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Research

Total Hip Arthroplasty in 40 years Old Patients or Younger in Comparison with the Old Ones

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Abstract

Background: The results of total hip arthroplasty in young adults indicate a high complication rate and questionable durability. We set up this study to evaluate our experience in the mentioned topic

Methods:. In a retrospective study, we evaluate 239 hips which have been undergone THA since 1983 in our hospital. We invite them for current set of clinical and radiological evaluation. Ninety Six of them responded and came for follow up. Then the Harris hip score and status of implant were compared.

Results: The mean age at the time of follow-up was 33.1±7.6 in younger group and 67±13.6 in older group. The mean Harris score, survival of cup and survival of stem was 79.8±14.6, 4±2.6 and 4.26±3 in young patients and 77.5±16.2, 5.2±3.7 ad 5.3±3.6 in older patients respectively (P<0.55, P<0.06, and P<0.10 respectively).

Multivariable analysis shows significant effect of age and duration of follow up (P<0.039) on overall implant loosening which indicate the confounder role of follow up period. We match the following up period between the groups. Analysis of cemented THA shows: mean Harris score of 88±4 in younger and 8.12±11.7 in older group (P<0.27), 0% cup loosening of younger and 9.5% of older group (P<0.52) and 25% stem loosening of younger and 9.5% of the older group (P<0.38). Analysis of cementless THA shows: mean Harris score of 76.5±15.9 in younger and 80.2±14.5 in older group (P<0.05, r-0.295) and 0% stem loosening of younger and 4% of older group (P<0.46).

Conclusion: The major draw back of our study was lower cementless cup survival in younger patients. Anyways, the new implant design and technique seems to improve durability of implant in young adult but not enough to reject the concept of poor survival of THA in younger patients.

Key words: Arthroplasty; replacement; hip; young age

Introduction

Total hip arthroplasty remain an area of controversy for orthopaedic surgeon in case of young patient with end stage hip disease[1-10] There are several studies with several theory in using cemented[2,7,10], cementless[3,11,12], and hybrid[4] total hip arthroplasty for young patients who expected to live more than 30 years.

The purpose of current study is to determine mid term result of cemented and cementless THA in 40 years old or younger patients in comparison to the older ones in our institute.

Patients and Methods

We set up a retrospective study on THAs which was performed between 1983 till 2003 in our institute. We called the 210 consecutive patients (239 hips) and invite them for current set of follow up. Twenty six patients have been passed away and 71 unable or unwilling to obtain current set of roentgenograms. Also 17 whose telephone contact or addresses have been changed were out of reach. In 97 patients who passed away or unable to obtain current follow-up telephone interview was performed to reveal (we asked the patient in 71 cases or their relative in 26 who passed away) the rate of revision and, second-time revision or griddle stone in the previously revised ones. Fortunately their entire relative was completely aware of the history of the passed ones.

All the remainder (96) came for visit and had a minimum follow-up time of one year with a maximum follow-up of 19 years.

We performed 12 cemented THA and 28 cementless THA on patients 40 years old or younger. In addition, we performed 87 cemented THAs and 83 cementless THAs in patients older than 48 years.

The mean age of the 40 years old or younger patient at the time of surgery was 28.7±6.6 years (26.2±7.6 years in cemented group and 29.7±5.9 years in cementless group). The mean age of the older ones was 6.19±11.4 years at the time of surgery (65.5±10.5 years in cemented hips and 58.1±11.1 years in cementless hips, $P<0.0005$). The initial etiology of the younger group was post traumatic DJD in 8 patients (8 hips, 20%), CDH in 7 patients (8 hips, 17.5%), rheumatoid arthritis in 6 patients (7 hips, 15%), ankylosing spondylitis in 4 patients (7 hips, 10%), primary osteoarthritis in 3 patients (4 hips, 7.5%), myositis ossificant due to thermal injury, chondrolysis, tuberculosis, and malignancy in 2 patients each (2 hips each, 5% each), and Perhtesis, poliomyelitis, post infection, and during induce O.A. in one patient each (one hip each, 2.5% each).

