Jan. 13, 1970 W. X. HALLORAN 3,489,143

CONVERTIBLE HIP PIN

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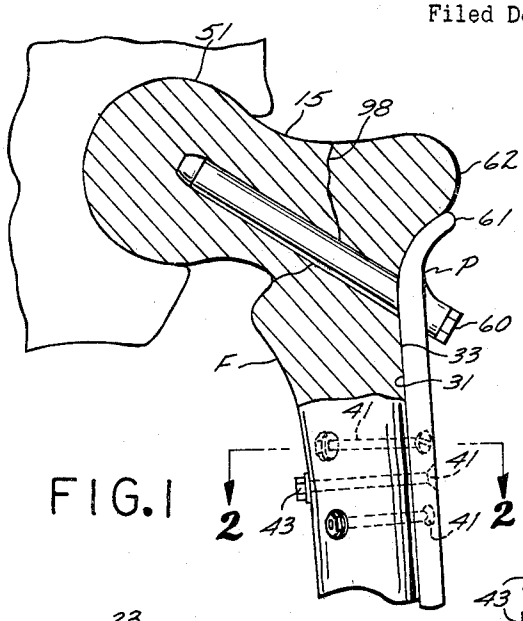

FIG. 1

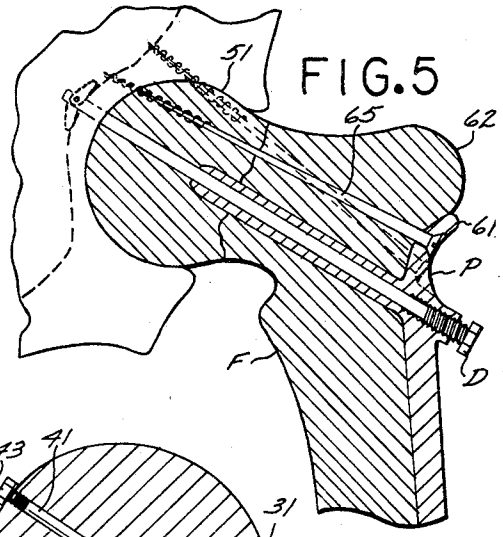

FIG. 5

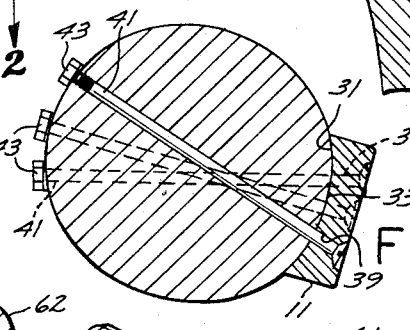

FIG. 2

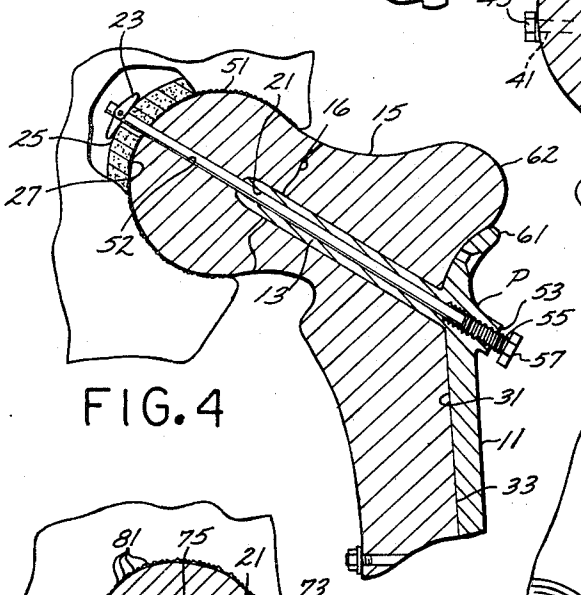

FIG. 4

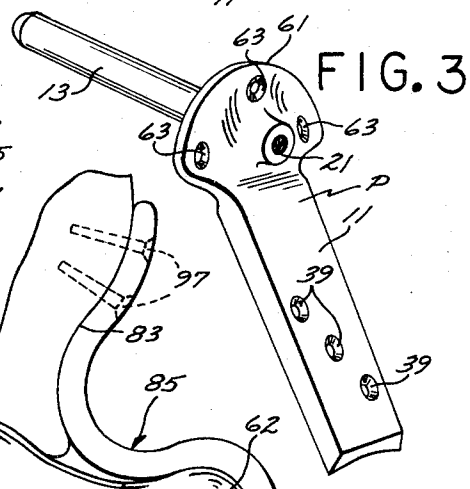

FIG. 3

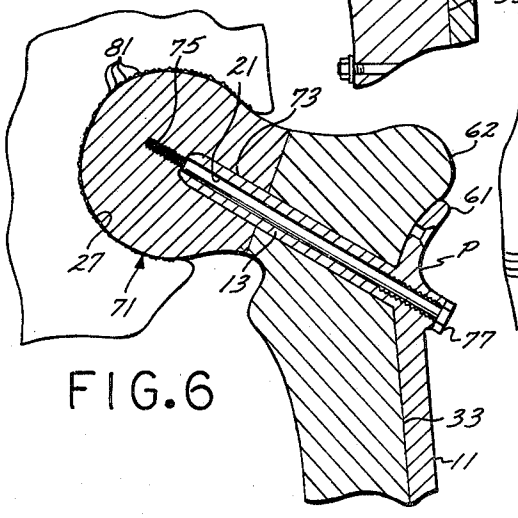

FIG. 6

FIG. 7

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CONVERTIBLE HIP PIN

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ABSTRACT OF THE DISCLOSURE

A hip pin adapted for use in a conventional hip pinning operation, but convertible for use as a compression assembly or the like where indicated. The pin includes a plate extending along the subtrochanteric lateral surface of the femoral shaft for affixation thereto, and further includes an elongated nail portion for projection through an axial bore provided in the neck of the femur. The nail portion is made of sufficient length to project inwardly of the location of the normal femur fracture and into the femoral head for support. The nail portion includes a longitudinal through passage to receive a compression device for engagement upon the pelvis bone to form a compression arthrodesis.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates generally to hip pins adapted for use in conventional hip pinning procedures, and more particularly to hip pins which are further adapted to anchor the femur to the pelvis, or to mount an artificial head to the femur.

Description of the prior art

Most existing hip pins include nail portions for projection through the femoral neck and beyond the fracture, but none includes a nail portion having a longitudinal passage to receive a compression device adapted to anchor the existing femur to the pelvis or to mount an artificial head to the femur. Thus, for example, if there is a deterioration in the condition of the pinned area subsequent to use of one of the hip pins of the prior art, a radical procedure is indicated to remove the hip pin and mount a compression device or the like.

