

[54] ARTIFICIAL HIP-JOINT AND A METHOD FOR ITS INSTALLATION

1,215,737 12/1970 Great Britain 128/92 C

[76] Inventor: Yakov Isaevich Shersher, 1n Degtyarny pereulok, 3 kv. 42, Saratov, U.S.S.R.

Primary Examiner—Ronald L. Frinks
Attorney, Agent, or Firm—Holman & Stern

[22] Filed: Apr. 27, 1973

[21] Appl. No.: 355,298

[57] ABSTRACT

[30] Foreign Application Priority Data

May 4, 1972 U.S.S.R. 1776054
May 4, 1972 U.S.S.R. 1776055

[52] U.S. Cl. 3/1, 128/92 CA

[51] Int. Cl. A61f 1/24

[58] Field of Search 3/1; 128/92 C, 92 CA, 92 R

An artificial hip-joint in which there is provided an endoprosthesis of the acetabulum and an endoprosthesis of the proximal portion of the femur coupled therewith by a hinged joint. The endoprosthesis of the proximal portion of the femur is formed by a head passing into a neck, then into an intertrochanteric section and ending in a shaft inserted into the femoral medullary canal. The intertrochanteric section of the prosthesis is similar in shape to the inner canal of the femoral intertrochanteric region and is bounded in its proximal portion by two planes, with one roughly perpendicular to the intertrochanteric axis and the other roughly perpendicular to the femoral neck axis.

