بسم الله الرحمن الرحيم

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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات:
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Short Stem versus Standard Stem Hip Arthroplasty

Systematic Review and Meta-Analysis

Thesis

Submitted for Partial Fulfillment of Master Degree
in **Orthopedic Surgery**

By

Mohamed Ismail Abdelhady
M.B.B.Ch. - Alexandria University

Under Supervision of

Ass. Prof. Dr. Ahmed Samy Kamel
Assistant Professor of Orthopedic Surgery
Faculty of Medicine, Ain Shams University

Ass. Prof. Dr. Ahmed Mohassab
Assistant Professor of Orthopedic Surgery
Faculty of Medicine, Ain Shams University

Faculty of Medicine
Ain Shams University
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Abb.	Full term
BMD	*Periprosthetic bone mineral density*
DEXA	*Dual-energy x-ray absorptiometry*
EQ-5D	*EuroQol 5D*
FDA	*Food and Drug Administration*
HHS	*Harris Hip Score*
MIS THA	*Minimally invasive total hip arthroplasty*
OHS	*Oxford Hip Score*
PROM	*Patients reported outcome measures*
RCTs	*Randomized controlled trial*
THA	*Total hip arthroplasty*
WHO	*World Health Organization*

Abstract

Background: Minimally invasive total hip arthroplasty (MIS THA) has recently increased in popularity. Concurrently, newly developed short femoral components are being used. These short components may make insertion during MIS approaches easier and preserve more bone than traditional femoral stems, while providing a more anatomic stress distribution in the proximal femur, **Aim and objectives** to perform an evaluation and meta-analysis of all available trials and studies demonstrating the different clinical outcomes following cementless THR using short stem and standard stem in young patients. **Subjects and methods:** Published observational analytical studies (Case-control, case reference , cohort studies or systematic reviews) On the outcomes of short stem and standard stem total hip replacement. Trials which involve English papers from the year 2000 till 2020. **Result**: We found 220 records, of them 90 unique records identified (duplicate, non English records and records before 2000 were removed) by the database searches, 65 records were excluded (not describing outcomes or inaccessible artilcles), leaving 25 studies that met all inclusion criteria, **Conclusion**: Despite favorable medium-term revision rates suggested by observational studies, there remains a need for long-term RCTs, registry data, biomechanical analyses, and bone density measurement to affirm the benefits of short-stem hip arthroplasty, Keywords; Total hip arthroplasty; cementless short stems.

INTRODUCTION

Total hip arthroplasty (THA) was introduced and advanced since the 1960s and then it became one of the most successful and cost-effective procedures in surgery.[1]

THA operation is applied by replacing morbid hip articulating surfaces with artificial implants. It helps to relieve pain and improve performance. THA is sometimes thought to be useful when non-surgical methods fail to manage pain. In individuals complaining of severe hip illness, THA is often life-changing with major enhancements in pain relief and performance.[2,3]

The World Health Organization (WHO) mentioned that THA is one of the most cost-efficient surgical operations.[4]

Whereas symptomatic hip inflammatory disease sometimes affects old patients, the number of young and active patients is increasing. They were previously thought to be "too young for hip replacement". Over the last many years, the continuous development in the field of hip arthroplasty is permitting us to rethink that idea.[5]

Efforts to maximize the survival of implant components are directed towards optimal implant positioning, reducing the occurrence of wear, increasing osteointegration, and reducing the capability of the implant to migrate. Bone is the most important vital substance, on which prolonged implant fixation

depends and so, bone preservation of the femur and the acetabulum is still the most important item used to determine implant types.[6]

Cementless total hip arthroplasty has become the standard fixation option in the United States and is used in more than 90% of all THAs.[7,8] This technique allows bone growth over the stem and helps the bone-implant interface to remodel and has resulted in marvelous results especially for the young and active patients.[9,10]

Cementless THA allows for biological fixation of femoral and acetabular components to bone. So it avoids the increasing probability of mechanical loosening and also avoids bone loss caused by the cement used in cemented THA. Biological fixation of cementless THA occurs by bone ingrowth into porous metal surfaces. [11]

Wear particles are generated by all types of prostheses including polyethylene, metal, and ceramic. They induce an immunological reaction that leads to osteolysis and aseptic loosening. [12]

Ceramic bearings produce wear particles which are smaller in number and size than those produced with other bearings such as polyethylene, and therefore, also the cellular response towards ceramics is less. Alumina ceramics never produce ions so; they never cause any systemic hazards. [12]

Surface replacement and short stems are beneficial as they help for more preservation of bone. They are designed to help for hip replacement in younger patients. They allow for less bone consumption than standard stems and therefore the first revision can be considered a primary intervention rather than a revision. (13-6)

The benefits of hip resurfacing over the standard total hip surgical procedure (THA) are that it regains physiological biomechanics, saves more bone, and permits the patient to come back to be active again. However, patients have to lessen participation in sports to protect artificial implants form damage.(14,15)

Resurfacing procedure is unable to compensate for the limb-length discrepancy. So, arthritic hips with a minimum of one cm shorter than the contralateral limb must be managed with a standard THA. The most common cause of failure in resurfacing are fractures of the femoral neck and later on the loose femoral implant. Fractures of the femoral neck are a common complication after resurfacing.(17,18)

In 1984, Mayo stem (Zimmer) was the first FDA approved short stem for use in the United States then many implant designs have become available. Short stems can be applied more easily through the minimally invasive approach.(19)

Short stem THA attempts proximal load transfer to reduce thigh pain due to the absence of diaphyseal anchorage. When osteolysis occurs around the short stem, it can be revised using the standard stem, but when osteolysis occurs around the standard stem, revision with long stem is the only solution, so shorter hip stems are better to be used in osteoarthritic hips of the young and active patient and who are contraindicated for surface replacement.[20]

The new generations of short-stem hip implants allow mimicking the normal physiological loading of the normal hip joint to reduce the possible implant loosening in the long run.[21]

Conventional cementless implants have shown a continuing decrease of periprosthetic bone mineral density (BMD) within the proximal femur, as discovered by dual-energy x-ray absorptiometry (DEXA) particularly over the course of the primary year after surgery. Short implants are claiming less interference with the biomechanics of the proximal leg bone. As such, they can be alternatives to traditional implants, particularly for younger patients, wherever higher revision rates are expected. [22]

While the surgery using a minimally invasive hip replacement is comparable to the normal approach, there's considerably less harm to the tissues because the damage of the muscles is greatly reduced during implantation of the

prosthetics. Rehabilitation is accelerated and hospital time is minimized due to the smaller incisions and less interference with the soft tissues. Both short and standard stem prostheses can be applied using the minimally invasive technique. [19, 21]