EDITORIAL

Beyond Drop Foot: A Spectrum-Based surgical Approach to Flaccid Foot Paralysis

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Editorial

Not All Foot Drops Are Equal

Foot drop remains a commonly encountered condition in foot and ankle clinics, often referred from neurology or rehabilitation centers with a presumed diagnosis of dorsiflexor weakness or "drop foot". However, through over a decade of managing post-paralytic patients, I have repeatedly encountered cases that defy this narrow definition. Many presents with a gait pattern resembling classic drop foot, yet examination reveals deeper and more complex dysfunction — involving plantar flexors, invertors, and evertors to varying degrees as a spectrum.

To describe this broader functional impairment, I propose the term "flail-drop foot": a condition in which the dominant complaint is foot drop, but the actual pathology includes a wider, flaccid motor paralysis spectrum. Recognizing this helps distinguish these patients from solated extensor lag and leads to more accurate tailored surgical solutions.

The Limits of Existing Terminology

Traditional classifications of foot drop focus on dorsiflexion weakness, particularly tibialis anterior (TA), extensor hallucis longus (EHL), and extensor digitorum longus (EDL). This simple definition and diagnosis fall short when dealing with more common and mixed muscle group involvement, where invertors (posterior tibial tendon, PTT), evertors (peroneus brevis), and gastrosoleous muscle are variably affected. [1] In such patients, standard tendon transfer algorithms often fail to restore function, and functional outcomes are unpredictable.

A Functional Classification: Muscle Weakness to Surgical Planning

Based on clinical evaluation of gait, motor testing, and intraoperative findings, I have organized patients into a spectrum of flail-drop foot types. These six types directly link pattern of muscle involvement with patients walking deficits and functional needs, and guide us to a more fitted surgical strategy, enabling a more personalized and functionally driven approach [Table 1]. [2-7]

In some flail-drop foot cases, particularly with combined Achilles and posterior tibial weakness, arthrodesis is considered figure 2. However, I caution against overuse. hindfoot or pantalar fusion may impair residual mobility and increase risk of ulcer formation specially in patients with plantar sensory deficit. Pantalar fusion should be reserved for cases of severe deformity or arthritis.

In some cases, I have used a posterior talar bone block to limit plantarflexion without fusion, providing stability without limiting dorsiflexion. This strategy has been satidfactory for stair or climbing up and didn't increase risk for ulceration risk [Figure 4].[7]

Toward a Language That Matches Function

The term "drop foot" has become too broad — encompassing everything from mild extensor weakness to complex flaccid muscular deficits around the ankle. Introducing the term "flail-drop foot" invites surgeons to re-examine the functional status of all muscle groups and invites further study and collaboration. I believe it provides a more accurate language for the real-world challenges we face in treating these patients — and ultimately leads to better, more individualized outcomes.

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Table 1: Functional Spectrum of "Flail-Drop Foot" and My Surgical Recommendations

Muscle weakness	Patient needs	approach
TA	Easy fatigue with long distance walking	FDL transfer to dorsum to increase dorsiflexion power Jones and Hibbs procedure[2]
TA+ EHL+EDL	Toe drag, drop gait pattern	Triple transfer PTT transfer to middle cuneiform[Figure1] PB transfer to lateral cuneiform
TA+ EHL+EDL+PB	Recurrent giving way, awkward ankle inversion and drop , toe drag	PTT transfer to lateral cuneiform[6]
TA+ EHL+EDL+ PB+PTT	Drop + imbalance	**1-** Triple lambrinudi type arthrodesis (reduce ankle plantar flexion + eliminate subtalar motion)+Extensor tenodesis **2-** posterior talus bone block [Figure 4][7]
TA+ EHL+EDL+PB+PTT+Achilles	Slow walking , lack of propulsion power	Triple lambrinudi type arthrodesis + all available muscles transfer to Achilles [Figure3]
Complete flail foot+ sensory deficit	Slow walking , lack of propulsion power+ sensory ataxic	**1-** pantalar or hindfoot fusion surgeries just in case of concomitant deformities [Figure2][3] **2-** posterior talus bone block [Figure 4][7] **3-** extensor tenodesis[4,5] with or without ankle fusion