SUMMARY OF THE INVENTION

The present invention is a hip pin providing the usual hip-pinning function, but uniquely characterized by a nail portion having a central bore or through passage adapted for receiving a compression device whereby the pin forms part of an assembly operative to anchor the femur to the pelvis bone in compression.

Other objects and features of the invention will become apparent from consideration of the following description taken in connection with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view partially in section, showing a hip pin embodying the present invention;

FIG. 2 is a sectional view taken along the lines 2—2 of FIG. 1;

FIG. 3 is a perspective view of the hip pin shown in FIG. 1;

FIG. 4 is similar to FIG. 1 except that a compression device is installed in said hip pin;

FIG. 5 is similar to FIG. 4 except that auxiliary screws have been inserted in the hip pin;

FIG. 6 is a view similar to FIG. 1 except that an artificial femoral head is installed on the hip pin; and

FIG. 7 is an elevational view, similar to FIG. 6, except that a pelvis flange has been attached to said hip pin.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A hip pin P according to the present invention is shown in FIGS. 1 through 3, the pin P comprising, generally, a shank plate **11** which extends along the shank of the femur F, and a nail portion **13** which is attached to the upper central portion of the plate **11**. The nail portion **13** projects generally transversely of the plate **11** and extends inwardly through a bore provided in the neck **15** of the femur F.

