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Original Article

Simultaneous dual approach in Hawkins type II fractures: Maximum benefit at low risk?

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Abstract

Objective: The aim of this study was to evaluate the outcomes of Hawkins type II fractures treated with a simultaneous dual approach.

Methods: A retrospective multicenter study was conducted at four major trauma centers. Patients with Hawkins type II closed talar neck fractures managed by a simultaneous dual approach with complete preoperative medical records and a minimum follow-up of six months were included.

Results: Eighteen patients were identified. The anatomical reduction was achieved in 17 cases, with a mean follow-up of 53.57 ± 31.77 months (range 8 to 116 months), and the American Orthopaedic Foot & Ankle Society (AOFAS) score was 91.42 ± 7.66 points (range 75 to 100). There were two cases of subtalar arthritis (11%) and two cases of partial avascular necrosis of the talar body (11%), all of them asymptomatic and not requiring secondary surgical procedures up to the latest clinical follow-up.

Conclusion: The simultaneous dual approach is a safe and reliable strategy for managing Hawkins type II talar neck fractures without significantly compromising the talar circulation. We recommend that future prospective studies with a larger sample be conducted to validate these findings further.

Level of evidence IV; Therapeutic studies; Case series.

Keywords: Foot bones; Fracture healing; Bone avascular necrosis.

Introduction

Talar neck fractures with subtalar joint subluxation or dislocation, classically known as Hawkins type II, are the most frequent variety reported in the literature of these uncommon foot injuries[1,2].

Over the past 20 years, substantial improvements have occurred concerning their definitive surgical management. Combined lateral and medial access seems to be the most recommended since it is possible to visualize both sides of the segment and thus better control reduction, avoiding residual displacement[3-7]. The major concern is the potential threat to talus body vascularity: the additional damage involved in two close surgical approaches could increase the chance of developing osteonecrosis. Due to the low incidence of these injuries, the published evidence with this strategy remains scarce and limited to some case series, preventing the ability to draw definitive conclusions[1,5-9].

The aim of this study is to evaluate the outcomes of Hawkins type II fractures treated with a simultaneous dual approach in terms of reduction quality, functional results, and complication rates focusing on avascular necrosis and peritalar arthritis.

Considering all these aspects, the hypothesis is that this simultaneous dual approach is safe and highly recommended.

Study performed at the Sanatorio Allende, Córdoba, Córdoba, Argentina.

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Methods

A retrospective multicenter study was conducted at four level 1 trauma centers. Patient and clinical data were collected using a shared form completed after obtaining informed consent from all cases. The protocol was approved by the Hospital's Ethics and Research Commission.

Patients with Hawkins type II closed talar neck fractures treated by simultaneous dual approach with complete medical records, including preoperative radiographs and computed tomography (CT) scan, and a minimum follow-up of six months were included. Patients with open injuries, previous history of osteochondral lesions to the talus, simultaneous fixation of the calcaneus, and rheumatoid pathologies were excluded.

The surgical technique used an anterolateral approach starting from the lateral aspect of the ankle joint in line with the extensor digitorum longus muscle towards the base of the fourth metatarsal and anteromedial access between the anterior and posterior tibial tendons beginning over the medial malleolus and progressing towards the tuberosity of the navicular bone (Figure 1).

Medical data recorded was entered into an Excel spreadsheet including patient demographics, comorbidities, soft tissue condition, initial damage control surgery, time to definitive fixation, quality of reduction assessed by CT scan (anatomic or not; based on a 2 mm articular step), functional results based on the American Orthopaedic Foot & Ankle Society (AOFAS) hindfoot score and patient's reported satisfaction (very satisfied, satisfied, dissatisfied, very dissatisfied), early complications (superficial or deep infection, wound dehiscence or deep vein thrombosis), late complications (nonunion, avascular necrosis, subtalar and/or ankle arthritis), and need for secondary procedure.

Results

Between January 2014 and June 2023, 18 patients were identified with closed Hawkin type II talar neck fractures treated by open reduction and internal fixation by a simultaneous dual approach technique (Table 1). The mean age of the cohort was 30.8 years (range 15 to 45 years). Six cases (40%) required initial damage control surgery involving closed reduction and percutaneous pinning fixation.

