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Original Research Article

Comparison Between Conservative Treatment vs Primary Surgical Intervention in Jones Fracture of 5th Metatarsal Bone

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Abstract: *Jones fracture of the fifth metatarsal occurs at the metaphyseal–diaphyseal junction and is clinically important because of its relatively poor vascularity, high mechanical stress, and increased risk of delayed union or non-union. Both conservative treatment and primary surgical fixation are used, but the optimal approach remains debated, particularly in active adults and resource-limited settings.* ***Objective:*** *To compare functional recovery, pain improvement, radiological union, return to activity, and complications between conservative treatment and primary surgical intervention in patients with closed zone-II Jones fractures of the fifth metatarsal bone.* ***Methods:*** *This randomized controlled trial was conducted in the Department of Orthopedics, Bahawal Victoria Hospital, Bahawalpur, Pakistan, from 16 July 2025 to 16 October 2025. A total of 66 adult patients aged 18–60 years with radiologically confirmed closed zone-II Jones fractures were enrolled and randomly allocated into two equal groups. Group A received conservative treatment with below-knee cast immobilization and restricted weight-bearing. At the same time, Group B underwent primary surgical fixation using K-wires or bicortical screws according to fracture morphology. Patients were followed at 2, 4, 6, and 12 weeks and at 6 months. Functional outcome was assessed using the American Orthopaedic Foot and Ankle Society score, pain using the Visual Analogue Scale, and fracture healing through clinical and radiological assessment. Data were analyzed using SPSS version 22.0, with $p<0.05$ considered statistically significant.* ***Results:*** *The mean age was 34.7±10.2 years, and 47 patients were male. Baseline demographic and clinical characteristics were comparable between groups. The surgical group demonstrated significantly better functional recovery, with higher AOFAS scores at 6 weeks, 12 weeks, and 6 months. Radiological union occurred earlier after surgery, with a shorter mean union time compared with conservative treatment. Patients in the surgical group also achieved earlier clinical union, full weight-bearing, and return to routine daily activity. Overall complications were numerically higher in the conservative group, mainly due to stiffness, non-union, and re-fracture, whereas surgical complications were minor and manageable.* ***Conclusion:*** *Primary surgical intervention provided faster union, earlier functional recovery, and quicker return to daily activity than conservative treatment in patients with closed zone-II Jones fracture. Conservative treatment remains an acceptable option for selected compliant patients with stable fractures, but surgical fixation may be preferable when early mobilization and reduced delayed healing are clinical priorities.*

Keywords: Metatarsal Bones, Fractures, Bone, Fracture Fixation, Internal, Conservative Treatment, Treatment Outcome

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Introduction

Jones fracture refers to a fracture at the metaphyseal–diaphyseal junction of the fifth metatarsal, commonly classified as a zone-II fracture of the proximal fifth metatarsal. This injury has attracted considerable clinical attention because of its relatively limited vascularity, high mechanical stress during weight bearing, and greater tendency toward delayed union or non-union compared with more proximal tuberosity avulsion fractures (1, 2). The watershed blood supply at the metaphyseal–diaphyseal region and the bending forces acting on the lateral column of the foot are considered major biological and biomechanical contributors to difficult healing (3). Therefore, appropriate early classification, risk stratification, and treatment selection are essential to optimize union, reduce complications, and restore functional mobility.

The management of Jones fracture remains clinically debated, particularly in young and active adults. Conservative treatment, usually involving immobilization and restricted weight bearing, remains an accepted option for selected nondisplaced fractures, especially among low-demand patients or those with contraindications to surgery (4). However, prolonged immobilization may be associated with delayed functional recovery, stiffness, non-union, re-fracture, and delayed return to work or daily activity (5). Surgical treatment, most commonly intramedullary screw fixation or other internal fixation techniques, has been increasingly favored in athletes, active individuals, displaced fractures, and patients requiring early mobilization (6). Recent evidence suggests that operative fixation may offer faster union, earlier return to weight-bearing, and a reduced risk of delayed healing in selected patients, although some contemporary studies have also reported satisfactory outcomes with nonoperative management in zone-II fractures (7, 8).

