

Comparison of Shetty ankle test and Ottawa ankle rules in ankle injuries

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Abstract. – OBJECTIVE: Foot and ankle injuries are the most common extremity trauma and have an important place among the admissions to the emergency service. Ankle injuries are the most frequent form of orthopedic emergencies. Currently, Ottawa ankle rules (ORL) is the most popular test used worldwide for the ankle injuries. Shetty test is an important test used to evaluate the clinical status of patients admitted for the ankle trauma.

PATIENTS AND METHODS: This study was initiated in the emergency service between May 1, 2018, and May 1, 2019, after the approval of the Ethics Committee. The patients were classified according to gender, age, and admission, Ottawa test results, Shetty test results, and radiography status.

RESULTS: Shetty test can be used to differentiate between the foot sprains and fractures as a simple and inexpensive method. Despite its effectiveness, Ottawa ankle rules is not widely used due to the detailed implementation of the Ottawa ankle rules and the components of the test. The ease of applicability of the Shetty test in primary care makes the test stand out. In our study, although the sensitivity of Shetty and Ottawa tests resulted in close percentages (82.86% - 85.71%), the specificity of Ottawa test was found to be higher.

CONCLUSIONS: Detecting a fracture in emergency services is more valuable than excluding a fracture. Even though Shetty test is simple to use, we recommend Ottawa test for the foot and ankle sprains due to the legal problem that could be caused by Shetty test.

Key Words:

Emergency service, Shetty test, Ottawa criteria, Ankle injuries.

thopedic Surgeons, approximately 25,000 ankle injuries are recorded each day in trauma departments of hospitals in the United States alone². In addition to clinical tests, radiological imaging is used for ankle injuries. Radiography is performed to exclude fractures in almost all patients. However, a fracture is detected in 15-20% of this admissions³. Since radiological tests take time and involve radiation exposure, clinical tests are of great importance. Furthermore, the radiological tests are not applicable because most of ankle injuries are soft tissue injuries. Currently, Ottawa ankle rules (ORL) is the most popular test used worldwide for ankle injuries⁴. Many studies⁵⁻⁸ have been conducted on ORL in various parts of the world. With the help of these studies, the radiological demands (examinations) are reduced. Another test that is used to evaluate ankle injuries is the Shetty test. The Shetty test is an important test used to evaluate the clinical status of patients admitted for ankle trauma. Since the applicability of the Shetty test is easier and cheaper than other similar tests, we think that this test may be more suitable for use in primary healthcare institutions. In this test, the patients sit on the examination table to place their foot on the palm of the doctor, and then they are asked to simulate the gait by pressing their foot. According to the pressure applied by the patient to the doctor's hand, the necessity of the radiography is determined for the patient. If the patient cannot step, the result of the test is considered positive, and the necessity of radiography is questioned. The positive outcome of the test indicates a possible fracture. If the patient can step, the test result is negative which means that the radiography would not be considered¹.

Introduction

Foot and ankle injuries are the most common extremity trauma and have an important place among admissions to the emergency service. Ankle injuries are the most frequent form of orthopedic emergencies¹. According to the American Academy of Or-

Patients and Methods

Field of Study and Population

This study was initiated in the emergency service of S.B.Ü Gazi Yaşargil Education Research Hospital between May 1, 2018, and May 1, 2019, after the approval of the Ethics Committee. Data were

collected prospectively after obtaining the consent of the patients who applied to the emergency service for ankle injury for any reason. Ottawa test was performed by the emergency physicians at the time of admission. Then, the Shetty test was applied after the patient was taken to the stretcher by the same emergency physician. Radiological imaging was evaluated by the same emergency physician. The patients were evaluated according to gender, admission, Ottawa test results, Shetty test results, and radiological imaging results. The data of all patients are recorded with the physician's notes.

Exclusion Criteria

Throughout the study, the results of patients who did not want Ottawa and Shetty tests to be performed, did not want to participate in the study, or exhibited negative behavior during the tests were not included in the study.

Data Collecting and Measurements

The patients were classified according to gender, age, admission, Ottawa test, Shetty test, and radiography results. All applied patients with ankle injuries were evaluated by the same emergency physician and recorded on data forms. The research protocol was reviewed and approved by S.B.Ü Gazi Yaşargil Education Research Hospital Ethics Committee on 25.05.2018 with the case number of 85. The study was conducted, reviewed, and approved according to the Helsinki Declaration.

Statistical Analysis

SPSS software version 24 (IBM Corp., Armonk, NY, USA) was used to analyze the variables. The results were expressed as mean + SD and n (%). The Chi-square test was used for univariate statistical analysis of categorical variables. For the evaluation of the correlation between the gathered data, Spearman's rho correlation analysis was used. $p < 0.05$ was considered statistically significant.