The nail portion **13** includes a through passage or axial bore **21** for receiving a compression device D characterized by an elongated shaft or stud, threaded at its outer extremity and including pivotable gripping elements **23** at its opposite extremity. As will be seen, rotation of the pin P pulls the gripping elements **23** inwardly against the pelvic bone **25** forming the acetabulum **27**, as best seen in FIG. 4.

The inner surface **31** (FIG. 2) of the rectangularly shaped plate **11** is concave for complemental abutment with the generally convex subtrochanteric lateral surface **33** of the femoral shaft **35**. A plurality of bolt receiving bores **39** are provided in the upper extremity of the plate **11** and are each directed inwardly toward a common center such that a corresponding plurality of bolts **41** extending therethrough lie along respective diameters of the femoral shaft **35**, as best seen in FIG. 2. The ends of the bolts **41** are threaded to receive a plurality of nuts **43** which can be tightened to rigidly support the pin P upon the femur F.

The projection of the nail portion **13** from the shank plate **11** is at an angle providing optimum support for the particular fractured femoral neck **15**, the angle being approximately 135°, as shown in FIG. 1.

Referring to FIG. 4, it is particularly noted that the nail portion **13** projects inwardly, beyond the fracture line **16**, and into the femoral head **51**. With the nail portion **13** providing support for the femoral head **51** in this manner, the hip pin P can be installed without the compression device D, as shown in FIG. 1, and will provide the usual support obtained with conventional hip pins. If, however, the pinned area should deteriorate, not respond properly or otherwise suffer a poor prognosis, it is a relatively simple matter to use the bore **21** of the pin P as a guide for drilling a bore **52** inwardly, through the femoral head **51**, and into the pelvis bone **25** for reception of the compression device D. In this regard, the outer end of the nail portion **13** projects outwardly of the shank plate **11** and terminates in a surface **53** substantially perpendicular to the axial bore **21**, and the associated portion of the axial bore **21** is complementally threaded for receiving the threads **55** of the compression device D.

The end of the compression device D, outwardly of the threads **55**, is in the form of a hex head **57** to enable the device D to be turned with a wrench to enable the compression device D to be backed out of the bore **21** and thereby tighten the femur F against the pelvic bone **25**.

Referring to FIG. 1, when the hip pin P is utilized without the compression device D a plug in the form of a relatively short stud **60** can be screwed into the outer end of the passage **21** to prevent access thereto whereby any infection at the outer end of the nail portion **13** will be prevented from traveling up the bore **21** and into the hip joint.

Referring to FIGS. 3 and 5, a circular crown **61** includes three bores **63** for receiving auxiliary screws **65** and curves generally outwardly to complement the shape

of the major trochanter **62** whose purpose will be described below.

Referring now to FIG. 6, the fixation shown in FIG. 1 may fail because of the development of some unforeseen circumstance and it will be necessary to install an artificial femoral. The artificial femoral head **71** may be made of acrylic or any other suitable material, and usually includes an axial bore **73** through which the nail portion **13** is adapted to project. In order to prevent rotation of the artificial head **71**, with respect to the remainder of the femur F, a bore **75** is drilled beyond the inner extremity of the nail **13** and threaded for receiving the threaded extremity of an elongated stud **77**. The stud **77** extends through the passage **21** and is screwed into the threaded bore **75** of the femoral head **71** to affix it securely to the femur.

In certain circumstances it becomes necessary to provide positive constraint against rotation of the artificial femoral head **71**, with respect to the acetabulum **27**. Accordingly, the spherical surface of the artificial head **71** is provided with a plurality of serrations **81** which frictionally resist rotation of the head **71** relative to the acetabulum **27**. If desired, auxiliary screws (not shown) similar to screws **65** may be inserted through the bores **63** in the crown **61** and disposed through the head **71** and into the pelvic bone **25**.

Referring to FIG. 7, in certain individuals it is desirable to provide auxiliary support for the fracture area by attaching a support flange, generally designated **85**, to the crown **61**. The flange **85** fits over the major trochanter **62** and includes an upper portion complementally shaped to fit the outer surface **83** of the flare of the pelvic bone above the acetabulum **27**. The lower portion of the support flange **85** includes at least one bore **91** which confronts one of the bores **63** to receive a screw **93** for disposition through the associated bore **63**. The screw **93** threads into the trochanter **62**. The upper portion of the support flange **85** includes a pair of bores which accept support screws **97** that are screwed into the pelvic bone to secure the support flange **85** thereto.

