



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 the efficacy of intra-articular prolotherapy combined with peri-articular perineural injection in the management of knee osteoarthritis (KOA)
- Characterization of magnetic resonance imaging (MRI) features of humerus osteosarcoma in children and with respect to risk of sustaining a pathologic fracture
- Impact of inflammation on joint function following hip fracture in elderly individuals: A clinical investigation
- Case report on using Distal Fibula Pro-Tibial Screws in Salvage Fixation of Bimalleolar Ankle Fractures in Osteoporotic Bone

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Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited



Comparison of the efficacy of intra-articular prolotherapy combined with peri-articular perineural injection in the management of knee osteoarthritis (KOA)

INTRODUCTION

Knee osteoarthritis (KOA) is a prevalent degenerative disease among middle-aged and elderly individuals, with its incidence rising significantly with age.¹ Recent evidence indicated that KOA impacts both intra-articular and extra-articular structures, including the articular cartilage, subchondral bone, articular capsule, synovium, menisci, tendons, and ligaments.² Treatment options for KOA vary depending on disease severity. While surgery was considered more effective, studies have shown that up to 20% of patients still experience knee pain post-surgery, with 2% facing serious postoperative complications. Intra-articular injection has emerged as an effective method for treating osteoarthritis. Prolotherapy, a newer approach, involves injecting small doses of an irritating solution into the joint cavity or ligament to repair damaged cartilage, ligaments, and other joint supporting structures. Hypertonic dextrose, due to its

affordability and safety profile, has become the most widely used injection drug in prolotherapy. Research indicates that hypertonic glucose can induce inflammation in cells, triggering an inflammatory cascade. However, both knee structural lesions and neurological changes play crucial roles in the pain mechanism of KOA, often limiting the efficacy of prolotherapy. Therefore, finding a combination therapy for better results was necessary. Perineural injection, a therapy for chronic neuropathic pain, involves injecting 5% dextrose into the painful nerve to achieve pain relief. Intra-articular hypertonic dextrose prolotherapy was considered a safe and effective non-surgical option for KOA. However, there was a lack of studies comparing intra-articular versus extra-articular dextrose injections or combination therapies to determine if combination therapy yields superior outcomes.³ This study was designed to assess the effectiveness of three treatment options in reducing pain and enhancing functionality among patients with knee osteoarthritis.



KNEE OSTEOARTHRITIS

Short-term pain relief and improved knee joint function appear to be more effective with the ultrasound-guided I+PG of 5% glucose than with mono treatment. To help patients with KOA have better clinical symptoms, clinical rehabilitators might use this I+PG combination.

METHODS



This was a double-blind, randomised, controlled clinical trial involving 60 KOA patients in total. Participants were divided into three groups: the intra-articular prolotherapy group (IG), the peri-articular perineural injection group (PG), or the combined treatment group (I+PG). Inclusion criteria were as follows: patients aged between 48 and 80 years old, diagnosed with KOA, with grades 2 and 3 on the Kellgren–Lawrence grading scale, and experiencing pain, crepitation, and knee joint stiffness persisting for at least three months. All patients underwent treatment under ultrasound guidance, and follow-up data were collected at 2, 4, and 8 weeks post-treatment. The study groups comprised IG (n=20), PG (n=20), and I+PG (n=20). Outcome measures included the Visual Analogue Scale (VAS), the Western Ontario McMaster University Osteoarthritis Index (WOMAC), and the pressure pain threshold (PPT), assessed at baseline and at 2, 4, and 8 weeks.

RESULTS

The VAS scores for all three patient groups decreased significantly at 2, 4, and 8 weeks post-treatment compared to before treatment ($p<0.05$). After 2 weeks, both the PG and I+PG groups showed significantly lower VAS scores compared to the IG group ($p<0.05$). However, at 4 and 8 weeks post-treatment, the I+PG group had significantly lower VAS scores compared to both the PG and IG groups ($p<0.05$), with no significant difference between the PG and IG groups ($p>0.05$) (Fig. 1). Similarly, the WOMAC scores decreased significantly for all groups at 2, 4, and 8 weeks post-treatment compared to pre-treatment ($p<0.05$). After 2 weeks, the PG and I+PG groups had significantly lower WOMAC scores compared to the IG group ($p<0.05$). However, at 4 and 8 weeks post-treatment, the I+PG group had significantly lower WOMAC scores compared to both the PG and IG groups ($p<0.05$), with no significant difference between the PG and IG groups ($p>0.05$) (Fig. 2). Additionally, the PPT values increased significantly for all groups at 2, 4, and 8 weeks post-treatment compared to pre-treatment ($p<0.05$). At all observation times, the PPT values for the PG and I+PG groups were significantly higher than those for the IG group ($p<0.05$). Furthermore, at 8 weeks post-treatment, the PPT values for the I+PG group were significantly higher than those for the PG group ($p<0.05$).

