Anterior versus posterior approach of total hip arthroplasty

A systematic review of literature

Essay

Submitted for partial fulfillment of Master degree in

Orthopaedic surgery

Presented by

Mahmoud El-Sayed Masoud
(M.B.,B.Ch)

Under supervision of

Prof. Dr. Ibrahim Mostafa El-Ganzory
Professor of Orthopedic surgery

Dr. Ahmed Salem Eid Ali
Assistant Professor of Orthopedic surgery

Faculty of Medicine-Ain Shams University

2017

وَأَنْزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَم تَكُنْ تَعْلَمُ ۚ وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيما

الاية 113 – سورة النساء

Acknowledgement

First and above all thanks to ALLAH.

I would like to express my endless gratitude & appreciation to my eminent professor: ***Prof. DR. Ibrahim Mostafa El-Ganzory*** *Professor of Orthopedic surgery, Faculty of medicine,Ain shams University, for giving me the honor to work under his supervision & from whome I did learn a lot, he encouraged me, removed all the obstacles from my way & pushed me to achieve success.*

My sincere thanks to ***Dr. Ahmed Salem Eid Ali,*** *Assistant Professor of Orthopedic surgery, Faculty of medicine, Ain shams University, for his continous guidance, honest help & endurance that made this search come to light.*

My great thanks to Orthopedic surgery department, Faculty of medicine, Ain shams University, for giving me the chance for postgraduate studies & continous learning.

I would also like to express my gratefulness to my family, my parents & the great help and encouragement given to me by my wife in the search & all my life.

Contents

List of Abbreviations

- AA----------Anterior approach
- CK----------Creatine kinase
- CRP----------C-reative protein
- CT----------Computed Tomography
- CINAHL--------- Cumulative Index to Nursing and Allied Health Literature
- EBL----------Estimated blood loss
- ECRI----------Emergency Care Research Institute
- H-FABP----------Heart-type fatty acid binding protein
- HHS----------Harris Hip Score
- HOOS----------Hip disability and Osteoarthritis Outcome Score
- IL-6----------Interleukin-6
- LOS----------Length of hospital stay
- M-FIM----------Motor component of the Functional Independence Measure
- MIS----------Minimally invasive surgery
- MeSH----------Medical Subject Hedings
- MCAL----------Microcontroller Abstraction Layer
- OA----------Osteoarthritis
- OHS----------Oxford Hip Score
- ON----------Osteonecrosis
- PA----------Posterior approach
- PACU----------Post-Anesthesia Care Unit
- POD----------Post-operative Day
- RCT----------Randomized controlled trial
- ROM----------Range of motion
- SD----------Standard deviation
- SF-12----------Short Form 12 (Item Health Survey)
- TFL----------Tensor fascia lata
- THA----------Total hip arthroplasty
- TUG----------Timed up and go test
- UCLA----------University of California, Los Angeles
- VAS----------Visual analog score
- WOMAC----------Western Ontario and McMaster Universities Osteoarthritis Index
- PRISMA----------Preferred Reporting Items for Systematic Reviews and Meta-analyses

List of figures

List of tables

Abstract

``The objective of this study is to compare the clinical, radiographic and surgical outcomes among patients undergoing primary THA performed via the anterior versus posterior approach.

We searched numerous sources and eventually included 17 studies, totaling 2302 participants. In terms of post-operative pain and function, the anterior approach was significantly favored in 4 studies at short-term follow-up. Pooled estimates showed a significant difference in favor of the anterior approach in terms of length of stay and dislocations. Current evidence comparing outcomes following anterior versus posterior THA does not demonstrate clear superiority of either approach.

Until more rigorous, randomized evidence is available, we recommend choice of surgical approach for THA be based on patient characteristics, surgeon experience and surgeon and patient preference``.

Key word

-Anterior approach
-Posterior approach
-THA
-Systematic review

Protocol of the research

Introduction

Total hip arthroplasty (THA) has been shown to be an effective treatment for osteoarthritis of the hip and offers patients relief of pain, improved function and substantial improvement in quality of life[1–3].

The demand for THA is expected to grow exponentially in the next two decades. Kurtz et al noted a 50% increase in the prevalence of THA from 1990 to 2002 [4] and projected a 174% increase, in THA from 208,600 in 2005 to 572,000 in 2030 [5].

There are several surgical approaches that are used in primary THA. The posterior approach is the most common approach utilized [6].

Recently, however, there has been increased interest in the anterior approach for THA due the belief that the intermuscular anterior approach may result in decreased pain, faster recovery, improved hip stability and decreased risk of dislocation following surgery when compared to the more commonly used, muscle splitting, posterior approach.

Preliminary series of patients who have undergone THA using the anterior approach have suggested decreased narcotic consumption, decreased length of hospital stay, decreased 30- day readmission, higher percent discharged to home vs. rehabilitation facility, earlier independent mobilization and improved radiographic component positioning [7–10].

However, others suggest that it is not the surgical approach, but rather factors such as patient selection, patient and family education, accelerated rehabilitation and improved analgesia protocols that play a more important role in influencing THA outcomes [11–13].

Aim of the work

The purpose of this study was to systematically review the available evidence to compare clinical and surgical outcomes among patients undergoing THA performed by the anterior versus posterior approach.

Hypothesis

Based on the following supported questions :
1. Anterior Vs posterior approach in THA.
2. Hospital stay.
3. Analgesics post-operative.
4. Rehabilitation.

