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Early outcome of minimally invasive total hip arthroplasty

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Abstract

Introduction: The underlying aim of MIS hip replacement has been to reduce the tissue trauma, reduce blood loss and transfusion rates, to reduce post-operative pain, to hasten recovery of normal function and to improve scar cosmesis in THA. But unfamiliarity with the approaches also has the potential to increase complication rates, and this needs to be audited closely.

Materials and Method: A prospective study was carried out in 50 patients undergoing primary Total Hip Arthroplasty via mini incision posterior approach from March 2006 to January 2011. Intraoperative blood loss, surgical time, transfusion requirement, postoperative ambulatory status and complications were noted. Harris hip evaluation (modified) was used evaluate the outcome of the procedure.

Results: In our study we found out operating time was less, reduced Intraoperative blood loss and less postoperative blood transfusion. Other than that we did not find any difference in length of stay, post-operative ambulatory status, pain and final outcome according to Harris hip score. There was no significant difference in complication rates also.

Conclusion: Single-incision minimally invasive THR offers some perioperative advantages, including less blood loss, shorter operative time, and shorter length of stay. Little evidence exists with regard to any long-term differences between single-incision minimally invasive THR and standard-incision THR.

Keywords: Mini incision, Total hip replacement

1. Introduction

In the last few years there has been an increasing interest in the application of minimally invasive surgery (MIS) techniques to the field of Total Hip Arthroplasty (THA). Developments in surgical methods and instrumentation have allowed surgeons to reduce the length of incision through which the operation is performed. Although at the present time nomenclature and classification have not been finalized we use the term minimally invasive THA for any procedure in which the incision and surgical access are modified in an attempt to reduce the tissue trauma associated with hip replacement. Most authors who have reported results in this field have used a wound of 10 cm or less [1-8]. And this is emerging as the upper limit of incision length for MIS hip replacement. The different techniques have recently been classified [13]. Into two main groups: the minimal approaches and the micro-minimal or two-incision approach. The minimal incision approaches are small-incision modifications of the standard posterior [5, 6, 8], anterolateral [14]. And anterior [15]. Approaches used for THA. The Micro-minimal approach is a new development [4]. That utilizes intermuscular planes to gain access to the hip joint, and avoids the conscious detachment of muscles and tendons.

The underlying aim of MIS hip replacement has been to reduce the tissue trauma associated with THA, which it is hoped will confer benefits on both patients and health care providers, but unfamiliarity with the approaches also has the potential to increase complication rates, and this needs to be audited closely. A reduction in tissue trauma associated with hip replacement has the potential to reduce blood loss and transfusion rates, to reduce post-operative pain, to hasten recovery of normal function and to improve scar cosmesis.

The cosmetic advantages to the patient are obvious and they may play a major role in the introduction of MIS hip replacement into widespread use, particularly in health care systems in which market forces apply. Three studies [3-5] have reported the positive attitude of patients towards the scars that result from MIS hip replacement.

The potential disadvantages of these approaches include reduced visualization, a possible increased risk of neurovascular injury, and component malpositioning, thereby compromising the long-term results of an already successful procedure.

2. Materials and Methods

A prospective study was carried out in 50 patients undergoing primary Total Hip Arthroplasty *via* mini incision posterior approach from March 2006 to January 2011. Patients with primary and secondary degenerative arthritis were included. Patients with Parkinson's and other medically unfit patients were excluded. Standard DVT prophylaxis protocol was followed. Both cemented and uncemented prosthesis were used depending upon Dorr criteria. Same surgeon performed all surgeries using posterior mini incision of 8-12 cms centered over greater trochanter, external rotators and capsule repair was done. Intraoperative blood loss, surgical time, transfusion requirement, postoperative ambulatory status and complications were noted. Postoperative pain was assessed using visual analogue scale. Harris hip evaluation (modified) was used to evaluate the outcome of the procedure. Radiographs were taken to evaluate the acetabular, femoral component positioning and cement fill. Acetabular component placement (cup abduction angle) was considered vertical if it is more than 55° and horizontal if less than 35°. Femoral component were considered valgus and varus if more than 5° from horizontal line. For cementless stems, metaphyseal and isthmus fit and fill was measured using Mulliken [27]. Criteria. For cemented stems, bone cement interface was evaluated using Barracks [22]. Grading. The average follow-up period was 12 months.

