Modern Techniques In Management Of Periprosthetic Femoral Fractures After Total Hip Arthroplasty

Essay

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(M.B.,B.CH)

In the fulfillment of Master degree

In

"Orthopedic surgery"

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2009

الطرق الحديثة لعلاج كسور عظمة الفخذ حول المفاصل الصناعية فى مفصل الحوض

لوحظ فى العقود الأخيرة زيادة معدل حالات كسور عظمة الفخذ حول مفاصل الحوض الصناعية، و تعد هذه الكسور من المشكلات التى تواجه المريض و الجراح أثناء و بعد تركيب مفصل الحوض الصناعى، و هذه الدراسة تستوفى النقاط الهامة التى تهم جراح العظام فى التعامل مع هذه المشكلات.

يمكن حدوث كسور عظمة الفخذ حول المفاصل الصناعية أثناء عملية تركيب المفصل أو فى فترة ما بعد العملية و هناك العديد من العوامل التى تساعد على حدوث هذه الكسور و تشمل هذه العوامل: هشاشة العظام، لين العظام ، الروماتيزم، العيوب الخلقية فى عظمة الفخذ، الإعوجاج الناتج عن كسر قديم أوما بعد عملية شق عظمى سابقة فى أعلى عظمة الفخذ، تحلل العظام، و تخلخل جزع المفصل الصناعى و تزيد خطورة هذه العوامل أثناء العمليات الخاصة بإعادة تركيب المفصل الصناعى.

تختلف حدوث هذه الكسور بين المفصل الأسمنتى و اللاأسمنتى حيث تصل نسبة إحتمال حدوث هذه الكسور فى المفصل الغير أسمنتى إلى ١٨% أما فى المفصل الأسمنتى فتصل إلى ١% فقط.

تقسيم هذه الكسور يعتبر حلقة الوصل بين الباحثين و الجراحين و ذلك للحصول على أفضل النتائج فى علاج هذه الحالات و قد تم تقسيم كسور عظمة الفخذ حول مفصل الحوض الصناعى بواسطة فانكوفر حيث أن هذا التقسيم يعتمد على ثلاث عوامل و هى: موقع الكسر

حول جزع المفصل الصناعى، مدى ثبات جزع المفصل الصناعى فى عظمة الفخذ و مدى جودة عظمة الفخذ حول الجزع الصناعى.

تختلف طرق علاج هذه الكسور على حسب هذه العوامل و تشمل هذه الطرق: تركيب شرائح و مسامير لتثبيت الكسر، عمل ترقيع عظمى للكسر، إعادة تركيب جزع مفصل صناعى أخر مع عمل تثبيت للكسر و ذلك فى حالات الكسور المصاحبة بتخلخل فى جذع مفصل الفخذ أو عمل إستبدال لأعلى عظمة الفخذ بجزء أخر أو تركيب مفصل خاص بحالات الأورام و ذلك فى الحالات المصاحبة بتفتت عظمى شديد.

Acknowledgement

First and foremost, thanks to ***Allah***; to whom I relate any success in achieving any work in my life.

Words stand short when they come to express my gratefulness to my supervisors. I would like to express my deep thanks and extreme gratitude to ***Prof. dr. Ashraf Abd Elkader Elnnahal***. *Professor of orthopedic surgery faculty of medicine, Cairo University*, giving me this precious opportunity of working under his supervision, his vast knowledge, wide experience and guidance, added much to this work.

I am gratefully expressing my sincere appreciation to ***Dr. Omar Soleiman*** *Ass. Prof. of orthopedic surgery faculty of medicine, Cairo University,* for this utmost supreme guidance and supervision with the kindest encouragement.

Last but not least, my deep appreciation is expressed to all the staff of orthopedic department, Faculty of Medicine, Cairo University, and for my father, mother and all members of my family for their co-operation and encouragement.