Figure 1. The three groups' VAS scores at two, four, and eight weeks following therapy

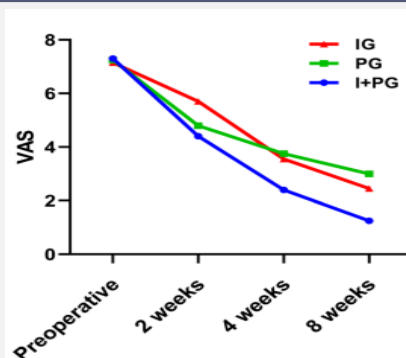
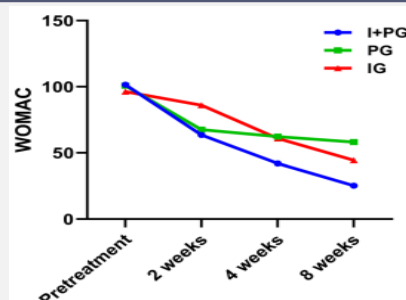


Figure 2. The three groups' WOMAC scores at two, four, and eight weeks following therapy



DISCUSSION



This study revealed that after 4 and 8 weeks of treatment, the VAS score and WOMAC index significantly decreased in the I+PG group compared to both the PG and IG groups following combination therapy. This suggested that the combination therapy offers superior pain relief and improvement in knee joint function compared to either single PG or IG treatment. Interestingly, at 2 weeks post-treatment, there was no significant difference in VAS score and WOMAC index between the I+PG and PG groups, although both were significantly lower than those in the IG group. This indicated that peripheral nerve injection therapy might provide quicker pain relief and better early efficacy compared to intra-articular injection therapy, possibly due to differing mechanisms between the two treatments. Reeves et al. demonstrated that injecting hypertonic glucose into the joint could notably enhance the sense of stability by addressing ligament laxity.⁴ According to Rabago et al., the intra-articular injection of hypertonic glucose primarily stimulates cartilage regeneration and initiates mild local inflammatory responses around damaged or lax ligaments and other supportive structures within the joint. This process triggers healing responses marked by the release of growth factors, which in turn strengthen ligaments and other supportive structures, consequently enhancing joint stability and alleviating pain associated with knee osteoarthritis.⁵

CONCLUSION

Ultrasound-guided intra-articular injection combined with 5% glucose appears to offer greater effectiveness in relieving pain and enhancing knee joint function compared to single therapy in the short term. Clinical practitioners may consider employing this combination of intra-articular injection and glucose to address clinical symptoms in patients with knee osteoarthritis.

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Characterization of magnetic resonance imaging (MRI) features of humerus osteosarcoma in children and with respect to risk of sustaining a pathologic fracture

INTRODUCTION

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Osteosarcoma is a rare form of cancer, constituting less than 1% of all tumor cases, yet it stands as the most prevalent primary malignant bone tumor among children and adolescents. It's incidence rate was approximately 4.4 cases per million individuals aged between 0 and 24 years.¹ Despite being the third most frequent site anatomically (after the distal femur and proximal tibia), the proximal humerus exhibits a diminished response to chemotherapy, increased occurrence of pathologic fractures, and poorer survival rates across all age groups.² Pathologic fractures in osteosarcoma can occur either upon diagnosis or during neoadjuvant chemotherapy. The precise pathophysiological mechanism remains elusive, likely stemming from a combination of tumor-related factors (such as size, histologic subtype, and response to chemotherapy) and patient-dependent factors (including age, activity level, and anatomical location). Magnetic resonance imaging (MRI) serves as the preferred imaging method for anatomical visualization and surgical planning. While existing literature predominantly focuses on clinical outcomes by aggregating osteosarcomas from various locations and patients of all ages, there was a lack of published studies systematically characterizing preoperative MRI features specific to humeral osteosarcoma in pediatric patients, especially in comparison to those with and without fractures.³ Therefore, the aim of this study was to analyze MRI characteristics of humeral osteosarcoma and identify imaging findings that could indicate a heightened risk of pathologic fractures in patients.