Functional outcome assessment is central in Jones-fracture research because radiological union alone may not fully represent patient recovery. The American Orthopaedic Foot and Ankle Society score is widely used to assess pain, function, walking capacity, alignment, and activity restoration after foot and ankle injuries (9). Similarly, pain assessment, time to clinical union, time to radiological union, and return to routine activity are important patient-centered outcomes when comparing conservative and surgical strategies. Complication profiling is also necessary, as conservative care may be complicated by non-union or re-fracture, whereas surgery may be associated with wound infection, implant irritation, hardware failure, or the need for revision procedures (10).

The clinical decision between conservative and primary surgical intervention should therefore be individualized according to fracture displacement, patient age, activity level, occupation, bone health, compliance with non-weight bearing, and access to follow-up care. In resource-limited settings, this decision carries additional importance because delayed union and prolonged immobilization can increase indirect costs, loss of income, repeated hospital visits, and caregiver burden. Conversely, surgery requires operative expertise, implants, aseptic operating conditions, and postoperative monitoring.

In Pakistan, orthopedic trauma commonly affects economically productive young adults, and access to timely specialist trauma care may

vary between public and private healthcare settings. Recent Pakistan-based trauma literature highlights the substantial burden of injury care and the need for context-specific evidence to improve treatment pathways (11,12). Local evidence comparing conservative treatment with primary surgical intervention for Jones fracture is limited. This study was therefore conducted to compare functional recovery, pain improvement, union time, return to activity, and complications between conservative treatment and primary surgical intervention among Pakistani patients with closed zone-II Jones fracture of the fifth metatarsal bone.

Methodology

The present randomized controlled trial was conducted in the Department of Orthopedics, Bahawal Victoria Hospital, Bahawalpur, Pakistan, from 16 July 2025 to 16 October 2025. The study compared conservative treatment with primary surgical intervention in adult patients presenting with closed zone-II Jones fracture of the fifth metatarsal bone. Although patient recruitment and initial data collection were completed during the stated study period, enrolled patients were followed according to the planned follow-up schedule at 2, 4, 6, and 12 weeks and at 6 months after treatment to assess clinical and radiological outcomes.

After approval from the institutional ethical review board, patients presenting to the Orthopedic Outpatient Department and emergency services of Bahawal Victoria Hospital were screened for eligibility. Written informed consent was obtained from all participants after explaining the study objectives, treatment options, follow-up requirements, potential risks, and expected benefits. Confidentiality of patient information was maintained throughout the study, and each participant was assigned a study identification number for data recording and analysis.

A total of 66 patients were enrolled using a non-probability consecutive sampling technique. The sample size was calculated using OpenEpi software for comparison of two means, taking the previously reported mean radiological union time of 15.46±5.44 weeks in the conservative treatment group and 12.52±2.50 weeks in the operative treatment group, with a 95% confidence level and 8% absolute precision. The final sample included 33 patients in the conservative treatment group and 33 patients in the surgical treatment group.

Patients of either gender, aged 18 to 60 years, with radiologically confirmed closed zone-II Jones fracture at the base of the fifth metatarsal bone were included. Jones fracture was defined as a fracture at the proximal metaphyseal-diaphyseal junction of the fifth metatarsal, confirmed on anteroposterior and lateral radiographs of the foot. Patients with open fractures, pathological fractures, diabetes mellitus, and those unwilling or unable to comply with the required follow-up schedule were excluded from the study.

Eligible patients were randomly allocated into two equal groups using a computer-generated random number sequence. Group A received conservative treatment, while Group B underwent primary surgical intervention. Baseline information, including age, gender, body mass index, contact details, side of injury, mechanism of trauma, comorbidities, vitamin D deficiency, and clinical presentation, was recorded on a structured proforma. Initial radiographs were obtained for all patients to confirm fracture location and classify the injury before allocation to treatment.

Patients in the conservative treatment group were managed with a below-knee cast and were advised strict non-weight-bearing for the initial 6 to 8 weeks after injury. The cast was removed after this period depending on clinical and radiographic evidence of healing. Follow-up radiographs were performed to evaluate progression of union, and patients were gradually allowed partial weight-bearing with assistive devices as tolerated. Progression to full weight-bearing was permitted after satisfactory clinical improvement and radiological evidence of fracture healing.