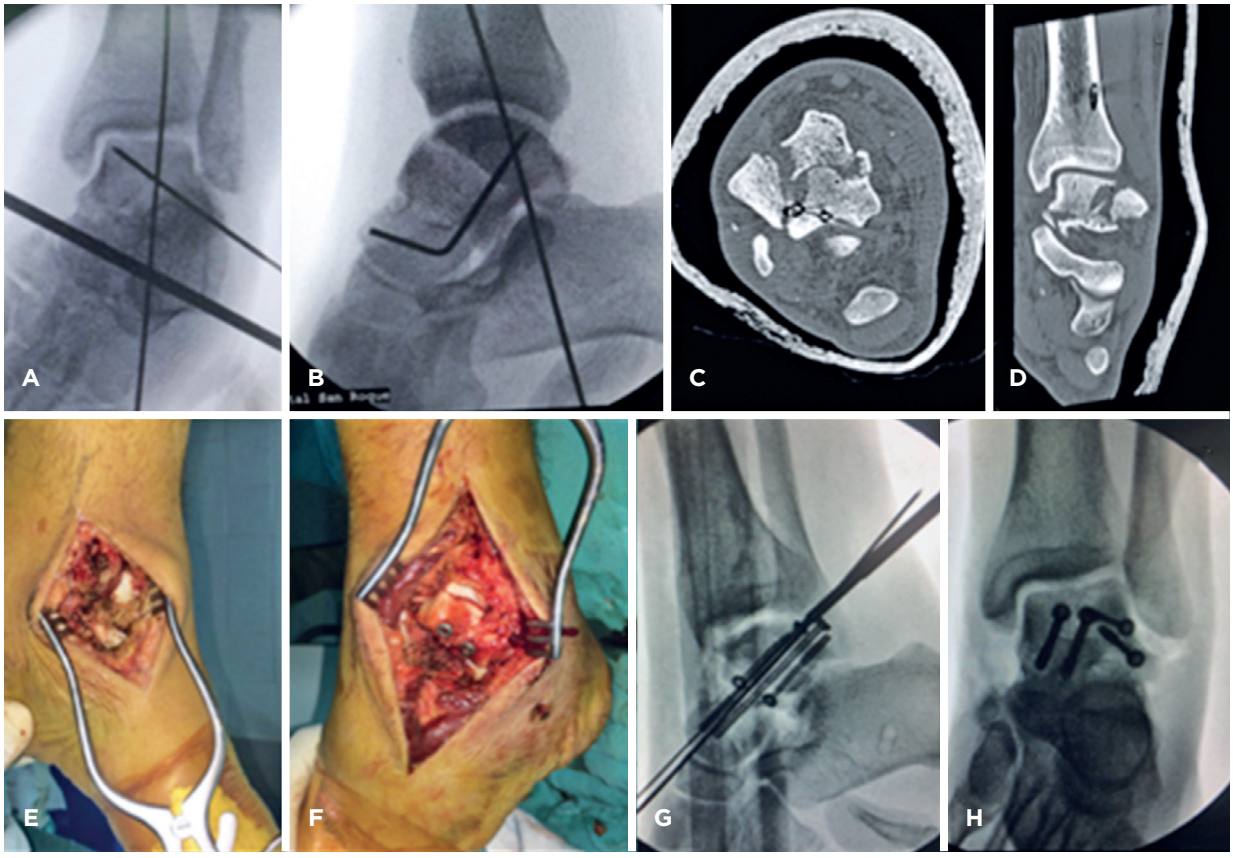

Figure 1. Sample Case. Description: (A and B) Anteroposterior and lateral radiographs of the talus after initial closed reduction. (C and D) Post-reduction axial computed tomography. (E) Anteromedial approach. (F) Anterolateral approach. (G and H) Anteroposterior and lateral radiographs of open reduction and internal fixation.

The mean time to definitive surgery was 19.42 ± 32.13 days (range 1 to 144 days). Three cases required surgical manipulation on the medial malleolus through the anteromedial approach, either as a Chevron osteotomy (1 case) or surgical fixation of an associated medial malleolus fracture (2 cases).

Anatomical reduction was achieved in 17 of 18 cases. With a mean follow-up of 53.57 ± 31.77 months (range 8 to 116 months), the AOFAS score was 91.42 ± 7.66 points (range 75 to 100). Patient satisfaction in the postoperative was 11 very satisfied, seven satisfied, and none dissatisfied.