Materials and methods :

Using the Medline database on PubMed from 2006 to 2016, all the English language published studies will be identified with the search keywords of "Anterior approach ", "Posterior approach "and "THA".

Inclusion criteria :

(1) Provides levels I to IV evidence
(2) RCT & comparative studies
(3) They included measures of functional and clinical outcomes.

Exclusion criteria :

(1) Non English papers.

(2) Non human trials.

(3)Articles with no clinical data

Introduction

Total hip arthroplasty (THA) has been shown to be an effective treatment for osteoarthritis of the hip and offers patients relief of pain, improved function and substantial improvement in quality of life[1–3].

The demand for THA is expected to grow exponentially in the next two decades. Kurtz et al noted a 50% increase in the prevalence of THA from 1990 to 2002 [4] and projected a 174% increase, in THA from 208,600 in 2005 to 572,000 in 2030 [5].

There are several surgical approaches that are used in primary THA. Currently, the posterior approach is the most common approach utilized [6].

Recently, however there has been increased interest in the anterior approach for THA due the belief that the anterior approach may result in decreased pain, faster recovery, improved hip stability and decreased risk of dislocation following surgery when compared to the more commonly used, posterior approach.

On the operating table, the patient is placed supine the anterior approach allows the use of fluoroscopic image intensification allowing intra-operative assessment and correction of component positioning which may permit more accurate final component position.

Preliminary series of patients who have undergone THA using the anterior approach have suggested decreased narcotic consumption, decreased length of hospital stay, decreased 30-day readmission, higher percent discharged to home vs. rehabilitation

facility, earlier independent mobilization and improved radiographic component positioning [7–10].

However, others suggest that it is not the surgical approach, but rather factors such as patient selection, patient and family education, accelerated rehabilitation and improved analgesia protocols that play a more important role in influencing THA outcomes [11–13].

Clearly, improvements in THA technique that reduce length of stay, hasten the return of joint function and improve patient comfort would likely have a positive impact on the cost effectiveness of THA, and may reduce the cost of the procedure to the health care system.

Aim of the work

The purpose of this study was to systematically review the available evidence to compare clinical and surgical outcomes among patients undergoing THA performed by the anterior versus posterior approach .

Materials and methods

This review was done using standard methodology outlined in the Cochrane Handbook [14] and reported the findings in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement guidelines [15].

Inclusion criteria in the analysis :

1. **The design** : a comparative study between these two approaches (RCT & Compartive studies)
2. **Population** : patients of all ages undergoing primary total hip arthroplasty.
3. **Incision** : One group received single-incision, anterior approach (Smith-Petersen) THA; the other group received single-incision posterior approach (Southern or Moore) THA.
4. **Outcome measures :** greater than or equal to one pre-specified quantifiable outcome measure (They included measures of functional and clinical outcomes).
5. **Level of evidence :** papers provides levels I to IV of evidence .

Exclusion criteria :

1. Non English papers.
2. Non human trials.
3. Articles with no clinical data.

Type of included participant

Patient with advanced hip “osteoarthritis”(OA), Patient with fracture neck femur, Patient with Avascular Necrosis (AVN) head femur.

The primary outcome:

Focusing on pain and function following THA Table (1) Accepted Validated Patient Reported Outcome Measures included:

- Harris Hip Score (HHS) [16]
- Medical Outcome Study : Short Form (SF.)-12 [17] or SF-36 [18]
- Visual Analog Pain Scale (VAS) [19]
- Hip Outcome Score (HOS) [20]
- Western Ontario & McMasters University Arthritis Index (WOMAC)[21]
- Hip disability and Osteoarthritis Outcome Score (HOOS) [22],
- Merle d'Aubigne and Postel score [23]
- Oxford Hip Score (OHS) [25]
- Japanese Orthopedic Association Hip Score(JOAHS) [26].

Patient Reported Outcome Measure	Domains Covered	Total Score Range	Score Interpretation
Harris Hip Score (HHS)	Pain, function, absence of deformity, range of motion	0–100	70–80 Fair 80–90 Good 90–100 Excellent
Hip disability and Osteoarthritis Outcome Survey (HOOS)	Pain, other symptoms, function in activities of daily living, function in sports and recreation, hip-related quality of life	0–100	Zero indicates extreme hip problems 100 indicates no hip problems
Short-form Health Survey 12 (SF-12)	Overall health status via Physical Component Status (PCS) and Mental Component Status (MCS)	0–100 PCS 0–100 MCS	50 is median score for United States population, standard deviation of 10 PCS and MCS >50 is good
Short-form Health Survey 36 (SF-36)	Overall health status via Physical Component Status (PCS) and Mental Component Status (MCS)	0–100 PCS 0–100 MCS	50 is median score for United States population, standard deviation of 10 PCS and MCS >50 is good
Merle d'Aubigne and Postel score	Pain, walking, range of motion	0-18	<13 Poor 13–14 Fair 15–17 Good 18 Excellent
Oxford Hip Score (OHS)	Pain, function in relation to daily activities	0–48	<27 Poor 27-33 Fair 34-41 Good >42 Excellent
Western Ontario and McMaster Universities Arthritis Index (WOMAC)	Pain, stiffness, physical function in daily activities	Pain 0–20 Stiffness 0–8 Function 0–68	Higher scores indicate worse pain, stiffness, and function
Japanese Orthopedic Association Hip Score (JOAHS)	Pain, range of motion, ability to walk, activities of daily life	0–84*	Higher scores indicate less pain, better ability to walk and perform activities of daily life

Table (1): The primary outcome scores