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Clinical and Patient-Reported Outcomes Following Peroneus Brevis Reconstruction With Hamstring Tendon Autograft

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Abstract

Background: Peroneal tendon injuries are a common cause of lateral ankle pain and instability. While the use of hamstring autograft has been proposed as a viable surgical option for peroneus brevis reconstruction, reported outcomes with this technique are limited in the literature. We present patient-reported and clinical outcomes for patients who underwent peroneus brevis reconstruction with hamstring autograft.

Methods: Thirty-one patients were retrospectively identified who underwent a procedure including peroneus brevis reconstruction with hamstring autograft for peroneal tendinopathy between February 2016 and May 2019. All patients who had a peroneus brevis reconstruction were included, and all concomitant procedures were noted. Patient-Reported Outcomes Measurement Information System (PROMIS) surveys were prospectively collected preoperatively and at a minimum of 1 year postoperatively (mean, 24.3; range, 12-52.7) months. Retrospective chart review was performed to evaluate the incidence of postoperative complications and reoperations.

Results: When evaluating pre- and postoperative patient-reported outcome surveys (n = 26; 84%), on average, patients reported improvement in every PROMIS domain evaluated, with significant improvement in Physical Function (+5.99; $P = .006$), Pain Interference (–8.11; $P < .001$), Pain Intensity (–9.02; $P < .001$), and Global Physical Health (+7.29; $P = .001$). Three patients reported persistent pain at a minimum of 1 year postoperatively, of whom 2 required reoperation. No patient reported persistent pain or discomfort at the harvest site of the hamstring autograft.

Conclusion: Patients undergoing peroneus brevis reconstruction with hamstring autograft experienced clinically significant improvement in patient-reported and clinical outcomes. Few postoperative complications were observed, and patients reported improvements across all patient-reported outcome domains, with significant improvements for pain and function domains. Reconstruction with hamstring autograft represents a viable surgical option in the setting of peroneal tendinitis or tears.

Level of Evidence: Level IV, case series.

Keywords: peroneal tendon, peroneal reconstruction, peroneus brevis, hamstring autograft

Peroneal tendon injuries are often found in patients presenting with chronic lateral ankle pain and instability. The difficulty in distinguishing peroneal tendon pathology from lateral ligamentous injuries in the setting of acute ankle trauma likely contributes to these injuries being missed. These injuries are often longitudinal splits and occur within the spectrum of tendinopathy rather than frank ruptures. Treatment options historically have included nonoperative management, debridement and repair, longus to brevis tenodesis, or tendon transfer of the flexor digitorum longus (FDL) or flexor hallucis longus (FHL).[5] The current literature generally suggests improvement following surgical intervention with these techniques. As each has its limitations, the optimal treatment varies with severity of tendon

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injury or degradation.[6] Demetracopoulos et al[3] reported excellent long-term results for their cohort of patients who underwent debridement and primary repair of peroneus longus and brevis.

For severe tears involving greater than 50% of the tendon, reconstruction with allograft or autograft has been described, although each technique has its limitations.[12] Allografts introduce the potential for donor rejection and issues with tissue availability, while the primary concern with the use of autografts is the potential for donor site morbidity at the knee. However, in a study evaluating hamstring autografts for foot and ankle applications, Cody et al[2] reported that 32 out of 37 patients (86%) reported no pain or discomfort at the harvest site, while the remaining 5 patients (14%) reported only mild to moderate pain, and flexor strength loss was not clinically notable. Outcomes data on allograft for peroneal tendon reconstruction are currently limited, but 1 case series of 14 patients did demonstrate positive results without any graft-related complications.[10] Importantly, peroneal tendon pathology often presents alongside other pathologies, such as cavovarus deformity or ankle instability, which may require a number of concomitant procedures at the time of peroneal tendon reconstruction.

At our institution, we have used reconstruction with hamstring autograft for peroneal tendon injuries in patients who have failed nonoperative management or who have less than 50% of healthy tendon upon presentation. The state of the tendons is evaluated preoperatively with magnetic resonance imaging (MRI), to determine if 50% or more of the cross section of the tendon on axial and coronal cuts lacks the normal signal characteristics. These findings are confirmed with direct visualization at the time of surgery. Although the technique for this approach has been described previously, there is limited evidence on outcomes following this procedure.[5,11] This reconstructive method may be more efficacious than repair given that it removes all diseased tissue, which may be the source of pain. The purpose of this study was to evaluate clinical and patient-reported functional outcomes for patients who underwent peroneus brevis reconstruction with hamstring autograft. Our goal was to present a larger case series of outcomes following this treatment, as the current literature includes results from only a few patients.[11] We hypothesized that patients would report good functional outcomes and would experience few complications or reoperations.

