



ORTHO NEWSCAST



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Dear Doctor,

Greetings from Micro Labs. We are happy to bring you “Ortho Newscast” which contains latest and interesting news in the field of Orthopaedics.

This issue contains

- **Comparison of different management techniques for Distal Humerus Metaphyseal-Diaphyseal Junction Fractures in Children- A Systematic Review and Meta-Analysis**
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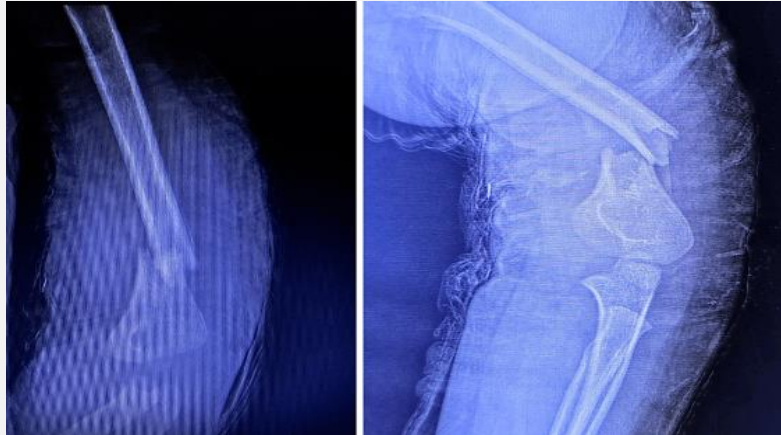
Medical Team, Micro Labs Limited



Comparison of different management techniques for Distal Humerus Metaphyseal-Diaphyseal Junction Fractures in Children- A Systematic Review and Meta-Analysis

INTRODUCTION

The most common elbow fracture in children was the supracondylar humerus fracture, accounting for about 17% of all childhood fractures and 58% of pediatric elbow fractures.¹ Supracondylar humerus fractures are generally described as fractures occurring just above the distal humeral condyles, passing through the thin cortical



Distal Humerus Metaphyseal-Diaphyseal Junction Fracture

bone of the olecranon fossa, and were typically treated with closed reduction and fixation using either lateral pins or a combination of lateral and medial pins.² Metaphyseal-diaphyseal junction (MDJ) fractures are very uncommon, making up approximately 3% of supracondylar humerus fractures. These fractures need to be distinguished from typical supracondylar humerus fractures because the cross-sectional area of the bone at the MDJ is significantly smaller than in the supracondylar region. This reduced area complicates achieving proper fixation since the pins tend to intersect at a high fracture level and run nearly parallel to the humeral axis, resulting in diminished axial and rotational stability. These specific characteristics of MDJ fractures necessitate management through classic pinning, as conventional supracondylar fracture methods have a higher rate of failure and postoperative complications. Over the past two decades, various techniques have been proposed for treating pediatric distal humerus MDJ fractures, but none have emerged as the definitive standard of care.¹ So, this study evaluated and compared various management techniques.

Differentiating paediatric distal humerus metaphyseal-diaphyseal junction fractures from the more common supracondylar humerus fractures is important since traditional pinning methods are linked to longer healing and an increased risk of complications.

METHODS

This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. They conducted a comprehensive literature search across multiple online databases, including PUBMED/MEDLINE, Scopus, Web of Science Core Collection, and Google Scholar. To be included in the review, studies had to meet the



following criteria: (1) involve human subjects, (2) focus on distal MDJ fractures, (3) include patients with open physes, (4) report some of the specified outcomes, and (5) have a minimum follow-up period of 9 months from the time of fracture to the final assessment. Data from eligible articles were extracted and organized based on the treatment methods used. The primary parameters analyzed were functional and cosmetic outcomes, demographic characteristics, and complications.