Results

150 patients were included in the study. 54 of the patients were female and 96 were male. The mean age was 30.93 ± 13.154 the most common injury (127 patients, 84.7%) was caused by ankle sprain injuries, while sports activities (23 patients, 15.3%) were less common. Radiologic evaluation revealed fractures in 35 patients (23.3%). Pearson Chi-Square analysis was statistically significant in patients who underwent Shetty and Ottawa tests according to the pres-

ence or absence of radiological fractures ($p < 0.001$). When we evaluated the distribution of fractures radiological, metatarsal fractures (25 patients, 16.6%) were more common than lateral malleolar fractures (10 patients, 6.7%). When we evaluated two tests in terms of sensitivity and specificity, the sensitivity and specificity of the Shetty test were 82.86% and 77.39%, respectively. The sensitivity and specificity of the Ottawa test were 85.71% and 82.61%, respectively. Positive and negative predictive values of the Shetty test were 52.73% and 93.68%, respectively, while Ottawa's positive and negative predictive values were 60% and 90%, respectively (Table I-II).

Spearman's rho correlation analysis was performed to determine whether there was a correlation between fracture detection in the radiographs of patients evaluated according to Shetty and Ottawa rules. Although it was found to be statistically significant ($p < 0.001$) in both tests, it was found that the correlation coefficient of the Ottawa test was higher. Correlation coefficients were $r = 0.528$ for the Shetty test and $r = 0.613$ for the Ottawa test.

Discussion

The usefulness of clinical screening tests, such as the Ottawa Ankle Rules, has been tested and validated in adult patients presenting to the emergency department with an acute ankle injury. Therefore, although their use in primary care settings has not been evaluated, guidelines have shown excellent results in both pediatric and adult emergency room patient populations^{9,10}. A systematic review¹¹ of 27 studies, including a total of 15,581 patients, showed that Ottawa ankle rules are highly sensitive to exclude ankle fractures (96.4 to 99.6 percent). In the emergency service, it is estimated that the use of these rules for patients with acute ankle sprain will reduce the number of unnecessary radiographs by 30-40%⁹.

Table I. Statistical analysis of Shetty test.

Statistic	Result	95 % GA
Sensitivity	82.86%	66.35-93.44%
Specificity	77.39%	68.65-84.67%
Positive Likelihood Ratio	3.66	2.53-5.3
Negative Likelihood Ratio	0.22	0.11-0.46
Prevalence	23.33%	16.82-30.93%
Positive Predictive Value	52.73%	43.51-61.76%
Negative Predictive Value	93.68%	87.67-96.87%
Accuracy	78.67%	71.24-84.93%

Table II. Statistical analysis of Ottawa test.

Statistic	Result	95 % GA
Sensitivity	85.71%	69.74-95.19%
Specificity	82.61%	74.43-89.04%
Positive Likelihood Ratio	4.93	3.24-7.51
Negative Likelihood Ratio	0.17	0.08-0.38
Prevalence	23.33%	16.82-30.93%
Positive Predictive Value	60%	49.62-69.55%
Negative Predictive Value	95%	89.37-97.73%
Accuracy	83.33%	76.39-88.91%

Shetty test can be used to differentiate between foot sprains and fractures as a simple and inexpensive method. Despite its effectiveness, Ottawa ankle rules are not widely used due to the detailed implementation of the Ottawa ankle rules and the components of the test. The ease of applicability of the Shetty test in primary care makes the test stand out. Ojeda et al¹⁰. Found that the Shetty test is a simple, rapid, and reproducible clinical screening tool to decide whether simple radiography is indicated in foot and ankle injuries. In an emergency room study evaluating the specificity and sensitivity of the Shetty test in ankle and foot trauma, they found that the Shetty test could safely reduce unnecessary radiographs in the emergency department¹². In our study, although the sensitivity of the Shetty and Ottawa tests resulted in close percentages (82.86-85.71%), the specificity of the Ottawa test was found to be higher.

Limitations

Our study is a single center study. In the study case planning, the false positivity and negativity in the tests may have been caused by the patient that applied to the emergency service after the development of the trauma, drugs used before applying to the emergency service, or treatment given in another health institution. While obtaining the patients' consent to participate in the case study, we observed many patients desire radiographs after informing about the test. Therefore, we think that even though we excluded the cases that made excessive simulation during the examination, there could be missed cases.

Conclusions

During our study, we found that the Shetty test is more functional. We believe that the Shetty test

is useful when the patient is examined completely and regularly. Detecting a fracture in emergency services is more valuable than excluding a fracture. Even though the Shetty test is simple to use, we recommend the Ottawa test for foot and ankle sprains due to the legal problem that could be caused by the Shetty test. We believe that case studies on larger populations will increase the sensitivity and specificity. A combined test method can be applied as a result of the guidelines and studies to be established.

Conflict of Interest

The Authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Informed Consent

Consent was obtained from all patients participating in the study.

Ethics Approval

The research protocol was reviewed and approved by S.B.Ü Gazi Yaşargil Education Research Hospital Ethics Committee on 25.05.2018 with the case No. 85.

Data Availability

The data used to support the findings of this study are available from the associated author upon reasonable request.

Authors' Contribution

The first draft of the manuscript was written by ÖA, MT. Material preparation, data collection, and analysis were performed by ÖA. The final versions of the manuscript were revised by ÖA, MT. The final manuscript was read and approved by both authors.

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