



ARIZONA COLLEGE OF PODIATRIC MEDICINE



Recurrence of Congenital Vertical Talus: A Systematic Review of the Influence of Age, Etiology, and Surgical Technique

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ABSTRACT

Congenital vertical talus (CVT) is a rare pediatric foot deformity that can cause lifelong pain, disability, and gait abnormalities. The minimally invasive Dobbs method has improved outcomes, offering flexible, plantigrade feet with fewer complications than traditional extensive surgical releases. However, recurrence remains a concern, especially in syndromic patients and those treated after 12 months of age. This review evaluates recurrence rates across surgical techniques and age groups, identifies predictors of poor outcomes, and assesses the long-term success of the Dobbs method.

A systematic search was conducted with terms including “congenital vertical talus,” “treatment outcome,” “recurrence,” and “follow-up.” Data was extracted using a structured template and descriptive and trend analyses were performed.

Seventeen studies met the inclusion criteria, encompassing 746 pediatric patients (1054 feet). Recurrence, commonly defined as a lateral talar axis–first metatarsal base angle (TAMBA) $>30^{\circ}$ in a previously corrected foot, ranged from 0% to 37.5%. Higher recurrence rates were observed in syndromic patients and those treated after one year of age. The Dobbs method demonstrated superior radiographic outcomes (14/17 studies) with lower recurrence and reoperation rates compared to extensive soft-tissue release procedures.

Increased age at treatment initiation was associated with recurrence risk. Syndromic etiology was an even stronger predictor, with recurrence rates exceeding 45%. Functional outcomes, including ankle range of motion and patient-reported measures were consistently better in patients treated early and with minimally invasive techniques. Long-term flexibility and pain-free ambulation were more common in Dobbs-treated cohorts. Brace compliance and complete talonavicular reduction were emphasized as key factors in preventing relapse, particularly within the first postoperative year.

Early intervention and minimally invasive techniques are critical to reducing recurrence risk. Syndromic patients have higher recurrence rates. These findings can educate families about expected outcomes, emphasize early treatment, and guide future research to identify genetic predictors of recurrence.

INTRODUCTION

Congenital vertical talus (CVT) is a rare but complex pediatric foot deformity characterized by irreducible dorsal dislocation of the navicular on the talus, resulting in a rigid rocker-bottom foot (Miller & Dobbs, 2015). The estimated prevalence is approximately 1 in 10,000 live births, though under-diagnosis is common due to difficulty distinguishing CVT from other deformities such as oblique talus or calcaneovalgus (Grzegorzewski et al., 2023). Etiology is heterogeneous, with genetic associations (e.g., HOXD10, GDF5 mutations) and frequent links to neuromuscular disorders such as arthrogryposis and spina bifida (Yang & Dobbs, 2015). Left untreated or under-corrected, CVT can cause lifelong pain, disability, and gait abnormalities a higher risk of morbidity (Miller & Dobbs, 2015).

Historically, extensive soft-tissue release was the standard treatment but carried high risks of stiffness, wound complications, and long-term degenerative changes (Day et al., 2023). Multiple surgical techniques have been developed with the aim of permanently resolving the deformity, with varying rates of success and complications (Cummings et al., 2023). The Dobbs minimally invasive method, introduced in 2006, combines serial casting with limited surgery and has demonstrated improved outcomes including greater ankle mobility, fewer complications, and lower recurrence compared to traditional approaches (Cummings et al., 2023).

Despite these advances, recurrence is still a major challenge, particularly in syndromic patients and those treated after 12 months of age. This review evaluates recurrence rates across surgical techniques and age groups, identifies predictors of poor outcomes, and assesses the long-term success of the Dobbs method. Understanding predictors of recurrence and optimizing early intervention are critical for improving long-term function and reducing morbidity.

METHODS

A systematic search was of PubMed, ScienceDirect, and EBSCOhost was conducted in accordance with PRISMA guidelines (last search: October 2025). Search terms included “congenital vertical talus,” “treatment outcome,” “recurrence,” and “follow-up.” Studies were eligible if they reported analyzable patient-level data, radiographic outcomes, or recurrence rates following surgical or conservative treatment of CVT; narrative or technical reports were excluded. Risk of bias was assessed using the Newcastle-Ottawa Scale. Data was extracted using a structured template capturing variables such as age at treatment initiation, etiology, surgical technique, radiographic outcomes, and recurrence definitions. Descriptive and trend analyses were performed.

