Acta Scientific Orthopaedics (ISSN: 2581-8635)

Volume 3 Issue 7 June 2020

Research Article

Short-Term Functional Outcomes of Primary Total Hip Arthroplasty Using A Modified Minimally Invasive Antero Lateral Approach

F Maturana[1], G Hernández[2]*, I López[3] and P Dobbs[4]

[1]*Department of Orthopedics, Hip Surgeon - Senior Staff, Hospital Clínico Instituto de Seguridad del Trabajo (IST), Viña del Mar, Santiago, Chile*

[2]*Department of Orthopedics, Orthopedic Surgeon - Staff, Hospital Clínico Instituto de Seguridad del Trabajo (IST), Viña del Mar, Santiago, Chile*

[3]*Orthopedic Surgery Residency Program, Universidad Nacional Andrés Bello - IST, Viña del Mar, Santiago, Chile*

[4]*Orthopedic Surgery Intern, Universidad Nacional Andrés Bello, Santiago, Chile*

***Corresponding Author:** G Hernández, Department of Orthopedics, Orthopedic Surgeon - Staff, Hospital Clínico Instituto de Seguridad del Trabajo (IST), Viña del Mar, Santiago, Chile.

DOI: 10.31080/ASOR.2020.03.0191

Received: May 16, 2020

Published: June 30, 2020

Abstract

Background: Minimally invasive surgery (MIS) has had a progressive development in recent years, due to its advantages in terms of: reducing the rates of complications, infection, surgical time and bleeding. Total hip arthroplasty (THA) has not been exempt from this current. Since of the first descriptions in 90´, several different techniques has been described to achieve smaller incisions and better results in primary THA, however, there is not enough statistical evidence to widely recommend MIS-THA, defined as an incision < 8 cm.

Materials and Methods: We retrospective reviewed a cohort of 173 THA, 55 men and 118 women, between January 2016 and October 2019, in an advanced trauma hospital, all performed by the same surgeon. An independent team, blinded to the primary diagnosis, performed a standardized clinical and radiological evaluation at 2, 6 and 12 weeks.

Results: The average length of the incision was 71 mm (48 - 84 mm). The average surgical time was 68 minutes (42 - 175). Hematocrit decreased by an average of 3.8% (2.2 - 8.1%). Average blood loss was 335 ml (120 - 950 ml). Preoperative Harris Hip Score was 67 (45 - 76) and postoperatively at 12 weeks of 92 (82 - 97). Three cases of perioperative complications where reported: 1 case of calcar fracture with extended approach (84 mm) and cerclage fixation, 1 case of prosthetic dislocation and 1 postoperative periprosthetic fracture Vancouver B2. No cases of neurovascular injury, infection or misalignment of components were reported.

Conclusion: These results with a locally developed technique, achieved satisfactory clinical and radiological outcomes, with minimum incisions up to 48 mm, with an average reduction of 50% to the standard approach (13 - 15 cm).

Keywords: Minimally Invasive Surgery (MIS); Total Hip Arthroplasty (THA); Fracture

Introduction

Minimally invasive surgery (MIS) has had a progressive development in recent years, due to its advantages in terms of reducing the rates of complications, infection, surgical time and soft tissue injury.

Total hip arthroplasty (THA) has not been exempt from this current. Since of the first descriptions in 90´, several different techniques have been described to achieve smaller incisions and better results in primary THA, however, there is not enough statistical evidence to widely recommend MIS-THA [1-3], defined as an incision < 8 cm.

Different techniques and new implants have been developed that have allowed achieving smaller incisions and with its, better functional outcomes in primary hip arthroplasties. These MIS techniques have the advantage of being less aggressive with soft tissues and with this, a reduced surgical time, shorter postoperative recovery, decreased blood loss, pain, time to discharge, lower complication rate and better cosmetic results.

Materials and Methods

In an advanced trauma hospital, we retrospective reviewed a cohort of 173 patients (Table 1) with unilateral primary elective Total Hip Arthroplasty (THA), between January 2016 and October 2019.

