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TREATMENT OF FIBULAR LIGAMENT RUPTURE WITH THE ORTHO REHAB SHOE

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Abstract: In a prospective study we examined 46 patients (14 - 49 years of age) with fresh ruptures of the lateral ligaments of the ankle (talar tilt ≥ 10 degrees). Treatment consisted in six weeks of taping combined with wearing of a special rehabilitation shoe (*Ortho Rehab*). 28 patients were treated conservatively and 18 had an operative repair of their ruptured ligaments. After 8 weeks every patient was clinically controlled. Until now 35 patients were re-evaluated more than one year after injury. Treatment was judged as very comfortable and positive. Working capacity was achieved after an average of 14.8 days and all patients returned to their former sports activity 3 to 8 weeks after the event. Mechanical and functional stability after more than one year are excellent with the exceptions of 3 cases. The results are discussed and compared with other studies.

Zusammenfassung: 46 Patienten im Alter von 14 - 49 Jahren mit röntgenologisch durch gehaltene Aufnahmen gesicherten frischen fibularen Kapselbandverletzungen (Talar tilt ≥ 10 Grad) wurden in einer prospektiven Studie während 6 Wochen im Tapeverband und *Ortho-Rehab-Stabilschuh* behandelt, wovon 18 nach primärer Bandnaht. Sämtliche Patienten konnten nach 8 Wochen über die Behandlung befragt und klinisch untersucht und bislang 35 davon durchschnittlich nach 13.6 Monaten nachkontrolliert werden. Die durchgeführte Behandlung wurde als sehr angenehm beurteilt. Die Arbeit konnte durchschnittlich nach 14.8 Tagen und die sportliche Aktivität in allen Fällen nach 3 bis 8 Wochen aufgenommen werden. Die Stabilitätsprüfungen nach über 1 Jahr sind mit 3 Ausnahmen ausgezeichnet. Die Resultate werden diskutiert und mit anderen Studien verglichen.

Résumé: 46 patients âgés de 14 à 49 ans ayant subi une lésion fraîche des ligaments externes de la cheville et présentant une instabilité nette (talar tilt ≥ 10 degrés) ont été traités par un tape et le soulier orthopédique *Ortho Rehab* pendant 6 semaines, dont 18 cas après suture ligamentaire. 8 semaines plus tard, tous les patients ont été interrogés sur le traitement et réexaminés. Lors d'un contrôle plus de 13 mois après, 35 patients ont pu être examinés cliniquement et radiologiquement. Le traitement instauré a été jugé très agréable et positif. Le travail peut être repris après 14.8 jours en moyenne et l'activité sportive entre la troisième et la huitième semaine. Les résultats de l'épreuve fonctionnelle après plus d'une année sont, à l'exception de 3 cas, excellents. Les résultats sont discutés et comparés à d'autres études.

1. INTRODUCTION

Fibular ligament and joint capsule disruptions are the most frequent injuries to the foot mechanism, especially in sports [22]. These injuries are the result of extreme plantar flexion stress coupled with a supination-inversion movement [24] as well as the progressively insufficient protection by the talo-fibular joint (TFJ) in this movement.

In this position a loosening of the talus from the malleolus occurs as well as a reduction of the muscular stabilization [4, 19]. The fear of future damage in the form of capsule ligament instability with repeated injury [6],

and the awareness of the durability of operatively treated capsule-ligament injuries [2], led some years ago to a demand for primary surgical care, provided that sufficient criteria are evident of an unstable injury [1, 16, 17].

New comparative studies, however, imply that comparable results in stability can be reached with either surgical ligament suturing or adequate conservative treatment. [3, 10, 11, 12, 20, 25].

Opinions vary as to the effectiveness of conservative treatment versus surgical intervention. Evans (1984) required strict immobilization in a foot cast for 7 weeks for both regimen. In his random study of 100

Taping, use in so many cases, is seen as a reasonable ancillary measure in the prophylaxis as well as in the aftercare. The disadvantage is the large expenditure of time and materials required [18].

In addition, its application is only meaningful when performed by skilled hands.

On the other hand, so-called "ankle braces", which can in part be laced up, result in a marked increase in stability, albeit 25% less than in the use of a freshly wrapped tape (Bunch in 18).

The "stable shoe", introduced by Spring (1979), reportedly achieved very good functional results on follow-up without the use of plaster casts, for over 500 primarily operative treated patients [21].

An unsolved problem with all "stable shoes" is the nocturnal maintenance of the injured joint. Recommendations vary from wearing the shoe at night, using plaster splints, or leaving the joint unsupported. [14, 18, 21].