Five patients (27%) reported complications (Figure 2). There was one early complication: a deep infection that required debridement and antibiotic therapy with a favorable resolution. Late complications included two cases of subtalar arthritis (11%) and two cases of partial avascular necrosis of the talar body (11%), all of them asymptomatic and not requiring secondary surgical procedures up to the latest clinical follow-up.

Discussion

Talar neck fractures involving subtalar joint displacement are challenging injuries that carry a significant risk of complications, leading to long-term functional impairment and disability[10,11]. Among the most common complications are subtalar arthritis, avascular necrosis, malunion, and nonunion. The literature consistently emphasizes the importance of achieving anatomic reduction and rigid internal fixation while preserving the blood supply to the talar body to minimize these complications. However, there is ongoing debate regarding the optimal surgical approach.

The dual incision technique, combining an anteromedial and anterolateral approach, has become a standard for talar neck fractures, providing excellent exposure and enabling precise reduction. Several studies have highlighted the

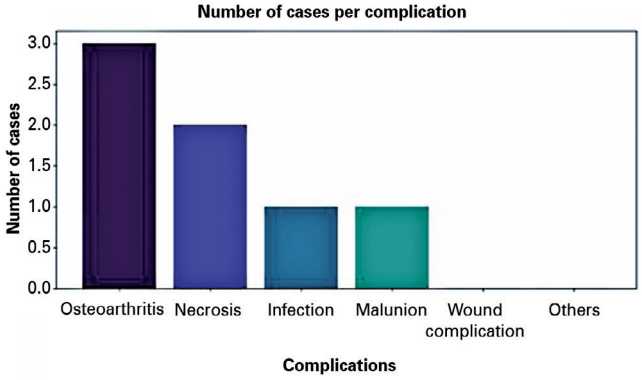

Figure 2. Distribution of complications.

Table 1. Sample description.

N	Age	Sex	PH	Damage control surgery	Osteotomy MM	Reduction CT	Follow-up (m)	AOFAS	Satisfaction	Complications					Others	2nd surgery
										Early		Late				
										Infection	Wound complication	Artrosis	AVN	Malunion		
1	21	M	No	Yes	No	A	29	84	Satisfied	No	No	Yes	No	No	No	Yes
2	42	F	No	Yes	No	NA	98	75	Satisfied	No	No	No	Yes	Yes	No	No
3	23	M	No	Yes	No	A	81	100	Very satisfied	No	No	No	No	No	No	No
4	39	F	No	No	No	A	81	90	Very satisfied	Yes	No	No	No	No	No	No
5	27	M	No	No	No	A	73	90	Very satisfied	No	No	No	No	No	No	No
6	45	M	No	Yes	No	A	64	95	Very satisfied	No	No	Yes	No	No	Yes	Yes
7	22	M	No	No	No	A	63	90	Very satisfied	No	No	No	No	No	No	No
8	24	F	No	No	Yes	A	54	80	Satisfied	No	No	Yes	No	No	No	Yes
9	27	F	No	No	Yes	A	53	90	Satisfied	No	No	No	Yes	No	No	No
10	22	M	No	No	No	A	50	100	Very satisfied	No	No	No	No	No	No	No
11	43	M	No	Yes	Yes	A	37	90	Very satisfied	No	No	No	No	No	No	No
12	15	F	No	Yes	No	A	36	100	Satisfied	No	No	No	No	No	No	No
13	42	M	No	No	Yes	A	25	90	Satisfied	No	No	No	No	No	No	No
14	28	F	No	No	Yes	A	13	100	Very satisfied	No	No	No	No	No	No	No
15	43	F	No	No	No	A	8	90	Satisfied	No	No	No	No	No	No	No
16	33	F	No	No	No	A	30	93	Very satisfied	No	No	No	No	No	No	No
17	20	M	No	No	No	A	14	100	Very satisfied	No	No	No	No	No	No	No
18	35	M	No	No	No	A	14	100	Very satisfied	No	No	No	No	No	No	No

A: Anatomical; NA: Non-anatomical; (m): Months; AOFAS: The American Orthopaedic Foot & Ankle Society; AVN: Avascular necrosis PH: Pathological history CT: Computed tomography.

