

Tenotomy positively affect as the prognosis of patients with diabetic foot as economic demand of podiatric care (bicentric study)

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Patients with Diabetic Foot Syndrome (DFS) are threatened by lower limb amputations (LLA). Most of them are preventable by appropriate comprehensive podiatric approach. One of curable surgical procedure able to off-load diabetic foot ulcers (DFUs) is flexor tenotomy that belongs to one of surgical method of off-loading. However, it ´s efficacy is still not fully described. Tenotomy should be used in patients with DFUs and toe deformities (fig. 1 a), b)), that predispose to increased plantar pressures in toe and metatarsal heads areas (1,2). The diabetic foot management guidelines recommends to perform tenotomies only on from the 2nd to the fifth toe (1), where are preulceration lesions or active DFUs, in which standard of care (SOC) treatment failed (1). Tenotomies could potentially shorten healing time (3) and possibly could be financially saving.

The aim of our study was to assess the frequency of tenotomies in two Czech podiatric centers and to evaluate their impact on prognosis of patients with toes DFUs and the possible costs.

Methods: In total, 259 patients with DFUs (Table 1) treated in our out-patient foot clinic between 1/2024 and 12/2024 were enrolled in this bicentric prospective study. Epidemiological characteristics, DFUs healing and therapy costs were compared between patients treated by tenotomies and those treated by standard of care (SOC) in 3-months follow-up.

Results:

- Tenotomy was performed in 13.1% of patients (34/259).** Compared to study subjects treated by SOC these patients were significantly younger ($p=0.04$) with a shorter duration of diabetes ($p<0.0001$) and DFUs ($p=0.04$) and better microcirculation ($p=0.004$; Table 2).
- During the follow-up period, no amputation occurred in tenotomized individuals, while in the SOC treated cohort amputation was performed in 25.8% of patients (58/225, $p<0.0001$).**
- We observed a positive trend toward faster healing ($p=0.17$) and shorter ATB therapy ($p=0.17$) in patients after tenotomies compared to SOC.
- Tenotomies significantly reduced the costs of therapy in comparison to SOC treatment (394.8 ± 413.9 with a median of 210Euro vs. 565.3 ± 745.3 with a median of 307Euro; $p=0.05$; fig. 2).
- Subanalysis showed that amputees healed significantly longer (2.6 ± 1 months; $p=0.003$), with the longest ATB therapy (2.2 ± 1.1 months; $p<0.0001$) and significantly higher financial demands (1100.5 ± 996.6 with a median of 829.9 Euro; $p<0.0001$; fig.3) in contrast to SOC treated subjects without amputation.

Conclusion: Our study showed that tenotomy enhanced wound healing, reduced the number of amputations and the costs associated with podiatric care. This method of surgical off-loading should be more widely implemented into clinical podiatric practice

Figure No.1: Claw toe (a) and hammer toe (b)deformities



Scalpel flexor tenotomy



Needle flexor tenotomy

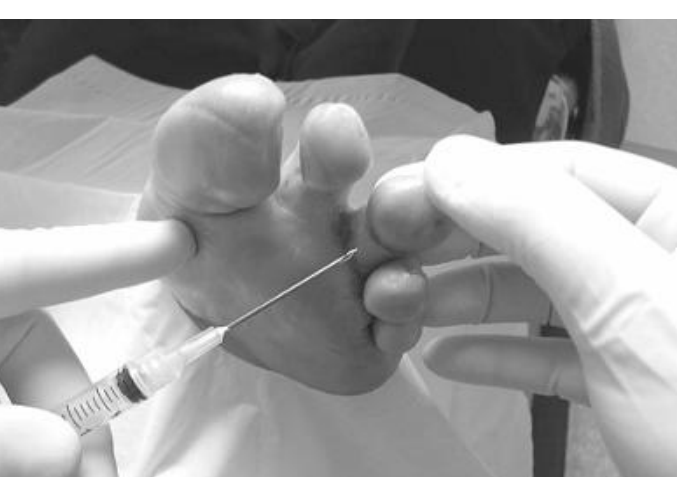


Table No.1: Basal characteristics of study subjects

Evaluated parameters	Mean values (n=259)
Age (years)	66.8 ± 11.3
BMI (kg.m ⁻²)	30.8 ± 11.0
Diabetes duration (years)	25 ± 12.4
HbA1c (mmol/mol)	58.2 ± 18.3
DM 1.typu (%)	25
PAD (%) / TcPO2 (mmHg)	50.3 / 42.1 ± 17.6
DFUs duration (months)	5.2 ± 9.6
Wifl composite score	3.3 ± 1.7
Osteomyelitis (%)	26

Table No. 2: The comparison of study patients and DFUs characteristics between subjects after tenotomies and those treated by SOC