Methods

This is a single-center retrospective study. Approval was obtained from the research steering committee that oversees the Foot and Ankle Registry at our institution. Consecutive patients who underwent a procedure that included peroneus brevis reconstruction between February 2016 and May 2019 by 1 of 3 foot and ankle fellowship–trained orthopedic surgeons at our institution were included. Patients were excluded if they underwent a primary repair, FHL or FDL transfer, or reconstruction with allograft as opposed to autograft. Patients were also excluded if an isolated peroneus longus reconstruction was performed. In total, 31 eligible patients, 21 women (68%) and 10 men (32%) with an average age of 47 (range, 20-73) years and an average body mass index (BMI) of 28.3 (range, 19.1-43.1) kg/m^2, were identified.

Retrospective chart review was performed. The mechanisms of injury, concomitant procedures, and any postoperative complications or reoperations were noted. All but 1 patient experienced chronic injury of the peroneal tendons. The remaining patient had an acute inversion sprain. Eleven of the 31 patients underwent reconstruction of the brevis tendon alone, 17 underwent longus to brevis tenodesis following hamstring reconstruction of the peroneus brevis, and 3 patients underwent both peroneus brevis and longus reconstruction using 2 separate autograft tendons. Sixteen patients underwent cavovarus deformity correction, while 10 patients underwent concurrent ankle stabilization, and 3 underwent both. Cavovarus deformity corrections included subtalar fusion (n = 6), dorsiflexion metatarsal osteotomy (n = 10), and/or calcaneal osteotomy (n = 6). No patient had Charcot-Marie-Tooth (CMT) disease. Other concomitant procedures included osteochondral lesion repair (n = 2) and lateral ligament reconstruction (n = 2).

The gracilis alone was harvested in 25 cases as the tendon was found to be robust enough in length and width for reconstruction. The semitendinosus alone was harvested in 4 cases, and in 2 cases, both the gracilis and semitendinosus were harvested. One of these patients had a concurrent lateral ligament reconstruction for which the gracilis was used while the semitendinosus was used for the peroneal reconstruction. For all hamstring autografts used for peroneal reconstruction, the average length was 27.3 (range, 20-32) cm, with an average diameter of 4.5 (range, 3.5-5.0) mm.

Patient-Reported Outcomes

Patient-reported outcomes were prospectively collected using Patient-Reported Outcomes Measurement Information System (PROMIS) scores. The PROMIS domains evaluated included Physical Function, Pain Interference, Pain Intensity, Global Physical Health, Global Mental Health, and Depression. The Physical Function domain in particular has been validated for both pre- and postoperative use in foot and ankle orthopedic patients.[1,8] PROMIS scores were prospectively collected at preoperative, 1-year, and, if applicable, 2-year postoperative time points. For the purposes of this study, an attempt was made to collect most recent