Patients in the surgical treatment group underwent operative fixation under spinal anesthesia. Each patient was placed in the supine position on a radiolucent orthopedic table, and the procedure was performed under image intensifier guidance. A small stab incision was made approximately 0.5 to 1.0 cm from the base of the fifth metatarsal bone. Fracture fixation was performed using either K-wires or bicortical screws, depending on fracture morphology and intraoperative assessment. After fixation, patients were observed overnight and received prophylactic parenteral antibiotics for the first 24 hours. Patients were advised to avoid weight-bearing for the first 2 weeks, followed by partial weight-bearing with crutches until the fourth week. Full weight-bearing was allowed after 4 weeks if clinical and radiological findings were satisfactory. In cases where screw loosening or widening of the fracture line was suspected, progression to full weight-bearing was delayed for an additional 2 weeks.

Clinical and radiological follow-up was performed at 2, 4, 6, and 12 weeks and at 6 months after treatment. Functional outcome was assessed using the American Orthopedic Foot and Ankle Society score. AOFAS scores were categorized as excellent, good, fair, or poor according to the grading criteria provided in the study proforma. Pain was assessed using a 10-point Visual Analogue Scale during each follow-up visit. Radiological union was assessed on anteroposterior, lateral, and oblique radiographs of the foot. Union was defined as the presence of cortical bridging and callus formation in at least three of four cortices on radiographic assessment, along with clinical improvement.

All radiographs were reviewed by an orthopedic specialist with at least 5 years of experience and a radiographer. Clinical union was assessed on the basis of absence of localized tenderness, painless weight-bearing, and improvement in functional activity. Time to clinical union, time to radiological union, return to full weight-bearing, AOFAS score, VAS score, and return to routine daily activity were recorded. Complications, including superficial infection, re-fracture, internal fixation loosening, stiffness or rigidity, delayed union, and non-union, were documented throughout follow-up. Non-union was defined as absence of clinical and radiological progression of healing with persistent pain and lack of callus formation at 6 months.

Data were entered and analyzed using IBM SPSS Statistics version 22.0. Quantitative variables, including age, BMI, AOFAS score, VAS score, clinical union time, and radiological union time, were expressed as mean and standard deviation. Categorical variables, including gender, BMI category, mechanism of injury, AOFAS grade, radiological union status, and complications, were presented as frequency and percentage. The independent-samples t-test was used to compare continuous variables between the conservative and surgical treatment groups. The chi-square test or Fisher's exact test was used to compare categorical variables where appropriate. Multivariable analysis was planned to adjust for potential confounding variables, including age, gender, BMI, baseline AOFAS score, and baseline pain score. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 66 patients with closed zone-II Jones fracture of the fifth metatarsal bone were included in this randomized controlled trial, with 33 patients allocated to the conservative treatment group and 33 patients to the primary surgical intervention group. The mean age of the study population was 34.7±10.2 years. The mean age was 35.2±9.8 years in the conservative group and 34.1±10.6 years in the surgical group. Most patients were male, with 47 (71.2%) males and 19 (28.8%) females, reflecting the higher frequency of traumatic foot injuries among active adult males in the local Pakistani population. Baseline demographic characteristics, including age, gender, BMI, side of injury, mechanism of injury, vitamin D deficiency, and hypertension, were comparable between both groups (Table 1).

Baseline clinical and fracture-related variables were also comparable between the two groups. All patients had closed zone-II Jones fractures. The mean baseline AOFAS score was 47.5±6.2 in the conservative group and 47.1±6.5 in the surgical group. Similarly, the baseline VAS score was 7.2±1.1 in the conservative group and 7.3±1.0 in the surgical group. No

statistically significant difference was observed between groups for baseline clinical condition, fracture displacement, local swelling, or difficulty in weight bearing (Table 2).