[56] References Cited

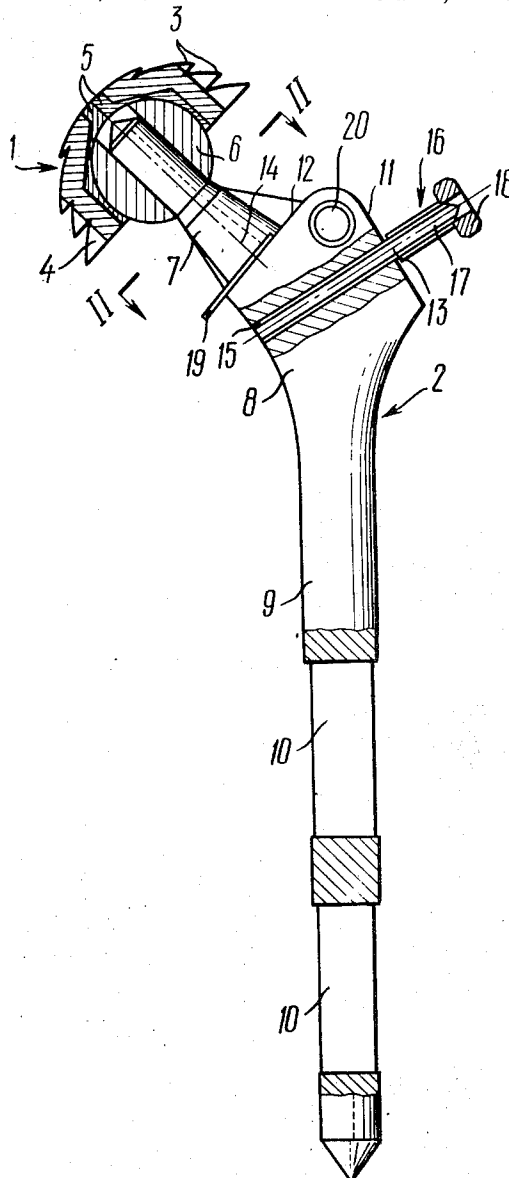
UNITED STATES PATENTS

3,064,645 11/1962 Ficat et al. 128/92 CA

FOREIGN PATENTS OR APPLICATIONS

1,912,630 10/1969 Germany 128/92 CA

5 Claims, 2 Drawing Figures



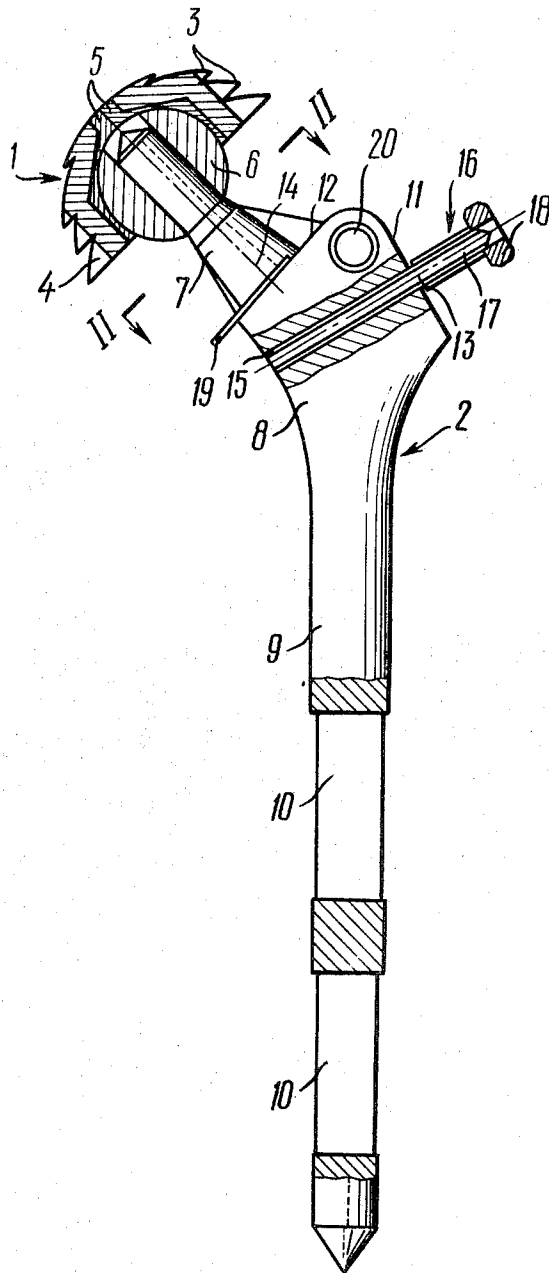


FIG. 1

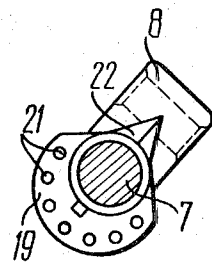


FIG. 2

ARTIFICIAL HIP-JOINT AND A METHOD FOR ITS INSTALLATION

BACKGROUND OF THE INVENTION

The present invention relates to artificial joints employed in intra-articular prosthetic replacement, and more particularly to an artificial hip-joint for arthroplasty. It is designed as a means of regaining mobility in the hip-joint after such mobility has been lost due to such diseases as ankylosing spondylitis, arthritis deformans, arthritis infectiosa and aseptic necrosis of the femoral head, as well as femoral neck fractures in the aged.

PRIOR ART

Known in the art are artificial hip-joints comprising an endoprosthesis of the acetabulum and an endoprosthesis of the proximal section of the femur coupled therewith by a hinged joint. The endoprosthesis of the proximal section of the femur is formed by a head and neck passing into an intertrochanteric section and then into an intraosteal fenestrated shaft and is provided with a bearing pad and a lock for the trochanter major.

The known artificial hip-joint is installed in the following manner:

The upper end of the femur is exposed by a lateral incision. The trochanter major is cut off and drawn up together with the muscles attached thereto. The femur is cut off at the level of the lower end of the trochanter minor. Then the femoral head together with the neck is removed and the femoral medullary canal and the depressions in the acetabulum are prepared for arthroplasty.

The shaft of the endoprosthesis is immersed in the femur. The endoprosthesis of the acetabulum is impacted in the prepared acetabulum. The trochanter major is impacted to the outer surface of the upper end of the femur. Finally the wound is tightly sutured in layers.

The prosthetic replacement employing the known artificial hip-joint provides for the removal of the intertrochanteric region with the result that the affected limb loses in length, and the bearing pad is disposed on the cortical layer of the transverse section in the upper third of the femoral diaphysis. The trochanter major is attached to the prosthesis on the outer surface of the femur, rather than at its normal site.

The fact that the intertrochanteric region where muscles are attached is removed and the trochanter major to which an important muscle is likewise attached changes its site of attachment, substantially disturbs the function of the affected limb. After surgery the patient acquires a swinging gate, for the artificial hip-joint is detached from the muscles, and the sole muscle normally attached to the trochanter major now adheres to the femur.

With the removal of the intertrochanteric region, a spacious cavity is formed around the long neck of the endoprosthesis, in which a large amount of blood is accumulated after the operation, thereby adding to the menace of postoperative suppuration.

The shortening of the limb as a result of the operation makes orthopaedic footwear unavoidable as a means of compensating the newly acquired leg length defect.

In case of a complication necessitating the removal of the endoprosthesis, the union of the hip and pelvis is very difficult to achieve.

Furthermore, with the bearing pad disposed on the transverse section of the upper third of the femur, the endoprosthesis is not totally secure from swivelling.

5 OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the present invention to provide an artificial hip-joint which does not require the intertrochanteric region of the femur to be removed.

It is another object of the invention to provide an artificial hip-joint which does not lead to the shortening of the affected limb.

It is yet another object of the invention to provide an artificial hip-joint which permits of fixing the trochanter major at its normal site.

