Guideline for the

Administered by the Alberta Medical Association

Radiography of the Ankle and Foot (Ottawa Ankle Rules)

This guideline has been adapted by an Alberta Clinical Practice Guidelines Program working group from the Ottawa Ankle Rules developed by Dr. Ian Stiell et al. Stiell received financial support from the Institue of Clinical and evaluative Studies in Ontario.

EXCLUSIONS

- Less than 18 years
- Intoxication
- Multiple painful injuries
- Pregnant
- Head injury
- Diminished sensation due to neurological deficit

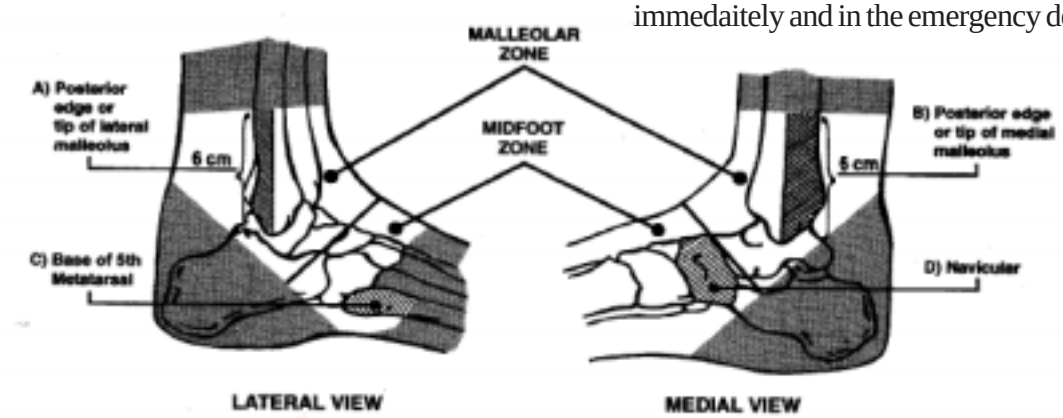
RECOMMENDATIONS

An Ankle X-ray Series is required only if there is pain in the malleolar zone and any one of the following:

- Bone tenderness along the distal 6 cm of the posterior edge of the fibula or tip of the lateral malleolus.
- Bone tenderness along the distal 6 cm of the posterior edge of the tibia or tip of the medial malleolus.
- Inability to bear weight for 4 steps both immediately and in the emergency department.

A Foot X-ray Series is required only if there is pain in the midfoot zone and any one of the following:

- Bone tenderness at the base of the 5th metatarsal.
- Bone tenderness at the navicular bone.
- Inability to bear weight for 4 steps both immedaitely and in the emergency department.



The above recommedations are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.
They should be used as an adjunct to sound clinical judgement.

BACKGROUND

Blunt ankle trauma is a common presenting complaint by patients at health care facilities. Physicians have traditionally relied on the use of radiography to exclude fractures. It is estimated of the six million ankle X-rays done annually in North America, only 15 per cent are positive for significant fractures. Ankle radiographs are typically the second most commonly performed musculoskeletal examination in the emergency department, after the cervical spine series. This conservative approach leads to many unnecessary radiographic studies. With a modest reduction in radiographic procedures a significant cost savings may be had.

RESEARCH FINDINGS

Dr. Stiell's Research

Dr. Ian Stiell developed a series of studies to look at the role of radiographic imaging of the ankle and midfoot, and produced five papers reporting the results of his studies. Dr. Stiell's research led to a final set of decision rules for the use of radiography in ankle injury. These rules, found on the front page of this document, have been named the "Ottawa Ankle Rules." Dr. Stiell's papers are summarized below.

Agreement in the Examination of Acute Ankle Injury Patients

In his first paper, Dr. Stiell described a method for measuring interobserver agreement and determined the reliability of physical findings used by emergency physicians in assessing ankle injury patients.

The study was performed in the two adult emergency departments in Ottawa. Patients were eligible if they had suffered acute blunt trauma to the ankle, regardless the cause of injury. Patients were excluded if they were under 18 years of age, pregnant, had isolated superficial skin injury, had been injured more than ten days previously or had returned for reassessment of the same injury.

The research team looked at 10 areas of point tenderness and four areas of soft tissue tenderness. As well they noted ecchymosis, range of motion, degree of swelling in four locations, anterior drawer sign and ability to bear weight for at least four steps in the emergency department.

The team found that the best agreement in judging ability to bear weight, and good agreement in judging bone tenderness. Findings related to ecchymosis, range of motion, soft tissue tenderness and anterior drawer sign were unreliable.

The interobserver agreement was most reliable for the ability to bear weight for four steps in the emergency department, swelling of the lateral malleolus, and localized bone tenderness of the base of the fifth metatarsal, the anterior and posterior edges of the lateral malleolus and the inferior tip of the medial malleolus.

A study to Develop Clinical Decision Rules for the Use of Radiography in Acute Ankle Injuries

A second study was undertaken to develop decisions rules that would predict fractures in patients with ankle and midfoot injuries.