Functional outcome improved progressively in both groups; however, patients managed surgically showed significantly faster improvement in AOFAS scores from the fourth week onward. At 6 weeks, the mean AOFAS score was 68.4±8.5 in the conservative group compared with 78.6±7.0 in the surgical group. At 12 weeks, the score increased to 82.1±7.6 in the conservative group and 91.6±4.9 in the surgical group. At 6 months, both groups showed good recovery, but the surgical group maintained a significantly higher mean AOFAS score than the conservative group (96.1±2.8 vs. 92.7±5.0; p=0.001) (Table 3).

Pain improved steadily in both groups during follow-up. The surgical group demonstrated significantly better pain relief at each follow-up interval. At 6 weeks, the mean VAS score was 6.2±1.1 in the conservative group compared with 7.4±1.0 in the surgical group. By 12 weeks, the mean VAS score improved to 8.1±1.0 in the conservative group and 9.0±0.7 in the surgical group. At 6 months, pain relief was near complete in both groups, although the surgical group continued to show a statistically better score (Table 4).

Radiological union occurred earlier in the surgical group. At 6 weeks, radiological union was observed in 10 (30.3%) patients in the surgical group compared with 3 (9.1%) patients in the conservative group. At 12 weeks, union was achieved in 27 (81.8%) patients in the surgical group and 19 (57.6%) patients in the conservative group. The mean radiological union time was significantly shorter in the surgical group than in the conservative group (12.1±2.4 weeks vs. 15.8±4.6 weeks; p<0.001). Similarly, clinical union, full weight-bearing, and return to routine activity were achieved earlier in the surgical group (Table 5).

Complications were more frequent in the conservative treatment group, mainly due to stiffness, non-union, and re-fracture. Non-union occurred in 3 (9.1%) patients in the conservative group and none in the surgical group. Re-fracture occurred in 2 (6.1%) conservatively managed patients. Superficial infection was observed in 2 (6.1%) patients in the surgical group and was managed conservatively with antibiotics and wound care. Overall, any complication was reported in 8 (24.2%) patients in the conservative group and 4 (12.1%) patients in the surgical group. After adjustment for age, gender, BMI, baseline AOFAS score, and baseline VAS score, surgical treatment remained independently associated with higher AOFAS score at 6 months and shorter radiological union time (Table 6).

Table 1: Baseline demographic characteristics of study participants

Variable	Conservative treatment Group A (n=33)	Surgical treatment Group B (n=33)	Total (n=66)	p-value
Age, years, mean±SD	35.2±9.8	34.1±10.6	34.7±10.2	0.662
Age group, n (%)				0.891
18–30 years	12 (36.4)	13 (39.4)	25 (37.9)	
31–45 years	14 (42.4)	13 (39.4)	27 (40.9)	
46–60 years	7 (21.2)	7 (21.2)	14 (21.2)	
Gender, n (%)				0.786
Male	23 (69.7)	24 (72.7)	47 (71.2)	
Female	10 (30.3)	9 (27.3)	19 (28.8)	
BMI, kg/m², mean±SD	26.3±3.6	25.9±3.8	26.1±3.7	0.661
BMI category, n (%)				0.956
Normal	12 (36.4)	13 (39.4)	25 (37.9)	
Overweight	15 (45.5)	14 (42.4)	29 (43.9)	
Obese	6 (18.2)	6 (18.2)	12 (18.2)	
Side of injury, n (%)				0.805
Right foot	19 (57.6)	18 (54.5)	37 (56.1)	
Left foot	14 (42.4)	15 (45.5)	29 (43.9)	
Mechanism of injury, n (%)				0.972
Twisting/inversion injury	22 (66.7)	21 (63.6)	43 (65.2)	
Fall/slip injury	8 (24.2)	9 (27.3)	17 (25.8)	
Sports-related injury	3 (9.1)	3 (9.1)	6 (9.1)	
Vitamin D deficiency, n (%)	11 (33.3)	12 (36.4)	23 (34.8)	0.794
Hypertension, n (%)	4 (12.1)	3 (9.1)	7 (10.6)	0.690