In use, the hip pin P of the present invention may be utilized for providing support to a femur having a transverse fracture **98** in the lower neck area as shown in FIG. 1. In such situations the hip pin P is similar in operation to existing hip pins, but offers the advantage that if the initial pinning operation fails, a compresson arthrodesis of the type shown in FIG. 4 may be performed without removing the hip pin P. That is, the plug **60** may be removed, a bore **52** drilled on through the femoral head **71** and pelvic bore **25**, and the compression device D inserted. The device D is screwed into the pin P until its inner extremity projects a sufficient distance behind the pelvic bone **25** to receive the fastener **23**. After the fastener **23** has been installed, the device D will be retracted outwardly in the passage **21** a distance sufficient to effect the desired compression of the femur F upon the pelvic bone **25**.

Installation of the compression device D without removal of the hip pin P is particularly advantageous in the case of elderly people where their physical condition will not permit prolonged operating periods. All presently existing hip pins must be removed from the femur F before a compression device can be installed and, as a consequence, once a pinning operation of the type shown in FIG. 1 fails the patient is frequently destined to confinement in a wheel chair for the remainder of his days because of his inability to withstand an operation entailing removal of the hip pin P and substitution of the compression device D.

When it is desirable to prevent rotation of the femoral head **51** relative to the acetabulum, as for instance when the pain effected by such rotation is intolerable, the fixation screws **65** (FIG. 5) are inserted through the bores **63**.

The screws **65** project inwardly through bores in the neck **15** and femur head **51** and on into the back wall of the acetabulum.

If either of the operative procedures shown in FIGS. 4 or 5 fail, it may become necessary to insert an artificial femoral head **71**. The artificial femoral head **71** is generally scored or serrated at **81** to induce purchasing in the acetabulum. Such an artificial head **71** can be attached to the hip pin P without removal of the hip pin P.

If the patient's hip joint is in such a state of deterioration that it will not support the patient, the support flange **85** shown in FIG. 7 can be installed to provide additional support for the patient.

From the foregoing it will be clear that the hip pin of the present invention can be utilized not only as a conventional hip pin would be utilized, but also to form a compression prosthesis or an arthrodesis if the initial hip pinning has failed. This is of particular importance in that it enables such operations to be performed on patients who would not be able to endure the lengthy procedures now required to remove a hip pin and substitute a compression device.

Various modifications and changes may be made with regard to the foregoing detailed description without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. Support apparatus to provide support for a fractured upper femur, said apparatus comprising:

a hip pin including a plate for projection along the subtrochanteric lateral surface of the femoral shaft and including mounting means for affixing said plate to said shaft, an elongated nail portion projecting from said plate for projection inwardly through a portion of the upper femur, said nail portion including a longitudinal through passage;

and a compression device extending through said passage, including means on its inner extremity for engagement upon the pelvis bone forming the acetabulum which receives the head of said femur, and including tightening means for urging said plate toward said pelvic bone to create a compression joint.

2. Support apparatus as set forth in claim **1** wherein said tightening means includes threads in said passage and complementary threads on said compression device.

3. Support apparatus as set forth in claim **1** wherein said compression device includes:

an elongated stud for projection inwardly through said passage and through the pelvis bone forming said acetabulum; and

fastening means on said stud for engagement upon said pelvic bone.

4. Support apparatus as set forth in claim **1** that includes:

an artificial femoral head for selectively being secured to the inner extremity of said nail portion.

References Cited

UNITED STATES PATENTS

2,077,804	4/1937	Morrison	128—83
2,441,765	5/1948	Hopkins	128—92
2,485,531	10/1949	Dzus et al.	128—92
2,631,584	3/1953	Purificato	128—92
2,699,774	1/1955	Livingston	128—92

FOREIGN PATENTS

86,969	4/1966	France.
1,046,827	12/1958	Germany.
868,185	5/1961	Great Britain.

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