The initial etiology of the older ones was post traumatic DJD in 69 patients (40.6%), primary osteoarthritis in 67 patients (39.4%), CDH in 19 patients (11.2%), drug induced O,A and rheumatoid arthritis in three patient (1.8% each), ankylosing spondylitis, post infection O.A, and unknown in 2 patients (1.2% each) and protrusion due to osteomalacia, perhtesis, and malignancy in one patients (0.6% each).

The surgical approach wasn't unique among cases. We used MOORE approach in 73% lateral approach in 20.5% and antero lateral approach in 6.5% of cases.

The surgical technique which is used for cemented hand-packing THA, gun cementation and intramedullary pluck, and cementless THA was the same among the surgeons.

Trochanteric osteotomy wasn't used in primary THA at all.

For acetabular component loosening, we used three zone divisions as described by Delee and Charnley[13]. For femoral component loosening, we used seven-zone divisions as described by Gruen et al[14]. Using the criteria of Harris et al.[15], three category of loosening were applied to assess radiological stability of the femoral component (definitely loose, probable loose and possibly loose).

We used a variety of implant design in our 20 years hip arthroplasty. 47.9 percent of our surgeries (133 hips) was cemented. Till 1997 we used the older acetabular and femoral design like Charnley (stainless steel, tapered stem) or Müller hip prosthesis, with polyethylene cup and mono block system for our cemented THA. The acetabular design were used in recent years was ZCA all-poly acetabular cup (Zimmer) with CPT hip system and standard or long stem (primary or revision THA) (Zimmer) for nearly most of the cemented THA except two cases whom was underwent surgery in 1996 and their implant record is missed.

We have started cementless techniques since 1990 and have performed 130 cementless hips. The c-fit, cobalt chromic, porous coated, metal back acetabular design (Corin) with c-fit

cobalt chromic, proximal coated straight stem (Corin) was used in 47 percent of cementless THA. In another 30.3 percent of cementless THA, the trilogy acetabular system which is shelled with claster holes and porous (Zimmer) with versys hip system which is a fiber metal mid-coated stem (Zimmer) was used. In 22.7 percent remain; RM cup which is coated with titanium (Mathys) and CBC stem which was coated with HAC (Mathys) were used.

Using the Kaplan-meier[16] survivorship analysis, we calculated the survival of acetabular and femoral component in 40 years old or younger patients in comparison with the older ones, using revision/radiographic loosening as the end point.

We also analyze the effect of limiting pateint's activities during convalescence period, wise, unwise, and no activities, elevated toilet seat, and our traditional eating position on the survival of the implant and their mean Harris score.

The Chi-square test was used to asses the significant difference in nominal data and independent T-test was used to numeric data. For eliminating the confounder data we used multivariable analysis.

Results

From 40 years old or younger patients, two patients unwilling to come for follow up, one passed away due to car accident, 18 were interviewed by telephone contact, and 19 came for follow-up visit. Therefore 37 patients were followed as of revision or prosthesis failure and 19 as of Harris score, the four questions about their life style and radiographic sign of loosening[13,15].

The mean age of the 40 years old patients or younger at the time of current set of follow up was 33.1±7.6 years (30.6±8.6 years in cemented group and 34.1±7 in cementless group). From older than 40 years old patients, 15 lost to follow up, 25 expired (relative interview), 78 were interviewed by telephone contact and 77 came for follow up. The mean age of the older than 40 years patients at the time of follow was 67±13.6 years (70.6±13.6 in cemented THAs and 63.7±12.7 in cementless THAs, P<0.001).

The mean follow up time of the younger group in cemented THAs was 4.5±2 years and in cementless THAs was 4.2±3.4 years (P<0.74).

The mean follow up of the older group in cemented THAs was 5.9±4 years and 5.6±4 in cementless THAs (P,0.68).