RESULTS

About 10 retrospective studies met inclusion criteria, encompassing a total of 178 participants with unilateral pediatric distal humerus metaphyseal–diaphyseal junction fractures. Closed reduction and percutaneous pinning were the most frequently used methods, appearing in seven articles. Three articles utilized the elastic stable intramedullary nail technique, two opted for conservative treatment, one employed a lateral miniplate with assisted K-wire, and another combined closed reduction with both percutaneous pinning and intramedullary K-wire. In terms of operation time, the elastic stable intramedullary nails had the shortest average duration at 39.7 minutes (range: 37.5–41.9 minutes), while closed reduction and percutaneous pinning had the longest average duration at 75.47 minutes (range: 55.9–92.1 minutes). Healing times varied, with the miniplate showing the shortest average healing time at 7.2 weeks, followed by closed reduction and percutaneous pinning at 10 weeks, and conservative treatment having the longest average healing time at 12 weeks (Table 1). Regarding Flynn's criteria, all participants achieved excellent or good outcomes, except for those treated with closed reduction and percutaneous pinning, whereas 13 cases were rated as fair and 2 cases as poor. Complications were most commonly observed as cubitus varus, with the highest incidence in conservative management (33% of cases), followed by closed reduction and percutaneous pinning (10.9% of cases). The elastic stable intramedullary nails had a lower incidence (3.77% of cases), and no cases treated with a miniplate developed this complication. Other complications were solely observed in the closed reduction and percutaneous pinning group: 8.5% of cases experienced fixation loss, 6.2% had a significantly reduced range of motion, one case (0.78%) suffered a radial nerve injury, and one case experienced re-fracture.

DISCUSSION

This study evaluated various treatment methods, including closed reduction and percutaneous pinning (CRPP), the elastic stable intramedullary nail (ESIN) technique, conservative treatment,

lateral miniplate with assisted K-wire, and a combination of CRPP and intramedullary K-wire. Further, it was concluded that CRPP was associated with poorer outcomes, a higher incidence

Healing time (weeks)	CRPP	ESIN	Conservative treatment	Lateral mini plate+K
Min	6.7	6.8		
Max	12	9		
Mean	9.97	7.9	12	7.2
±SD	2.86	1.56		
CRPP: closed reduction percutaneous pinning; ESIN: elastic stable intramedullary nail technique.				

Table 1. The healing phases of the therapeutic procedures in the literature reviews.

of complications, and longer operative and healing times. Upon reviewing the sample size and raw data for the ESIN technique, the study concluded that ESIN was a reliable method of fixation when it was technically feasible.¹ In Xue et al., the use of a lateral miniplate with assisted K-wire resulted in the shortest average healing time of 7.2 weeks. Additionally, the study reported no complications and achieved satisfactory functional and cosmetic outcomes, with 19 cases rated as excellent and 2 as good according to Flynn's criteria.³ In Zhou et al., which involved six patients (3.37%), a central long intramedullary wire combined with two cross-pinned wires was used. This approach facilitated closed reduction by using the intramedullary wire to stabilize the reduction until the cross-pinned wires were placed. The study reported no complications, and all six patients achieved excellent outcomes according to Flynn's criteria.⁴

CONCLUSION

Pediatric distal humerus MDJ fractures should be differentiated from the more common supracondylar humerus fractures. CRPP was linked with poorer outcomes, a higher rate of complications, and longer operative and healing times. An analysis of the sample size and data from three studies utilizing the ESIN technique indicated that ESIN was an dependable fixation method when technically feasible. This recommended conducting further research on non-operative management, miniplates, and cross-pinning combined with intramedullary wires.

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Correlation between Osteoporosis and Frailty: A Cross-Sectional Observational Study with Mendelian Randomization Analysis

INTRODUCTION

Osteoporosis is a progressive systemic condition marked by reduced bone density, deterioration of the bone tissue's microstructure, and increased susceptibility to fractures.¹ Globally, around 200 million women suffer from osteoporosis, with osteoporotic fractures affecting 30% of women and 20% of men aged 50 and older. As the global population ages,

the incidence of fractures related to osteoporosis was projected to rise by 310% by 2050 or sooner. Thus, early detection and treatment of osteoporosis are crucial. Frailty is a condition where individuals experience a heightened risk of adverse outcomes due to reduced physiological reserves and the decline of multiple organ systems related to aging.

