Clinical diagnosis of syndesmotic ankle instability

Evaluation of stress tests behind the curtains

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ABSTRACT – We studied the feasibility of clinical tests in the diagnosis of syndesmotic injury of the ankle. 9 investigators examined 12 persons twice, including 2 patients with an arthroscopically-confirmed syndesmotic injury. They sat behind a curtain that exposed only the lower legs. We found a statistically significant relation between the final arthroscopic diagnosis and the squeeze, fibula translation, Cotton, and external rotation tests as well as for limited dorsal flexion. None of the syndesmotic tests was uniformly positive in chronic syndesmotic injury. The external rotation test had the fewest false-positive results, the fibula translation test the most. The external rotation test had the smallest inter-observer variance. The physical diagnosis was missed in one fifth of all examinations. When in accordance with medical history and physical examination, positive stress tests should raise a high index of suspicion of syndesmotic instability. The final diagnosis of such instability, however, should be made by additional diagnostic imaging and/or arthroscopy.

The integrity of the distal tibiofibular syndesmosis may be clinically tested by the following 4 stress tests. The Cotton (1910) test was originally used to diagnose an ankle fracture. It is positive when more movement is felt during translation of the talus from medial to lateral than on the other side. The external rotation test (Boytim et al. 1991), done by applying an external rotation stress to the involved foot and ankle with the knee held at 90 degrees of flexion and the ankle in the neutral position, causes pain at the anterior or posterior syndesmotic ligament or over the interosseous membrane. The squeeze test (Hopkinson et al. 1990) is done by squeezing the fibula towards the tibia halfway up the calf. When positive, this test produces pain in the area of the syndesmosis. Finally, the fibula translation test (Ogilvie-Harris and Reed 1994) was originally considered positive if anteroposterior translation of the fibula causes pain at the level of the syndesmosis. In clinical practice, however, it is often considered positive when the anteroposterior displacement of the fibula is greater than on the other side. Some authors have also used pain on palpation of the anterior tibiofibular ligament (Taylor et al.1992) and reduced passive dorsal flexion (Ward 1994) to recognize syndesmotic injuries. In lateral collateral ankle instability, an important differential diagnosis of syndesmotic instability, the anterior drawer test (Cedell 1975) is usually used. The ability of the syndesmotic tests to distinguish between healthy subjects and patients with an arthroscopically-proven syndesmotic injury has never been assessed.

We evaluated the feasibility of these ankle tests in the physical diagnosis of chronic syndesmotic injuries.

Patients and methods

12 persons, 3 patients suspected of a chronic syndesmotic rupture and 9 healthy volunteers with asymptomatic ankles, were placed in a sitting position behind a curtain that exposed only the lower legs (Figure). The suspected rupture in

Study persons were placed behind a curtain that only exposed the lower legs.

these patients was based on the medical history, physical examination, and diagnostic imaging on previous visits to the outpatient clinic. Both ankles of all persons were examined twice in a different order by 7 examiners (4 orthopedic surgeons, 3 orthopedic registrars). The examinations included the squeeze, Cotton, fibula translation, external rotation, and anterior drawer tests, and range of motion. They were told not to speak during the investigations, and to indicate pain by tapping on a wooden board followed by indicating the place where the pain was felt with one finger. A test was considered positive when more movement was felt than on the other side or local pain was involved at the syndesmosis. After assessing each ankle, the examiner had to make a "physical diagnosis" regarding the presence or absence of a syndesmotic injury. On the following day, the 3 patients underwent an arthroscopy of the ankle to determine the presence of a syndesmotic injury (Beumer et al. 2000).

