Systematic Review of bone transport versus fibular bone grafting for the reconstruction of bony defects following bone tumors resection

Essay
Submitted for partial fulfillment of master degree in orthopedic surgery

By
Mohammed Nour Eldeen Mohamed Essa
M.B., B.Ch. Faculty of Medicine – Ain Shams University

Under supervision of

Prof. Dr.
Mahmoud Mohamed Fayed
Professor of Orthopedic surgery
Faculty of Medicine – Ain Shams University

Dr.
Ahmed Rayan Ahmed
Lecturer of Orthopedic surgery
Faculty of Medicine – Ain Shams University

Faculty of Medicine
Ain Shams University
2016

سورة طه – آية 114

Acknowledgement

I would like to express my sincerely appreciation to **Prof. Dr. Mahmoud Mohamed Fayed**, professor of orthopedic surgery, faculty of medicine, Ain shams university for his support, valuable guidance and his generosity to get this work possible and done.

And I am grateful to **Dr. Ahmed Rayan Ahmed**, lecturer of orthopedic surgery, faculty of medicine, Ain Shams University for his kindness, patience, support and valuable opinions all through making of this work

This work is dedicated to my family and my work team.

Mohamed Nour Eldeen Mohamed

Abstract

The treatment of bone defects occurring after the resection of bone tumors is a major orthopedic problem. Limb-salvage operations are now done rather than amputation.

Various principles are available for reconstruction of the bone defect following en-bloc resection of tumor endoprosthetic replacement, Bone transport , Vascularized bone graft, non-vascularized bone grafts, Allograft and synthetic bone graft.

Key words:

Bone transport, Fibular bone graft, Bone tumors, Bone defect.

Table of Contents

List of Abbreviations

FVFG:	Free Vascularized Fibular Graft
MSTS:	Musculo Skeletal Tumor Score
NVFG:	Non-Vascularized Fibular Graft
PVFG:	Pedicled Vascularized Fibular Graft
ROM:	Range Of Motion
VFG:	Vascularized Fibular Graft

Introduction

The treatment of bone defects occurring after the resection of bone tumors is a major orthopedic problem. Emphasis has been put on limb-salvage operations in tumor surgery rather than amputation. The ideal reconstruction should have biological affinity, resistance to infection, sufficient biomechanical strength and durability in order to achieve the desired results [(1)].

The wide resection of a musculoskeletal tumour creates a large bony defect. There are several methods by which this may be reconstructed. Endoprosthetic replacement is the mainstay of treatment when the tumour is periarticular. Where a diaphyseal lesion has been resected, the reconstructive options are a massive allograft, distraction osteogenesis, endoprosthetic diaphyseal replacement and vascularized or non-vascularised bone grafting. Both vascularised and non-vascularised fibular autografts seem equally reliable biological methods for the reconstruction of a bone defect after resection of a diaphyseal bone tumour [(2)].

Long bone reconstruction using an autologous vascularized fibular graft is a reliable technique providing satisfactory functional results. Complications can be prevented by making solid fixation and using a corticocancellous graft creating a favorable osteoinducing environment [(3)].

Distraction osteogenesis, which was put forward by Ilizarov in the middle of the last century, is a biological approach to repairing segmental bone defects and has been widely used for the treatment of nonunion leg-length discrepancy, deformity, osteomyelitis, and traumatic bone defects. It is a dynamic subject with increasing popularity in which de novo bone is created with the slow distraction of corticotomy. Although the Ilizarov technique has disadvantages such as the long treatment period, risk of pin tract infection, delayed ossification or maturation, functional limitations by wrongly placed K wires through muscles, and pain caused by loosening of K -wires, it is still preferred because it is a biologic technique, has relatively fewer complications compared to other alternatives ,has the ability to restore all defects of any diameter and length, and allows early weight bearing and motion of the extremity [(4)].

Recent advances in the management of bone tumors have led to a significant increase in the survival rates of patients with malignant bone tumors. Therefore, limb salvage surgery has gained importance for preserving limb function and providing a better quality of life. However, it is difficult to determine the best treatment strategy for a particular patient. In general, reconstructive procedures have been chosen considering several factors such as the site and involvement of the tumor, pathology and biological behavior of the tumor, life expectancy and predicted function of the limb [(5)].

Aim of the work

The aim of this work is to compare bone transport with fibular bone grafting in reconstruction of bony defects after resection of bone tumors in terms of indications, functional outcomes and complication rates.

Review of Literature

Bone tumors may lead to bony defects, limb length discrepancy, and deformity either primarily or following surgical resection. The main challenge facing the orthopedic oncologists is the optimal treatment of the tumor and the subsequent bone reconstruction [6].

Until the 1970s, amputation was done in most cases. Now with development in the diagnosis and treatment of bone tumors, 80% of patients with bone tumor of an extremity can be treated by a combination of chemotherapy and wide local resection with preservation of the limb and without increased mortality [7].

Various principles are available for reconstruction of the bone defect following en-bloc resection of tumor endoprosthetic replacement, vascularized bone graft or non-vascularized bone grafts (auto-graft or allograft, allograft combined with a vascularized bone graft, re-implantation of sterilized autologous bone), and bone transport with distraction osteogenesis [5] [7].