Revision surgery, severe dysplasia (defined as > Crowe 2 classification), fracture, tumoral disease or severe comorbidity (ASA > 3) were excluded.

The surgical approach was an Anterolateral (AL/Watson-Jones) modified as described by Pipino [4,5], a Tissue Sparring Surgery (TSS) with minimal gluteus medium incision (Figure 1), all performed in lateral position, with preoperative surgical site demarcation and all by the same surgeon (Figure 2).

Figure 1: Intraoperative view of MIS-THA approach with TSS technique (F Pipino., *et al*.).

The main implant used was uncemmented tapered stem (Taperloc® Biomet® mainly used or similar), with modular acetabular implant (Biomet G7® Acetabular System, most used or similar), no drainages were used.

The intraoperative blood loss was estimated with differential weight of sponge packs and saline/blood balance in suction canister (Baxter®). All skin closure was made with staples. Scar incision was measured after finished surgery (Figure 3 and 4) and at 12 weeks. All clinical measures of incision were certificated with staples length distance in digital AP pelvis X-Ray, using General Electric Centricity® Digital Image System, License 2091904-106.

The main cause was Osteoarthritis in 83,8%, and Others in 16, 2%, like femoral head avascular necrosis or mild dysplasia. An independent team, blinded to the primary diagnosis, performed a standardized clinical evaluation at 2, 6- and 12-weeks using Harris Hip Score (HHS), and radiological control with AP Pelvis projection immediately post-operative and at 12 weeks.

Results

We present results of 173 patients treated with MIS-THA (Table 2). The average length of the incision was 71 mm (48 - 84 mm). Average surgical time was 68 minutes (42 - 175 minutes). Hematocrit decreased by an average of 3.8% (2.2 - 8.1%). Preoperative Harris Hip Score was 67 (45 - 76) and postoperatively at 12 weeks of 92 (82 - 97). Mean blood loss was 335 ml (120 - 950 ml). We also report a good correlation of ± 2 mm between clinical measured of skin incision and radiological length of staples in AP Pelvis film.

Figure 2: Intraoperative surgical site demarcation and incision length planning.

Data	Mean	Range
Age (years)	63,08	42 - 90
Sex Male (%)	55 (31,8%)	
Female (%)	118 (68,2%)	
BMI	29,3	19 - 34
ASA score	2	1- 3
Primary diagnosis Osteoarthritis	145 (83,8%)	-
Other	28 (16,2%)	-

Table 1: Demographics.

Figure 3: Immediately post-operative skin incision measure (53 mm).

Figure 4: Example #2 - Immediately post op skin incision measure (54 mm).

Three cases of perioperative complications where reported: 1 case of calcar fracture with extended approach (84 mm) with intraoperative cerclage stabilization, 1 case prosthetic dislocation with no need of implant revision and 1 postoperative periprosthetic fracture Vancouver B2. No cases of neurovascular injury, infection, thromboembolism or misalignment of components were reported. Due to the study was a transversal retrospective cohort with one group of patients, no statistical analysis was made.

Figure 5: Example of staples length measurement of two different patients in immediately Pelvis AP X-ray.

The results obtained in this study are comparable to those obtained by the SD approach for THA. Despite the fact that there are multiple reports in the literature that do not show advantages of minimally invasive surgery over the traditional incision, not all the topics in which MIS may affect are standardized, therefore, different variables are considered in similarly studies of MIS-THA.

Discussion

Minimally invasive surgery has had a wide development in recent years, as a global trend in orthopedic surgery [6,7], in the search for better aesthetic and functional outcomes based on less soft tissue injury. Total hip arthroplasty has not been exempt from this trend based on 2 principles: Smaller Approaches (MIS) and TSS techniques. To achieve this, a broad knowledge of surgical anatomy is required, and an optimal preoperative positioning, which allows, using this MIS technique, a mobile cutaneous window that allows to focus on acetabular and femoral components, to implants positioning without complications during procedure.