advantages of this approach in terms of improved fracture alignment and reduced rates of residual displacement. In our series, anatomical reduction, confirmed by postoperative CT scan, was achieved in 17 out of 18 cases, supporting the efficacy of this technique. Our results align with those of Bastos et al.[12], who also found that a dual approach resulted in satisfactory fracture reduction and functional outcomes in their cohort of eight patients with Hawkins type II and III fractures. Furthermore, studies by Lindvall et al.[13] and Liu et al.[14] reported similar findings, showing that the dual approach significantly reduced the risk of malalignment and secondary complications. A systematic review and meta-analysis by Giordano et al.[15] found that dual approaches, particularly for fractures classified as Hawkins type II, III, and IV, were associated with favorable fracture reduction and low rates of post-traumatic arthritis and avascular necrosis. In their study, anatomical reductions were achieved in most cases, and only a small percentage of patients developed avascular necrosis, similar to our findings[15]. Giordano et al.[15], along with those of Fleuriau Chateau et al.[3] and Wu et al.[16], emphasize that the dual approach allows for better control of fracture alignment and reduces the incidence of subtalar arthritis when compared to single approaches. While the risk of avascular necrosis[17,18] remains a concern in managing talar neck fractures, our study demonstrated that its incidence was low, with only two cases of partial, asymptomatic that did not impact the patients' functionality or pain. This result is consistent with the findings of Bastos et al.[12], who reported no significant increase in avascular necrosis with the dual approach, even when a medial malleolar osteotomy was required. Additionally, studies by Liu et al.[14] and Maceroli et al.[19] reported similarly low rates of avascular necrosis in patients treated with a dual approach, even in more severe fractures. Despite its advantages, the dual approach comes with challenges. A study by Ohl et al.[20] raised concerns about the potential damage to surrounding soft tissues and the increased complexity of performing two incisions. However, our study, along with the review by Giordano et al.[15], suggests that these risks can be minimized with careful surgical technique and meticulous tissue handling. Furthermore, the improved fracture reduction achieved with the dual approach justifies its use, especially in fractures with significant displacement or those at high risk of complications. Additionally, the dual approach has been associated with improved functional outcomes, as reflected in the mean AOFAS score of 91 points in our cohort. This aligns with studies by Fleuriau Chateau et al.[3] and Lindvall et al.[13], which demonstrated similar functional results with dual approaches. These outcomes support the hypothesis that, while technically demanding, the dual approach offers significant benefits in both fracture reduction and long-term functionality.

Our study has limitations, including the small sample size and retrospective design, which introduce the potential for selection and data collection biases. These concerns are echoed by Giordano et al.[15], who also highlight the need for larger, prospective studies to validate further the benefits of dual approaches in talar neck fractures. Additionally, while our follow-up period was relatively long (mean 4 years), the relatively short follow-up in some studies may affect the long-term outcomes, particularly concerning the development of arthritis or avascular necrosis.

Conclusion

The simultaneous dual approach remains a highly effective technique for managing complex talar neck fractures. It provides superior exposure, reduces the risk of malalignment, and results in satisfactory clinical outcomes. While concerns about avascular necrosis and vascular compromise are valid, our findings and those in the literature suggest that these risks can be minimized with proper technique. Further research is needed to solidify these results and explore the long-term benefits of the dual approach in talar neck fractures.

Authors' contributions: Each author contributed individually and significantly to the development of this article: JPA *(https://orcid.org/0000-0001-9662-0367) Conceived and planned the activities that led to the study, wrote the article, data collection, bibliographic review; IJT *(https://orcid.org/0000-0001-5134-1428) Bibliographic review, performed the surgeries; LMVB *(https://orcid.org/0000-0001-8596-5466) Performed the surgeries; EC *(https://orcid.org/0000-0002-4893-6006) Participated in the review process, formatting of the article; GSM *(https://orcid.org/0009-0003-6734-3294) Performed the surgeries, survey of the medical records; MARN *(https://orcid.org/0009-0004-4470-2490) Survey of the medical records, clinical examination, participated in the review process; FS *(https://orcid.org/0009-0000-7101-9145) Statistical analysis, interpreted the results of the study; FPS *(https://orcid.org/0000-0002-2376-4834) Performed the surgeries, data collection, conceived and planned the activities that led to the study. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID).

