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Original Article

Trans-olecranon fossa four-cortex purchase lateral pinning in displaced supracondylar fracture of the humerus – a prospective analysis in 48 children☆

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ABSTRACT

Objective: The current study aims at a functional analysis of trans-olecranon lateral pinning for displaced supracondylar fracture of the humerus (SCFH) in children.

Methods: A prospective study of 48 children (30 males, 18 females; mean age: 7.4 years) with displaced SCFH was treated at this institution with modified technique from March 2011 to September 2014. Cases were selected on the basis of inclusion criteria. The functional outcome was assessed clinically by modified Flynn's criteria along with achievement of full range of motion.

Results: All 48 children with a mean follow up of 20 months (range: 6–26 months) were assessed. All fractures united well. With modified Flynn's criteria, results were excellent in 40 children (83.3%), good in six children (12.5%), and fair in two children (4.2%). There were no poor results. Preoperative nerve palsies seen in four children recovered at ten weeks. Full range of motion was achieved on an average of 20 days after K-wire removal and no new post-operative nerve palsies were noted.

Conclusion: The modified trans-olecranon fossa four-cortex purchase (TOF-FCP) technique was promising in all cases of unstable SCFH without the complications of loss of reduction or iatrogenic ulnar nerve injury. This technique is simple, safe, and reproducible, with good clinical results in this type of fracture.

☆ Work performed in the KS Hospital and Vinayaka Missions Medical College and Hospital, Department of Orthopedics, Karaikal, India.

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Fixação lateral em quatro corticais da fossa trans-oleocraniana em fraturas supracondilianas deslocadas do úmero - uma análise prospectiva em 48 crianças

Palavras-chave:
Fraturas do úmero
Fixação de fraturas, interna
Processo olecraniano, lesões
Criança

RESUMO

Objetivo: O presente estudo teve como objetivo analisar funcionamente a fixação lateral trans-olecraniana em fraturas supracondilares deslocadas do úmero (FSDU) em crianças.
Métodos: Estudo prospectivo de 48 crianças (30 do sexo masculino, 18 do sexo feminino, idade média: 7,4 anos) com FSDU, tratados nesta instituição entre março de 2011 e setembro de 2014 usando uma técnica modificada. Os casos foram selecionados com base em critérios de inclusão. O resultado funcional foi avaliado clinicamente pelos critérios de Flynn modificados, juntamente com a realização da amplitude de movimento completa.
Resultados: Todas as 48 crianças foram avaliadas, com seguimento médio de 20 meses (intervalo: 6 a 26 meses). Todas as fraturas apresentaram boa união. De acordo com os critérios de Flynn modificados, os resultados foram excelentes em 40 crianças (83,3%), bons em seis (12,5%) e razoáveis em duas (4,2%). Não foram observados resultados ruins. As paralisias nervosas pré-operatórias observadas em quatro crianças se resolveram às dez semanas. Os pacientes alcançaram amplitude completa de movimento em uma média de 20 dias após a remoção dos fios de Kirschner e não foram observadas novas paralisias nervosas pós-operatórias.
Conclusão: A técnica modificada de fixação em quatro corticais da fossa trans-oleocraniana (FQC-FTO) foi promissora em todos os casos de FSDU instável, não apresentando complicações de perda de redução ou lesão do nervo ulnar iatrogênico. A técnica é simples, segura e reprodutível, com bons resultados clínicos nesse tipo de fratura.

Introduction

Supracondylar fractures of humerus (SCFH) represent 50–70% of all elbow fractures in children during first decade of life.[1] The non-operative management of unstable SCFH including Dunlop skin traction, skeletal traction and cast application has historically been associated with a greater incidence of failure to obtain and maintain fracture reduction as well as carries higher complication rates.

Current preferred method of treatment for displaced pediatric SCFH has been closed reduction and percutaneous pin fixation which has given excellent results as reported by various authors.[2–4] Among this, a continuous debate persists between cross pinning (lateral and medial K wires) and lateral only pinning (LOP). Medial pinning carries risk of iatrogenic ulnar nerve injury whereas lateral only pinning is blamed for its instability.[5–9]

Lateral only pinning may result in rotationally unstable fixation causing varus collapse and cubitus varus deformity along with additional medial comminution at the fracture site.[9] Biomechanical studies have shown that chances of rotational loss of reduction in conventional lateral only constructs are high compared with cross pinning, indicating that cross pinning has greater torsional stability.[10]

In our study, we modified the standard two parallel LOP technique to make it a more stable construct by achieving a trans-olecranon fossa four cortical purchase, so that this technique can be used universally in all pediatric displaced SCFH including for unstable fracture patterns.

Methods and materials

Following clearance from Institutional Ethical Committee, 48 prospective children with displaced SCFH were included in our study during the period from March 2011 to September 2014.

Gartland classification was used to categorize the fractures. Willkins modification was applied to Gartland Type II subclassifying them into type A in which posterior cortex was intact with anterior humeral line passing through capitellum and type B with anterior humeral line passing anterior to capitellum with rotated distal fragment. Gartland Type III fractures were also classified as Type A (postero medial displacement) and Type B (postero lateral displacement).

Inclusion criteria

All closed type IIB and type III Gartland SCFH between age group of 3–14 years, within seven days of injury were included in the study. Children with pre-operative nerve injuries as well as pulseless pink limb were also included.

Exclusion criteria

Gartland type I and type II A, open fractures and fractures with compartment syndrome or vascular injury demanding repair were excluded.

Immediately after the patients' arrival to the hospital a detailed clinical examination including a thorough neurovascular assessment was carried out. Standard anteroposterior

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