

## Statement of Purpose

The purpose of this study was to evaluate the biomechanical improvements of gait after a Brostrom-Gould procedure for lateral ankle stabilization.

## Methods and Procedures

- Patient inclusion criteria
  - 18-70 years old, with clinical diagnosis of lateral ankle instability and history of at least one significant ankle sprain
  - Current complaints ‘giving way’ or ‘unstable’ ankle
  - Failure of conservative therapy
  - Independent community ambulation
- Patient exclusion criteria
  - Acute injury to spine or LE in last 3 months
  - Recent LE surgery
  - Current PT patients
  - Uncontrolled DM with neuropathy
- 10 patients were initially recruited into the study.
- All included patients underwent a pre-procedure biomechanical gait exam by students of the DPT program at Nazareth College by video capture analysis, STAR excursion balance testing, and Foot and Ankle Disability Index testing.
- All patients had a single ankle Brostrom-Gould procedure performed by fellowship trained surgeons.
  - PT started 4-6 weeks post-op including range of motion, strength, balance and proprioception exercises
- Patients returned for biomechanical re-evaluation at four months post-op.
  - Only four of the initial patients followed up for re-evaluation.
- Statistical analysis was performed in Microsoft Excel using Students T-Test with significance at 0.05.

## Literature Review

- The Brostrom-Gould procedure has been extensively studied, and results consistently demonstrate its effectiveness in the treatment of lateral ankle instability.<sup>1</sup>
- Several publications report high-level athletes returning to pre-injury levels of performance.<sup>2,3</sup>
- Cadaveric studies supplement and support clinical data with respect to the strength of the construct, and additional modifications to the procedure have been utilized for certain types of cases.<sup>4</sup>
- There is a lack of consensus on the appropriate time frame for return to various physical activities.<sup>5</sup>
- Outcome measures in this large body of research range from subjective questionnaires to validated quantitative functional scoring systems.<sup>6</sup>
- Previous studies have identified biomechanical categories associated with ankle instability, including stride velocity, step length, and single leg excursion.<sup>7,8</sup>
- No study has performed a pre- and post-operative comprehensive biomechanical analysis and FADI score with our relatively short follow-up period of 4 months to our knowledge.

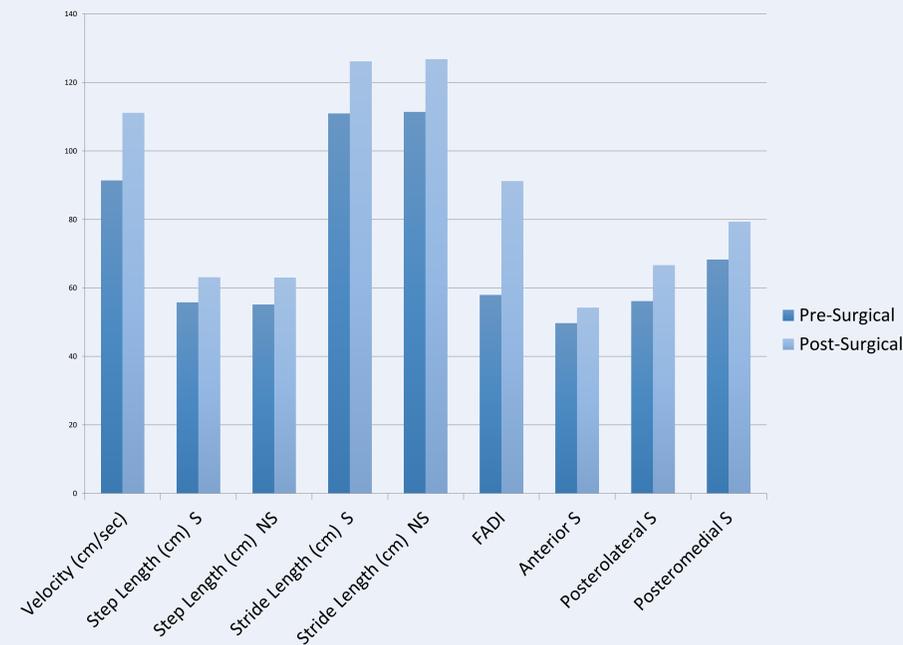
## Financial Disclosure

Authors received no compensation for their work. Participants were compensated for fuel for a portion of the study by Nazareth College.