Frailty and osteoporosis had a significant correlation, and the findings were true even after controlling for confounding variables. Moreover, MR analysis has demonstrated a reciprocal causal link between frailty and osteoporosis.

Among the elderly population, both osteoporosis and frailty are two common conditions. However, there is a dearth of primary research specifically examining the connection between osteoporosis and frailty, despite the association between the two conditions being mentioned in numerous review articles.² This study aimed to offer robust epidemiological evidence on the relationship between osteoporosis and frailty, enhance awareness of the importance of early detection of these conditions in clinical settings, and expedite the development of effective strategies for their prevention.

METHODS

This cross-sectional study included 19,091 participants without frailty and 5,878 participants with frailty through data from the National Health and Nutrition Examination Survey (NHANES). Frailty was assessed through seven indicators: cognition, dependence, depressive symptoms, comorbidities, hospital utilization and access to care, physical performance, and anthropometric and laboratory values. Logistic regression analysis was employed to examine the relationship between osteoporosis and the frailty index. Additionally, the study investigated the causal link between these conditions using Mendelian randomization analysis.

RESULTS

The study found a significant positive correlation between osteoporosis and frailty. After adjusting for demographic factors, body mass index (BMI), smoking, and alcohol consumption, the association between osteoporosis and frailty remained strong (OR=1.454, 95% CI [1.142, 1.851], P=0.003). Stratified analyses showed consistent results across different groups, including ethnicity, marital status, and smoking and alcohol use. A bidirectional two-sample Mendelian randomization (MR) analysis was employed to explore the causal relationship between osteoporosis and frailty. This analysis revealed a significant causal link: when osteoporosis was considered the exposure factor, the pooled odds ratio (OR) for frailty using the inverse variance weighted (IVW) method was 2.81 (95% CI [1.69, 4.68], P=6.82×10⁻⁵). Conversely, when frailty was the exposure factor, the OR using the IVW method was 1.01 (95% CI [1.00, 1.01], P=3.65×10⁻⁷). The results of the multivariate MR analysis were statistically significant (Fig. 1). In reverse Mendelian randomization, while the results remained significant, the absolute value of the beta coefficient was relatively small.

