

Surgery Of The Pes Cavus Foot: A Historical Perspective

Richard J. Zirm, D.P.M.

Pes cavus is one of the most perplexing and challenging of all foot deformities. The condition may be dynamic as well as progressive and is frequently of neuropathic origin. Historically, the deformity has remained difficult to treat because in most cases the deformity is not present at birth but gradually progresses as the child's foot develops.

A succession of surgical procedures have been proposed in an attempt to permanently correct this disorder. Many of the theories and procedures initially attempted have been retired due to lack of success. However, some of the original concepts have survived and have been further developed.

Appropriate surgical selection and intervention of the pes cavus foot has reached a sophisticated level with predictable results. Guidelines have been established by the medical community, learning from experience and research derived from the fields of neurology, biomechanics, and surgery. It is interesting to note that the historical evolution of surgical technique loosely recapitulates the currently accepted paradigms of treatment for the deformity. That order being:

1. Soft tissue procedures (plantar fascia release, tendon release, tendon transfer).
2. Osteotomy procedures (metatarsal, midfoot, calcaneal).
3. Arthrodesis (subtalar, triple)¹.

Surgeons no longer rely on the "quick fix" approach. Staging procedures throughout ontological and skeletal development with attention to the progression of the underlying disease is now the acceptable mode of treatment. The following table is a chronological account of the various surgical milestones developed for the correction of deformities associated with the pes cavus foot.

History of Surgical Technique in Pes Cavus

Name	Year	Procedure
Steindler ²	1912	stripping plantar fascia from calcaneus
	1921	dorsal wedge osteotomy of talus and cuboid
	1926	added osteoclasia of calcaneus and transfer of EHL into FHL
Forbes ³	1913	EDL transfer into respective metatarsals, dorsal capsulotomies of MPJs
Jones ⁴	1916	transfer of EHL into neck of 1st metatarsal
Hibbs ⁵	1919	transfer of conjoined EDL tendons into third cuneiform
Hoke ⁶	1921	subtalar and talonavicular arthrodesis
Ryerson ⁷	1923	triple arthrodesis
Stuart ⁸	1924	added IP arthrodesis to Jones procedure
Sherb, Hackenbroch ⁹	1924	dorsal osteotomy of the 1st metatarsal
Dickson, Dively ¹⁰	1926	transfer of EHL into the FHL
Spitzzy ¹¹	1927	release of calcaneocuboid and calcaneonavicular ligaments combined with Steindler stripping
Royle ¹²	1927	tibialis posterior transfer into calcaneus
Lambrinudi ¹³	1927	digital IP joint arthrodesis with tenotomy of EDL tendons
Heyman ¹⁴	1932	capsulotomies of MPJs
Wagner ⁹	1934	transfer of EHL to 1st metatarsal and EDL to 5th metatarsal

Name	Year	Procedure
Saunders ¹⁵	1935	transfer of long extensors into the cuneiforms or of the EHL into the 1st met with lengthening of the peroneus longus
Forrester-Brown ¹⁶	1938	transfer of the FHL into the EHL
Cole ¹⁷	1940	anterior, midtarsal wedge osteotomy
Hammond ¹⁸	1943	1st metatarsal dorsi-flexory osteotomy
Schmier ¹⁹	1945	neurectomy of medial and lateral plantar nerves
Watkins ²⁰	1954	interosseous tibialis posterior transfer
McElvenney, Caldwell ²¹	1958	1st metatarsal, cuneiform, navicular joint arthrodesis
Fowler, Brooks, Parrish ²²	1959	medial cuneiform osteotomy
Guyer, Fagan ²³	1959	plantar soft-tissue release
Samilson ²⁴	1960	crescentic calcaneal osteotomy
Dwyer ²⁵	1963	closing, pronatory calcaneal osteotomy
Kelikian ²⁶	1965	DFWO, Jones procedure, hallux IP arthrodesis
Japas ²⁷	1968	midtarsal V osteotomy
Parrish ²⁸	1973	flexor tendon transfer for clawtoes
Wang, Shaffer ²⁹	1973	multiple metatarsal osteotomies
Jahss ³⁰	1980	tarsometatarsal, truncated wedge arthrodesis

The time tested concepts and merits of the surviving procedures have been improved upon since their inception. Advanced knowledge and technical improvement in the fields of internal fixation, power instrumentation, biomaterials, as well as surgical technique have all improved the overall surgical results in pes cavus surgery. However, the thought process involving the underlying etiological factors, biomechanical analysis and surgical methods remains paramount in the selection of surgical procedures. Modern surgical planning is now directed at the multiple levels and planes of deformity. Attention is now directed at the "apex of the deformity." These factors along with the age and overall condition of the patient help determine the appropriate surgical plan.

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