Notice:
1- Hindfoot (Ankle+ subtalar) and pantalar fusions are recommended just in severe deformity or painful osteoarthritis
2- Pantalar fusion is prohibited in plantar sensory deficit as a result of increase in pressure sore formation

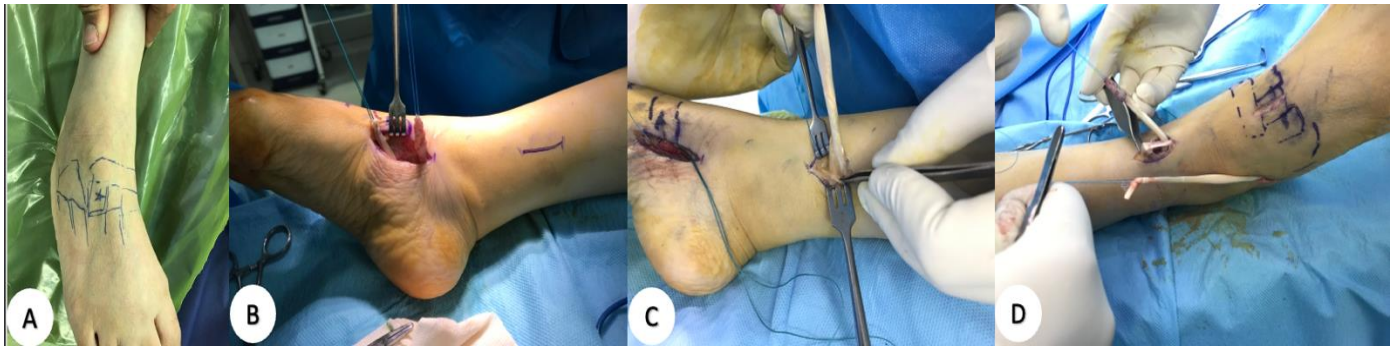

Figure 1. 38-year-old lady came to foot department with drop foot gait since childhood. She had a lumbar fracture when she was 6-year-old. Now EMG\NCV shows complete l5 impaired function. Tibialis posterior power was about 4 out of 5. Plan was posterior tibialis tendon transfer to lateral cuneiform (A) and replacement of its original function with FDL transfer (B). Posterior tibialis tendon was rerouted from second incision (C) which showed fatty degeneration in muscle belly. So, the technique was changed to bridle procedure (D) for more robust balance and results. Some dorsiflexion was gained one month after surgery not obvious in walking, interestingly full dorsiflexion power was regained in walking 6-month post operatively

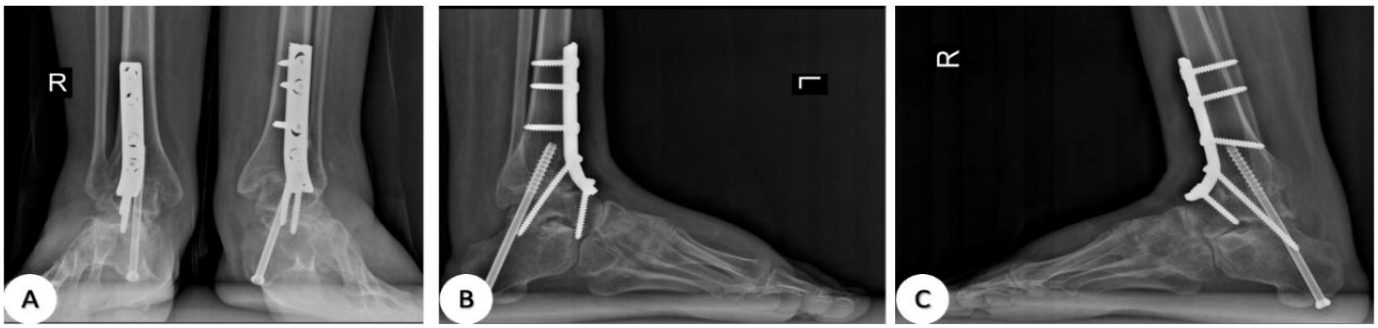

Figure 2. Staged bilateral TTC fusion in a 40 year old woman with flail foot as a result of CMT. She is satisfied with the results but with some signs and symptoms of aggravated quadriceps weakness. It seems satisfaction decreases constantly over the time. This procedure is not supported by the evidences