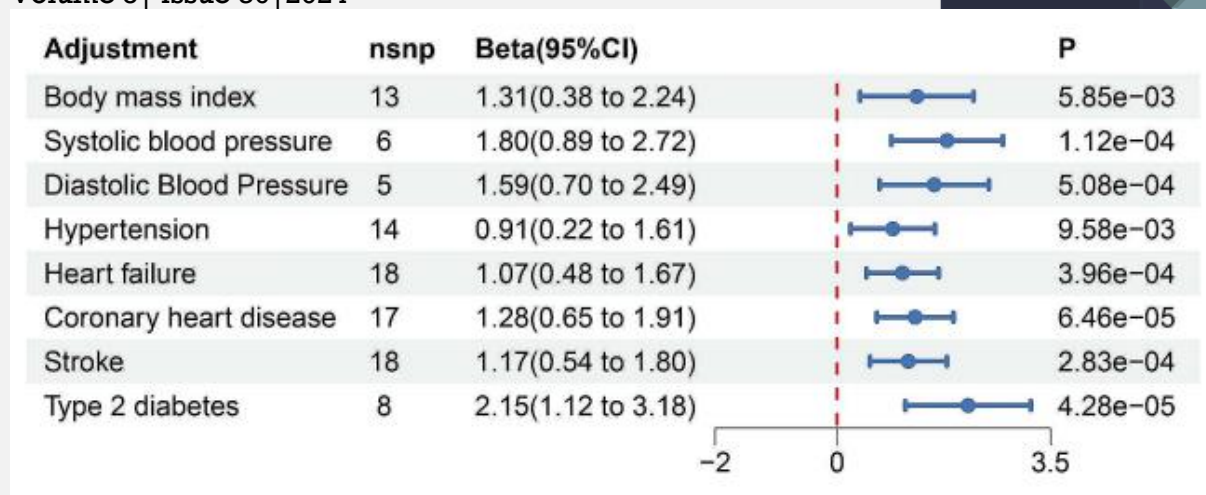


Figure 1. MR analysis of the correlation between frailty and osteoporosis after controlling for confounding variables

DISCUSSION

This study identified a positive correlation between osteoporosis and frailty. However, a prior cohort study with 405 participants found that the relationship between osteoporosis alone and frailty was weak, and that an increased risk of frailty was observed only when both sarcopenia and osteoporosis were present.³ Additionally, a cross-sectional study of postmenopausal women found that older adults with osteoporosis had a higher risk of developing frailty syndrome, with osteoporosis predicting frailty with over 75% accuracy.⁴

CONCLUSION

This study demonstrated a strong positive correlation between osteoporosis and frailty, with the results remaining consistent after accounting for various covariates. Further Mendelian randomization analysis indicated a bidirectional causal relationship between the two conditions. The findings support the integrated management of osteoporosis and frailty. However, additional research was needed to explore the underlying pathophysiological mechanisms linking these conditions.

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Comparison of the complication and reoperation rates between multiple constructs used for simple olecranon fracture fixation

INTRODUCTION

Olecranon fractures are prevalent in adults, comprising 10% of upper limb fractures and being the most common type of elbow fracture. The estimated incidence is around 11.5 to 12 per 100,000 individuals.¹ Surgical repair of proximal ulna fractures is particularly challenging because these fractures are often intra-articular and the bone has limited soft tissue coverage. Inadequate fixation of olecranon fractures can lead to complications such as chronic pain, posttraumatic arthritis, joint contracture, or progressive joint degeneration due to persistent elbow instability. Tension band wiring (TBW) often necessitates symptomatic removal of hardware, partly because of the proximal migration of Kirschner wires used in these constructs. Intramedullary screws have also been used for olecranon fracture fixation, either alone or in combination with plates or tension band augmentations. Biomechanical studies have shown that intramedullary screws combined with tension band augmentation offer better fixation compared to TBW or plate fixation alone. Despite prior descriptions of this hybrid technique, there were limited data comparing hybrid intramedullary screw constructs to standard TBW and plate fixation (PF) methods. So, this study aimed to address this gap by comparing hybrid intramedullary screw and tension band fixation with the commonly used techniques. Using a large diameter cortical screw and washer with TBW may reduce proximal migration and soft tissue irritation, mitigating the high incidence of hardware prominence seen with TBW alone.² Further, it evaluated the rates of complications and reoperations associated with various fixation methods for simple olecranon fractures.

When compared to other well-researched techniques of olecranon fracture fixation, intramedullary proximal ulna screws in conjunction with tension band augmentation represent a feasible and effective therapeutic alternative.

METHODS

A retrospective chart review was performed on patients with olecranon fractures who received internal fixation at a single Level 1 trauma center. The study included 217 patients and data was gathered through CPT codes, and patients were classified into five groups based on their fixation method: no implant, tension band alone, locking olecranon plate, intramedullary screw combined with tension band, and other methods. Recorded variables included patient demographics, Mayo fracture classification, open versus closed injury, type of implant used, reoperation rates, and postoperative complications. Secondary variables assessed were diabetes and smoking status, operative time, and estimated blood loss. Statistical analysis was conducted using IBM SPSS Statistics software (version 29.0).