15 It is still another object of the invention to provide an artificial hip-joint such that would be impacted to the femur without recourse to cementing agents.

One more object of the invention is to provide a method for the installation of the aforementioned artificial hip-joint.

20 These objects are accomplished by that in an artificial hip-joint, comprising an endoprosthesis of the acetabulum connected by a hinged joint with an endoprosthesis of the proximal portion of the femur formed by a head passing into a neck passing into an intertrochanteric section and ending in a shaft, of which the intertrochanteric section has a shape similar to that of the inner canal of the femoral intertrochanteric region and is bounded by two planes, with one roughly perpendicular to the intertrochanteric axis of the femur and the other roughly perpendicular to the axis of the femoral neck.

The bearing pad of such artificial hip-joint should serve as an extension of the plane roughly perpendicular to the axis of the femoral neck.

35 An orifice for the fixation of the lock of the trochanter major should be preferably provided in the plane roughly perpendicular to the intertrochanteric axis.

40 The objects of the invention are also attained by a method for the installation of said artificial hip-joint, which, in accordance with the invention, comprises exposing and cutting off the trochanter major, cutting off the femoral neck at the base thereof at right angles to the axis thereof and removing said neck together with the femoral head, reaming the medullary canal of the femur to a specified size; milling the acetabulum to the specified size, inserting part of the endoprosthesis of the proximal portion of the femur comprising the shaft and the intertrochanteric section into the prepared medullary canal along the axis thereof, inserting part of the endoprosthesis of the acetabulum into the prepared depression of the acetabulum, and finally impacting the trochanter major to the intertrochanteric section of the endoprosthesis of the proximal portion of the femur.

55 The artificial hip-joint of this invention does not call for the removal of the intertrochanteric region to be installed. The trochanter major is immobilized at its normal site; the function of the affected limb is not disturbed, what with all the muscles attached at their normal points; the cavity in which blood can accumulate is substantially reduced; the limb does not lose in length and the need to wear orthopaedic shoes is obviated.

The endoprosthesis is secure against swivelling in the hip; in case of failure, arthrodesis is feasible, as well as any other subsequent plastic surgery.

Apart from all the above advantages, the present artificial hip-joint provides for the impaction of the endo-

prosthesis to the femur and pelvis without recourse to cementing agents.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, wherein:

FIG. 1 is a view partly in elevation and partly in cross-section of an artificial hip-joint in accordance with the invention;

FIG. 2 is a sectional view taken along line II—II of FIG. 1, the view looking in the direction of the arrows.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows an artificial hip-joint, comprising an endoprosthesis 1 of the acetabulum connected by a hinge with an endoprosthesis 2 of the proximal portion of the femur. The endoprosthesis 1 of the acetabulum is formed as a seat, of which the exterior surface is defined by tiered blades 3 with sharp edges and orifices 4 formed therein for the advancement of burgeoning bony tissue therethrough. The interior surface of the endoprosthesis 1 of the acetabulum has an irregular through hole to receive two split bushings 5 enveloping more than half of a head 6 of the endoprosthesis 2 of the proximal portion of the femur, thereby forming a hinged joint for the endoprostheses 1 and 2. Apart from the head 6, the endoprosthesis 2 of the proximal portion of the femur comprises a neck 7 on which the head 6 is securely fitted.

The neck 7 directly passes into an intertrochanteric section 8 which in turn passes into a conical shaft 9 with fenestras 10 through which burgeoning bony tissue can advance, with the shaft 9 having a shape similar to that of the femoral medullary canal (not shown).

The intertrochanteric section 8 is similar in shape to the inner canal of the femoral intertrochanteric region and is bounded in its proximal part by two planes 11 and 12, with the plane 11 perpendicular (or roughly perpendicular) to an intertrochanteric axis 13 and the plane 12 perpendicular (or roughly perpendicular) to an axis 14 of the neck 7. There is an orifice 15 in the plane 11, and in which orifice a lock 16 for the trochanter major is fixed, with the lock 16 comprising a screw 17 provided with a locking nut 18. The endoprosthesis 2 of the proximal portion of the femur also has a bearing pad 19 which is an extension of the plane 12. There is an orifice 20 provided in the proximal part of the intertrochanteric section 8 for the convenience of the surgeon during the operation, for example if the endoprosthesis 2 is to be removed.

FIG. 2 which is a section of FIG. 1 taken in the plane II—II shows the bearing pad 19 in plan comprising openings or orifices 21 provided to help regeneration processes. At the base of the neck 7 lugs 22 are provided to strengthen the endoprosthesis 2 at the point of passage of the neck 7 into the intertrochanteric section 8.

The artificial hip-joint is made of titanium, while the hinged joint, the head 6 (FIG. 1) and the bushing 5, of an alloy comprising cobalt, chromium and molybdenum.