Pathologic fractures were present in more than one-third of the patients with humerus osteosarcoma; however, they did not substantially correlate with bigger tumour size, particular MRI characteristics, or a higher risk of disease recurrence.

METHODS

This study comprised 25 children (10 boys, 15 girls) with a mean age of 12.9 ± 4.2 years, among whom 9 (36%) experienced fractures (6 at diagnosis, 3 during treatment), while 16 (64%) did not. The author included children with histologically confirmed humerus osteosarcoma who underwent preoperative MRI between 2008 and 2023. Each patient underwent at least two MRI scans: one at diagnosis and one preoperatively following neoadjuvant chemotherapy. MRI protocols encompassed T1-weighted images with and without fat-suppression, fluid-sensitive images using T2-weighted or short tau inversion recovery (STIR), and contrast-enhanced T1-weighted images with fat-suppression. Two radiologists retrospectively assessed all MRIs for medullary, joint, and extraosseous involvement (including muscle, neurovasculature, and lymphadenopathy). Tumor volumes were measured at diagnosis and after neoadjuvant chemotherapy, and comparisons were made between those with and without fractures.

RESULTS

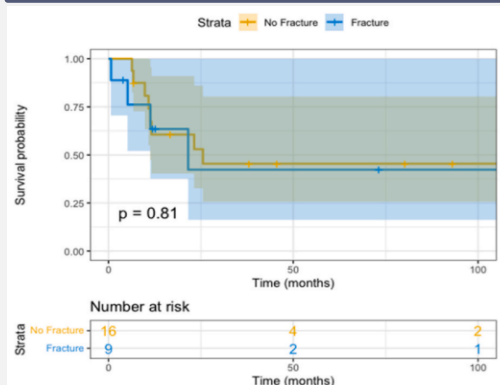
In the non-fracture group, presenting symptoms included pain in 10 cases (63%), pain and swelling in 4 cases (25%), and were unknown in 2 cases (12%). Among all humerus osteosarcoma patients, the most common findings were trans-epiphyseal tumor (80%), invasion into the long head of the biceps tendon (76%), and invasion of the axillary neurovasculature (72%). The length of symptoms before to diagnosis ($p = 0.22$) and the interval

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between an MRI and surgery ($p = 0.61$) did not significantly differ between the fracture and non-fracture groups. Furthermore, there was no significant disparity in median follow-up time after surgery between the two groups ($p = 0.80$). The agreement between radiologists in assessing MRI findings ranged from 60% to 100%. No significant differences in MRI findings ($p > 0.05$) were observed between the groups. Out of the 25 patients studied, tumor volume remained stable or increased in 60% of cases after neoadjuvant chemotherapy and decreased in 40% ($p = 0.84$). At a median follow-up of 17 months (interquartile range: 7-55), disease relapse occurred in 13 children (52%), with 9 cases isolated to the lungs, 1 case isolated to axillary soft tissues, and 3 cases with multifocal disease. Of these, 5 patients were alive and 8 were deceased. For individuals with and without fractures, the median durations for disease recurrence were 8 and 11 months, respectively. There was no statistically significant difference in the groups' survival estimates ($p = 0.81$) (Fig. 1).

Figure 1. Disease-free Patients with and without fractures were compared using the log-rank test and the Kaplan-Meier curve survival. With the matching line colour, the confidence interval is displayed as shaded.



DISCUSSION

In this study, more than a third of patients diagnosed with humerus osteosarcoma experienced pathologic fractures.³ While it was widely acknowledged that fractures were more prevalent in osteosarcomas located within the humerus compared to other anatomical sites,⁴ the exact underlying pathophysiology remains uncertain. However, identifying joint involvement preoperatively was crucial as it directly influences the surgical approach. Although it's widely acknowledged that osteosarcomas typically don't significantly reduce in size following chemotherapy due to their internal tumoral matrix, within our cohort of 25 humerus osteosarcomas, more than half exhibited stable or increased tumor volume ratios after neoadjuvant chemotherapy. This aligned with previous findings and may be more common in humerus osteosarcomas compared to those in other anatomical locations,² However, further studies involving larger patient cohorts were needed to confirm these findings.