References

1. Ahmad J, Raikin SM. Current concepts review: talar fractures. Foot Ankle Int. 2006;27(6):475-82.
2. Schwartz AM, Runge WO, Hsu AR, Bariteau JT. Fractures of the Talus: Current Concepts. Foot Ankle Orthop. 2020;5(1):2473011419900766.
3. Fleuriau Chateau PB, Brokaw DS, Jelen BA, Scheid DK, Weber TG. Plate fixation of talar neck fractures: preliminary review of a new technique in twenty-three patients. J Orthop Trauma. 2002;16(4):213-9.
4. Sanders DW, Busam M, Hattwick E, Edwards JR, McAndrew MP, Johnson KD. Functional outcomes following displaced talar neck fractures. J Orthop Trauma. 2004;18(5):265-70.
5. Rammelt S, Zwipp H. Talar neck and body fractures. Injury. 2009;40(2):120-35.
6. Shamrock AG, Byerly DW. Talar Neck Fractures. StatPearls Publishing; 2022.
7. Segura FP, Eslava S. Talar Neck Fractures: Single or Double Approach? Foot Ankle Clin. 2020;25(4):653-65.
8. Vallier HA, Reichard SG, Boyd AJ, Moore TA. A New Look at the Hawkins Classification for Talar Neck Fractures: Which Features of Injury and Treatment Are Predictive of Osteonecrosis?. J Bone Joint Surg Am. 2014;96(3):192-7.
9. Vallier HA. Fractures of the talus: state of the art. J Orthop Trauma. 2015;29(9):385-92.
10. Clare MP, Maloney PJ. Prevention of Avascular Necrosis with Fractures of the Talar Neck. Foot Ankle Clin. 2019;24(1):47-56.
11. Jordan RK, Bafna KR, Liu J, Ebraheim NA. Complications of Talar Neck Fractures by Hawkins Classification: A Systematic Review. J Foot Ankle Surg. 2017;56(4):817-21.
12. Bastos LR, Ferreira RC, Mercadante MT. Analysis of clinical and functional outcome and complications of talar neck fractures. Rev Bras Ortop. 2010;45(4):362-74.
13. Lindvall E, Haidukewych G, DiPasquale T, Herscovici D Jr, Sanders R. Open reduccion and stable fixation of isolated, displaced talar neck and body fractures. J Bone Joint Surg Am. 2004;86(10):2229-34.
14. Liu H, Chen Z, Zeng W, Xiong Y, Lin Y, Zhong H, et al. Surgical management of Hawkins type III talar neck fracture through the approach of medial malleolar osteotomy and miniplate for fixation. J Orthop Surg Res. 2017;12(1):111.
15. Giordano V, Ramos Liberal B, Rivas D, Baía Souto D, Yazeji G, Serrão Souza, et al. Surgical managment of displaced talus neck fractures: single vs double approach, screw fixation alone vs screw and plating fixation- systematic review and meta-analysis. Injury. 2021;52(Suppl 3):S89-S96.
16. Wu K, Zhou Z, Huang J, Lin J, Wang Q, Tao J. Talar neck fractures treated using a highly selective incision: a case-control study and review of the literature. J Foot Ankle Surg. 2016;55(3):450-5.
17. Mechas CA, Aneja A, Nazal MR, Pectol RW, Sneed CR, Foster JA, et al. Association of Talar Neck Fractures With Body Extension and Risk of Avascular Necrosis. Foot Ankle Int. 2023;44(5):392-400.
18. Alley MC, Vallier HA, Tornetta P 3rd, Orthopaedic Trauma Research Consortium. Identifying Risk Factors for Osteonecrosis After Talar Fracture. J Orthop Trauma. 2024;38(1):25-30.
19. Maceroli MA, Wong C, Sanders RW, Ketz JP. Treatment of comminuted talar neck fractures with use of minifragment plating. J Orthop Trauma. 2016;30(10):572-8.
20. Ohl X, Harisboure A, Hemery X, Dehoux E. Long-term follow-up after surgical treatment of talar fractures: twenty cases with an average follow-up of 7.5 years. Int Orthop. 2011;35(1):93-9.