

Research Article

Scarf Osteotomy with Herbert Screw Fixation for Correction of Hallux Valgus in a Young Adult: A Case Report

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ABSTRACT

Background: Hallux valgus (HV) is a common forefoot deformity characterized by lateral deviation of the great toe and medial deviation of the first metatarsal. While adult HV differs mechanically from juvenile HV, both share instability of the first ray as a common pathway, and surgical correction must be individualized to the patient's specific deformity pattern.

Case Presentation: We report a 20-year-old woman who presented with painful bilateral forefoot deformity, RIGHT > LEFT, without antecedent trauma or systemic symptoms. Clinical and radiographic evaluation confirmed severe hallux valgus with an increased hallux valgus angle (HVA) and intermetatarsal angle (IMA) on the right foot. She underwent a Scarf osteotomy of the right first metatarsal with open reduction and internal fixation using two Herbert (headless compression) screws, combined with closed reduction and Kirschner-wire fixation of the right great toe. The postoperative course was uneventful; she was discharged on oral antibiotics, analgesics, and a structured physiotherapy and below knee slab application.

Conclusion: An individualized surgical strategy combining a diaphyseal first metatarsal osteotomy with herbert screw fixation and adjunct phalangeal correction can achieve satisfactory radiographic and early functional outcomes in symptomatic hallux valgus. This report adds to the limited case-level literature on combined Scarf-Herbert screw fixation and highlights points relevant to surgical decision-making and postoperative protocol design.

INTRODUCTION

Hallux valgus (HV) is one of the most common forefoot pathologies encountered in orthopaedic practice (Nix et al., 2010), defined radiographically as a hallux valgus angle (HVA) greater than 15°, with moderate deformity between 20° and 30° and severe deformity above 40° (Coughlin & Jones, 2007; Coughlin & Freund, 2001). Pooled global prevalence is estimated at about 19%, and is higher in women (about 24%) than in men (about 11%) (Cai et al., 2023). Although often considered an adult disease attributable to footwear, genetic and anatomical predisposing factors are now well recognized (Hardy & Clapham, 1951; Mann & Coughlin, 1981), and a substantial proportion of adults with HV report that their deformity began during childhood or adolescence.

The first ray is intrinsically unstable owing to the spherical first metatarsal head, with the

medial collateral ligaments and medial sesamoid acting as the principal static stabilizers against the dynamic deforming forces of the abductor hallucis and long flexor/extensor tendons (Easley & Trnka, 2007a). Predisposing factors such as an increased distal metatarsal articular angle (DMAA), metatarsus adductus, and first metatarsal varus alter this balance and drive progressive deformity (Coughlin, 1997). While these factors are described most extensively in the juvenile population, in whom the growth plate both limits and enables surgical correction, the underlying instability concept is relevant across age groups and informs the choice of osteotomy and fixation in older adolescents and young adults presenting with established, symptomatic deformity.

Surgical correction is indicated for painful, functionally limiting HV that has failed conservative measures (shoe modification,

orthoses, analgesia) (Vanore et al., 2003). Increasing deformity severity is associated with progressively poorer general and foot-specific health-related quality of life (Menz et al., 2011). Numerous osteotomy techniques have been described — including Chevron, Mitchell, proximal opening/closing-wedge, double first metatarsal osteotomy, and the Scarf osteotomy — each with a specific ability to correct HVA, intermetatarsal angle (IMA), and DMAA (Easley & Trnka, 2007b; Fukushi et al., 2022). We present a case of severe bilateral hallux valgus, predominantly affecting the right foot, managed surgically with a Scarf osteotomy and Herbert screw fixation, and discuss the surgical rationale in the context of the current literature.

CASE REPORT

History and Clinical Examination

A 20-year-old woman was referred from a

taluk (sub-district) hospital with complaints of pain and progressive deformity over both forefeet. There was no history of preceding trauma, no evening rise of temperature, and no cough or night sweats to suggest an infective or tuberculous etiology. She had no other skeletal deformities and no known comorbidities. No history of similar complaints in family.

On general examination, she was conscious, oriented, and hemodynamically stable. Systemic examination — respiratory, cardiovascular, abdominal, and central nervous system — was unremarkable. Local examination of both feet demonstrated the clinical stigmata of hallux valgus, with active toe and ankle movements preserved bilaterally and the dorsalis pedis pulse palpable on both sides, confirming intact distal neurovascular status.