Data	Mean	Range
Length of incision (mm)	71	48 - 84
Length of scar (12w)	62	42 - 80
Blood loss (ml)	335	120 - 950
Hematocrit decrease (%)	3,8	2,2 - 8,1
Surgical time (min)	68	42 - 175
	62	42 - 80
Functional outcome		
Pre op HHS	67	45 - 76
Post op HHS (12w)	92	82 - 97

Table 2: Results.

Our experience has been developed over decades, with a long learning curve, developing the TSS principles of F. Pipino [8], incorporating MIS on them, as many others modified approach that also has been reported from different countries [9-12], under the same principled of TSS, but less combining MIS-TSS AL approach for THA.

There is wide evidence today that the functional outcomes between standard-invasive approach (SD) and MIS for THA are similar [13-16], Migliorini., *et al.* reported a study of 4842 THA, with statistical support for MIS to less blood loss, shorter surgical time, and shorter length of stay; but lower HHS compared to SD approach, with no differences in dislocation and revision rates [13]. However, the advantages like need for transfusions, use of analgesics, remains a controversial in the available literature.

Our 1,7% rate of complications was lower than that reported in other series [16,17], however, it must be considered a suboptimal follow-up time for this group, and the revision rate at one year could increase as the follow-up is extended. Nevertheless, no major intraoperative complications were reported, like false femoral route or dislocation as Mandereau., *et al*. series, reaching up to 8,7%, excluding tendon pain as a complication like our series, for all cases, with spontaneous recovery before 3 months [15].

We reported no case of infection, necrosis or infection related to skin damage to retractors with this technique, one of the mayor concerns of detractors of MIS approach in THA, due the increased

retractor traction needed to correct visualization of acetabulum to avoid misalignment complications [18]. At the end of the 12-weeks follow up, we reported an up to 25% scar size reduction, major in younger patients (Figure 6). No wound healing problems were reported in this series, considering no use of drainage as a local Hospital protocol. No cases of iatrogenic nerve palsy were reported, contrasting evidence of high risk associated to MIS, probably due to a small sample [2].

This is a primary report of early functional outcomes, with a short time of follow-up to 6 months for the newest cases, so it will be interesting to: compare in time against stronger evidence, results at one year, and keeping every variable included so far, to sustain evidence that can support MIS-THA in the future. There no doubt, that larger, blinded multi-center studies comparing this MIS technique vs SD approaches will have to be performed to discern the risks and benefits of each one.

As a result of our investigation, we have experimented several non-functional improves of MIS-THA against SD approach, that must be compared to a control group, to support sadistically this data in further studies over comparable population.

Figure 6: Example of scar retraction at the end of 12-weeks follow-up

Conclusion

This study shows, as well as other reports available in literature, that primary THA performed with modified MIS Anterolateral approach has similar short-term functional outcomes compared to SD approach, with several advantages with this TSS technique and may be consider by hip surgeons that MIS-AL approach as a similar rate of complication like SD approach, in well selected patients.

For further studies, will be interesting to compare these results against SD approach with the same demographical characteristic. Time to discharge was not and objective of this study, nevertheless, some patients archived weight bearing and independent walk with crutches 24 hrs after surgery, this also be an interesting feature to compare with standard approach, considering advantages of MIS in less pain, less blood loss and less muscular detachment, to know if that can impact clinically in early patient functionality. Our department are currently developing an early discharge protocol, in consistency with current evidence in this area [19-21].

However, as a recommendation of our surgical experience, that can only be performed by experienced surgeons, with a high grade and frequency of training in Hip surgery and only after completing the MIS learning curve. Only after many years focused on seeking and learning, we progressively reached this success rate, shorter incisions and lower surgical time.

Bibliography

1. R Martin and PE Clayson S. "Anterolateral minimally invasive total hip arthroplasty: a prospective randomized controlled study with a follow-up of 1 year". *Journal of Arthroplasty* 26.8 (2011): 1362-1372.