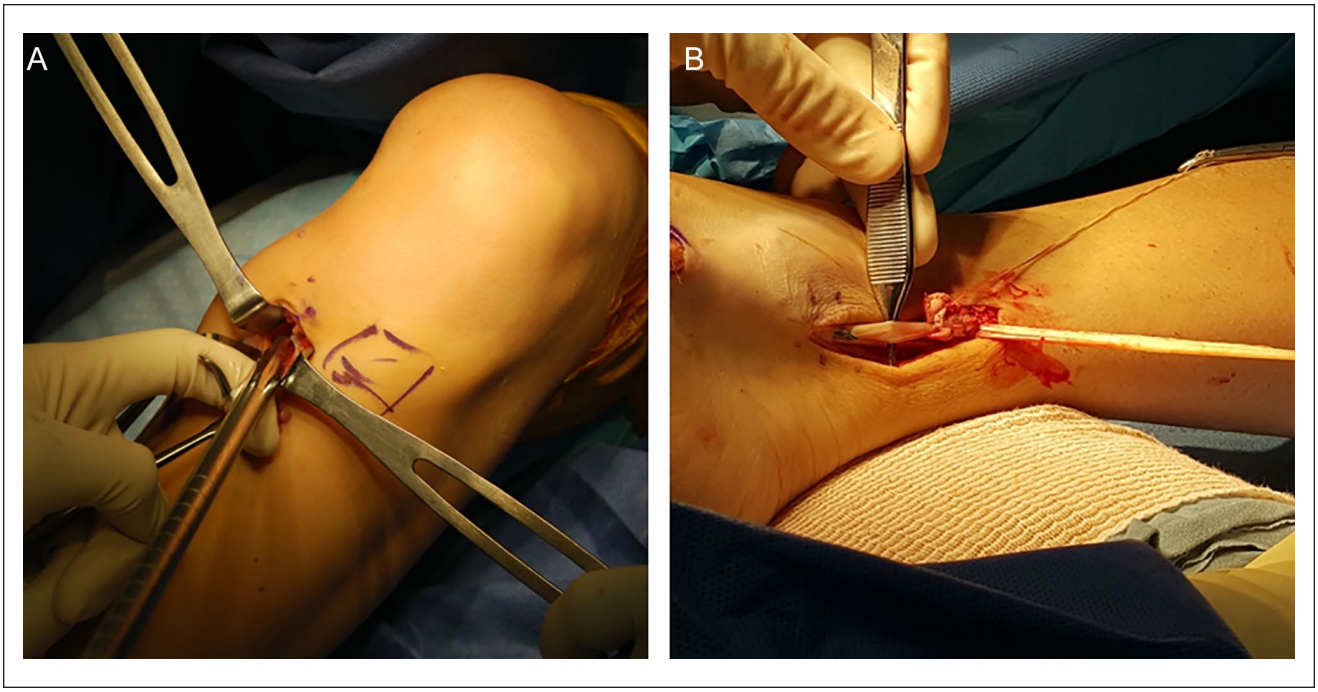

Figure 1. (A) The hamstring graft is harvested with a tendon stripper. (B) The graft is then incorporated into the peroneal tendon using a pulver taft weave and anchored into the base of the fifth metatarsal.

PROMIS scores for all patients. In total, 26 of 31 patients had both preoperative and minimum 1-year postoperative PROMIS scores. Average time from surgery to survey follow-up was 24.25 (range, 12-52.7) months.

Surgical Technique and Postoperative Protocol

First, the hamstring graft was harvested. A thigh tourniquet was applied and an incision was made over the proximal medial tibia. Sharp dissection was carried down through the skin and subcutaneous tissue, followed by blunt dissection to the level of the sartorial fascia. The sartorial fascia was incised lightly in line with its fibers, and the hamstring tendon of interest was identified. The gracilis or semitendinosus was harvested, and in some cases both tendons were harvested when it was deemed 1 tendon alone was not sufficient (Figure 1A). The harvested hamstring tendons were relieved of all adhesions using a tendon stripper and prepared by removing any muscle tissue. The graft was then tubularized with a running, absorbable suture.

Attention was then turned to the ankle, where an incision was made over the peroneal tendons. Once the skin and subcutaneous tissue was dissected, blunt dissection was performed to expose the peroneal retinaculum. The peroneal retinaculum was incised both proximally and distally, allowing for later repair. Any scar tissue surrounding the peroneal tendons was removed. The tendons were inspected and debrided, and any diseased tissue was excised. Commonly, the entire affected portion of the tendon was taken out. In the case of peroneus brevis reconstruction, an anchor was placed in the fifth metatarsal base to secure the graft distally. In some cases, an additional incision was made over the metatarsal base in order to place this anchor using a skin bridge to decrease the overall incision length. The graft was then shuttled underneath the skin bridge proximally within the peroneal retinaculum (Figure 1B). The graft was shuttled through the proximal stump of the tendon with a Pulvertaft-type maneuver and sutured there. It was then doubled back and tied onto itself distally. This created a double-bundle effect, allowing the surgeon to fine tune the tension of the graft and increase the width of the graft closely approximating the native tendon. For cases with longus to brevis tenodesis, resection was taken back to healthy nondiseased tendon, which is often proximal to the fibular tip (on average about 4-5 cm). Next, a side-to-side tenodesis of longus to brevis was completed followed by reconstruction of the tendon to the base of the fifth metatarsal. This procedure leads to a better eversion moment arm. The peroneal retinaculum was then repaired, and the wounds were irrigated and closed.

