Modified Posterior Approach to the Hip Joint

K. Mohan Iyer
Editor

Second Edition

Springer

Modified Posterior Approach to the Hip Joint

K. Mohan Iyer
Editor

Modified Posterior Approach to the Hip Joint

Second Edition

Springer

Editor
K. Mohan Iyer
Retired Consultant Orthopaedic Surgeon
Bengaluru, Karnataka, India

Formerly Locum Consultant Orthopaedic
Surgeon
Royal Free Hampstead NHS Trust
Royal Free Hospital
London, UK

ISBN 978-3-031-35789-3 ISBN 978-3-031-35790-9 (eBook)
https://doi.org/10.1007/978-3-031-35790-9

1st edition: © K. Mohan Iyer 2015
2nd edition: © The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2023

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

To the memory of my respected teacher

(Late) Mr. Geoffrey V. Osborne

I have written this dedication with a very heavy mind full of fond memories for my late respected teacher, Mr. Geoffrey V. Osborne, without whose constant encouragement and freedom I could not have written this book. These teachers are extremely rare to spot these days where the turmoil of daily life

overtakes one's ambitions, duties, and career aspirations. I have a remarkable store of personal and academic memories of him, with whom I spent four long years at the University of Liverpool, UK, during which I rarely looked upon him as my teacher, as he was more of a close friend and father to me during all those years.

He inspired me with his approach and knowledge of orthopedics, that is unforgetable, and I would not have followed his footsteps, had it been for him. I just have hallucinations that he is very much present there and I am sharing with him the joy of being in India. He was a patron of the Indian Orthopedic Association, and he patiently listened when I presented my original research on the hip joint, done in Liverpool, with my respected teacher and late Dr. Rasik M. Bhansali who was the chairman at the Conference of the Association of Surgeons of India in December 1982.

and loving thanks to

My wife, Mrs. Nalini K. Mohan
My daughter, Deepa Iyer, MBBS, FRCP (UK), FAFRM (RACP)
(1. Honorary Adjunct Assistant Professor/ Bond University, Queensland
2. Senior Lecturer/Griffith University and University of Queensland)
My son-in-law Dr. Kanishka B.
My son, Rohit Iyer, B.E. (IT)
My daughter-in-law, Deepti B. U.
My grandsons Vihaan and Kiaan
My grandchild Nisha Iyer

Foreword

I am pleased to write this Foreword to Dr. K. Mohan Iyer after 8 years in the 2nd edition of this book titled *Modified Posterior Approach to the Hip Joint* which has been accepted for publication by Springer Nature (Switzerland) since I wrote the foreword in its 1st edition 8 years ago.

The surgery for the hip joint has evolved considerably in different parts of the world. This evolution dates back to as early as 1883 and is still developing in many parts of the world. Dr. K. Mohan Iyer started with his research in 1981 and is seen in many textbooks of repute such as

1. *The Year Book of Orthopaedics 1982*—Mark B. Coventry, pp. 371–373.
2. *Campbell's Textbook of Operative Orthopaedics*, 12th edition by S. Terry Canale and James H. Beaty, p. 331. He had also given me a Foreword for my book *The Hip Joint* (1st edition) as seen on his website at kmohaniyer.com.
3. *Surgery of the Hip*, Elsevier, Mosby/Saunders, Volume 2, by Daniel J. Berry and Jay R. Lieberman, p. 269.
4. *The Adult Hip (Lippincott-Raven)* (1998), Volume 1, Callaghan, Rosenberg and Rubash, pp. 700–701, 718.
5. *The Hip* by Richard A. Balderston. Lea & Febiger: My original work has been quoted on page 90.
6. *Surgery of the Hip Joint* by Raymond G. Tronzo: Ref. no. 187: (p. 333): Fractures of the Hip in Adults: My original research on the Hip Joint has been quoted.
7. William J. Hozak, Martin Kirsmer, Michael Hogler, Peter M. Bonutti, Franz Rachbauer, Jonathan L. Scaffer, William J. Donnelly (Editors).

His original work (1981) is also referred to in this book *Total Hip Arthroplasty*, Arch Orthop Trauma Surg 102:225–229 at reference no. 24 (pp. 115–229). The Foreword by William J. Hozak for his book *The Hip Joint* (2nd edition) as seen on his website at kmohaniyer.com.

It has reached a new dimension to include in the 2nd edition

1. Posterior Approach to Hip Joint
2. Southern Posterior Approach of the Hip

3. Direct Anterior Approach to the Hip Joint
4. Principles of the Anterior Approach for Total Hip Arthroplasty
5. Anterior Minimally Invasive Surgery
6. Direct Anterior Approach to the Hip Joint
7. Direct Anterior Approach for Total Hip Arthroplasty.