CONCLUSION

The most prevalent MRI findings in children diagnosed with humerus osteosarcoma included trans-epiphyseal disease, followed by extraosseous involvement affecting the long head of the biceps tendon and axillary neurovasculature, with intra-articular extension into the glenohumeral joint being rare. Pathologic fractures were observed in one-third of our patients, with two-thirds occurring at diagnosis. Sixty percent of the tumors exhibited stable (8%) or

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increased (52%) volume after neoadjuvant chemotherapy, indicating a limited response to this treatment. These findings, alongside the absence of significant differences between fracture and non-fracture groups regarding serum biomarkers, histologic subtype, treatment response, MRI findings, and outcomes, suggested that these fractures may arise from a combination of tumor-related and patient-specific factors. However, they did not appear to significantly correlate with an increased risk of relapse.

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Impact of inflammation on joint function following hip fracture in elderly individuals: A clinical investigation

INTRODUCTION

Hip fractures represent a significant and widespread public health challenge, especially given the elevated rates of illness, mortality, and disability among aging populations. As osteoporotic fractures, they were particularly prone to re-fracture, leading to compromised mobility and diminished quality of life for patients. With the global population aging, the incidence of hip fractures was projected to reach 4.5 million by 2050. Numerous risk factors contribute to hip fracture susceptibility, including age, gender, smoking, osteoporosis, nutritional status, and medication use.¹ Nevertheless, there was a paucity of research investigating the impact of inflammatory factors on the surgical prognosis of elderly patients with hip fractures. Evidence suggested that immunoinflammatory responses and oxidative stress play significant roles in influencing post-operative outcomes in hip fracture patients.² Multiple inflammatory factors were linked to fracture trauma and the bone healing process. For instance, interleukin (IL)-6 levels were elevated in osteoporotic human bone and contribute to the initiation and maintenance of the inflammatory response, which can impede fracture healing.³ The purpose of this study was to explore the potential risk factors influencing postoperative joint functional activity and outcomes in elderly patients with hip

Inflammatory variables are risk factors for fair joint function following hip fractures in elderly adults; hence, early intervention to address these indicators is critical to improve joint function and prevent sequelae.



fractures, with the goal of offering evidence to guide patient rehabilitation and clinical management practices.

METHODS

This retrospective study included a total of 119 elderly patients who underwent hip fracture surgery, comprising 37 males and 82 females, with ages ranging from 56 to 100 years and a mean age of 76.4 ± 12.29 years. Patients were categorized into two groups based on postoperative hip function: a fair function group (Score < 80) and an excellent function group (Score ≥ 90) according to the Harris hip function scale. All patients underwent either proximal femoral nail antirotation (PFNA) or total hip arthroplasty (THA), with 61 undergoing PFNA and 58 undergoing THA. Inclusion criteria involved age ≥ 50 years, diagnosis of hip fracture, and receipt of surgical treatment. Hip function assessment utilized the Harris hip function scale, evaluating pain, function, deformity, and joint mobility. Clinical characteristics and information of patients with excellent and fair postoperative hip function were compared, including age, gender, fracture site, surgical technique, and laboratory indices. Univariate analysis was conducted to identify risk factors impacting postoperative joint function, followed by multiple logistic regression analysis to determine independent risk factors. Additionally, variables such as visual analogue scale and length of hospital stay were compared between the two groups.

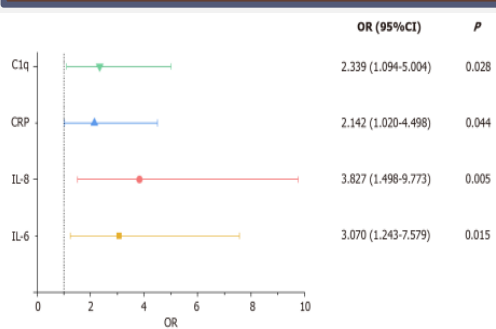
RESULTS

After surgery, 67 patients exhibited fair hip function, while 52 patients demonstrated excellent hip function. Significant differences were observed in IL-6, IL-8, IL-10, CRP, and C1q levels ($P < 0.05$). However, there were no significant differences in age, gender, hypertensive disease, diabetes, fracture location, surgical approach, time from injury to surgery, serum neutrophil count, and lymphocyte count ($P > 0.05$). Notably, the length of hospital stay differed significantly between the two groups ($P < 0.05$),

while VAS scores did not show statistically significant differences ($P > 0.05$). In the multivariate logistic regression analysis (Figure 1), IL-6 > 20 pg/mL (OR 3.070, 95%CI: 1.243-7.579), IL-8 > 21.4 pg/mL (OR 3.827, 95%CI: 1.498-9.773), CRP > 10 mg/L (OR 2.142, 95%CI: 1.020-4.498), and C1q > 233 mg/L (OR 2.339, 95%CI: 1.094-5.004) emerged as independent risk factors for limited hip mobility following hip fracture surgery (all $P < 0.05$).