OUR OWN TREATMENT METHOD

For 3 years we have been treating fresh capsule-ligament disruption of the TFJ with the *Ortho Rehab Stable Shoe* (Künzli) combined with taping for 6 weeks. This is used as a conservative-functional treatment alone, or in the aftercare of primarily operative treated patients (Fig. 1). We maintain that in the schema described in Fig. 2 we also accommodate the patient's need for activity, including sports.

This article summarizes the results of our studies of 46 patients with severe capsule-ligament injuries to the ankle. All were followed up after 2 months, and 35 were followed up after an average of 13.6 months.

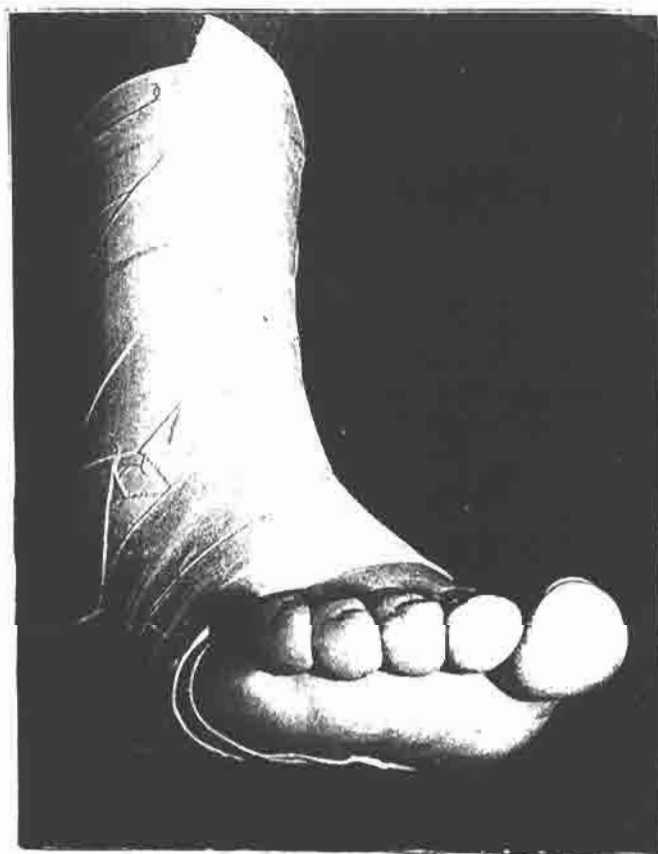


Fig 1: Combined treatment with tape and the *Ortho Rehab* shoe (Künzli); the tape was changed once to twice per week and left on day and night.

Ligament Disruption	Lateral Subluxation	Treatment
light	up to 5 degrees	conservative-functional
medium	5 to 10 degrees	conservative-functional
heavy	more than 10 degrees	conservative-functional
	more than 12 degrees*	operative

Fig 2: Difficult classification of the TFJ disruption and the treatment concept (* especially with lateral differential of 10 degrees and over, and with very ambitious patients).

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2. PATIENTS AND METHODS

Post injury status of the patients was determined with questionnaires asking them the precise circumstances and the local anamnesis.

Number of patients	46
♀	13
♂	33
Age average	24.8
Age range	14-49

Fig 3: Patients

During examination, radiological examination was performed. The lateral joint space laxity of the TFJ was measured according to the methods described elsewhere [7]. For this study most of the measurements were taken manually. In the time period from July 1988 to June 1989, 64 patients were treated for lateral ligament injuries to the ankle. 48 patients satisfied the criteria for an acute ligament disruption with a lateral subluxation of 10 degrees or more. Two of the 48 patients were removed later from the study due to recurrent trauma, so that all together 46 patients were taken into consideration for the study. (Fig. 3). 32 patients were conservatively treated with taping and the *Ortho Rehab* stable shoe (Künzli) for 6 weeks.

After 10 days, full-weight bearing was allowed. To facilitate early return to normal activities for outdoor professionals, 11 cases were also prescribed the Rocky Plus Shoe (Künzli) (Fig. 12).

Low tennis shoe	30
High shoe	5
Other	11

Fig. 4: Shoes worn at the time of accident

In the first follow-up visit after 8 weeks, all of the 46 patients were given questionnaires on the treatment already received and were clinically examined. After an average of 13.6 months (minimum 11.2, maximum 15.2 months), 35 patients were clinically reexamined. Varus subluxation was checked radiologically as well as manually.

3. RESULTS

Out of 46 patients, 28 suffered sports injuries and 8 work related injuries. 32 wore inferior footwear, mostly tennis shoes (Fig. 4). The majority stated the cause of the accident to be bad terrain, fatigue or a lack of concentration (Fig. 5). 45 patients reported that the treatment carried out with the *Ortho Rehab* stable shoe and taping was comfortable.