This second edition also has a furthur reference reading section given by all seven contributory authors at the end of their respective chapters.

The best part of his research is its feasibility in Third World countries when it can be done in an indigenous way as shown in detail in Chap. 7 of this book.

It is my pleasure to be able to write this Foreword to the 2nd edition being published by Springer Nature (Switzerland).

Dr. med. Thomas Stähelin
Von Büren, Orthopädische Chirurgie
und Traumatologie des
Bewegungsapparates FMH,
St. Klara-Rain 1, CH-6370 Stans,
Switzerland

Preface

The evolution of my research done (Modified Posterior Approach to the Hip Joint) in 1981 with Dr. Martin A. Elloy, Ph.D., University of Liverpool, UK, is the basis of this book. I had done this at a time when dislocations were frequently reported in literature those days.

In the beginning in Chap. 1 of the manuscript, the description of the Posterior Approach(C) had been written by Dr. Ahmed Zaghloul, lecturer at Orthopedic Department Mansoura University, Mansoura University Hospitals, Mansoura University, Egypt, only for this book being published by the publisher Springer Nature, Switzerland AG.

Another additional version of the traditional Posterior Approach is also given in Chap. 2 by Kemal Şibar, Affiliation: Ankara Etlik City Hospital and Alper Öztürk, Ankara, Turkey.

Professor John O'Donnell; Direct Anterior Approach to the Hip Joint in Chap. 3 by John O'Donnell from my book *Hip Joint in Adults: Advances and Developments* (permission of publisher taken).

Alessandro Geraci; Orthopedic Department, CaFoncello Hospital, Treviso, Italy, from the publication of my book *The Hip Joint* (2nd edition) in Chap. 4 (permission of publisher taken) of this book.

Hiran Amarasekera (Warwick); Hip Preservation Fellow, University Hospitals of Coventry and Warwickshire, UK, Research Fellow at Warwick Medical School, UK, in Chap. 5.

There is a new additional chapter on DAA written Kirubakaran Pattabiraman, Assistant Professor, Department of Orthopedics, JIPMER, Puducherry, India, with Prof. Thomas Mullner, on Minimally Invasive Joint Surgery—Total Hip Replacement. This chapter has been published in detail by another publisher.

DAA by Ahmed Saad, Karthikeyan P. Iyengar, Rajesh Botchu, and Callum McBryde (Direct Anterior Approach to the Hip Joint) by Calllum McBryde in Chap. 6.

Dr. Deepak Gautam, Consultant Joint Replacement and Director of Orthopedic Disciplines, Medicover Hospital, Navi Mumbai and former—Assistant Professor of Orthopedics at AIIMS, New Delhi, India (new additional chapter) in Chap. 7

elaborates a method of doing the DAA on a plain table without the use of any leg holder which is extremely useful in Third World countries.

I am also very thankful to Jenny Rompas and Stanford Chong, Directors and Publishers, Jenny Stanford publishing, Singapore, for their permission to include Chapter 17 (Direct Anterior Approach to the Hip Joint by John O'Donnell) from my book *The Hip Joint in Adults: Advances and Developments* and Alessandro Geraci from my book *The Hip Joint* (2nd edition).

I am also thankful to Dr. Rajesh Botchu, Consultant Musculoskeletal Radiologist, The Royal Orthopedic Hospital, Birmingham, UK, for helping me out in Chap. 6.

Above all my grateful thanks to Melisa Morton [Executive Editor Clinical Medicine], Elizabeth Pope and Ram Prasad Chandrasekar for their invaluable help in this manuscript.

Also my thanks to Vishnu M. G., project Manager at Straive, Chennai – India for his patience in the production of my book titled Modified Posterior Approach to the Hip Joint.

Above all I highly appreciate the help of my son, Mr. Rohit Iyer, in the presentation and publication of this book.

Bengaluru, Karnataka, India

K. Mohan Iyer
MBBS (Mumbai), MCh Orth. (Liverpool), MS Orth. (Mumbai), FCPS Orth. (Mumbai), D'Orth. (Mumbai)

Introduction

The PA is the most commonly used surgical approach for THA worldwide. There have been several iterations of the PA since it was first described by von Langenbeck in 1874 where he mentioned that all 11 posterior approaches have been described when all either divide the short external rotators or pass between them (Moretti and Post 2017, von Langenbeck 1874). Numerous surgical approaches to the hip joint have been described over the years. Each approach offers certain advantages as well as has its own unique limitations. Access is the key for success; it is essential for the surgeons to be aware of the different surgical approaches in order to deal with variable complex clinical situations. Most new approaches are based on older approaches which have been modified to a specific purpose or for a specific reason. The approach is based on the access needed, the potential for complications, the purpose for which it is needed along with the experience of the surgeon. The primary aim is to maintain the primary blood supply to the femoral head from the medial femoral circumflex artery and its ascending branches. In total hip arthroplasty, disruption of the ascending branches is of no consequence, while in hip resurfacing or osteotomy, the anterior, anterolateral, lateral, or medial approaches are more preferred in order to prevent osteonecrosis of the femoral head. The lateral approaches, which require osteotomy which have a significant nonunion rate, should also be taken into account. Overall, the surgical approaches to the hip may be broadly classified as: anterior, anterolateral, lateral, posterior, medial, lateral subtrochanteric, and proximal femoral shaft. The most commonly used approaches for THA (Moretti and Post 2017) include posterior approach (PA), direct lateral approach (DLA), and direct anterior approach (DAA):

