

Foot Posture & Orthotic Implications

Pes Planus, Pes Cavus, Forefoot Varus/Valgus — Clinical Features and Prescribing Approach

Foot posture classification is a key starting point for orthotic prescribing. However, static posture is only one component of the clinical picture — dynamic function during gait, symptom presentation, and tissue capacity must all be integrated. This reference outlines the key foot posture categories, their biomechanical features, associated pathologies, and orthotic prescribing implications.

1 Pes Planus (Flat Foot)

Aspect	Detail
Definition	Reduced or absent medial longitudinal arch; calcaneal eversion; talar plantarflexion and adduction; forefoot abduction relative to rearfoot.
Flexible vs Rigid	Flexible (most common): arch partially or fully reconstructs on toe standing — STJ motion available; ROM present. Rigid: no arch reconstruction on toe standing — fixed deformity; limited STJ motion.
Key Static Features	RCSP eversion $>4^{\circ}$; positive FPI-6 ($\geq +7$ adults); low navicular height; forefoot abduction visible from behind ('too many toes' sign); medial arch collapse on weightbearing.
Gait Features	Prolonged pronation in midstance; delayed or absent resupination in propulsion; abductory twist at heel lift; early heel rise; increased tibial internal rotation.
Associated Pathologies	Plantar fasciitis, PTTD, medial tibial stress syndrome, hallux valgus, FHL, patellofemoral pain, medial knee OA, low back pain.
Orthotic Approach	Semi-rigid to rigid shell; medial heel skive; medial arch fill/support; rearfoot varus post; forefoot varus post if forefoot deformity present; medial flange in severe cases; casting in STJ neutral NWB.

2 Pes Cavus (High Arch Foot)

Aspect	Detail
Definition	Elevated medial longitudinal arch; calcaneal inversion (varus); forefoot plantarflexion (often with forefoot valgus); reduced shock absorption capacity.
Flexible vs Rigid	Flexible cavus: some arch reduction under load — better prognosis for conservative management. Rigid cavus: fixed high arch — no load-dependent deformation; structural deformity.
Key Static Features	RCSP inverted or neutral; negative FPI-6 (≤ 0); high arch visible; plantar fascia tightness; calcaneal varus; forefoot valgus or plantarflexed 1st ray; may have clawing of lesser toes.
Gait Features	Reduced shock attenuation at heel strike; lateral heel contact; limited pronation in midstance; lateral loading throughout stance; early forefoot loading.
Associated Pathologies	Lateral ankle instability, peroneal tendinopathy, 5th metatarsal stress fractures, plantar fasciitis (different mechanism — fascial tightness), lesser toe deformities, lateral metatarsalgia, Achilles tendinopathy.
Orthotic Approach	Soft to semi-rigid accommodative shell; lateral heel skive; forefoot valgus post; lateral flange for stability; deep heel cup; full-length cushioning top cover (Poron/PPT); casting in WB or SWB — avoid overcorrection; NWB neutral risks excessive correction.

3 Forefoot Varus

Aspect	Detail
Definition	The plantar forefoot is inverted relative to the rearfoot bisection when STJ is held in neutral NWB. The forefoot tilts medially (1st ray elevated relative to 5th).
Compensation	The foot compensates by pronating at the STJ in late stance to bring the medial forefoot to the ground — driving excessive late-stance STJ pronation.
Measurement	Forefoot-to-rearfoot measurement NWB with STJ neutral: $>4^\circ$ inversion = clinically significant forefoot varus.
Associated Pathologies	Plantar fasciitis, hallux valgus, FHL, medial column overload, MTSS, PFPS (via tibial internal rotation).
Orthotic Approach	Forefoot varus post (medial forefoot posting) to accommodate deformity and reduce compensatory pronation; match post angle to degree of deformity (50–75% correction); combine with medial rearfoot correction if RCSP also pronated.
Key Distinction	Forefoot varus is a structural deformity of the forefoot — it must be accommodated, not forcefully corrected. The post fills the gap between the forefoot and ground in neutral STJ.

4 Forefoot Valgus

Aspect	Detail
Definition	The plantar forefoot is everted relative to the rearfoot bisection when STJ is held in neutral NWB. The forefoot tilts laterally (5th ray elevated relative to 1st).
Compensation	Foot compensates by supinating or plantarflexing the 1st ray; may drive lateral column overload or excessive resupination in propulsion.
Types	Flexible forefoot valgus: 1st ray can be dorsiflexed passively — plantarflexion is the compensation. Rigid forefoot valgus: fixed position — cannot be reduced passively.
Associated Pathologies	Lateral metatarsalgia, peroneal tendinopathy, lateral ankle instability, pes cavus, 5th metatarsal pathology.
Orthotic Approach	Forefoot valgus post (lateral forefoot posting) to accommodate deformity; lateral rearfoot correction if calcaneus also inverted; avoid overcorrecting flexible 1st ray — 1st ray plantarflexion can be functional; casting in WB or SWB preferred.

5 Clinical Summary: Posture → Prescription Direction

Foot Posture	FPI-6	RCSP	Rearfoot Post	Forefoot Post	Shell	Key Modifications
Flexible flat foot (mild)	+5 to +7	4–6° eversion	Varus 2–4°	Varus if FF varus present	Semi-rigid	Medial skive; arch fill
Flexible flat foot (severe) / PTTD	+8 to +12	>6° eversion	Varus 4–6°	Varus if indicated	Rigid	Medial skive; medial flange; deep heel cup
Pes cavus (flexible)	0 to -4	Neutral or inverted	Valgus 2–4°	Valgus if FF valgus	Semi-rigid	Lateral skive; lateral flange; cushioning
Pes cavus (rigid)	-4 to -8	Inverted	Accommodate only	Valgus to accommodate	Soft / accommodative	Full cushioning; lateral flange; no overcorrection
Forefoot varus (isolated)	Normal or +3 to +6	Normal or mild eversion	Neutral or mild varus	Varus 2–6°	Semi-rigid	Forefoot varus post principal modification
Forefoot valgus (isolated)	Normal or 0 to -3	Normal or inverted	Neutral	Valgus 2–4°	Semi-rigid to soft	Lateral forefoot post; cushioning

Posture classification is a starting point — not the whole story. A flat foot in an asymptomatic runner with good hip strength may need no intervention. The same foot posture in a patient with PTTD and 3-year history of progressive arch collapse demands aggressive orthotic management. Symptoms, function, and clinical context determine the prescription — posture alone does not.