DISCUSSION

Figure 1. Multivariate logistic regression investigation of elderly people with hip fractures' postoperative fair hip functional



CRP: C-reactive protein; IL: Interleukin; C1q: Complement C1q; OR: Odds ratio.

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This study's findings indicated that inflammatory factors contribute to joint function outcomes following hip fractures in older patients. Long et al. demonstrated that a preoperative neutrophil to lymphocyte ratio (NLR) ≥ 7.28 was the sole independent risk factor associated with 4-year all-cause mortality, while a preoperative C-reactive protein (CRP) to albumin ratio (CAR) ≥ 1.36 was independently linked to 1-year, 2-year, and 4-year all-cause mortality. The study suggested that Admission CAR and NLR could serve as valuable indicators for predicting long-term mortality in elderly patients undergoing hip fracture surgery. However, further research was necessary to validate these findings.⁴

CONCLUSION

This study highlighted various risk factors associated with a less favorable prognosis of joint function in hip fracture patients. Identifying these predictors can aid physicians in developing rehabilitation protocols and implementing early interventions.

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Case report on using Distal Fibula Pro-Tibial Screws in Salvage Fixation of Bimalleolar Ankle Fractures in Osteoporotic Bone

INTRODUCTION

Treating osteoporotic ankle fractures conservatively often results in high rates of displacement. Additionally, elderly patients frequently struggle to limit their weight bearing, which can extend their hospital stays. Surgical intervention was difficult and carry the risk of reduction loss or implant failure.¹ This case demonstrated the successful use of a novel extension of the previously described protibial

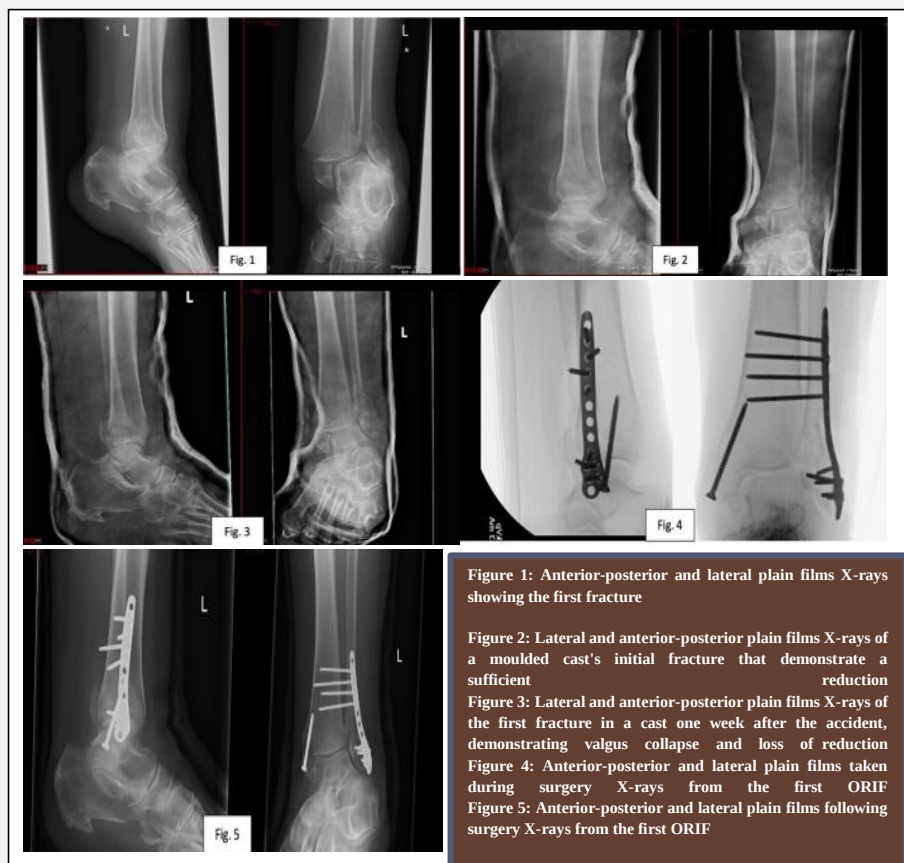
An innovative treatment option for bimalleolar ankle fractures in osteoporotic bone with impaired distal fibular fragment bone purchase was the use of distal fibula pro-tibial screws instead of hindfoot nailing.