The mean follow up was significantly longer in older group (P<0.08 in cemented group and P<0.07 in cementless group). Multivariable analysis shows significant effect of age and duration of follow up (P<0.039) on overall implant loosening which indicate the confounder role of follow up period. We set the analysis again and matched the follow up period between the groups. While we started THA in young adult since 1996 (except one which was performed in 1985) we ignored the older patients whose surgeries have been performed before 1996 to eliminate the confounder role of follow up period in our results. Therefore 74 patients whose ages were above 40 years and their initial surgery have been performed before 1996 were excluded.

The prevalence of cemented acetabular component revision for any reason as the end point in 40 years old patients or younger was 0% versus 5.6% in more than 40 years old patients (P<0.42). The prevalence of cementless acetabular component revision for any reason as the end point in 40 years old patients or younger was 7.4% versus 6.1% in more than 40 years old patients (P<0.82).

The prevalence of cemented femoral component revision for any reason as the end point in 40 years old patients or younger was 0% versus 9.4% in more than 40 years old patients (P<0.29). The prevalence of cementless femoral component revision for any reason as the end point in 40 years old patients or younger was 0% versus 4.6% in more than 40 years old patients (P<0.25).

Using radiographic loosening (definitely and probably) and revision for aseptic loosening as the end point; the prevalence of cemented aseptic acetabular component loosening in 40

years old patients or younger was 0% versus 9.5% in above 40 years old patients (P<0.52); the prevalence of cementless aspectic acetabular component loosening in 40 years old patients or younger was 23.8% versus 4% in above 40 years old patients (P<0.06); the prevalence of cemented aseptic femoral component loosening in 40 years old patients or younger was 25% versus 9.5% in above 40 years old patients (P<9.38) and the prevalence of cementless aseptic femoral component loosening in 40 years old patients or younger was 0% versus 4% in above 40 years old patients (P<0.46).

The mean Harris score of cemented THAs was 88+4 in 40 years old patients or younger and 81.2±11.7 in patients who was older than 40 (P<0.27). The mean Harris score of cementless THAs was 76.5±15.9 in 40 years old patients or younger and 80.2±14.5 in patients who was older than 40 years (P<0.47).

Limited return to work (limiting bending, manual labor, weight lifting) (P<0.43), wise or unwise exercise (P<0.67), elevated toilet seat or our traditional toilet style (squatting position) (P<0.23), and using ordinary chair or seat on earth in eating time (our traditional eating position) (P<0.59) fail to show any effect on survival of acetabular component neither in cemented THAs nor in cementless THAs.

In cemented THAs, the patient who didn't limit their return to work had higher rate of stem loosening (0% VS 100%, P<0.04) but the limited number of cases in that group make it difficult to accept the reported percent. In area of cementless THAs none of the femoral component was loosed.

We found that patients who used elevated toilet seat had better femoral component survival in comparison with the ones use Iranian traditional toilet style (3.9% versus 18.2% loosening respectively, P<0.08). In addition, seating in ordinary chair for eating and wise athletic activities would lead to better femoral component survival in comparison with seating on earth for eating (our traditional eating position), and no athletic activities (2.8% versus 11.1% loosening, P<0.19 and 0% versus 11.1% loosening, P<0.08 respectively).

We divided our homogenous sample (older THAs were exclude) into three groups. Group 1 consists of the 40 years old or younger patients. Group 2 consists of 40-60 years old patients, and group 3 consists of patients who were older than 60 years old. The distribution of acetabular and femoral component survival is illustrated in table 1-4 for these three groups.