RESULTS



Operating room (OR) time and blood loss were significantly higher in the locking plate group ($p \leq 0.001$). Specifically, the estimated blood loss in the locking plate group was greater compared to other treatment groups ($p = 0.013$). The locking plate group also had a notably longer OR time compared to the no-implant group ($p \leq 0.001$) and other treatment methods ($p = 0.003$). However, there was no significant difference in OR time between the locking plate group and the intramedullary screw plus tension band group ($p = 1.000$) or the tension band group ($p = 0.576$). Implant choice did not affect reoperation rates ($p = 0.461$). A significant correlation was observed between reoperation rates and fracture type ($p = 0.027$), with higher reoperation rates in more complex fracture patterns (Mayo 3B). Additionally, open fractures were associated with a higher reoperation rate compared to closed fractures ($p \leq 0.01$) (Figure 1).

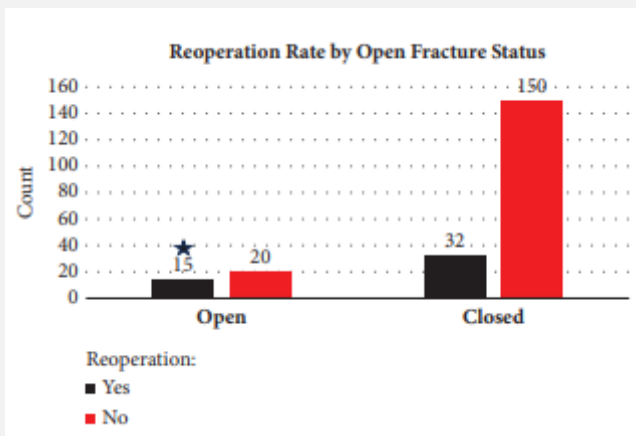


Figure 1: Reoperation rate according to the presence of open fractures. There was a significant difference in the rates of reoperation between closed and open fractures, with open fractures requiring more reoperation.

DISCUSSION

The findings of this study indicated that the hybrid fixation approach, which combines intramedullary proximal ulna screws with tension band augmentation, was a viable and competitive alternative to other established fixation methods. Labrum JT et al. found that, despite the availability of various techniques for olecranon fracture fixation, the intramedullary screw with tension band wiring (TBW) offered biomechanical advantages, was technically straightforward, and generally resulted in fewer complications compared to more commonly used fixation methods.³

CONCLUSION

In suitable cases, a hybrid construct using an intramedullary screw and tension band can be a tolerable and cost-effective choice, offering similar complication rates compared to established standards of care.

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An uncommon case of paralumbar compartment syndrome developed after high intensity deadlifting

INTRODUCTION

Paralumbar compartment syndrome is an uncommon condition that was often missed at the initial presentation because its nonspecific symptoms can mimic those of more common disorders.¹ It is most frequently observed in younger males following weightlifting workouts. Like prolonged positioning on the side, it is also a surgical complication. Patients experiencing back discomfort and rhabdomyolysis following strenuous activity or surgery need to be evaluated for this disorder. Acute back pain surgery may be helpful to avoid persistent back pain.² In this case report, the authors described a 53-year-old male patient experienced progressively worsening lower back pain and paresthesias one day after performing high-intensity deadlifting.

Fasciotomies are the recommended treatment for paraspinal compartment syndrome in order to avoid chronic back pain, especially during physical activity, and its long-term consequences.

CASE PRESENTATION

The patient, a 53-year-old male, presented with worsening lower back and upper buttock pain, along with paralumbar paresthesias, which had developed over the past 24 hours after performing heavy deadlifting. He reported no bowel or bladder dysfunction, direct trauma, prior back surgeries, similar past symptoms, pain radiation, radicular symptoms, or lower extremity numbness or weakness. He also denied intravenous drug use or recent drug abuse. His medical history included bipolar disorder, anxiety, depression, and hypercholesterolemia. Physical examination revealed prominent bilateral paraspinal muscles with diffuse tenderness, subjective paresthesias, and sensory loss over the lumbosacral region. The midline lumbar spine was minimally tender, posture was neutral, and distal motor strength and sensation were intact.