Postoperatively, patients were placed in a splint, which was removed after 2 weeks. Partial weightbearing on the affected extremity was initiated after 6 weeks, along with formal physical therapy.

Table 1. Comparison of Patient-Reported Outcomes Measurement Information System Scores for Patients With (n = 17 Total, n = 15 With Survey) and Without (n = 14 Total, n = 10 With Survey) Longus to Brevis Tenodesis.[a]

Characteristic	Preoperative	Postoperative	Pre- to postoperative change	*P* value[b]
Physical Function				
Tenodesis (n = 15)	44.10	49.31	+4.89	**.044**
No tenodesis (n = 10)	43.43	50.47	+7.73	.093
P value[c]	.816	.757	.677	
Pain Interference				
Tenodesis (n = 15)	58.43	51.94	−7.16	**.026**
No tenodesis (n = 10)	59.73	49.89	−9.54	**.003**
P value[c]	.595	.523	.658	
Pain Intensity				
Tenodesis (n = 15)	49.90	41.82	−9.15	**.011**
No tenodesis (n = 10)	49.99	40.17	−10.08	**.004**
P value[c]	.964	.644	.855	
Global Physical Health				
Tenodesis (n = 15)	46.80	52.23	+6.20	.059
No tenodesis (n = 10)	45.49	54.30	+9.53	**.003**
P value[c]	.608	.468	.523	
Global Mental Health				
Tenodesis (n = 15)	54.47	57.22	+2.58	.397
No tenodesis (n = 10)	52.68	58.75	+7.45	.112
P value[c]	.622	.644	.143	
Depression				
Tenodesis (n = 15)	47.69	45.89	−2.83	.530
No tenodesis (n = 10)	46.72	45.26	−2.85	.631
P value[c]	.735	.835	.996	

[a]Tenodesis vs no tenodesis demographic comparison: average age: 49.11 vs 44.35 years ($P = .214$). Average body mass index: 29.71 vs 26.65 kg/m^2 ($P = .166$). Average time to survey follow-up: 22.79 vs 37.09 months ($P < .001$).
[b]*P* values represent comparison of the 2 groups.
[c]*P* values represent pre- to postoperative change within each group.
P-values in bold represent statistically significant ($p < 0.05$) results.

Statistical Analysis

Student *t* tests were used to compare preoperative and postoperative PROMIS scores across the full cohort. Subgroup analyses were also performed using *t* tests when subgroup cohort numbers were large enough. A comparison was made between patients with and without longus to brevis tenodesis, with and without cavovarus deformity correction, or with and without ankle stabilization procedures. Statistical significance was determined using an α of .05 for all comparisons.

Results

Patient-Reported Outcomes

Twenty-six of 31 eligible patients (84%) completed preoperative and postoperative PROMIS surveys. Attempts to contact the 5 remaining patients who did not complete surveys via phone and email were unsuccessful. On average, patients demonstrated pre- to postoperative improvement in every PROMIS domain evaluated, with significant improvement in Physical Function (+5.99; $P = .006$), Pain Interference (–8.11; $P < .001$), Pain Intensity (–9.02; $P < .001$), and Global Physical Health (+7.29; $P = .001$). Improvements in Global Mental Health (+3.90; $P = .154$) and Depression (–2.94; $P = .394$) were not statistically significant. These average improvements exceeded the suggested thresholds for minimal clinically important differences (MCIDs) based on half of the standard deviation.[7,9]

When evaluating subgroup comparisons, no significant differences in preoperative, postoperative, or pre- to postoperative change in PROMIS scores were detected when evaluating patients with and without longus to brevis tenodesis (Table 1), cavovarus deformity correction (Table 2), or ankle stabilization procedures (Table 3). Age, BMI, and average time to survey follow-up were also compared in each of the subgroup analyses. No significant differences between subgroups were observed for age or BMI. The average follow-up for patients without longus to brevis tenodesis (37.09 months) was significantly longer than the average follow-up for patients with longus to brevis tenodesis (22.79 months; $P < .001$). The average follow-up for

Table 2. Comparison of Patient-Reported Outcomes Measurement Information System Scores for Patients With (n = 16 Total, n = 13 With Survey) and Without (n = 15 Total, n = 12 With Survey) Cavovarus Deformity Correction.[a]