Table 2: Baseline clinical and fracture-related characteristics

Variable	Conservative treatment Group A (n=33)	Surgical treatment Group B (n=33)	p-value
Zone-II Jones fracture, n (%)	33 (100.0)	33 (100.0)	—
Closed fracture, n (%)	33 (100.0)	33 (100.0)	—
Baseline AOFAS score, mean±SD	47.5±6.2	47.1±6.5	0.799
Baseline VAS score, mean±SD	7.2±1.1	7.3±1.0	0.701
Fracture displacement <2 mm, n (%)	25 (75.8)	24 (72.7)	0.778
Fracture displacement ≥2 mm, n (%)	8 (24.2)	9 (27.3)	0.778
Local swelling at presentation, n (%)	29 (87.9)	30 (90.9)	0.690
Difficulty in weight bearing, n (%)	33 (100.0)	33 (100.0)	—
Time from injury to treatment, days, mean±SD	4.4±1.8	4.1±1.9	0.512

Table 3: Comparison of mean AOFAS scores and AOFAS grades during follow-up

Follow-up interval	Conservative treatment Group A mean±SD	Surgical treatment Group B mean±SD	p-value	Excellent outcome Group A n (%)	Excellent outcome Group B n (%)	p-value
2 weeks	48.4±6.8	51.9±6.5	0.036	0 (0.0)	0 (0.0)	—

4 weeks	58.7±7.9	66.2±7.3	<0.001	0 (0.0)	2 (6.1)	0.151
6 weeks	68.4±8.5	78.6±7.0	<0.001	2 (6.1)	14 (42.4)	<0.001
12 weeks	82.1±7.6	91.6±4.9	<0.001	21 (63.6)	31 (93.9)	0.004
6 months	92.7±5.0	96.1±2.8	0.001	30 (90.9)	33 (100.0)	0.238

Table 4: Comparison of VAS pain scores during follow-up

Follow-up interval	Conservative treatment Group A mean±SD	Surgical treatment Group B mean±SD	Mean difference	p-value
2 weeks	3.1±1.0	3.8±1.1	0.7	0.009
4 weeks	4.7±1.2	5.9±1.3	1.2	<0.001
6 weeks	6.2±1.1	7.4±1.0	1.2	<0.001
12 weeks	8.1±1.0	9.0±0.7	0.9	<0.001
6 months	9.2±0.8	9.7±0.5	0.5	0.004

Table 5: Radiological union and recovery outcomes

Outcome	Conservative treatment Group A (n=33)	Surgical treatment Group B (n=33)	p-value
Radiological union at 6 weeks, n (%)	3 (9.1)	10 (30.3)	0.030
Radiological union at 12 weeks, n (%)	19 (57.6)	27 (81.8)	0.033
Radiological union at 6 months, n (%)	30 (90.9)	33 (100.0)	0.238
Clinical union time, weeks, mean±SD	13.9±4.0	10.8±2.6	<0.001
Radiological union time, weeks, mean±SD	15.8±4.6	12.1±2.4	<0.001
Time to comfortable full weight-bearing, weeks, mean±SD	12.6±3.8	8.4±2.2	<0.001
Time to return to routine daily activity, weeks, mean±SD	16.9±4.6	12.7±3.0	<0.001

Table 6: Complications and adjusted outcome analysis

Variable	Conservative treatment Group A (n=33)	Surgical treatment Group B (n=33)	p-value
Superficial infection, n (%)	0 (0.0)	2 (6.1)	0.492
Internal fixation loosening, n (%)	—	1 (3.0)	—
Stiffness/rigidity, n (%)	4 (12.1)	1 (3.0)	0.355
Non-union, n (%)	3 (9.1)	0 (0.0)	0.238
Re-fracture, n (%)	2 (6.1)	0 (0.0)	0.492
Any complication, n (%)	8 (24.2)	4 (12.1)	0.204
Adjusted effect of surgical treatment on AOFAS score at 6 months, β coefficient	Reference	3.10	0.001
Adjusted effect of surgical treatment on radiological union time, β coefficient	Reference	-3.42	<0.001

Discussion

This randomized controlled trial showed that both conservative treatment and primary surgical intervention resulted in progressive recovery among patients with closed zone-II Jones fracture; however, surgical management produced faster functional improvement, earlier radiological union, earlier full weight bearing, and quicker return to routine daily activity. Baseline comparability between groups supports the internal validity of these findings, as age, gender, BMI, fracture displacement, baseline AOFAS score, and baseline VAS score were similar before treatment. The higher AOFAS score in the surgical group from early follow-up to six months suggests that primary fixation may provide earlier mechanical stability and allow more confident rehabilitation, especially in active adult patients.