Conducted as a prospective study in the two adult emergency departments in Ottawa, an initial pilot study looked at 155 patients, followed by the main study of 750 patients. They assessed 32 standardized clinical variables which were assessed for reliability by the kappa coefficient, for the association with significant fracture of the ankle or midfoot. They wanted the decision rules to 100% sensitive for detecting fractures of the ankle and midfoot. Applying the rules to the group of 750 patients, they found 70 (9.3%) significant malleolar fractures and 32 (4.3%) significant midfoot)

The research team concludes that an ankle X-ray was necessary only if the patient had pain near the malleoli and one or more of the following: over age 55, unable to bear weight for four stepsin the emergency department, bone tenderness at the posterior edge or tip of the malleolus.

A foot X-ray was necessary if the patient had pain in the midfoot and the bone tenderness at the navicular, cuboid, or base of the fifth metatarsal.

Clinicians found the rules to be practical and maintained 100% sensitivity. Unfortunately, 77% of their X-rays were still negative. When they excluded bone tenderness of the inferior tip of the lateral malleolus as part of the examination, the research team found they could raise the specificity to 55.7 % from 40 %, and pontential cost savings to 49.8%.

However, this would drop the sensitivity to 95.7%, which they though would be unacceptable to physicians in North America.

Decision Rules for the Use of Radiography in Acute Ankle Injuries

The third paper reported on Dr. Stiell's study to validate and refine the clinical decision rules for acute ankle injuries. The study was set up as a convenience survey and was prospectively administered in two stages: validation and refinement of the original rules, followed by validation of the refined rules.

The research team concluded that an ankle X-ray was necessary only if the patient had pain near the malleoli and one of: inability to bear weight for four steps in the emergency department or bone tenderness at the posterior edge or tip of either malleolus.

They determined that foot X-ray was necessary only if the patient had pain in the midfoot and on of: inability to bear weight for four steps or bone tenderness at the navicular or base of the fifth metatarsal.

Implementation of the Ottawa Ankle Rules

The fourth paper addressed the implementation of the Ottawa Ankle Rules and the impact of their implementation on clinical practice.

Applying the rules resulted in a relative reduction in ankle radiographs of 28% and in foot radiographs of 14%. The rules were found to be 100% sensitive. Patients waited less, were not dissatisfied with their treatment, and significant fractures did not go undetected.

The above research led to a final set of decision rules, named the "Ottawa Ankle Rules," for the use of radiography in ankle injury. The rules appear on the front page of this document.

Multi Trial to Introduce the Ottawa Ankle rule for the Use of Radiography in Acute Ankle Injuries

The fifth study assessed the feasibility and impact of introducing the Ottawa Ankle Rules in a wide variety of teaching and community hospital settings.

The research team concluded that applying the Ottawa Ankle Rules was feasible in a wide variety of hospital and community settings. When a variety of physicians applied the rules, ankle radiography, waiting times and costs decreased, but the rate of undetected fractures did not increase.

Validation Studies

In addition to Stiell's work, subsequent validation studies were reviewed. One was found to be methodologically flawed. One replicated the 100% sensitivity of Stiell's work, and another concluded that the rules were more sensitive than clinical suspicion alone but could not replicate the 100% sensitivity. The few undetected fractures in the latter study resulted mainly from diagnosis by physicians' assistants or emergency medicine residents.

SUMMARY

Physicians clearly have the clinical ability to identify patients at low risk of fracture. However, they are fearful of the medicolegal consequences of not detecting a fracture. This guideline helps physicians with this determination. Applying the rules offers several benefits: avoidance of unnecessary radiation exposure to patients, an overall reduction in treatment time, and a reduction in health care costs. However, the rules are not meant to be inflexible or dogmatic: they do not replace a physician's judgement and common sense.

ADVICE TO PATIENTS

An integral part of managing patients without radiographs is communication. It is important to explain the nature of a sprained ankle, why radiographs may be unnecessary, and what the patient should expect in the week following the examination. Give written instructions regarding recommended treatment and encourage follow-up in five to seven days if pain and ability to walk does not improve.

NOTE ON THE APPLICABILITY OF THIS GUIDELINE

The Ottawa Ankle Rules approach 100 per cent sensitivity in emergency departments with trained physicians. To date, no implementation research has been conducted outside emergency departments. Validation studies continue and may affect the recommendations in the future.

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THE ALBERTA CLINICAL PRACTICE GUIDELINES PROGRAM

The Alberta Clinical Practice Guidelines Program promotes appropriate, effective and quality medical care in Alberta by supporting the use of clinical practice guidelines. The program is administered by the Alberta Medical Association under the direction of a multi-stakeholder steering committee.

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TO PROVIDE FEEDBACK

The Alberta CPG Working Group for Radiography of the Ankle and Foot is a multi-disciplinary team composed of general practitioners, emergency physicians, a radiologist, orthopedist, internist, nurse, regional health authority representative, and a member of the public. The team encourages your feedback. If you have difficulty applying this guideline, if you find the recommendations problematic, or if you need more information on this guideline, please contact:

The Alberta Clinical Practice Guidelines Program
12230 - 106 Avenue NW
Edmonton AB T5N 3Z1
Phone: (780) 482-2626
or toll free 1-800-272-9680
Fax: (780) 482-5445
Email: cpg@albertadoctors.org
Website: www.albertadoctors.org

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