure eight maneuver and repeated several times to secure and maintain the proper position, substantially as shown in Figure 5.

After the appliance 10 has been attached, in either manner described, the patient can move the legs up and down, but the appliance prevents rotating of the legs externally or flexing of the extremities. The appliance is left in place until the sutures are removed from the wound after an interval of from 7 to 10 days, depending upon the potentiality of the tissues to heal and the training and experience of the surgeon. The device 10 is then removed and the patient, supported with crutches, is allowed up and out of bed.

Where desirable, of course, additional padding may be used between the side bars 11 and the patient. In Figure 1, for example, two or three abdominal pads may be interposed protectively between the side bars and the patient's legs for this purpose.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In an appliance for post-operative reintegration in femor prothesis cases, side bars adapted to be attached to the legs of a patient, an adjustable crossbar, and means connecting the crossbar substantially medially to the inner sides of the side bars, said crossbar comprising a pair of swivelly-connected turnbuckle members and adjustably extensible and retractable threaded rod members connected to the turnbuckle members and to the side bar members.

2. In an appliance for post-operative reintegration in femor prothesis cases, side bars adapted to be attached to the legs of a patient, an adjustable crossbar, said crossbar comprising a pair of swivelly-connected turnbuckle members and longitudinally adjustably extensible and retractable threaded rod members connected to the turnbuckle members, and means connecting the rod members to the side bar members, at least one of said means including a ball head on the crossbar rod and a medially located connection boss on the associated side bar and slotted longitudinally of the side bar and providing a ball receiving socket within which the ball is engaged, said ball having a reduced diameter neck at juncture of the same with the crossbar rod, said neck being movable in the slot between spaced ears provided by said boss for rocking of the associated side bar about the axis of the crossbar and about an axis transverse to the axes of the crossbar and the side bar and being engageable with said ears to restrain rocking of the side bar about its axis, said ball and socket affording a range of relative swivelling movement of the side bar and the crossbar, said neck having a pair of stop wings thereon engageable with said ears to limit said swivelling movement.

3. In an appliance for post-operative reintegration in femor prothesis cases wherein a hip has been surgically opened with a generally longitudinal incision along the femur and after attachment of the prosthetic femur head and insertion of the same into the capsule of the joint of the operated hip the incision is sutured, side bars adapted to be attached longitudinally to the inner sides of the patient and each side bar having an outer leg opposing side and an opposite inner side, a crossbar assembly extending between the inner sides of the side bars and being longitudinally adjustable to vary the distance between the side bars for determining abduction of the patient's legs, means connecting the opposite extremities of the crossbar assembly to the respective side bars comprising at least with respect to the one side bar for attachment to the leg on the operated hip side of the patient a connecting structure on the side bar and complementary connecting structure on the associated crossbar extremity, said connecting structures having interengaging surfaces permitting pivoting of said one side bar substantially freely about an axis transverse to the crossbar assembly so that said one side bar can swing from its opposite ends toward the crossbar structure, said interengaging surfaces also permitting a wide range of pivoting of said side bar about the crossbar assembly, and one of said connecting structures having stop surfaces engageable with corresponding stop surfaces on the companion connecting structure to substantially preclude rotation of said one side bar about its longitudinal axis so as to hold the attached leg of the patient in a predetermined position of internal rotation and against inward or outward rotation from such predetermined
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position whereby to avoid straining of the sutures retaining the incision.

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