The proposed artificial hip-joint may be manufactured by several methods, for example precision casting, pressing or machining.

The method of installing the proposed artificial hip-joint is as follows:

With the patient lying on his side or back, the trochanter major is exposed by a lateral incision, cut off

at the base thereof at right angles to the intertrochanteric axis and together with the muscles attached thereto drawn up, thereby exposing the joint. Then the femoral neck is sawed off at the base at right angles to the axis thereof and the head and neck of the patient's femur are removed. Thereafter the medullary canal of the femur is reamed to a required size and shape conforming to the size and shape of the proximal part of the endoprosthesis 2 (FIG. 1), and the patient's acetabulum is prepared by milling. The shaft 9 of the endoprosthesis 2 is inserted into the medullary canal of the femur strictly along the axis thereof until the endoprosthesis 2 has been firmly immobilized in the prepared inner femoral canal, with the bearing pad 19 abutted against the femoral plane formed after the neck has been sawn off. With the intertrochanteric section 8 of the endoprosthesis 2 and the inner canal of the patient's femoral intertrochanteric region having similar configurations, the endoprosthesis 2 is secure against turning about the longitudinal axis thereof.

This completed, the endoprosthesis 1 of the acetabulum is installed with the help of special guides, and the diameter of the endoprosthesis 1 is slightly larger than the prepared depression in the acetabulum.

The trochanter major together with the muscles attached thereto is installed on the plane 11 and immobilized thereon with the lock 16 of the trochanter major. The wound is rinsed with a solution of antibiotics and tightly sutured in layers.

What is claimed is:

1. An artificial hip-joint, comprising, in combination:

a. an endoprosthesis of the acetabulum formed as a seat;

b. an endoprosthesis of the proximal portion of femur hinged to the endoprosthesis of the acetabulum, and including:

i. a head engageable with the seat;

ii. a neck rigidly connected to said head and having a straight axis; and

iii. an intertrochanteric section provided as an extension corresponding to the like axis of a femur of the neck and defining an intertrochanteric axis, the section being similar in shape to an inner canal of a femoral intertrochanteric region and bounded in a proximal part thereof by two planes, a first of the planes arranged substantially perpendicularly to the intertrochanteric axis, and a second of the planes being substantially perpendicular to the axis of the neck.

2. An artificial hip-joint as set forth in claim 1, wherein an orifice is provided in and arranged perpendicular to the first of the planes, and locking means is arranged entering the orifice for attaching to the intertrochanteric section the trochanter major of a femur, and the endoprosthesis of the acetabulum being provided with a plurality of protruding blades on an exterior surface thereto, the blades arranged for attachment to the bone tissue of a patient's acetabulum.

3. An artificial hip-joint as set forth in claim 2, wherein a rod is provided as the intertrochanteric section, the rod being a direct extension of the intertrochanteric section and arranged for insertion into the medullary canal of a patient's femur, and a bearing pad in the form of an extension of the second of the planes, the pad provided with a plurality of openings arranged for helping regeneration processes and lugs arranged for strengthening the endoprosthesis at the point of

5

6

passage of the neck into the intertrochanteric section.

4. An artificial hip-joint as set forth in claim 1 wherein a rod is provided as the intertrochanteric section, the rod being a direct extension of the intertrochanteric section and arranged for insertion into the medullary canal of a patient's femur, and a bearing pad in the form of an extension of the second of the planes, the pad provided with a plurality of openings arranged for helping regeneration processes and lugs arranged for strengthening the endoprosthesis at the point of passage of the neck into the intertrochanteric section.

5. A method for installing an artificial hip-joint, comprising the steps of:

- a. exposing and cutting out the trochanter major of a patient at the base thereof along a plane substantially perpendicular to the intertrochanteric axis of the femur;
- b. drawing upwardly the trochanter major and exposing the joint;
- c. dislocating the head of the joint and cutting out

same along a plane at the base roughly perpendicular to the axis of the neck;

- d. preparing the patient's acetabulum for a required size of the endoprosthesis of the acetabulum to be installed;
- e. reaming the medullary canal to the size and shape conforming to the size and shapes of a proximal part of an endoprosthesis to be installed;
- f. inserting an intertrochanteric section of the endoprosthesis into the femur, and arranging a first plane of the section parallel to the cutting plane of the head and a second plane of the section parallel to the cutting plane of the trochanter major;
- g. installing an endoprosthesis of the acetabulum into the cavity prepared in step (d);
- h. affixing the trochanter cut out in step (a) in the proper position thereof by locking the trochanter to the intertrochanteric section; and
- i. suturing the wound.

* * * * *

25

30

35

40

45

50

55

60

65