Bad terrain	22
Tiredness, lack of concentration	16
Inappropriate shoes	5
Opponent's influence	3

Fig. 5: Subjective cause of accident

Great	20
Comfortable	25
Uncomfortable	1
Would prefer the same treatment	43

Fig. 6: Subjective opinion of the treatment

Heavy perspiration (*)	11
Poor traction	7
Not water-proof	6
Not for running	4
Not fashionable	3

Fig. 7: Negative aspects of the *Ortho Rehab* shoe; (Tape treatments were positively judged by all patients) (*) A perforated version of the *Ortho Rehab* is now available as well.

The patient found the treatment uncomfortable due to unclear instructions. He was later shown to be unreliable and uncooperative. 43 patients would choose the same treatment again, while 3 patients would prefer slight improvement in the shoe (Fig. 6). An overview of the negative aspects of the shoe is shown in Fig. 7.

Normal activity could be resumed, on average, after 14.8 days (minimum 0, maximum 42 days) and sport activity could be resumed between 3 to 8 weeks (Fig. 8). 21 patients continued to wear the shoe after the prescribed sixth week and 12 patients continued the tape procedure. 42 patients no longer experienced pain within 10 days, 3 patients after 1 day, and 1 patient after 20 days.

	days	days
Work	14.8	(0-42)
- conservative	14.2	(0-42)
- operative	15.8	(7-36)
Sport	32.5	(20-50)
- conservative	30.2	(20-50)
- operative	34.6	(22-43)

Fig. 8: Schedule of return to work and sports activities

Little more than one year later, the 35 patients reviewed showed identical flexibility, with two exceptions. In three cases moderate edema was present. Local discomfort was not present in any of the cases (Fig. 9).

Varus stress test showed radiographic evidence of excellent stability after an average 13.6 months, with only 3 exceptions (Fig. 10, 11).

	after 8 weeks	after 13.6 months
Local swelling		
- light	11	1
- moderate	2	0
- strong	1	0
Restriction of rom		
- to 5 degrees	9	2
- over 5 degrees	1	0

Fig. 9: Status at time of follow-up (amount of patients)

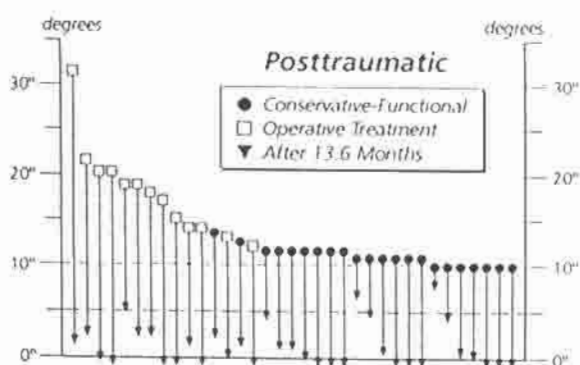


Fig. 10: Lateral subluxation in varus stress. Comparable post traumatic condition after 13.6 months by all 3 patients. A residual instability of 6 degrees and more are considered poor.

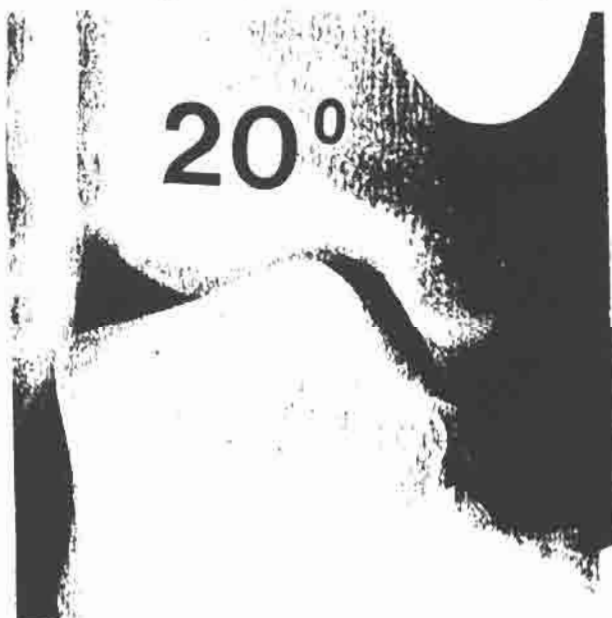
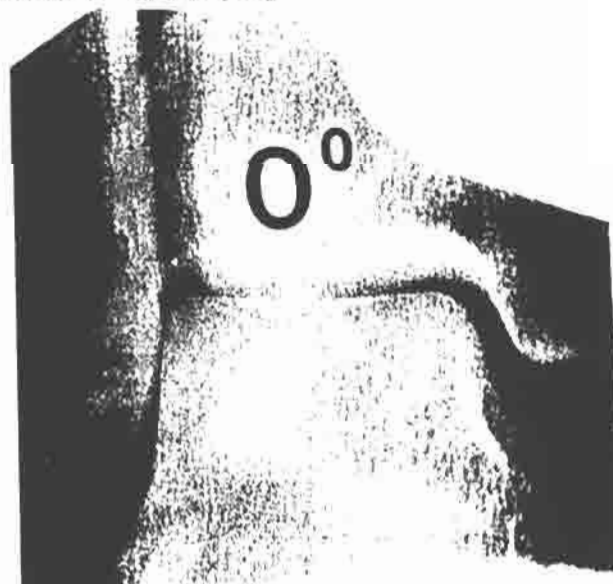