(A) Direct Anterior Approach

Internationally, this approach is gaining popularity in the hip arthroplasty community. Advocates of this approach consider its advantages to be the muscle-sparing nature of its internervous intervals, earlier restoration of gait kinematics, and low dislocation

rates. The direct anterior approach can be performed with or without the use of a specialized table or fluoroscopy.

The procedure begins by positioning the patient supine on a specialized traction table. Both feet are firmly secured to boots attached to lever arms that permit positioning of each lower extremity and applying traction to either limb. The perineal post located between the legs stabilizes the patient on the operating room table and provides a point of counter-traction.

The surgical incision begins 2–4 cm lateral to the anterior superior iliac spine of the pelvis. It is then carried distally and laterally for about 8–12 cm at 20° from the sagittal plane of the patient toward the lateral aspect of the patient's ipsilateral knee. The lateral femoral cutaneous nerve (LFCN) is identified, transposed medially, and protected.

After protecting the LFCN, the fascia overlying the tensor fascia latae (TFL) is incised, and a plane is then developed between the TFL and sartorius. The surgeon will then encounter the interval between the rectus femoris and gluteus medius. A Charnley hip retractor displaces the rectus femoris medially and the gluteus medius laterally to expose the anterior joint capsule of the hip. After coagulating or suture ligating the ascending branch of the lateral femoral circumflex artery, a Mueller retractor is placed inferior to the femoral neck, and a capsulotomy is performed. The joint capsule is incised along the length of the femoral neck from the acetabulum to the intertrochanteric line.

Gentle traction is then applied to the operative limb. Mueller and Hohmann retractors are placed intracapsularly around the femoral neck. A reciprocating saw is used to make a femoral neck osteotomy. The femoral head is then removed with a corkscrew. The osteotomy can be repeated, and the resultant napkin ring of bone is removed to increase the ease of removing the femoral head.

Once the femoral head is removed, traction is released and the leg is externally rotated to improve exposure for acetabular preparation. The Charnley hip retractor maintains exposure medially. Placement of the final acetabular component is facilitated by the use of an offset inserter handle to minimize soft tissue injury. Intraoperative fluoroscopy is used to optimize component anteversion and inclination.

Femoral preparation can be difficult owing to limited proximal femoral exposure with this approach. The operative limb is carefully placed in a position of extension, adduction, and external rotation to improve the accessibility of the proximal femur. Overly forceful external rotation can result in soft tissue injuries to the knee and ankle as well as intraoperative fracture. A specialized bone hook is then inserted around the posterior aspect of the femur just proximal to the insertion of the gluteus maximus tendon. This bone hook can be used manually to elevate the proximal femur anteriorly. In the subset of patients in whom the femur cannot be sufficiently mobilized anteriorly, sequential release of the conjoint tendon and piriformis can also improve mobilization of the femur. Rarely, a release of the anterior 1–2 cm of the origin of the TFL off the iliac wing may be required. An offset femoral broach handle eases access to the proximal femur during preparation. Trialing can be combined with intraoperative fluoroscopy to assess leg length and offset. Femoral anteversion

is identified based on the posterior cortex of the proximal femur or by using the femoral epicondyles as a reference point. Once the final implants are in situ and the hip is reduced, implant positioning is verified with fluoroscopy, and the stability of the construct can be assessed out of traction.

(B) Hip Direct Lateral Approach (Hardinge, Transgluteal)

Majority of Canadian orthopedic surgeons prefer the Hardinge approach as it gives sufficient exposure to the proximal femur and acetabulum with an extremely low rate of dislocation as reported in the literature.

This is not in the true internervous plane, but is in the intermuscular plane because it (1) splits gluteus medius distal to innervation (superior gluteal nerve) and (2) the vastus lateralis is also split lateral to innervation (femoral nerve).