3. Results

In our study average age of patients was 56 years, most common diagnosis was avascular necrosis of femoral head and 90% of patients were less than 30 BMI which indicates mini incision approach is preferable in thinner patients.

Average duration of surgery was 75 min and average amount of blood loss was 600 ml and average blood transfusion was 350ml which is less than usual attributed to small incision.

Average preoperative Harris Hip score was 35 (range 24-45) and average postoperative Harris hip score was 89 (range 79-91).

Average cup abduction angle was 44° (range 35-55°), only one outlier (<35°) was seen may be due to poor visualisation. Only one femoral stem was placed in varus, average postoperative limb length was 0.5 cms. All the patient had good cement mantle (75% grade A & 25% grade B), all the uncemented stems had >90% fill (>95% in 16 patient and 90-94% in 4 patients) which suggests good isthmus fill. 95% of the patient had excellent to good functional result.

1 patient had personal nerve palsy which recovered within 6 months, 1 patient had immediate postoperative dislocation due to overzealous patient activity which was reduced and abduction splint was given and patient was taught about positions which didn't recur. One patient superficial skin infection which healed with antibiotics and dressing within 10 days. No patient had abductor lurch and were ambulated early (avg 1 week less) as compared to standard protocol. Postoperative pain score was not significantly reduced in our study.

4. Discussion

We analyzed a consecutive series of primary total hip replacements performed through a mini incision posterior

approach. The results of our study agree with two previous controlled studies [4,9]. In that most of the in hospital results for the patients managed with a mini-incision were no better than those for the control groups. One of these published reports found no differences with the exception of a decreased blood loss in the mini-incision group but with no increased transfusion requirement in the standard-incision group [4]. The other study found no difference in the early results except for the size of the scar [8].

We did not use any specialized instrumentation for the minimally invasive approach. This did not affect the accuracy of component placement or contribute to an increase in the prevalence of wound problems. Although reduced pain is one of the benefits that have been cited for the minimally invasive approach, none of the reported studies have included an objective assessment of this parameter. Sculco *et al* [6]. Reported that, with the mini-incision technique, postoperative rehabilitation can be accelerated, but the rationale for this was not stated. Dorr [12], who described a series of ninety patients, reported that the daily pain score during hospitalization averaged 3 on a scale of 10. There was, however, no control group. We found no difference in postoperative pain scores. DiGioia *et al* [10]. reported that their patients had a significant improvement with respect to the limp and the ability to climb stairs at three months ($p = 0.04$ and $p = 0.009$, respectively); an improvement with respect to the limp, distance walked, and the ability to climb stairs at six months; and no difference at one year. Their study group, however, was selected from a larger cohort of 121 patients, and there was no indication of how these parameters were tested. Dorr [12]. Considered the results of gait analysis in a subgroup of ten patients from a group of 105 patients. Higher levels of function were reported for the mini- incision group, but the postoperative protocols had differed. We did not find any significant difference in postoperative ambulatory status in our study. Our follow-up period was short but covered the critical time when the benefits of the minimally invasive approach to total hip arthroplasty are proposed to be maximal. Longer-term studies are required to investigate the impact of the use of the minimally invasive approach on the durability of hip replacements.

In conclusion, minimally invasive total hip arthroplasty performed through a single-incision posterior approach by a high-volume hip surgeon with extensive experience is a safe and reproducible procedure, but it offers no significant benefit in the early postoperative period compared with a standard incision.

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