## Results

- Improved FADI score was the only value to be determined to meet a *p* of 0.05.
- Several values approached significance, Step Length on both surgical and non-surgical side, and posteromedial balance.
- The level of significance was limited by the number patients available to follow up.

Figure 1 – Pre and Post Surgical Biomechanical Values



	Pre	Post	p-value
Velocity (cm/sec)	91.375	111.1	0.09
Step Length (cm) S	55.7	63.1	0.06
Step Length (cm) NS	55.2	63.0	0.10
Stride Length (cm) S	110.9	126.1	0.08
Stride Length (cm) NS	111.4	126.7	0.07
FADI	58.0	91.1	0.01
Anterior S (cm)	49.7	54.2	0.23
Posterolateral S (cm)	56.1	66.6	0.11
Posteromedial S (cm)	68.3	79.3	0.06

S – Surgical limb NS – Non-surgical limb

## Analysis and Discussion

- Surgery improved FADI scores within significance.
- All biomechanical values were improved after surgery, but remained under 0.05 for significance.
  - Posteromedial direction has strong correlation with lateral ankle instability
  - Improved post operatively
- Results were suggestive but hampered by limited follow up.
  - Patients initially received compensation in the form of fuel cards, but funding was withdrawn in follow up.

## Conclusions

- The Brostrom-Gould procedure improved the patient’s quality of life as evidenced in the FADI score.
- Biomechanical measurements were all improved post surgery, but the limited follow up patients affected the statistical significance of those improvements.
- Further study is warranted to demonstrate statistical significance.

## Thank You

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## References

1. Bell SJ, Mologne TS, Sitter DF, Cox JS. Twenty -six -year results after Brostrom procedure for chronic lateral ankle instability. *Am J Sports Med* 2006; 34:975-8.
2. White WJ, McCollum GA, Calder JD. Return to sport following acute lateral ligament repair of the ankle in professional athletes. *Knee Surg Sports Traumatol Arthrosc.* 2016 Apr;24(4):1124-9. doi: 10.1007/s00167-015-3815-1. Epub 2015 Oct 5.
3. Li X, Killie H, Guerrero P, Busconi BD. Anatomical reconstruction for chronic lateral ankle instability in the high-demand athlete: functional outcomes after the modified Broström repair using suture anchors. *Am J Sports Med.* 2009 Mar;37(3):488-94.
4. Viens, N. A., Wijdicks, C. A., Campbell, K. J., LaPrade, R. F., & Clanton, T. O. (2014). Anterior Talofibular Ligament Ruptures, Part 1: Biomechanical Comparison of Augmented Broström Repair Techniques With the Intact Anterior Talofibular Ligament. *The American Journal of Sports Medicine*, 42(2), 405–411.
5. Pearce, Christopher & Tourné, Yves & Zellers, Jennifer & Terrier, Romain & Toschi, Pascal & Silbernagel, Karin & Perera, Anthony. (2016). Rehabilitation after anatomical ankle ligament repair or reconstruction. *Knee Surgery, Sports Traumatology, Arthroscopy*. 24. 10.1007
6. Brodsky AR, O'Malley MJ, Bohne WH, Deland JA, Kennedy JG. An analysis of outcome measures following the Brostrom-Gould procedure for chronic lateral ankle instability. *Foot Ankle Int* 2005; 26:816-9.
7. The Reliability of an Instrumented Device for Measuring Components of the Star Excursion Balance Test. Plisky P et al. *Am J Sports Phys Ther.* 2009 May; 4(2): 92–99.
8. Gigi R, Haim A, Luger E, Segal G, Melamed E, Beer Y, Nof M, Nyska M, Elbaz A. Deviations in gait metrics in patients with chronic ankle instability: a case control study. *J Foot Ankle Res.* 2015 Jan 21;8(1):1.