

Total hip arthroplasty using TRI-LOCK® DePuy bone preservation femoral stem: our experience

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Abstract. *Purpose:* in this study we report our 3-years experience (from January 2010 to December 2013) of 101 total hip arthroplasties using Tri-Lock® DePuy bone preservation femoral stem, all performed in our clinic. *Methods:* 101 patients (F54-M47; median age around 69 yrs, range 42-84 yrs). 51 arthroplasties were implanted on the right side whereas 50 on the left side. The average follow-up was 27,3 months. All the arthroplasties were coupled with Pinnacle® polyethylene acetabular cup system; 98 prostheses were implanted cementless whereas cement was used in 3 cases. *Results:* the Tri-Lock® femoral stem allows both soft tissues and bone stock preservation, leading to greater trochanter maintenance, less spongy bone removal and distal cavity bone tissue conservation. In our experience, we were able to implant the Tri-Lock® femoral stem even in osteoporotic and overweight patients using Gription® porous coating. This allowed for commencing an intensive rehabilitation program with stable load from the following day, without observing any early complications or loosening. *Conclusions:* according to us, this device is solid and safe, providing remarkable sparing of both soft tissues and bone stock. (www.actabiomedica.it)

Key words: hip, total arthroplasty, Tri-Lock femoral stem, bone preservation

Introduction

In recent years, there has been an increase in commitment in prosthetic surgery towards the preservation of peri-articular soft tissue and bone stock (1-4).

Since 1981, the Tri-Lock® DePuy stem was the first cuneiform femoral stem with a proximally coated tapered-wedge (Fig. 1).

This stem allows for preservation of soft tissue due to its reduced lateral shoulder and blunted distal part. The above mentioned technical properties permit for easy stem insertion and a minimally invasive and less traumatic approach.

Moreover, due to reduced space occupation of the lateral shoulder, conservation of bone stock is enabled whilst maintaining the greater trochanter.

Relative to the A/P axis, its modest dimension allows for less spongy bone extraction, while the reduced

length of the prosthesis preserves the amount of bone tissue in the distal femoral canal. The angle of resection of the femoral neck at 50° permits maintenance of the neck, resulting in better proximal support (5).

With regards to stability, this implant provides a good axial fixation within the femoral canal (Fig. 2) due to the contact achieved by the lateral and medial cortex, allowed for by the Tri-Lock® DePuy geometry which reflects the anatomy of the femoral canal. On the other hand rotational stability is granted by the stem's reduced dimensions on the A/P plane.

The broad range of Tri-Lock® stems with increasing size intervals on the frontal plane, offers the choice for the best fit inside the widest part of the femoral canal, ie. the medio-lateral portion (5).

The axial and rotational stability obtained, permit the achievement of an optimal primary stability, which is moreover acquired together with the GRIPTION®



Figure 1. Bone preservation stem Tri-Lock® DePuy



Figure 2. Femoral canal

porous coating. This highly porous coating, which covers up to 63% of the stem surface, facilitates oxygenation and revascularization of bone tissue providing an increased surface area for osteoblast cells to adhere and proliferate, in this way enhancing the possibility of attaining long-term osteointegration (6-7).

Materials and methods

In this observational study, conducted at our Clinic “Prof. Nobili” of Castiglione dei Pepoli (Bologna) during the period starting January 2010 until December 2013, 101 patients were included, 54 females and 47 males, with an average age of 63 years (range: 42-84 yrs).

51 prosthesis were implanted on the right hip, while 50 were implanted on the left.

Average follow-up was 27,3 months.

Preoperative diagnosis in all cases was coxarthrosis.

In all hip arthroplasties comprised within the study, bone preservation femoral stem Tri-Lock® DePuy was used, coupled together with Pinnacle® DePuy acetabular cup system; the tribological coupling was always metal/polyethylene.

Of the 101 arthroprostheses, 98 were implanted cementless whereas cement was used in 3 cases.