INCLUSION STUDIES

Study	N (Patients / Feet)	Average Age at Surgery	Etiology	Average Post-Op Lateral TAMBA (°)	Recurrence Rate	Dobbs Method?	Average Follow-up
1	35 / 47	13 m	idiopathic only	12 +/- 8	9%	yes	45 m
2	24	> 12 m	58.3% syndromic	N/A	29.2%	yes	>1 y
3	16 / 24	≥ 17 m	54.2% syndromic	28.8	37.5%	yes	32 m
4	391 / 580	< 18 m	both, % not included	12.7 +/- 6.8	19.3%	yes + 4 additional	7 y
5	69	N/A	36.2% syndromic	17.25	N/A	yes + 3 additional	N/A
6	14 / 20	N/A	64.3%syndromic	syndromic 8 + 1.8 / nonsyndromic 10.5	30%	yes	24 m
7	8 / 11	14.6 m	idiopathic only	13.64	9.9%	yes	35.8 m
8	16 / 23	6.5 m	52% syndromic	13	26.3%	yes	10.4 y
9	32 / 46	N/A	idiopathic only	19.34	N/A	no	4 y
10	12 / 20	16 m	83.3% syndromic	5.65	0	no	4 y
11	25 / 40	20.7 m	syndromic only	12.1 +/- 8.9	30.9%	yes	55 m
12	22 / 31	33 m	51.2% syndromic	N/A	19.4%	no	11 y
13	27 / 42	6.6 m	37% syndromic	10.2 +/- 19.1	22.2%	yes + 1 additional	7 y
14	10 / 15	6.4 m	50% syndromic	15 +/- 6.7	0	yes	2 y
15	13	N/A	both, % not included	N/A	27.3	yes	≥ 2 years
16	21 / 30	6 m	56.7%	10.9 +/- 8	16.7%	yes	6.5 y
17	11 / 19	8 m	idiopathic only	8 +/- 1.8	31.2%	yes	≥ 2 years

Table 1: This table presents key characteristics and outcomes from 17 included studies

CVT PRESENTATION



Figure 1: Clinical presentation of idiopathic CVT at birth (Wack et al., 2025)

CVT RADIOGRAPH



Figure 2: Lateral radiograph demonstrating a talar axis–first metatarsal base angle (TAMBA) $>30^{\circ}$, most commonly used as a measurement for determining CVT recurrence (Eberhardt et al, 2012)

RESULTS

Seventeen studies met inclusion criteria, encompassing 746 pediatric patients (1054 feet). All studies demonstrated statistically significant ($p<0.001$) improvement in standard angles, talar axis-1st metatarsal base (TAMBA), talocalcaneal, and tibio calcaneal. Recurrence, most commonly defined as a lateral talar axis–first metatarsal base angle (TAMBA) $>30^{\circ}$ in a previously corrected foot, ranged from 0% to 37.5%. Higher recurrence rates were observed in syndromic patients and those treated after one year of age. The Dobbs method demonstrated superior outcomes in 14 out of 17 studies for both radiographic correction and functional mobility, with lower recurrence and reoperation rates compared to extensive soft-tissue release procedures.

Age at treatment initiation was significantly associated with increased recurrence risk, with multiple studies reporting higher relapse rates in patients treated after 12 months. However, successful correction remained achievable from infancy up to 8–9 years when manipulation and casting were carefully performed. Older age correlated with an increased number of cast cycles and occasional need for anesthesia. Importantly, adherence to postoperative protocols, particularly bracing, is the key determinant of success, mitigating the negative impact of older age. Syndromic etiology was a more powerful predictor of recurrence than age alone, with rates exceeding 45% in conditions such as arthrogryposis, spina bifida, and Charcot-Marie-Tooth disease. In contrast, idiopathic CVT showed near-universal sustained correction and the best functional scores.

Functional outcomes, including range of motion and patient-reported measures (e.g., PROMIS, PODCI), were consistently better in patients treated early and with minimally invasive techniques. Post-Dobbs ankle motion averaged 25–40° total arc versus $<15^{\circ}$ after extensive release. While radiographic correction was achieved across methods, long-term flexibility and pain-free ambulation were more common in Dobbs-treated cohorts, regardless of etiology. Several studies emphasized that complete talonavicular reduction and brace compliance during the first postoperative year are critical to preventing relapse.

DISCUSSION

Management of congenital vertical talus has undergone a complete paradigm shift,–from multi-incision extensive soft-tissue releases to a casting-driven, minimally invasive correction that preserves joint mobility and reduces complications. Distinguishing undercorrection from true recurrence remains a challenge due to limitations in early radiographic visualization. The invasive technique of midtarsal open reduction corrects verticality but can leave persistent talonavicular undercorrection and develop into pes planovalgus.

Critical predictors of compliance, along with specifics of post-operative bracing protocol, can substantially influence the risk of recurrence. The standard for wearing the boot-and-bar bracing (Dobbs bar) is for 23 hours per day for 2 months, then nighttime wear for approximately two years. Noncompliance of the brace and early K-wire removal consistently precede recurrence, with the majority of relapses occur within the first postoperative year. Consequently, authors emphasize comprehensive parental education and follow-up monitoring as essential components in minimizing recurrence risk and optimizing long-term outcomes.

CONCLUSION

Utilizing the Dobbs minimally invasive technique can maintain radiographic alignment, lower recurrence, increase parental satisfaction, and improve gait patterns, contributing to the long-term outlook for patients with congenital vertical talus overall. Based on the evidence, vertical talus is a phenotypic endpoint of multiple etiologies, not a single disease. While syndromic cases have a higher recurrence and lower PROMS, this population of cases still benefits from minimally invasive correction. Moreover, syndromic etiology remains the chief predictor of recurrence and limited function, compared to the factors of age or the number of castings. Radiographic correction is consistently large and statistically significant, but functional outcomes (pain, motion, shoe wear, gait) now define success. Long-term results include durable correction, flexible motion, and pain-free ambulation, validating the minimally invasive method as both effective and sustainable.

REFERENCES

References available upon request