بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

One-stage versus Two-stage Protocol in Management of Infected Nonunited Fracture Femur

Thesis

Submitted for Partial Fulfillment of
MD Degree in **Orthopedics**

Submitted by

Ahmed Mahmoud Badreldin
Master Degree of Orthopaedic Surgery
Faculty of Medicine, Ain Shams University

Supervised by

Prof. Dr. Khaled Mohamed Emara
Professor of Orthopaedic Surgery
Faculty of Medicine, Ain Shams University

Prof. Dr. Ramy Ahmed Diab
Assistant Professor of Orthopaedic Surgery
Faculty of Medicine, Ain Shams University

Prof. Dr. Mohamed Ahmed El-Kersh
Assistant Professor of Orthopaedic Surgery
Faculty of Medicine, Ain Shams University

Prof. Dr. Ayman Fathy Mounir
Assistant Professor of Orthopaedic Surgery
Faculty of Medicine, Ain Shams University

Faculty of Medicine, Ain Shams University
2021

سورة البقرة الآية: ٣٢

Acknowledgments

First and foremost, I feel always indebted to ***Allah*** *the Most Beneficent and Merciful.*

In addition, I would like to express my deepest gratitude and appreciation to ***Prof. Khaled Mohamed Emara*** *Professor of Orthopaedic Surgery, Department of Orthopaedic Surgery, Faculty of Medicine, Ain Shams University, for his unlimited support during the writing of this thesis.*

Words are not enough to express my thanks to ***Dr. Ramy Ahmed Diab****, Assistant Professor of Orthopaedic Surgery, Department of Orthopaedic Surgery, Faculty of Medicine, Ain Shams University, for his sincere efforts and valuable scientific supervision during the writing of this thesis.*

I would like to to express my deepest gratitude and appreciation to ***Dr. Mohamed Ahmed El-Kersh****, Assistant Professor of Orthopaedic Surgery, Department of Orthopaedic Surgery, Faculty of Medicine, Ain Shams University, for his sincere efforts and valuable scientific supervision during the writing of this thesis.*

Special thanks are due to ***Dr. Ayman Fathy Mounir*****,** *Assistant Professor of Orthopaedic Surgery, Department of Orthopaedic Surgery, Faculty of Medicine, Ain Shams University, for his continuous encouragement to bring this work to the attempted goal.*

Thanks a lot my dear Professors.

Ahmed Mahmoud Badreldin

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List of Abbreviations

Abb.	Full term
ASA	American Society of Anesthesiologists
BMI	Body Mass Index
CBC	Complete blood count
CI	Confidence Interval
CRP	C-reactive Protein
CT	Computed Tomography scan
ESR	Erythrocytes Sedimentation Rate
FDG	F18-Fluorodeoxyglucose
HA	Hydroxyapatite
IM	Intra-Muscular
IQR	Interquartile range
LRS	Limb Reconstruction System
MBC	Minimal bactericidal concentration
MIC	Minimal inhibiting concentration
MRI	Magnetic Resonance Imaging
NSAID	Nonsteroidal antiinflammatory drug.
NUSS	Non-Union Scoring System
PCR	Polymerase Chain Reaction
PET	Positron Emission Tomography
PMMA	Polymethylmethacrylate
PTI	Pin tract infection
RCT	Randomized Controlled Trial
RI	Radionuclide Imaging
RTA	Road Traffic accidents
RT-PCR	Reverse Transcriptase Polymerase Chain Reaction
SC	Subcutaneous
SD	Standard Deviation
WBC	White Blood Cell count

INTRODUCTION

The incidence of complex fracture non-unions are increased due to increased road traffic accidents and increased open fractures. These patients are usually operated upon several times for stabilization and to eradicate infection, which in turn produces scarring of the soft tissues and devitalization of any surviving bone. They present with indolent infection. [(1)]

Infected non-united fracture is a formidable complication to treat. It is a complex problem with considerable morbidity and can threaten the life and limb of the patient. There is considerable social, financial, physical, and psychological impact on the patient. [(1)]

Treatment of infected non-united fractures is technically demanding, prolonged, and needs a team. The presence of implants promotes both adherence of microbes and biofilm formation, and it adversely affects phagocytosis, thereby facilitating development of infection. [(2)]

Bone gap and active infection are the crucial factors relating to treatment and prognosis. Infected non-united fractures and segmental bone defects demand treatment methods that offer control of infection and provide stability to the bone to promote union. [(2)]

There are two schools of thought in the treatment of infected non-united fractures, the ‘union-first’ strategy and the

'infection-elimination first' strategy. The first strategy aims at achieving union first and then dealing with the problem of infection as the problem presents itself. This approach does not aim at eradication of infection as the main objective. The second strategy aims at elimination of infection as the first and major objective and bone union as the next objective. [(3)]

Conventional methods for treating septic non-union of the fracture femur includes external fixation, debridment, sequestrectomies. [(3)]

The patient with an unhealed, infected femoral fracture has two problems: osteomyelitis and a fracture of a major, weight-bearing bone that usually has not responded to treatment. Despite major advances in fixation techniques, soft-tissue management, and antibiotic therapy, septic non-union or delayed union after femoral fracture is a persistent and serious problem, may resulting in amputation.' High-speed motor vehicle travel, the continuing popularity of motorcycles, and mechanization of the workplace will continue to cause high-energy injuries and assure us of a future caseload of infected, nonunited fractures. [(4)]

The Ilizarov technique has been used for the last 20 years in the management of septic non-union of long bones. This method uses fine wires inserted percutaneously which are attached and tensioned to provide a strong frame construct. It

permits the use of compression, distraction, bone lengthening and deformity correction. [5]

The majority of femoral non-unions can be treated successfully by internal fixation. However, a septic non-union of the fracture femur can prove a difficult problem. This can be compounded by bone loss, deformity or failure of previous internal fixation. [6]

The treatment of bone infections after intramedullary nailing usually includes a series of different surgical procedures such as removal of metalwork, radical bony debridement, deep tissue sampling, and elimination of dead space and insertion of local antibiotic delivery systems. This is followed by the application of the Ilizarov external fixator. Furthermore, local or free soft tissue transfers are employed to cover any soft tissue defect. The Ilizarov method addresses all the above problems simultaneously and offers a good solution for infected non-unions. The stability of the construct permits weight bearing and joint mobilisation. Furthermore, bone defects can be filled by a corticotomy and bone transport. The control of infection is achieved by radical debridement of the bone ends. [6]

Local and host environment particularly favorable to infection like the initial open type IIIA fracture, comminution, bone loss, presence of a metallic implant, and insulin-dependent diabetes, respectively. These factors make successful treatment of this infected non-united fractures in one stage very