2. Toby O Smith and Vicky Blake. "Minimally invasive versus conventional exposure for total hip arthroplasty: a systematic review and meta- analysis of clinical and radiological outcomes". *International Orthopaedics* 35.2 (2011): 173-184.

3. Baohui Yang and Haopeng Li. "Minimally Invasive Surgical Approaches and Traditional Total Hip Arthroplasty: A Meta-Analysis of Radiological and Complications Outcomes". *PLoS One* 7.5 (2012): e37947.

4. Pipino F. "The bone-prosthesis interaction". *Journal of Orthopaedics and Traumatology* 1.1 (2000): 3-9.

5. Pipino F and Keller A. "Tissue sparing surgery: 25 years experience with femoral neck preserving hip arthroplasty". *Journal of Orthopaedics and Traumatology* 7 (2006): 36-41.

6. Berger RA. "Mini-incision total hip replacement using an anterolateral approach: technique and results". *Orthopedic Clinics of North America* 35.2 (2004): 143-151.

7. D Chen and R Berger. "Outpatient minimally invasive total hip arthroplasty via a modified Watson-Jones approach: technique and results". *Instructional Course Lectures* 62 (2013): 229.

8. Pipino F and Cimmino M. "A modified direct lateral approach for neck-preserving total hip arthroplasty: tips and technical notes". *Journal of Orthopaedics and Traumatology* 14.2 (2013): 137-142.

9. G Grano and M Pavlidou. "A new anterolateral surgical approach for total hip replacement". *Joints* 4.3 (2016): 148-152.

10. KC Bertin and H Röttinger. "Anterolateral mini- incision hip replacement surgery: a modified Watson-Jones approach". *Clinical Orthopaedics and Related Research* 429 (2004): 248.

11. BJ Hansen., *et al.* "The Röttinger approach for total hip arthroplasty technique and review of the literature". *Current Reviews in Musculoskeletal Medicine* 4.3 (2011): 132.

12. R Naim and A Martensen. "Minimally invasive anterolateral access route for total hip arthroplasty". *Revista Brasileira de Ortopedia* 46 (2011): 183-188.

13. Migliorini F and Biagini M. "Total hip arthroplasty: minimally invasive surgery or not? Meta- analysis of clinical trials". *International Orthopaedics* 43.7 (2019): 1573-1582.

14. Zimlitski M and Natchkebia L. "Modified anterolateral surgical approach in total hip replacement". *Georgian Med News* (2018): 7-12.

15. C Mandereau and V Brzakala J. "Functional recovery, complications and CT positioning of total hip replacement performed through a Röttinger anterolateral mini-incision. Review of a continuous series of 103 cases". *Orthopaedics and Traumatology: Surgery and Research* 98.1 (2012): 8.

16. Wu VJ and Ross BJ. "Complications Following Total Hip Arthroplasty: A Nationwide Database Study Comparing Elective vs Hip Fracture Cases". *Journal of Arthroplasty* (2020).

17. C Herndon and N Drummond. "Direct anterior versus mini-anterolateral approach for primary total hip arthroplasty: early postoperative outcomes and complications Arthroplasty Today" (2020).

18. Brodt S and Windisch C. "Influence of Surgical Approach on Pelvic Lift in Hip Arthroplasty During Cup Insertion". *Orthopedics* 40.4 (2017): e589-e593.

19. Bodrogi A and Dervin GF. "Management of patients undergoing same-day discharge primary total hip and knee arthroplasty". *CMAJ* 192 (2020): E34-E39.

20. Keulen MHF and Asselberghs S. "Predictors of (Un)successful Same-Day Discharge in Selected Patients Following Outpatient Hip and Knee Arthroplasty". *Journal of Arthroplasty* (2020).

21. A Bodrogi and GF Dervin. "Management of patients undergoing same-day discharge primary total hip and knee arthroplasty". *CMAJ* 192.2 (2020): E34-E39.