Figure 1. Lumbar spine's T2 Weighted Image axial cut shows significant paralumbar oedema and a lack of muscle striations. No evidence of cord compression was found.



Laboratory results showed elevated blood urea nitrogen (BUN)/creatinine (Cr) ratio, creatine kinase (CK), alanine transaminase (ALT), aspartate transaminase (AST), and white blood cell (WBC) count. Urinalysis revealed hematuria, ethanol, cannabinoids, and opiates. Lumbar spine X-rays, taken in the emergency department, showed no fractures or dislocations but did indicate straightening of normal lumbar lordosis and mild degenerative changes. The patient was admitted for rhabdomyolysis and acute kidney injury, receiving intravenous and oral pain medication along with resuscitative IV fluids. Despite this treatment, persistent lower back pain led to an orthopedic consultation the following morning. Lumbar spine MRI revealed dramatic paraspinal muscle enlargement, edema, and loss of signal characteristics extending from L1 to L5/S1, with significant loss of muscle striations (Fig. 1 and 2). The diagnosis of paralumbar compartment syndrome was confirmed based on clinical presentation and MRI findings, without the need for measuring intracompartmental pressures. Due to the patient's inadequate response to pain management and the significant clinical and radiographic findings, urgent bilateral fasciotomy of the paralumbar muscles was performed with delayed closure. The patient showed overall improvement and returned for follow-up in one week.

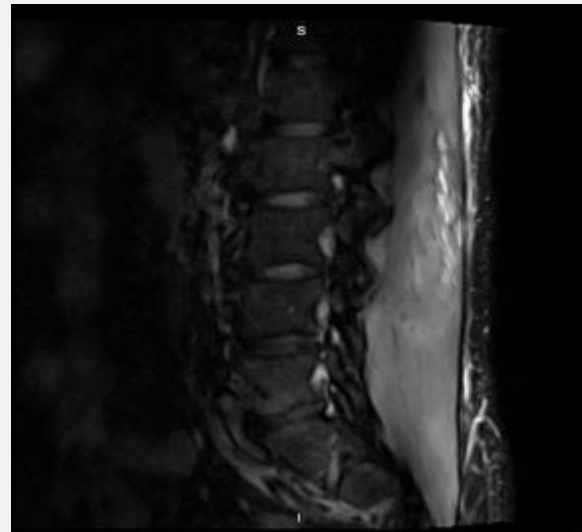


Figure 2. Lumbar spine's sagittal STIR MR image displaying severe paralumbar oedema

DISCUSSION

Paralumbar compartment syndrome was rarely documented in the literature. Currently, there were no Level 1 studies or robust treatment guidelines for this condition. A recent systematic review indicated that paralumbar compartment syndrome frequently occurs following intense physical activity, particularly high-intensity deadlifting, which was reported in nearly 50% of all documented cases.³ Ilyas et al. recently conducted a systematic review comparing outcomes from various case reports on paraspinal compartment syndrome. Their review revealed that, despite differing follow-up periods, most patients who received surgical treatment returned to their pre-operative levels of function. A common observation across these reports, including in this case, was that patients experienced immediate pain relief following surgery. The review also noted that patients who did not undergo surgery often reported mild, intermittent back pain linked to physical exertion after their condition.³

CONCLUSION

Paraspinal compartment syndrome was an uncommon condition observed in individuals with a recent history of intense physical exercise, who present with severe lower back pain, subjective sensory alterations in the affected area, and examination findings of tense, rigid



paraspinal muscles without motor or neurological deficits. Advanced imaging, such as MRI, typically shows significant edema in the paraspinal muscles. According to the limited available literature, early intervention with fasciotomy was recommended to prevent long-term issues, such as chronic exertional back pain. Future studies should focus on this condition with appropriate follow-up and the use of standardized pain and functional assessment tools.

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