These findings are consistent with Rikken et al., who reported adequate union rates after both conservative and surgical treatment of acute proximal fifth metatarsal fractures but emphasized individualized treatment according to fracture zone and patient activity level (13). Similarly, Attia et al. reported favorable return-to-play and union outcomes after surgical management of Jones fractures in athletes, supporting the role of operative fixation when early activity restoration is a priority (14). Goodloe et al. also concluded that elite athletes generally achieve high union and return-to-sport rates after operative management of proximal fifth metatarsal fractures (15). Although the present study was not limited to athletes, the predominance of young males and twisting or inversion injury mechanisms resembles active trauma populations in which early restoration of mobility is clinically relevant.

The shorter radiological union time in the surgical group in our study is supported by Hollander et al., who observed high union rates after surgical treatment of proximal fifth metatarsal stress fractures (16). Bucknam et al. also reported that intramedullary screw fixation was a reliable option, allowing early weight bearing and return to full activity in appropriate candidates (17). Similarly, Looney et al. found that early weight bearing after intramedullary screw fixation did not result in unacceptable delayed union rates, suggesting that stable fixation may support accelerated rehabilitation (18). These findings align with our observation that surgical patients achieved comfortable full weight bearing significantly earlier than conservatively managed patients.

However, our findings contrast partly with Kingery et al. and Kadiyala et al., who reported that nonoperative and operative treatment of true Jones or zone-II fifth metatarsal fractures may produce equivalent clinical and radiographic healing in selected patients (19,20). This difference may reflect variations in fracture definition, displacement, treatment protocols, weight-bearing restrictions, patient compliance, and follow-up duration. In the Pakistani context, prolonged non-weight-bearing compliance may be difficult for patients because of occupational demands, travel limitations, and limited access to repeated supervised rehabilitation, which may make surgical stabilization more advantageous in selected patients.

Pain improvement was greater in the surgical group throughout follow-up. This may be explained by reduced micromotion at the fracture site after fixation, earlier stability, and improved confidence during mobilization. Ficek et al. and Albloushi et al. similarly emphasized that restoration of agility and functional loading is a major target in fifth

metatarsal fracture management, particularly in active individuals (21,22). Complications were numerically higher in the conservative group, mainly due to stiffness, non-union, and re-fracture, whereas surgical complications were mostly minor and included superficial infection. Recent work by Flaherty et al. reinforces that non-union in fifth metatarsal fractures is multifactorial and may be influenced by fracture pattern, biological factors, and patient-related risks (23).

Overall, this study supports primary surgical intervention as an effective option for closed zone-II Jones fractures when early union, faster functional recovery, and earlier return to routine activity are desired. Conservative treatment remains reasonable in carefully selected, compliant patients with nondisplaced fractures, but it may carry a higher risk of delayed recovery. Future multicenter Pakistani trials with longer follow-up, cost-effectiveness analysis, standardized rehabilitation protocols, and validated patient-reported outcome measures are recommended.

Conclusion

Primary surgical intervention for closed zone-II Jones fracture of the fifth metatarsal was associated with earlier radiological union, faster functional improvement, earlier full weight-bearing, and quicker return to routine activity compared with conservative treatment. Although both approaches achieved satisfactory recovery by 6 months, surgical fixation may be more suitable for active adults and patients requiring early mobilization, while conservative management should be reserved for carefully selected patients with stable fractures and reliable follow-up compliance.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-BVH-03d-25)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

NA (PGR)

Contributed to study design, data collection and initial manuscript drafting

Assisted in data acquisition, literature review and manuscript editing

Performed statistical analysis and contributed to interpretation of results

SM (ASSOCIATE PROFESSOR)

Helped in methodology development, data organization and manuscript formatting

Contributed to patient recruitment, data entry and results compilation

Assisted in referencing, proofreading and final revisions of the manuscript

MR (PGR)

Provided guidance in study execution and critically reviewed the manuscript

Supervised the research, coordinated among authors, finalized the manuscript and approved the final version

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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