Clinical pictures of right foot



Clinical pictures of left foot



XRAYS OF SHILPA



Investigations

Baseline hematological, biochemical, coagulation, and virological screening was performed in preparation for surgery and was unremarkable (Table 1). A 2D-echocardiogram showed a normal study with an ejection fraction of 60%.

Table 1. Preoperative Laboratory Investigations.

Investigation	Value	Investigation	Value
Hemoglobin	11.1 g/dL	Total bilirubin / Direct	0.4 / 0.1 mg/dL
Total count	7,280 / μ L	AST / ALT	47 / 49 U/L

Platelets	245,000 / μ L	ALP	86 U/L
PT / INR	19.8 s / 1.4	HbA1c	5.2%
Urea / Creatinine	38.3 / 0.8 mg/dL	Na ⁺ / K ⁺	142 / 3.80 mEq/L
Total protein / Albumin	7.6 / 4.3 g/dL	HIV / HBsAg / HCV	Non-reactive / Negative / Negative
2D-Echocardiogram	Normal study, EF 60%		

Weight-bearing anteroposterior and oblique radiographs of both feet were obtained. On the right foot, the hallux valgus angle and intermetatarsal angle were both increased . The left foot showed a milder deformity of similar pattern .

HVA AND IMA ANGLES



Diagnosis

Bilateral hallux valgus deformity, severe on the right and mild-to-moderate on the left.

Treatment

After optimization and preoperative work-up, the patient underwent surgical correction of the right foot deformity on [08/07/2026]. The procedure performed was a Scarf osteotomy of the right first metatarsal with open reduction and internal fixation using two

Herbert (headless compression) screws, combined with closed reduction and Kirschner-wire fixation of the right great toe under spinal Anesthesia, tourniquet used,

Perioperative intravenous fluids, analgesia (diclofenac), a proton-pump inhibitor, and multivitamin supplementation were administered. Left foot was managed conservatively with bunion splint and planned for a surgery on elective basis.

Table 2. Implants Used.

Implant	Specification / Quantity
Herbert (headless compression) screw	3 mm $\times$ 14 mm — 1
Herbert (headless compression) screw	3 mm $\times$ 12 mm — 1
Kirschner (K-) wire	2.5 mm — 1

INTRA OP PICTURES



Postoperative Course and Follow-Up

Postoperatively, a below knee slab was applied for immobilization. The patient received intravenous ceftriaxone and amikacin, analgesics, and supportive medication, with regular wound dressings and physiotherapy.

The postoperative course was uneventful, and postoperative radiographs confirmed satisfactory position of the osteotomy and hardware .

POST OP XRAYS (R) FOOT



She was discharged in a stable condition on oral amoxicillin-clavulanate, diclofenac, a proteolytic enzyme preparation, pantoprazole, vitamin B-complex, calcium, and vitamin C, with instructions to continue slab

immobilization, regular dressing, and physiotherapy, and to review in the orthopaedic outpatient department after 15 days.

CLINICAL PICTURES AND XRAYS 2 MONTHS FOLLOW UP



DISCUSSION

Hallux valgus results from a fragile balance between the intrinsically unstable, spherical first metatarsal head and its static and dynamic stabilizers. Predisposing factors — an increased DMAA, metatarsus adductus, and first metatarsal varus — have been characterized in detail in the juvenile population, where the deformity often originates years before symptoms manifest around adolescence, and where a substantial proportion of adults recall the onset of their deformity from childhood or teenage years (Knörr et al., 2022). Although our patient presented at 20 years of age and is therefore managed according to adult surgical principles, the possibility of an early-onset (juvenile) deformity persisting into young adulthood is worth considering, particularly given the reported bilaterality and the severity of the right-sided deformity; a first-degree family history of HV would support this interpretation.

The Scarf osteotomy is a Z-shaped diaphyseal osteotomy of the first metatarsal that permits translation, rotation, shortening or lengthening, and plantar/dorsal displacement of the capital fragment, making it a versatile technique for correcting both HVA and IMA in adults (Barouk, 2000). Contemporary series report clinically meaningful improvement in the HVA and IMA after Scarf osteotomy, with corresponding gains in patient-reported pain and function scores that are sustained to at least two years (Sieloff et al., 2023). Meta-analyses of randomized trials show broadly