technique for salvage fixation, following the failure of initial fixation in a displaced bimalleolar ankle fracture in an osteoporotic elderly patient. This technique provided orthopaedic surgeons with a valuable option for managing such challenging fractures.²

CASE PRESENTATION

The patient experienced a bimalleolar ankle fracture which was initially managed with a plaster cast, as the fracture was not displaced and after weighing the risks and benefits of surgical fixation. Unfortunately, after one week, despite satisfactory initial X-rays and a well-molded cast, there was significant loss of reduction. The patient then underwent standard open reduction and internal fixation (ORIF) by a different surgical team the following day. They used a posterolateral anatomical locking plate for the comminuted distal fibular fracture and a cancellous screw for the medial malleolar fracture. However, due to both physiological and technical issues, this fixation also failed post-operatively. The first post-operative X-ray showed that the ankle had collapsed into valgus. Several distal fibular locking screws occupied most of the distal fibula fragment, and two proximal fibular plate screws missed the fibula

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entirely. The failure of conservative treatment in a cast and ORIF led to a two-week-old ankle fracture with severely compromised bone stock in an elderly patient, necessitating revision fixation [Figures 1–5]. Senior traumatologists reviewed this challenging case and deemed it unsuitable for standard fixation techniques, partly because there was insufficient distal fibular bone stock available for revision. Therefore, a novel approach deviating from the standard fibular pro-tibial fixation technique was considered. As expected, poor bone quality and significant bone loss in the distal fibular fragment, appearing "lightbulb-like" due to previous fixation attempts, made screw purchase in the distal fragment difficult. Distal fibular pro-tibial screws, which were trans-syndesmotic and trans-tibial, were employed to stabilize the remaining distal fibula. The medial malleolus fixation was also revised successfully using a combination of partially threaded and cortical screws along with a medial buttress plate. Post-operatively, a below-knee cast was applied, and the operative side was limited to partial weight-bearing for six weeks. Follow-up visits showed no loss of reduction, radiological union, and a full return to baseline mobility (using one stick for balance) at the final review seven months post-operatively. The patient's recovery was further evidenced by a high AOFAS Ankle-Hindfoot Score of 94%, with a range of motion from -10 degrees dorsiflexion to 50 degrees plantarflexion, matching the contralateral side.

DISCUSSION

Fixing ankle fractures in osteoporotic bone poses numerous challenges because of the decreased bone density and quality characteristic of osteoporosis. These issues can compromise the stability of fixation constructs and impact the overall success of the surgery.³ Operative treatment of bimalleolar ankle fractures typically involves using 1/3 tubular fibular plating and medial malleolar screws as recommended by the AO Foundation. However, in patients with osteoporosis, this technique raises concerns due to the poor screw/bone purchase, which may not provide adequate support for immediate post-operative weight bearing. Additional concerns include bone loss and an increased risk of soft tissue complications. Consequently, alternative fixation techniques have been developed, including the use of anatomical locking plates, fibular or hindfoot intramedullary nailing, and fibula pro-tibia fixation. Although the choice of fixation method should be tailored to each individual fracture pattern and case specifics, there was evidence supporting the use of fibula pro-tibia fixation over these alternative approaches.⁴

CONCLUSION

Managing osteoporotic ankle fractures was particularly challenging due to factors such as increased comorbidities, poor bone quality, and the limited ability of patients to adhere to non-weight bearing rehabilitation protocols. Current evidence indicated that surgical treatment for these fractures should aim to enable early weight-bearing. In this case, given the novelty of the described technique and its use as a revision or salvage procedure, a cautious approach to weight-bearing was adopted. This case also demonstrated that pro-tibial screws in the distal fibula fragment can provide secure fixation when previous fibular fixation has failed, and this

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method should be considered in surgical planning for similar challenging cases where other techniques have been unsuccessful or are deemed inadequate.



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