Fig. 11: Case example: 22 year old policeman, lateral subluxation after the accident - 20 degrees, 14.2 months after the suture - 0 degrees. Resumed work in 19 days and sports activities in 28 days.

The exceptions concerned 2 women with generally lax ligament mechanics, following only a conservative-functional treatment. The third was a mountain railway construction worker who still wore the *Rocky Plus* shoe to work in the field without complaints of any instability. The ligament suturing was not indicated, due to a poor ligament structure. It would have been better to have used a plastic ligament reconstruction.

4. DISCUSSION

The frequent occurrence of fibular capsule-ligament injuries to the ankle requires precise diagnosis [7] so that the injury can be treated properly. We agreed with other authors that a varus subluxation of 10 degrees or more and a lateral differential of 7 degrees or more would be considered a severe ligament injury. [13].



Our long-term treatment results of severe injuries with 6 weeks in tape and wearing the *Ortho Rehab* stable shoe indicate excellent flexibility and stability results, consistent with other studies following conservative-functional regimen [3, 10, 11, 20, 25].

In respect to stability, our results exceed those of Raemy and Fritschy, treating only with the aircast stirrup [5, 15]; Sommer's, treating with tape and zinc gelatin [20]; those of Spring and Paessler following immobilization with use of a stable shoe [14, 21].

Normal activity could be resumed in 148 days compared with Raemy's and Fritschy's treatment in 17 days with the air stirrup [5, 15].

Paessler and Spring, after use of a stable shoe, listed the return to normal activity as 24 and 25 days respectively [14, 21] and Holbach, after the PDS augmentation without posterior stabilization support, listed 26 days [8]. We attribute speedy recovery to the appropriate shoe wear.

Thanks to the Rocky Plus stable shoe (Fig. 12), for which the insurance companies covered the cost in all cases, 11 patients were able to return early to normal activity.



Fig. 12: Rocky Plus shoe (Künzli), the weatherproof model of the *Ortho Rehab* design for heavy outdoor use.

After 4 weeks, half of the patients, and after 6 weeks all but two of the patients were able to resume full sports activities. This corresponds to the findings of other authors following functional treatment [5, 9, 14,20].

The problem of immobilization at night was easily solved with the application of tape which efficiently protects the injured joint from excessive movement when putting on and taking off the shoe. Patients with sensitive skin could be protected against irritation by an "under" tape. We have seen no skin irritation caused with its use.

Our method of treatment was almost unanimously found to be comfortable and positive and 43 patients would prefer the same treatment again. We regard the positive acceptance by the patients a major factor for excellent long-term results. In comparison to other similar studies [5,14], the patient can experience the prophylactic effects of the boot and benefit at a later stage. It was stated by several patients that the shoes lacked an appropriate amount of traction, however we conclude this is a positive aspect for prophylaxis of the ankle.

5. CONCLUSION

The combined use of tape and the *Ortho Rehab* stable shoe as a conservative-functional treatment only, or as aftercare following primary ligament suturing, produced excellent stability results after treatment for over one year

The early return to sports activities equals other functional treatment/after-treatment methods.

Compared to other similar patient studies, use of a durable work stable shoe can speed recovery of normal functioning by an average of 14.8 days.

Patients have generally evaluated our method of treatment as comfortable and positive. This leads to a high level of compliance.

The shoe can be worn prophylactically after regular treatment time and the lateral stabilizers can gradually be removed to allow a staggered load increase to the healing ligaments.

Our study allows no comparison of conservative versus surgical treatments of serious capsule-ligament disruptions of the ankle, because a study of either treatment would use different objectives and therefore are not equally randomized.

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