Characteristic	Preoperative	Postoperative	Pre- to postoperative change	*P* value[b]
Physical Function				
Cavovarus (n = 13)	44.48	49.12	+3.82	.093
No cavovarus (n = 12)	42.97	50.48	+8.64	**.042**
P value[c]	.590	.690	.379	
Pain Interference				
Cavovarus (n = 13)	58.36	52.84	−5.73	.056
No cavovarus (n = 12)	59.71	49.26	−10.93	**.002**
P value[c]	.599	.260	.338	
Pain Intensity				
Cavovarus (n = 13)	49.52	42.78	−7.53	**.040**
No cavovarus (n = 12)	50.51	39.41	−12.28	**.001**
P value[c]	.647	.349	.360	
Global Physical Health				
Cavovarus (n = 13)	47.12	51.38	+4.46	.137
No cavovarus (n = 12)	45.17	54.87	+11.31	**.001**
P value[c]	.446	.230	.169	
Global Mental Health				
Cavovarus (n = 13)	53.36	57.11	+2.61	.262
No cavovarus (n = 12)	54.41	58.62	+6.19	.252
P value[c]	.776	.639	.258	
Depression				
Cavovarus (n = 13)	47.39	46.62	−1.88	.796
No cavovarus (n = 12)	47.23	44.58	−4.26	.351
P value[c]	.955	.494	.553	

[a]Cavovarus vs no cavovarus demographic comparison: average age: 49.21 vs 44.93 years ($P = .353$). Average body mass index: 29.99 vs 26.55 kg/m^2 ($P = .140$). Average time to survey follow-up: 23.34 vs 35.54 months ($P = .002$). *P*-values in bold represent statistically significant ($p < 0.05$) results.
[b]*P* values represent comparison of the 2 groups.
[c]*P* values represent pre- to postoperative change within each group.

patients without cavovarus deformity correction (35.54 months) was significantly longer than the average follow-up for patients with cavovarus deformity correction (23.34 months; $P = .002$). Average follow-ups for patients with and without ankle stabilization procedures were similar (30.20 vs 28.79; $P = .744$).

Persistent Pain and Reoperations

Three patients reported persistent postoperative pain, 1 of whom required reoperation. Of note, this patient had 3 prior procedures to address peroneal pathology and also underwent a number of concurrent procedures at the time of peroneal reconstruction, including lateral ligament reconstruction and repair for a 7 × 8-mm osteochondral lesion of the talus (OLT). The procedure performed at our institution was the fourth on the affected peroneal tendon. She presented 6 months after this procedure with persistent pain, at which point MRI showed an intact peroneal reconstruction with minimal edema. At 1 year postoperatively, ultrasound imaging showed signal around the base of the fifth metatarsal, and she subsequently underwent steroid injection and shockwave therapy, which slightly improved her symptoms. At 19 months following the index procedure, she underwent arthroscopy and debridement, OLT repair, and imbrication of a partial peroneal tendon repair. She has subsequently been diagnosed with complex regional pain syndrome (CRPS).

The remaining 2 patients who reported persistent postoperative pain initially did well for at least the first year postoperatively. One patient had no complaints until 3.5 years following the initial procedure, at which point she reported pain and tenderness at the base of the fifth metatarsal. Radiographs taken at that time were negative for stress fracture, and MRI showed interval thickening to the stump of the reconstruction with mild adjacent bone marrow edema but an intact reconstruction. She was diagnosed with a stress reaction at the site of the peroneal reattachment. She was placed in a boot for 6 weeks and subsequently transitioned into a brace and initiated physical therapy. The second patient with persistent postoperative pain had originally undergone a primary peroneal repair, with subsequent

Table 3. Comparison of Patient-Reported Outcomes Measurement Information System Scores for Patients With (n = 10 Total, n = 8 With Survey) and Without (n = 21 Total, n = 17 With Survey) Ankle Instability.[a]

