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### Flexor Tenotomy For The Treatment Of Hallux Ulcers

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## Statement of Purpose

The central purpose of this research is to demonstrate the impact and effectiveness of flexor tenotomies on the time course for healing hallux ulcers. Appropriate understanding and employment of flexor tenotomy in a clinical setting is essential in order to encourage awareness of the benefits, practicality and simplicity of this inexpensive and minimally invasive procedure.

## Literature Review

Diabetic foot ulcers are a tremendous health concern, which have been implicated as a causative factor in lower limb amputations. The annual incidence of diabetic foot ulcer (DFU) development in patients with DM is about 2%, and up to 25% over their lifetime. Regardless of other risk factors, these patients have a greater than two-fold increase in mortality compared to patients with diabetes without DFU (1,2).

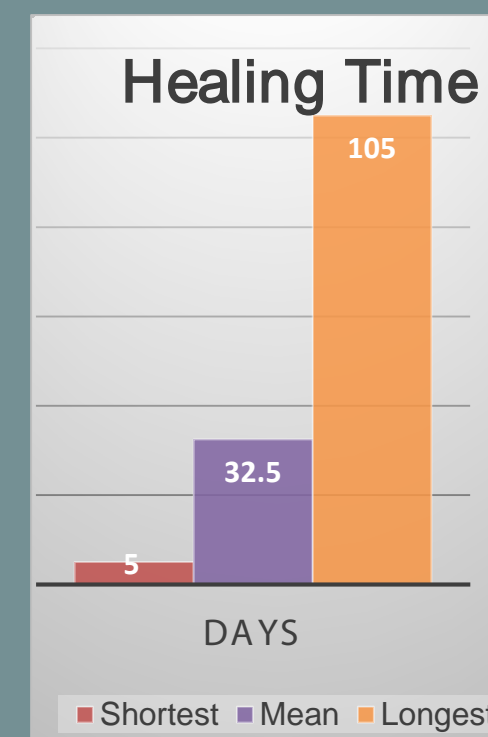
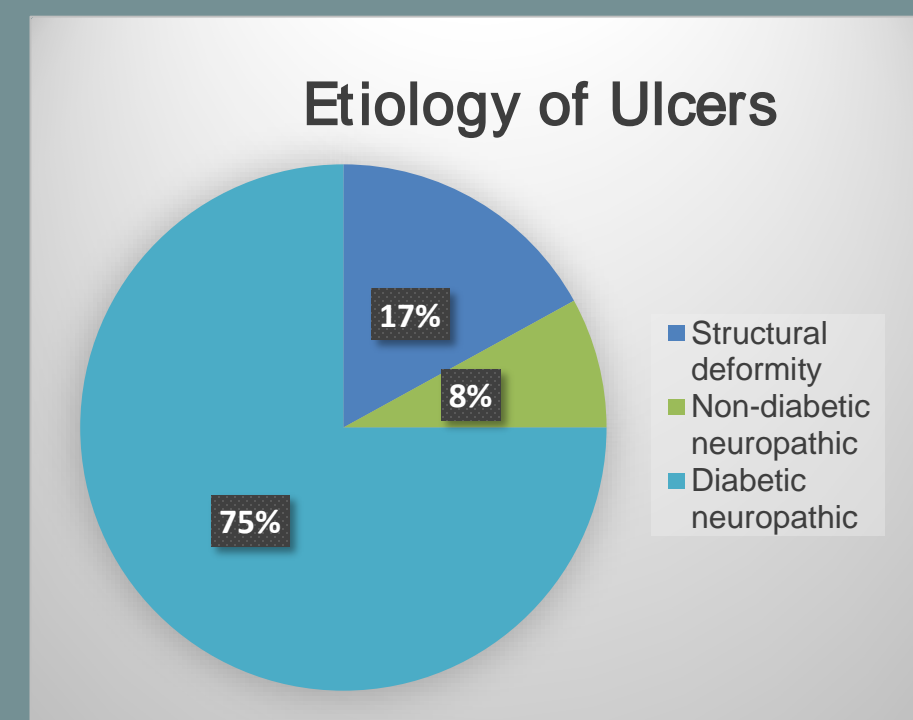
Particularly, in the presence of complicating factors such as neuropathy and toe deformities, during weight-bearing or gait, insensate and deformed toes may be subject to increased pressures and shear stress forces, which can result in formation of callus, tissue trauma, and ultimately ulcerations (3,4).

Throughout the years, research has suggested the flexor tenotomy, a minimally invasive surgical procedure, can reduce healing time as well as the risk of foot ulcer recurrence in patients with diabetes, peripheral neuropathy, and digital deformity, or combination of these (5,6). Flexor tenotomy encompasses, for instance, the utilization of the tip of a needle or a scalpel blade for the transection of the longitudinal fibers of the brevis/long flexor tendons, thus, reducing the contraction of the flexion deformity of the digits, and sequentially relieving pressure at the apex of the toes (7).

The aim of this study was to assess and evaluate the relationship between flexor tenotomies in a clinical setting, and the time course for healing neuropathic, diabetic, and structural deformity hallux ulcers.

## Methodology

A retrospective cohort study was performed to analyze the medical files of 1,471 patients treated for digital foot ulcers by flexor tenotomies between September 2011 and January 2019. For the intent of this particular research, focus was directed to the effect of flexor tenotomy on healing time to address hallux ulcers. The medical database of Ankle & Foot Center of Tampa Bay was screened in order to achieve this goal. The dates for procedure, follow-up visits, and wound closure were recorded. The time course for healing was calculated accordingly for all relevant patients, and basic statistical analyses were employed for data interpretation.



During the surgical procedure conducted in a clinical setting, under local anesthetic, the sharp end of an 18G needle or a #15 scalpel blade was used through a single plantar incision to release the fibers of the flexor hallucis longus/brevis; based on surgeon preference. Patients were examined within one week after the procedure performed, and then followed at regular intervals.

A total of 97 patients between the ages of 41 and 86 years of age underwent flexor tenotomy for the treatment of hallux ulcers with a follow up period of 7 months.

Patient Demographics			
Gender	Female: 46	Male: 51	
Age	Youngest: 41 y/o	Mean: 65 y/o	Oldest: 86 y/o

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## Results

The medical database search yielded a total of 1,585 flexor tenotomy procedures, from which 101 (6%) were performed on the hallux, 514 (32%) on the second digit, 497 (32%) on third digit, 375 (23%) on the fourth digit, and 98 (5%) on the fifth digit.



The 97 patients in this study were categorized into diabetic neuropathic ulcers, structural deformity ulcers, and non-diabetic neuropathic ulcers. The total number of females was 46 (48%) and total number of males was 51 (52%). The mean age was 65 years of age. Of the total number of ulcers; the non-diabetic neuropathic group comprised 8%, the structural deformity group comprised 17%, and the diabetic neuropathic group comprised 75%. The mean healing time represented 28 days. The shortest healing time was 5 days, and the longest healing time was 105 days.



## Discussion

It has been reported that 84% of diabetic lower limb amputations have been associated with DFU as a causative factor. It is important to remain vigilant with an eye toward the reduction of the development of risks factors such as osteomyelitis and consequently amputation (5).

Following the analysis of the extracted data, our results of using flexor tenotomy for the treatment of hallux ulcers have demonstrated improvement in healing time, as well as suggesting effectiveness of this minimally invasive procedure in an outpatient basis, for the achievement of wound closure and prevention of recurrence in patients with diabetes, neuropathy, and structural digital deformity.

## Acknowledgements

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