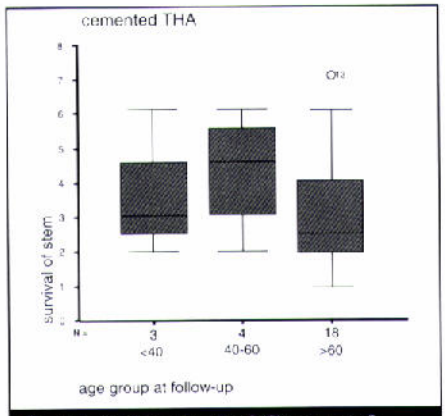

Figure-1: Survival of Cemented Femoral Component in three Groups

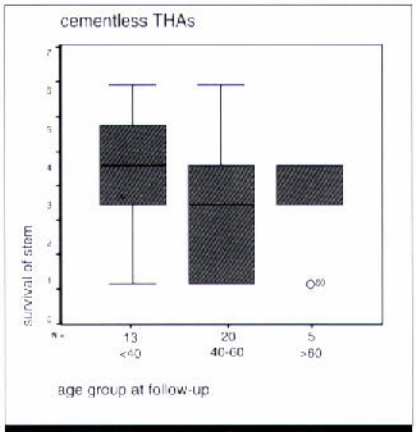

Figure-2: Survival of Cementless Femoral Component in three Groups

Survivorship analysis

Kaplan-Meier analysis-using radiographic loosening or revision as of loosening as the end point-shows the mid term result of cemented cup is superior to cementless ones (figure-5).

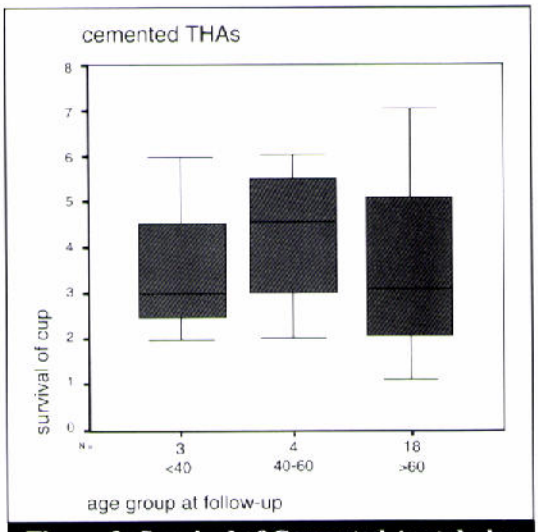

Figure-3: Survival of Cemented Acetabular Component in three Groups

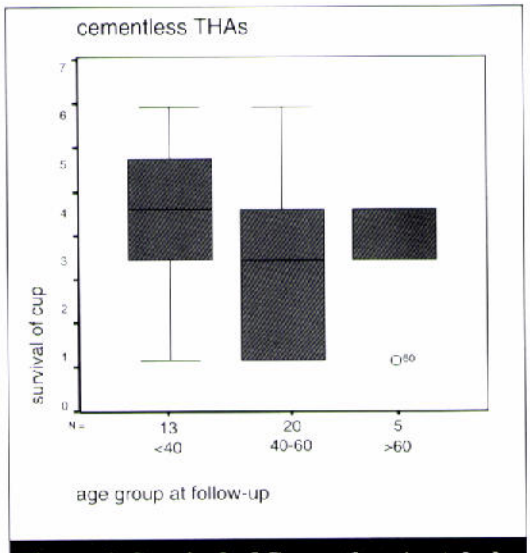

Figure-4: Survival of Cementless Acetabular Component in three Groups

Because there was only one aseptic loosening in cemented stem (no cementless stem loosening) we couldn't performed Kaplan-Meier analysis. However, the overall result of mid-term survival seems to be excellent.

Post operation complication

The rate of dislocation wasn't significantly different between the groups. The details of this finding is illustrated in table-1. Other complications like pulmonary emboli (3 patients), deep vein thrombosis (2 patients), osteolysis, heterotrophic ossification, myositis ossificant (one patients each) occurred only in patients older than 40 years of age.