Characteristic	Preoperative	Postoperative	Pre- to postoperative change	*P* value[b]
Physical Function				
Ankle instability (n = 8)	44.21	48.76	+3.50	.220
No ankle instability (n = 17)	43.65	50.25	+6.87	**.020**
P value[c]	.863	.633	.436	
Pain Interference				
Ankle instability (n = 8)	60.81	50.59	−12.80	**.029**
No ankle instability (n = 17)	58.08	51.37	−6.02	**.005**
P value[c]	.350	.840	.311	
Pain Intensity				
Ankle instability (n = 8)	53.01	40.25	−16.78	**.010**
No ankle instability (n = 17)	48.66	41.59	−6.98	**.006**
P value[c]	.072	.752	.120	
Global Physical Health				
Ankle instability (n = 8)	46.86	54.48	+10.22	**.047**
No ankle instability (n = 17)	46.08	52.39	+6.19	**.013**
P value[c]	.782	.524	.527	
Global Mental Health				
Ankle instability (n = 8)	57.73	59.30	+3.36	.733
No ankle instability (n = 17)	52.18	57.14	+4.27	.082
P value[c]	.183	.556	.736	
Depression				
Ankle instability (n = 8)	47.40	46.21	−3.94	.745
No ankle instability (n = 17)	47.29	45.37	−2.47	.454
P value[c]	.970	.809	.696	

[a]Instability vs no instability demographic comparison: average age: 45.62 vs 47.86 ($P = .708$). Average body mass index: 25.70 vs 29.58 ($P = .065$). Average time to survey follow-up: 30.20 vs 28.79 months ($P = .744$). *P*-values in bold represent statistically significant ($p < 0.05$) results.
[b]*P* values represent comparison of the 2 groups.
[c]*P* values represent pre- to postoperative change within each group.

reconstruction 2 years later due to persistent pain. At 18 months following the reconstruction, she continued to complain of lateral pain. Her MRI showed scarring, but the reconstruction was intact.

Another patient who initially did well required reoperation following a motor vehicle accident that damaged the reconstructed peroneal tendon. She presented following the accident with tendon subluxation. The patient underwent a course of nonoperative management, reporting some relief but persistent pain and swelling laterally. She underwent reoperation 18 months following the index procedure, including debridement and repair of the superficial peroneal retinaculum, and has done well following the secondary procedure.

Other Complications

One patient experienced a postoperative infection requiring antibiotics, and 1 patient experienced delayed wound healing that resolved uneventfully. No patient experienced postoperative deep vein thrombosis or nerve-related issues, and no patient reported persistent pain or discomfort at the site of the hamstring autograft harvest.

Discussion

Peroneal tendon tears rarely exist in isolation. They are often found in the setting of subtle cavus foot, recurrent isolation, or tendon dislocations. As a result, the tendon has a considerable amount of degeneration and tendinopathy in these cases and may better respond to reconstruction. In our cohort, patients reported excellent postoperative outcomes with pre- to postoperative improvement in every PROMIS domain evaluated. Significant improvement was seen in pre- to postoperative Physical Function, Pain Interference, Pain Intensity, and Global Physical Health. We did not detect any differences between patients who did or did not undergo longus to brevis tenodesis, cavovarus deformity correction, or ankle stabilization. In addition, we did not observe any instances of donor site morbidity. Our results support the efficacy of peroneus brevis reconstruction with hamstring autograft for patients with moderate to advanced

peroneal tendon pathology. The main advantage of a reconstructive technique is that often peroneal tendon tears exist within the spectrum of tendinopathy, which is often irreversible. This may also explain the persistence of pain following debridement and repair procedures. The introduction of an autograft allows for disease-free tissue with similar properties as the native tendon to function effectively, while at the same time removing the pain generator.

Although existing studies have evaluated outcomes following direct repair, tenodesis, or tendon transfer, to our knowledge, this is the largest study evaluating clinical and patient-reported outcomes following peroneus brevis reconstruction with hamstring autograft, although we use a cohort of patients who underwent a number of concomitant procedures at the time of peroneus brevis reconstruction. The demographics of our cohort are generally similar to those reported in the existing literature with regard to peroneal injuries,[3,4,13,15] although this cohort represents patients with more advanced degeneration, such that they were indicated for reconstruction as opposed to repair.