Statistics

In the comparison of the various diagnostic tests concerning the statistical evaluation of variations in outcome due to inter- and intra-observer components, both ankles of 1 person were regarded as giving separate independent contributions to those components, so that n = 24 ankles (12 persons × 2 ankles) were used in a variance component analysis to estimate the inter- and intra-observer variance. The other statistical tests were done in 12 persons, after averaging the measurements per person. Correlations between tests were analyzed using the Spearman rank correlation coefficient. Differences in test outcomes between a positive (n = 2 patients, 1 side per patient) and a negative (n = 10 persons, 2 sides per person) arthroscopic diagnosis were analyzed using the Mann-Whitney test. Differences in scoring between two different sets of types of observers were tested using the sign test.

Results

The final arthroscopic diagnosis of a syndesmotic injury was made in 2 ankles. The third patient had generalized joint laxity and lateral collateral instability. The total number of each test performed on these ankles was 7 investigators × 2 rounds × 2 ankles = 28. The number of positive tests in these injured ankles ranged from 13/28 (Cotton) to 21/28 (fibula translation), and the physical diagnosis of syndesmotic injury was made in 23/28.

The total number of each test done in asymptomatic ankles was 7 investigators × 2 rounds × (24–3) = 294. The number of positive tests in these asymptomatic ankles ranged from 3/294 (external rotation) to 35/294 (fibula translation), while the physical diagnosis of a presumed syndesmotic injury was made 15/294.

We found a relationship between the final arthroscopic diagnosis and the squeeze ($p = 0.02$), fibula translation ($p = 0.03$), external rotation ($p = 0.03$), and Cotton tests ($p = 0.04$), reduced dorsal flexion ($p = 0.01$), and physical diagnosis ($p = 0.03$), but none of the tests was uniformly positive in the presence of a syndesmotic rupture. The anterior drawer test showed no correlation to the final diagnosis. Small differences in the evaluation of the tests between the first and the second investigations showed no particular pattern. The findings with the external rotation test were the most consistent in (12 persons × 2 ankles) = 24 ankles in both rounds; the small variations in the same ankle were mainly due to intra-observer variability.

Discussion

In this study, the investigators were biased since they were focused on the recognition of a chronic syndesmotic injury, which differs from that in clinical practice. However, this was corrected to a certain extent by the few syndesmotic injuries in relation to asymptomatic ankles—i.e., comparable to the reported incidence of syndesmotic injuries of 1–11% of all ankle injuries (Cedell 1975, Hopkinson et al. 1990)—and by changing the order of the persons examined during 2 rounds. The final physical diagnosis of syndesmotic instability was missed in one fifth of all examinations. This could be partly due to the fact that the investigators were not informed about the medical history. In clinical practice, medical history and physical examination interact to lead to the clinical diagnosis. Chronic syndesmotic injury should be suspected in cases of long-standing complaints of pain in the region of the syndesmosis, sensation of instability and recurrent swelling (Hopkinson et al. 1990, Ogilvie-Harris and Reed 1994, Beumer et al. 2000). None of the syndesmotic stress tests per se proved to have a satisfactory predictive value. Despite its significant relationship with the final arthroscopic diagnosis of a syndesmotic injury, the fibula translation test showed the highest number of false positive results in asymptomatic ankles, which was probably due to the subjective evaluation by the investigators of increased movement as a test parameter. Pain instead of increased movement should therefore be used as an outcome measure for this test. Alonso et al. (1998) found that the external rotation test had the best interobserver agreement of 4 tests. This accords with our smallest inter-observer variance for this test. The similar test results during the first and second rounds indicate that these tests were not affected by repeated examinations.

In conclusion, the combination of a medical history of a high ankle sprain with an unusually long period of recovery, sensation of instability, positive external rotation, fibula translation, Cotton and squeeze tests, as well as reduced dorsal flexion should arouse a strong suspicion of chronic syndesmotic instability. Ideally, in future, the final diagnosis will be made by further diagnostic imaging, such as specific MRI investigations, focused on the recognition of chronic syndesmotic ruptures. As such investigations are not yet available, arthroscopy is still the mainstay in the diagnosis of chronic syndesmotic instability.

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