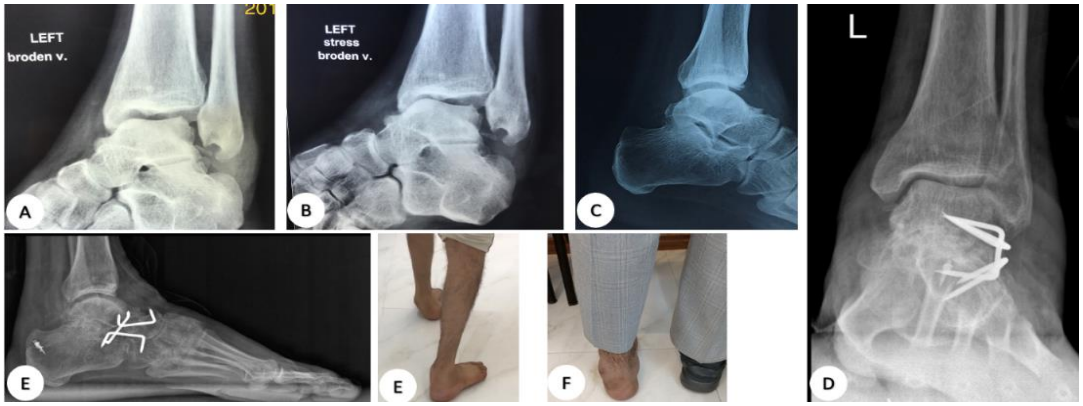

Figure 3.46 year old man known case of CMT came for left side flail cavovarus foot with recurrent giving way. broden view with and without stress showed some mechanical lateral instability(A and B) . lateral view showed few anterior exostosis and osteoarthritis in ankle joint. Calcaneal osteotomy with nonanatomic ankle ligament reconstruction could manage deformity and instability not flail issue. Another option was lambrinudi triple arthrodesis with extensor tenodesis which was chosen(D and E). preand post operative photograph are shown in E and F

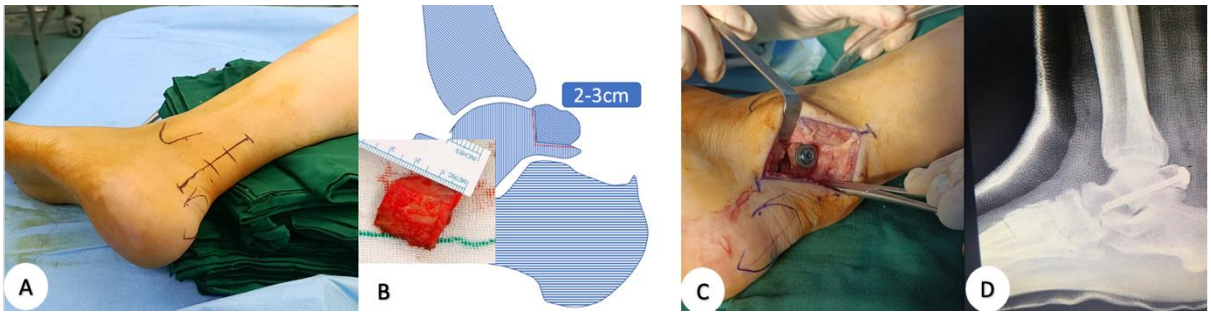

Figure 4. 45 year old man with chronic didcopathy, operated 3 years ago. Came with flail foot. He was mountain climber and pursued kind of surgery which decrease plantar flexion while maintain his passive dorsiflexion function (needed for climbing up) and was not satisfied with ankle foot orthosis. The plan was talus bone block which was done with posterolateral approach(A) with 2-3 centimeter length tricortical iliac crest autograft(B) and seated in a L shaped trough in posterosuperior aspect of talus just above posterior process fixed with 6mm cannulated screwand washer(sometimes two 4.0 mm screws) (C) which is seen in lateral x ray(D). toe extension was achieved with EDl and EHL tenodesis to extensor retinaculum

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