Regarding the surgical method, the direct lateral approach was used, except in two cases where anterior approach was used.

All patients were operated under spinal anaesthesia and had undergone appropriate antithrombotic prophylaxis with low molecular weight heparin.

During the operative procedure as well as the follow-up period, possible intra and post operative complications were considered.

The correct positioning of the acetabular cup system and the alignment of the femoral stem were evaluated using antero-posterior radiographic imaging, routinely used in our clinic.

Results

Of the 101 patients in the study, 99 were allowed to stand freely within the first post-operative day.

All patients had intra-operative and post-operative blood loss of approximately 200cc and 300cc respectively. During the post-operative course all patients received antibiotic and antiaggregant therapy together with an intravenous analgic pump.

On the second post-operative day, 99 patients had started walking using an orthopaedic walker and had

undergone rehabilitation cycles based on active and passive assisted mobilization, isometric and isotonic strengthening of the gluteal, quadriceps and femoral biceps muscles of the operated extremity, as well as gait re-education.

Intra-operative complications were two infractions resolved by cerclage with metal hoops and implant cementation (in these two cases the rehabilitation protocol was delayed by 15 days); post-operative complications were two separate cases of surgical wound dehiscence.

90 patients were discharged between 9th and 14th post-operative day, ie. from the moment they had attained full autonomy and mobility with a single crutch.

The remaining patients were discharged between 20th and 45th post-operative day, also with complete autonomy of mobility.

The follow-up protocol carried out in our clinic, requires that patients should have a clinical check-up on 45th, 90th and 180th post-operative day, with radiographic control at one year and thereafter every 12 months.

At the second ambulatory control, all patients in our study were able to walk without aid, irrespective of age and weight.

All patients returned to normal daily and work activity that they had before surgery, while 12 patients reacquired leisurely sporting activities.

Finally, we had one single aseptic mobilization of the Tri-Lock[®] stem three years after the surgery, in a patient who continued with heavy physical work during post-operative period. In this case, we reimplanted a new primary femoral stem.

Discussion

Evaluating the obtained results from our study, we noticed a significant stability of the Tri-Lock[®] femoral stem, examined during the radiological and clinical follow-up, of a comparable if not superior extent than that in current literature (8-10).

The use of a short stem such as the Tri-Lock[®], which we indeed use in our clinic in approximately 70% of cases over traditional stems, has allowed for greater conservation of the proximal femoral struc-

tures, providing higher resistance to torsional forces and a better endurance to valgus-varus stress (11-14).

The blunt and tapered shape of the stem which we used, permitted a minimally invasive surgical approach and allowed for an easier introduction of the prosthesis into the femoral canal, resulting in an optimal fit of the stem and calcar.

Moreover, the shortened length of the prosthesis together with the reduced space occupation of the lateral shoulder enabled conservation of the great trochanter, in this way preserving the hip abductor muscle integrity.

The above mentioned provided for limited blood loss, reduction of time for patients regaining autonomy (also due to prompt rehabilitation) and minimal occurrence of thigh pain during post-operative period.

Conclusions

From results obtained in our study, the Tri-Lock[®] DePuy femoral stem implanted in a group of patients



Figure 3. Left total hip arthroplasty. Positioning of bone preservation short stem



Figure 4. Left total hip arthroplasty. Post-intervention radiographic imaging



Figure 5. Left total hip arthroplasty. Positioning of bone preservation short stem

heterogeneous for age, gender and weight, has demonstrated considerable primary stability and good osteointegration.

This resulted in a rapid functional recovery along with a lower onset of post-surgical complications, specifically pertaining to prosthesis mobilization.

Additionally, optimal conservation of bone stock and soft tissue is considered a positive aspect for potential future revision, which is frequently possible to obtain with a primary stem.

For these reasons, we more readily consider the possibility of using this implant in our clinic (Fig. 3-5).

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