The Practicality of Using Cemented Polyethylene Liner in Cementless Metal Cup during Revision Total Hip Arthroplasty
(A Mid-Term Follow-up Study)

Abstract
Introduction: In some special situations during the revision total hip arthroplasty with well fixed, well oriented acetabular cementless cup, orthopedic surgeons may prefer to retain the well-fixed cementless cup. The aim of this study was to report the follow-up of some cases treated with such a technique during a 10-year period.
Methods: During 2004-2014, all cases of revision total hip surgery performed in Sina Hospital, Tehran, Iran were evaluated. 14 of 82 cases (16.5%) had cemented polyethylene liner in cementless metal shell. The demographic data, reasons for use of such revision technique result was evaluated by Harris Hip Score.
Results: The most common reason was osteolysis (64%), and the most common cause was impaired locking mechanism (65%). There were few complications (one osteolysis and one infection). In five cases (36%) constrained liner was added and in 10 cases (72%) allograft was needed. The final Harris Hip Scores was good or excellent in 78%. Only one dislocation was seen.
Conclusion: Cemented cup in cementless shell can be used in revision hip arthroplasty in well-fixed Acetabular shell situations with acceptable outcome.
Keywords: Total Hip Replacement, Revision Surgery, Osteolysis Bone Cements

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Introduction
It is believed that cemented total hip arthroplasty has its own indications with advantages, and disadvantages\(^{(1-5)}\). On the other hand, cementless total hip arthroplasty has also specific indications, advantages, and disadvantages\(^{(6-10)}\). In some occasions orthopedic surgeons may use hybrid type of total hip arthroplasty,\(^{(11-13)}\) (cemented cup with cementless stem or cementless cup with cemented stem) because of different opinions about the longitivity of either techniques. In some other situations, a surgeons may be forced to use unusual combinations of liners and metal shells. Such as revision total hip surgery, to retain a well fixed cementless cup with locking mechanism that cannot be reused\(^{(14,15)}\). Then a cemented liner can be used in the metal shell.\(^{16}\) Another situation is using cemented constrained liner in the metal shell for recurrent dislocation of total hip arthroplasy,\(^{(17,18)}\) when the proper size of constrained liner for a well fixed cementless cup is not available. To the best of our knowledge there are few reports about the survival of using such combined technique in the literature. So the aim of this study was to report the follow-up of cases treated with such a technique in our center in a 10-year period.
Methods

All cases of revision total hip surgery performed in Sina Hospital, Tehran, Iran were evaluated. The cases that received cemented polyethylene in metal shell were called for the study. In all the cases, highly cross linked polyethylene from Zimmer Company was used. The data regarding cause for revision, and also additional use of grafting or constrained liner were documented. The results were evaluated by Harris Hip Score.

Results

14 out of the 82 cases (16.5%) of revision total hip arthroplasties had cemented polyethylene liner in the cementless metal shell. In all the cases, highly cross linked polyethylene from the Zimmer Company (Zimmer, Warsaw, Indiana) were used. In five cases "constrained" liners and in the remaining 9 cases conventional liners was used. The average follow-up was 6.2 years (range: 1-10 years). Tables 1 and 2 show the details of the cases. 4 females and 10 males with an average age of 57.3 years (45-72 years) made up. The study group the most common reason for revision was osteolysis in 9 (64%), while recurrent dislocation was the reason in the remaining (36%).

The common cause for failure was impaired Shell-Liner locking mechanism in 9, followed by need and liner size mismatch in 5 cases. In five cases (36%) constrained liner was used. In the other nine cases, conventional highly cross linked polyethylene was used. In ten cases (72%) allografts were needed. The final Harris Hip Scores were mostly good or excellent (78%), one case had poor score (Harris Score= 65) because of dislocation and two cases had Harris Scores 78 and 79, which is fair, mainly because of leg length discrepancy. There were 3 post revision complications: one osteolysis, one infection, and one dislocation. The dislocation happened 3 weeks post surgery after fall in bathroom. There were few complications (one osteolysis, one infection, and one dislocation). The happened after 3 weeks following falling down in the bathroom that was managed by closed reduction.

Discussion

Although the combined technique we used in our study (cemented polyethylene liner in the cementless metal cup) is not a classic technique, it might be considered as a helpful method in some situations. If it is needed to use constrained liner for recurrent dislocation, (17,18) and no proper size of the liner for the metal shell is available at that time, putting a smaller constrained polyethylene cup with cement in the well-fixed metal and cementless shell will be very helpful. If it is decided to remove the well-fixed cup, this may cause iatrogenic bone loss of the acetabulum and make further reconstruction more difficult. (13,19). If the locking mechanism is damaged, it is possible to insert new highly cross linked polyethylene with cement in metal shell to preserve bone stock. The defective Liner-Shell locking mechanism seen in 9 of these 14 revisions has been previously alluded to by other investigators also (21).

As it can be seen in the table, Harris Hip Scores were good and excellent in 11 cases (78.5%), which shows that no adverse effect on the function occurred. In the study done by Callaghan and colleagues in 2012 on 31 hips, there were good results and significant improvement in the Hip Scores with low complication rate, which is similar to our study. (22). They also reported only two dislocations (6.4%), which were managed by closed reduction. In our study, dislocation rate was 7.2 %, which is close to Callaghan’s report. In another study with longer follow-up, there were four repeat revisions (two loosenings and
two recurrent dislocations) in the study of 22 patients, which is more than our study (23).

By using new highly cross linked polyethylene in the revised hips, the rate of osteolysis in the follow-up period was low (15%). One of our cases developed infection. This was the only case with loosening and dislocation despite the use of constrained liner. It seems that the infection, but not using the cemented liner in the metal shell is the main cause of such problems. In our study the five cases that had cemented constrained liner in the metal cup, no dislodgement of the liner from the cup was seen. It may mean that excessive stress from the constrained liner cannot loose the cement fixation in short term. Leg length discrepancy was not significant (only 1 cm) and caused no problem. According to satisfactory midterm results of cement less cups, it seems wise to save well fixed and well oriented cements cups (24).

**Conclusion**

With this short to medium term follow up it may be concluded that in extra ordinary occasions of hip revision arthroplasty a cemented cup in cementless shell can be used with good results without major early complication.

It might be concluded that in necessary occasions such an extraordinary combination of cemented cup in cementless shell can be used with no significant problems and complications. It means that it is not necessary to remove well fixed acetabular metal shell and make new bone loss because of the lack of proper size of constrained liner or damage to locking mechanism.

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