Evaluated parameters	Patients treated by tenotomies (n=34)	Patients treated by SOC (n=225)	P-value
Mean age (years)	63.6 ± 9.6	67.5 ± 11.4	P = 0.04
Mean BMI (kg.m ⁻²)	37.6 ± 25.4	29.7 ± 6.1	NS
Mean diabetes duration (years)	17.4 ± 9.9	26 ± 13	P < 0.0001
Mean HbA1c (mmol/mol)	56.2 ± 13.4	57.9 ± 17.5	NS
Mean DFU duration (months)	3.2 ± 3.9	5.1 ± 8.8	P = 0.04
Mean ABI	1.1 ± 0.2	1.26 ± 0.31	NS
Mean TcPO2 (mm Hg)	51.4 ± 15.7	40.8 ± 17.6	P = 0.004

FIGURE No.2:. Comparison of direct treatment costs (mean and median) over a 3-month follow-up period between patients treated with digital flexor tenotomy plus SOC and those treated with SOC alone.

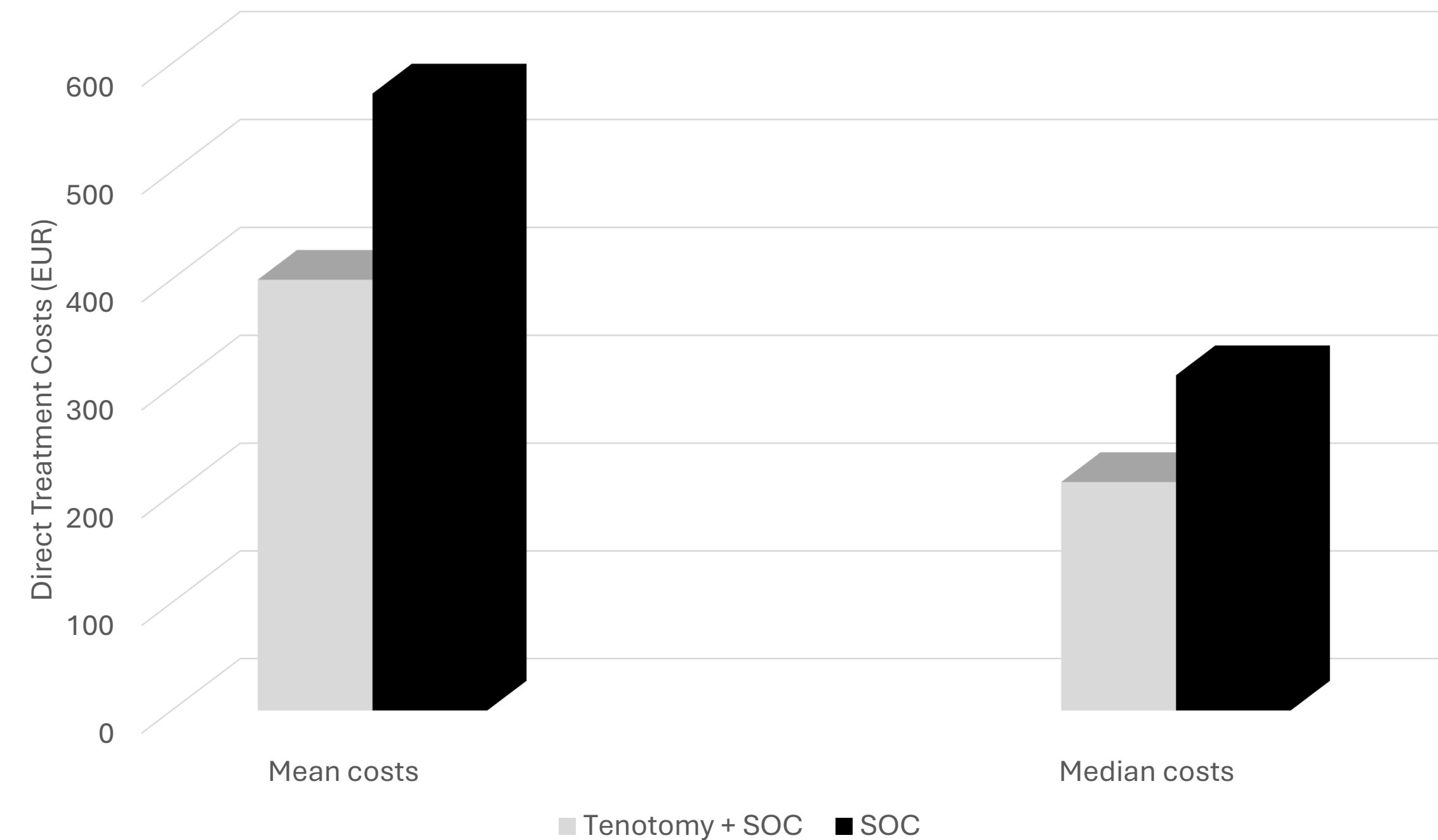


FIGURE No.3. Comparison of antibiotic therapy duration between study groups.