Previous studies have evaluated various techniques to address peroneal tendon pathologies. Demetracopoulos et al[3] reported excellent long-term results for their cohort of patients who underwent debridement and primary repair of peroneus longus and brevis. They reported no complications or reoperations with good patient-reported outcome scores and successful return to sport in 17 of 18 patients (94%) able to be reached for follow-up. However, these patients were all reported to have mild to moderate degeneration of the peroneal tendons, suggesting that patients with more severe injury may require more aggressive surgical intervention, such as reconstruction with allograft or autograft. Dombek et al[4] evaluated 40 patients who underwent debridement alone, debridement with tubularization, or tenodesis. Despite 98% of patients returning to physical activity, the authors reported relatively high complication rates. Twenty-percent of patients reported a minor complication that included sural neuritis, tendonitis, and subluxation, and 10% experienced a major complication that included postoperative hematoma, wound dehiscence, unresolved tendonitis, and persistent ankle instability. Other authors have reported similarly high complication rates following tubularization, tenodesis, tendon transfer, and allograft reconstruction. Redfern and Myerson[13] followed 28 patients for an average of 4.6 years postoperatively and observed complications in 31% of cases, with 50% of patients reporting some degree of persistent pain. In another study evaluating outcomes following peroneal repair, 2 of 16 patients (12.5%) did not return to full activity following surgical repair.[14] One study did report excellent outcomes for a cohort of 34 patients undergoing primary repairs, with significant improvement in visual analog scale (VAS) pain scores and Lower Extremity Functional Scale (LEFS) questionnaires. Seventeen of 18 responding patients (94%) returned to activity, and no reoperations were reported.[3] However, this cohort included patients with mild to moderate peroneal degeneration. In our experience, more advanced cases of chronic disease rarely respond to debridement and repair alone.

Mook et al[10] evaluated 14 patients who underwent allograft reconstruction at an average of 17 months postoperatively. These authors found improved eversion strength and satisfactory VAS pain, LEFS, and SF-12 patient-reported outcomes. They reported sensory numbness in the sural nerve distribution in 4 patients, 2 of whom had transient cases of numbness. No other major complications or reoperations were reported. There were no allograft-related complications, including supply issues, contamination and infection, and incorporation times.

The surgical technique for reconstruction of the peroneus brevis with hamstring autograft was described by Ellis and Rosenbaum[5] as a safe and efficacious procedure for patients with advanced peroneal tendon degeneration. Nishikawa et al[11] presented a case report of 3 patients who underwent reconstruction with a semitendinosus autograft. The authors reported no complications and no inversion or eversion strength deficits at 6 months postoperatively based on isokinetic strength testing results. Although the potential for donor site morbidity is a potential concern with the use of hamstring autograft, Cody et al[2] performed a study of 37 patients who underwent hamstring harvest for a variety of different foot and ankle procedures. In their study, 32 patients (86%) reported no pain at the site of the hamstring harvest, with the remaining 5 patients reporting mild to moderate pain symptoms. Furthermore, they used isokinetic strength testing to evaluate patient strength at an average of 38 months postoperatively and found minimal strength deficits in the involved knee.

There are several limitations of the present study. Our cohort includes patients who underwent a number of concomitant procedures, which may have influenced outcomes, but peroneal tendon tears rarely exist in isolation. Heckman et al[6] suggest that anywhere from 32% to 82% of peroneal pathologies are observed in patients with cavovarus deformity, while approximately 33% of patients have ankle instability, therefore suggesting that a population of isolated peroneal tendon reconstructions would be small. Other studies evaluating operative treatments for peroneal tendon injuries have also reported high rates of concomitant procedures. It is possible that the correction for cavovarus deformity or ankle instability may have been the primary factor contributing to the improvement in patient-reported outcomes. However, we did evaluate patients with and without these concomitant procedures and did not detect any significant differences. In addition, it would be ideal to have an objective measurement of strength following reconstruction, however given the retrospective nature of this study, Cybex testing was not completed. We also did not evaluate the reconstructed tendons radiographically. Additionally, longer follow-up would be optimal, although our average time to survey follow-up was 24.25 months, which we believe

provides strong evidence with regard to the efficacy of this technique. The limited number of cases and small effect size is certainly a limitation in the study. However, given the limited literature available in the discussion of hamstring autograft reconstruction, we feel that this study is a good starting point to build upon for future research demonstrating the clinical utility of the procedure.

Conclusion

Peroneus brevis reconstruction with hamstring autograft represents an effective treatment option for patients with moderate to advanced peroneal tendon injury or degeneration. We observed clinically notable normalization of postoperative patient-reported outcome scores with few complications. Furthermore, no patient reported persistent pain at the site of the hamstring autograft harvest, which is considered the primary concern with regard to autograft procedures.

Declaration of Conflicting Interests

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