comparable clinical results between Scarf and chevron osteotomies, with at most a small radiographic advantage for chevron in postoperative HVA (about 2°) and no significant difference in IMA, AOFAS score, or complication rates (Fukushi et al., 2022; Peng et al., 2024). The first randomized trial comparing the two techniques likewise found similar improvement in AOFAS score and radiographic correction at about 27 months (Deenik et al., 2007). Third-generation minimally invasive chevron-Akin osteotomy has been reported to give similar 2-year clinical and radiological outcomes to Scarf-Akin in a matched cohort (Tay et al., 2022), and modified Lapidus arthrodesis has been compared with Scarf osteotomy for moderate-to-severe deformity (Reilly et al., 2021). Fixation is most commonly achieved with one or two screws; comparative studies suggest that screw number does not materially affect radiographic correction or recurrence, although two-screw constructs may carry a modestly higher rate of hardware-related complications requiring later removal (Lewis et al., 2025; evidence drawn mainly from minimally invasive distal osteotomies). Symptomatic hardware has been reported even with headless screws, in 9% of one series of 175 Scarf osteotomies (Klobučar et al., 2023), and Scarf osteotomy without internal fixation has been reported to give good radiological correction (Leemrijse et al., 2012); bioabsorbable headless screws have also given satisfactory radiographic and clinical results with a low complication rate (Kim et

al., 2016). In the present case, two Herbert (headless compression) screws were used, providing interfragmentary compression across the osteotomy while avoiding a prominent screw head beneath the thin dorsal soft-tissue envelope of the forefoot.

It is notable that the reviewed pediatric literature cautions against reliance on the Scarf osteotomy in children, both because of its limited ability to correct an elevated DMAA and because the technique is traditionally reserved for cases with a measurable first-second intermetatarsal (M1M2) varus (Knörr et al., 2022). This caveat is specific to the juvenile skeleton, where growth-plate-preserving, percutaneous, and guided-growth techniques are preferred; it does not apply directly to a skeletally mature 20-year-old, in whom the Scarf osteotomy remains an established, well-validated option. The addition of Kirschner-wire fixation of the great toe in this case likely served to protect an adjunctive phalangeal procedure and provide provisional alignment of the first metatarsophalangeal joint, consistent with the broader literature's emphasis on correcting all components of the deformity — metatarsal, phalangeal, and, where present, metatarsus adductus — rather than an isolated distal or proximal procedure, since incomplete correction of any single component is a recognized driver of recurrence. In a recent meta-analysis, recurrence after Scarf alone (11.4%) was about twice that after combined Scarf–Akin osteotomy (5.7%), although the difference was not statistically significant (Butler et al., 2024). Reported recurrence after Scarf osteotomy depends heavily on follow-up length: 3.6–11.3% in short- to mid-term series (Clarke & Platt, 2021), compared with about 40% (HVA >15°) in long-term studies of shaft osteotomies with 8–14 years of follow-up (Lalevée et al., 2024). Across hallux valgus surgery generally, pooled recurrence is about 25%, with preoperative HVA and IMA and postoperative HVA and sesamoid position the main risk factors (Ezzatvar et al., 2021). Long-term data also warrant counselling: in a randomized trial with 14 years of follow-up, radiological recurrence was common after both Scarf and chevron osteotomy, with no

significant difference between the two (Jeuken et al., 2016). Longer follow-up will therefore be needed to establish the durability of correction in the present patient. Greater HVA and older age predicted second-ray pathology, such as hammertoe and second tarsometatarsal arthritis, in one series (Gribbin et al., 2017).

Postoperative rehabilitation is an important part of management. Plantar-pressure analysis has shown that physiological gait is not restored after hallux valgus surgery, and a multimodal programme of physiotherapy and gait training improved weight bearing of the first ray (Schuh et al., 2009). A recent systematic review of randomized trials found limited evidence for postoperative interventions: early weight bearing, dynamic metatarsal splinting and transcutaneous ultrasound appeared to improve outcomes, and rigid-soled footwear improved satisfaction (Gumuskaya et al., 2025). In the present case the foot was protected in a below-knee slab alongside physiotherapy; the optimal timing of weight bearing after stable Scarf fixation remains unsettled, and functional outcomes should be reported at follow-up.

CONCLUSION

Scarf osteotomy with Herbert screw fixation, combined with adjunct correction of the great toe, is a reproducible technique for correcting symptomatic hallux valgus in a young adult, achieving stable fixation and satisfactory early radiographic alignment. Individualized, "à la carte" surgical planning — correcting the metatarsal, phalangeal, and, where relevant, metatarsus adductus components together — remains central to minimizing the risk of recurrence, as is well established in both the adult and juvenile hallux valgus literature.

Key Points

- Bilateral hallux valgus in a young adult, severe on the right side, treated surgically with a right Scarf osteotomy and Herbert screw fixation.
- Combined correction of the metatarsal and phalangeal components is recommended to reduce recurrence risk.

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