Table-1: The Rate of Dislocation in Cemented or Cementless – THAs in Both Groups

THAs	Age	Dislocation	P-Value
Cemented	≤40 years	0%	<0.22
Cemented	<40 years	23.6%	<0.22
Cementless	≤40 years	7.6%	<0.09
Cementless	<40 years	0%	<0.09

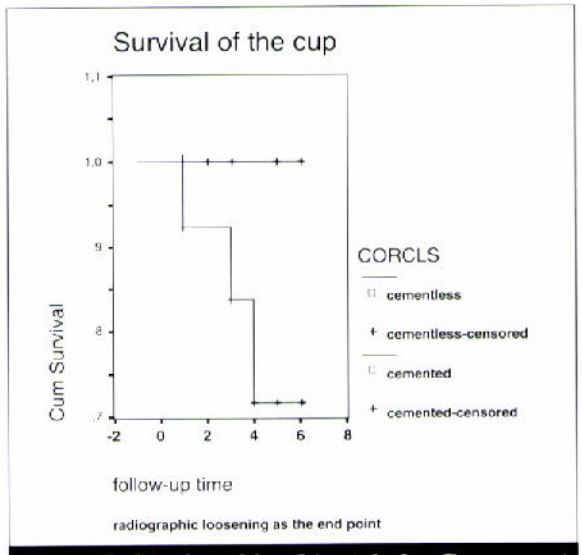

Figure-5: Survivorship of Acetabular Component in 40 years Old or Younger

The scope of current study was to determine the result of THA in 40 years old or younger patients in comparison with the older ones. Except one study[2], nearly all of the other studies in that field with some confounder data just like the situation we faced with. Some of them included hips which prior surgery failed[10,17] in the same time many of them was multi surgeon[17,19] and as the end point most of them had used variety of implant design[5,7,18,20,21].

However, in the present study there is much strength too. All of the THAs have been performed by the same surgeons by using same technique and device on the consecutive younger and older groups of patients. Furthermore in only 10 percent of them (50% of post traumatic DJD) prior surgeries have been down.

As we mentioned in results, we have started performing THAs in 40 years old or younger group since 1994 and there was only one patient in this age range whose surgery has been performed in 1985. In order to homogenise the data we exclude the recently mentioned THAs from the younger group as same as the THAs which have been performed before 1994 in patient older than 40 years old. Thus all of the analyses have been done in unique groups of patients with the same follow up duration.

The initial etiology of THAs in the groups wasn't totally different. Nearly half the both group consist of CDH and post traumatic DJD. Moreover none of the CDH, RA, or SA hips were loosed either using revision or radiographic loosening as the end point.

Nearly all of the cup loosening has been occurred in cementless post traumatic DJD hips that half of them prior hip surgery.

In the previously reported series[9,22,23] most of the cup loosening was interpreted to be related to some etiology like CDH or RA; but in our study, using revision as the end point (38 patients) all of the two cup loosening occurred in cementless THAs with initial etiology of post traumatic AVN or DJD. The same data reported by Rubinstein et al[24]. They reported the survivorship of their THAs was 89% at five years and 49% at ten years. Also they mentioned that nearly all of their revision was related to aseptic loosening of cemented prosthesis. We think it is time to tell so about cementless THAs too.

On the other hand, even using revision (38 patients) or radiographic loosening and revision (19 patients) as the end point, stem loosening in that period of follow up only took place in one cemented post traumatic DJD hip which revealed by radiograph evaluation (probably loosening).

Better survival of stem in younger age is described by several authors[2,5,7,20,21,25,28]. Most of them reported revision rate of less than 9% except one[7] who reported the rate of loosening more than 9%. In the cementless group of THAs in younger group the survival of stem during the follow up period was excellent and comparable to the reported data.

Although in the area of cemented THAs and the same age the rate of loosening was high (25%) and seems not acceptable; the limited number of patients in the recently called group make it impossible to interpret the rate of loosening clearly.

As we assumed the high rate of dislocation was related to traumatic dislocation or poor muscle and soft tissue condition of the older patients. Since some of our patients refuse to accept the surgery on time and we face with unnecessary delay which would lead to muscle weakness[25].

Conclusion

To draw conclusion, we should notify that use of cementless stem in 40 years old or younger patients seems to have better result in that short period of time. Also as many authors described the high rate of cup loosening especially in cementless metal on polyethylene hip arthroplasty of this exclusively young group of patients is stell a dilemma. Due to the fact of its dramatic high rate of loosening, it shouldn't be used for patients younger than 40 years of age in future.

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