Contents

Aim of the work

This study reviews the literature about incidence, etiology and risk factors of periprosthetic femoral fractures. Moreover, to review the literature about site and pattern of periprosthetic femoral fracture with their grading classifications. In addition, to review guide lines for management of these fractures focusing on modern techniques of fixation.

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Abstract

Periprosthetic fractures are increasing in number and complexity. Appropriate precautions should be taken to prevent these fractures. A systematic approach is needed in the form of detailed assessment of the fracture, stability of the implant and the available bone stock for planning an appropriate treatment. The treatment options described in this article can be used as a framework for making the right surgical decision regarding appropriate method of reconstruction to ensure optimum result.

Key words:

Total hip arthroplasty, periprosthetic fracture, femur.

INTRODUCTION

Total hip arthroplasty (THA) is one of the most successful orthopedic procedures performed today. For patients with hip pain due to a variety of conditions, THA can relieve pain, restore function, and improve quality of life. The outcome of an otherwise successful total hip arthroplasty is occasionally compromised by complications. Fracture around the femoral stem is a rare but potentially problematic complication of total hip arthroplasty. Such fractures can range from being minor, with minimal or no effect on the outcome, to being catastrophic and possibly creating an unreconstructable problem with an immense effect on the patient's function. **[32]**

As the number of patients undergoing primary and revision total hip arthroplasty (THA) continues to increase the incidence of periprosthetic femoral fracture is increasing proportionately as well. Intraoperative fractures occur mostly due to technical errors in about 1% of cemented and 3% to 18% of uncemented primary hip operations. The estimated incidence of postoperative periprosthetic fractures ranges from 1% after primary arthroplasty to 4% after revisions. **[54]**

Such fractures usually occur around the tip of the femoral stem, a site of stress concentration. Regional cortical defects such as screw holes, cortical windows or perforations, osteolysis and associated aseptic loosening of the femoral component are the main causes, while pathological processes that result in weakening of the bone, such as osteoporosis or rheumatoid arthritis, are contributory factors. **[39]**

Periprosthetic femoral fractures classification is important to allow communication among researchers and clinicians to guide treatment and to provide insight into outcomes. **Vancouver classification** is becoming the standard system in periprosthetic femoral fractures. It is based on fracture configuration, quality of bone, quality of fixation of stem and site of the fracture either trochanteric, around stem, at tip of stem or below stem tip. [6]

Management of these fractures can be challenging. If the femoral component is loosened, revision operation is recommended involving the insertion of a longer stem, to provide intramedullary stabilization, with or without extramedullary allograft strut supplementation. [43]

If the stem is firmly fixed, a variety of treatment options are available. Closed treatment (traction or application of a spica cast or cast brace) is often associated with complications of prosthetic loosening, malunion, nonunion, skin ulceration, loss of knee motion, and medical problems related to long-term immobilization. It is only indicated in undisplaced trochanteric fractures or when the patient's medical condition precludes surgery. In all other cases open reduction and internal fixation is the treatment of choice. Several methods of extramedullary fixation of periprosthetic fractures have been described, such as cerclage wires, cortical onlay allografts, dynamic compression plates, Mennen plates, Ogden plates, Partridge nylon plates and straps, and the Dall-Miles cable and plate system. [39]

Modern techniques to treat periprosthetic fractures focus on ways to avoid the fracture and new implants for improved fixation. New designs of

replacement prosthesis include changes in the shape of stems to better share load with the bone and avoid the osteoporosis of stress shielding, which weakens the bone and predisposes for fracture. New plate designs, such as the low contact dynamic compression plate, decrease the contact area of plates and decrease the osteoporosis of stress shielding. Changes in materials decrease bone destruction from osteolysis. Less rigid metals (e.g., such as titanium vs. stainless steel) share the load better. Less Invasive Stabilization system (LISS Plates), allow more stable fixation with minimally invasive techniques. [62]

There are many ways to prevent and avoid periprosthetic fracture by preoperative good assessment of the patient at risk, careful intra-operative technique with early interfering with any intra-operative problem and strict post-operative follow up of the patient. [41]