IOSUD - Politehnica University of Timișoara
Doctoral School of Engineering Studies

THE IMPACT OF EARLY INITIATION OF THE REHABILITATION PROGRAM ON BIOMECHANICS, STATICS, AND GAIT AFTER TOTAL HIP ARTHROPLASTY

Doctoral Thesis – Summary

for the attainment of the scientific title of Doctor at
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The doctoral thesis entitled "THE IMPACT OF EARLY INITIATION OF THE REHABILITATION PROGRAM ON BIOMECHANICS, STATICS, AND GAIT AFTER TOTAL HIP ARTHROPLASTY," conducted at the Doctoral School of IOSUD – Politehnica University of Timișoara, under the supervision of Professor Dr. Eng. Liviu Marșavină, presents the author's research results in the field of functional rehabilitation of the hip joint following total hip arthroplasty.

Chapter 1: Introduction

In this chapter, I outline the motivation behind choosing this topic, emphasizing the importance of research in the context of the rising incidence of coxarthrosis. The main aim of the study is defined, and specific research objectives are identified, focusing on improving the outcomes of the evaluation and treatment of patients suffering from this condition.

Chapter 2: Current State of Pre- and Postoperative Evaluation

This chapter provides an analysis of the current state of pre- and postoperative evaluation in total hip arthroplasty, offering an overview of the techniques and methodologies employed. Additionally, it highlights the global trend of increasing coxarthrosis incidence and the challenges faced by healthcare systems.

Chapter 3: Anatomy, Biomechanics, and Clinical Examination of Coxarthrosis

Key aspects regarding the anatomy and biomechanics of the hip, the importance of clinical examination, and the etiopathogenesis of coxarthrosis are detailed in this chapter. The chapter also discusses the morphopathology and the role of radiology in diagnosis, as well as the treatment options available for coxarthrosis.

Chapter 4: Evaluation Methodology

This chapter describes the methodology used for patient evaluation, including goniometric measurements and static analysis performed with the Zebris platform. It details the evaluation

procedure using the Zebris system, the interpretation of results, and a comparative analysis of the obtained data.

Chapter 5: Results

The chapter presents findings related to hip mobility, obtained through the early initiation of a fast-track functional rehabilitation program. It includes results from static and dynamic analyses performed using the Zebris platform, highlighting relevant aspects of patient recovery.

Chapter 6: Experimental Studies on Complications Following Total Hip Arthroplasty

This chapter focuses on postoperative complications, such as iliac bone fractures and their fracture toughness, as well as factors influencing this toughness. The clinical relevance of these complications is discussed, including a case study of a ceramic liner fracture after total hip arthroplasty. A brief review of the fracture mechanism of ceramic components complements this section.

Final Chapter: Conclusions and Personal Contributions, Future Research Directions

In this chapter, I synthesized the main conclusions of the study and highlighted my personal contributions, including proposals for optimizing the evaluation and treatment of patients with coxarthrosis. Future research directions were also discussed, suggesting the development of further studies to explore in greater depth the long-term effects of surgical interventions and rehabilitation approaches.