The anesthesia varies between general anesthesia and spinal with the patient positioned in the either lateral or supine position. The incision starts 5 cm proximal to tip of greater trochanter which is longitudinal being centered over tip of greater trochanter and extends down the line of the femur about 8 cm. The superficial dissection splits the fascia lata and retract anteriorly to expose tendon of gluteus medius and thus helps to detach fibers of gluteus medius that is attached to fascia lata using sharp dissection. The deeper dissection involves splitting of the fibers longitudinally at the middle of the greater trochanter which does not extend more than 3–5 cm above the greater trochanter thus preventing any injury to the gluteal nerve. It is also preferable to extend incision inferiorly through the fibers of vastus lateralis in order to develop an anterior flap containing the anterior aspect of gluteus medius from the anterior greater trochanter with its underlying gluteus minimus and the anterior part of vastus lateralis which then requires a sharp dissection of muscles of bone or lifting small fleck of bone. This thus exposes the anterior hip joint capsule. It is then advised to follow the dissection anteriorly along greater trochanter and onto femoral neck which leads to capsule when the gluteus minimus needs to be released from anterior greater trochanter. There are two structures at risk here, namely (1) the superior gluteal nerve which runs between gluteus medius and minimus 3–5 cm above greater trochanter and is protected by putting a stay suture at the apex of gluteal split and (2) the femoral nerve which is the most lateral structure in neurovascular bundle of anterior thigh. Some surgeons perform a capsulectomy to facilitate dislocating the hip. The surgeon then dislocates the femoral head by externally rotating and flexing the hip and knee. The foot is then placed in a sterile bag anteriorly when Hohmann retractors are positioned around the femoral neck, allowing the surgeon to safely perform a femoral neck osteotomy using an oscillating saw. Completion of the femoral neck osteotomy then provides access to the proximal femur and the acetabulum which is then prepared by externally rotating the leg with the knee in extension. Thereafter, retractors are placed anteriorly, posteriorly, and inferiorly to visualize the acetabulum completely. After trialing and final component placement, the anterior flap (gluteus medius, gluteus minimus, anterior capsule, and anterior vastus lateralis) is repaired

to its anatomic position and closed as one layer with a combination of interrupted and running sutures. The fascia lata, ITB, and gluteus maximus are then closed with either interrupted or running sutures followed by routine closure of the subcutaneous tissues and skin.

References

Moretti VM, Post ZD. Surgical approaches for total hip arthroplasty. Indian J Orthop. 2017; 51:368–76. http://dx.doi.org/10.4103/ortho.IJOrtho_317_16, http://www.ncbi.nlm.nih.gov/pubmed/28790465.

von Langenbeck B. Uber die schussverletzungen des huftgelenks. Arch Klin Chir. 1874; 16:263.

Contents

1 Posterior Approach to Hip Joint 1
Ahmed Zaghloul

2 Southern Posterior Approach of the Hip 31
Kemal Şibar and Alper Öztürk

3 Direct Anterior Approach to the Hip Joint 37
John O'Donnell

4 Principles of the Anterior Approach for Total Hip Arthroplasty 43
Alessandro Geraci

5 Anterior Minimally Invasive Surgery 49
Hiran Amarasekera and Dakshini Egodawatte

6 Direct Anterior Approach to the Hip Joint 61
Ahmed Saad, Karthikeyan P. Iyengar, Rajesh Botchu, and Callum McBryde

7 Direct Anterior Approach for Total Hip Arthroplasty 83
Rajesh Malhotra and Deepak Gautam

Further Reading Section 135

Contributors

Hiran Amarasekera University Hospitals of Coventry and Warwickshire, Coventry, UK;
Warwick Medical School, Coventry, UK;
Neville Fernando Teaching Hospital, Malabe, Sri Lanka

Rajesh Botchu Department of Musculoskeletal Radiology, Royal Orthopaedic Hospital NHS Trust, Birmingham, UK

Dakshini Egodawatte Trauma and Orthopaedics, Neville Fernando Teaching Hospital, Malabe, Sri Lanka

Deepak Gautam Department of Orthopedic Disciplines, Medicover Hospitals, Navi Mumbai, Maharashtra, India

Alessandro Geraci Orthopedic Department, San Valentino Hospital, Montebelluna, Italy

Karthikeyan P. Iyengar Department of Orthopaedics, Southport and Ormskirk Hospital NHS Trust, Southport, UK

Rajesh Malhotra Department of Orthopedics, All India Institute of Medical Sciences (AIIMS), New Delhi, India

Callum McBryde Department of Trauma & Orthopaedics, Royal Orthopaedic Hospital NHS Trust, Birmingham, UK

John O'Donnell International Society for Hip Arthroscopy (ISHA), Glasgow, UK; Department of Epidemiology & Preventive Medicine, School of Public Health & Preventive Medicine, Monash University, Melbourne, Australia

Alper Öztürk Department of Orthopaedics and Traumatology, Ankara Training and Research Hospital, Ankara, Turkey

Ahmed Saad Department of Orthopaedics, Royal Orthopaedic Hospital NHS Trust, Birmingham, UK