THE WEIGHT BEARING X-RAY IN SHOE FITTING PROBLEMS

By DONALD R. ADAMS, M.D.
Chief, Physical Medicine and Rehabilitation Service
Veterans Administration Hospital
Muskogee, Oklahoma

In the process of prescribing and fitting of special orthopedic shoes the x-ray has been found as a useful adjunct in determining errors in fit and fabrication providing that the foot in the shoe can be filmed in weight bearing. In usual techniques such an exposure is difficult to procure, the positioning uncomfortable for the patient and to a degree wasteful of film since under normal circumstances all of a 14" x 17" film must be exposed when half of the length is adequate.

To meet this recurring problem the Engineering Division of the VA Hospital, Muskogee, Oklahoma, designed a cassette holder and stair to facilitate easy procuring of x-ray films of the feet in weight bearing. The original idea was advanced and used by Dr. Edwin L. Libbert, Chief Roentgenologist at the VA Regional Office, Indianapolis, Indiana, and our device utilizes a similar principle with some additions to more readily adapt to the equipment at this station. The fabrication is simple and can be assembled by a good carpenter in a short period of time. The cassette holder is easily stored and the stair will be found to have additional daily uses in the x-ray department.

We present here a device that we have made for the securing of weight bearing films of the feet. For want of a better title we have referred to it as the x-ray analyst for feet in weight bearing.

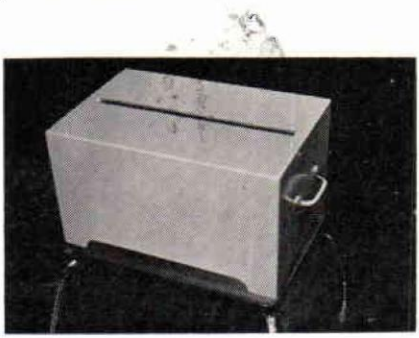

FIGURE 1: Cassette Holder for Weight Bearing Films.

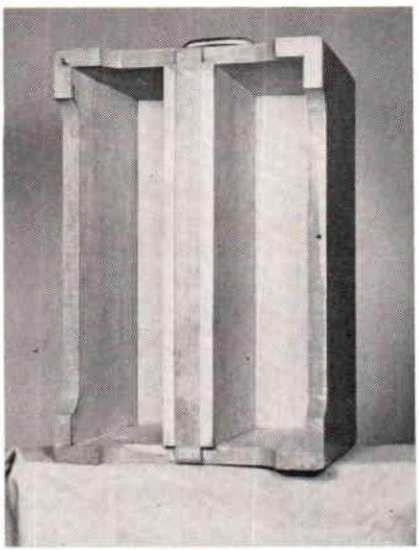

FIGURE: II: Inside View of Cassette Holder Showing Lead Lined Center Compartment.

FIGURE I consists of a wooden box with a central slot the length and width of a 14" x 17" x-ray cassette. This slot opening leads to an internal compartment which, like an envelope, has a wood surface and a wood floor and is lined with sheet lead.

FIGURE II illustrates the undersurface of the box showing how the lead envelope is constructed.

FIGURE III shows the box in front of the x-ray tube and is sitting on an ordinary cardiac stairway. It will be noted that the cassette has been placed in the leadlined slot so that only half of it is exposed to the roentgen tube. For the purpose of this picture the cassette was inserted backward, actually the black shiny surface should be as you know, facing the tube of the x-ray.

FIGURE IV is the view of the patient positioned on the box in front of the roentgen tube preparatory to securing an exposure of the right foot in weight bearing on half of the 14" x 17" cassette.

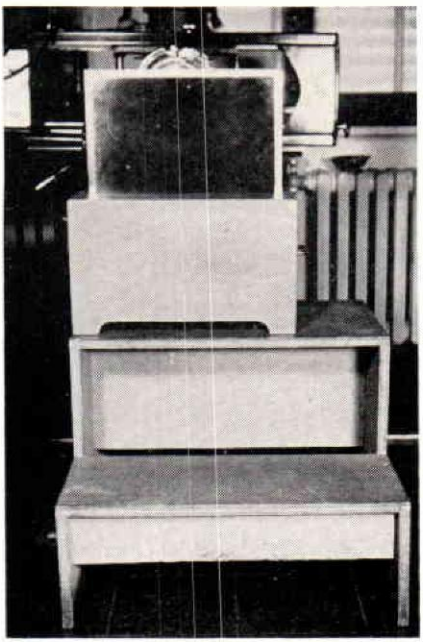

FIGURE III: Cassette In Position on the Holder on the Stair in Front of the Roengen Tube.

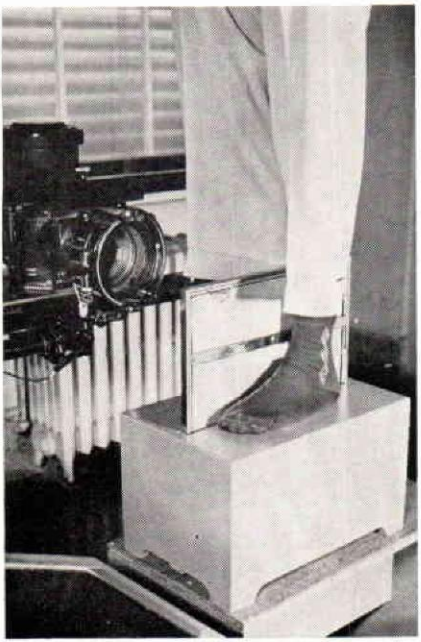

FIGURE IV: Patient Positioned for Exposure of the Left Foot in Weight Bearing.

FIGURE V shows the patient's foot as it were from the tube position. When this exposure has been made the ends of the cassette would be reversed and the patient turned around to secure a film of the opposite foot in weight bearing.

In our opinion this device has several advantages, the chief of which is showing the structures of the patient's foot as they relate to the support of his body weight and their positional relationship on a supporting surface, elements which cannot be secured with the extremity in repose. X-ray films of the feet in weight bearing are also useful to the roentgenologist in affording him impressions of pes planus or pes cavus or joint ankylosis.

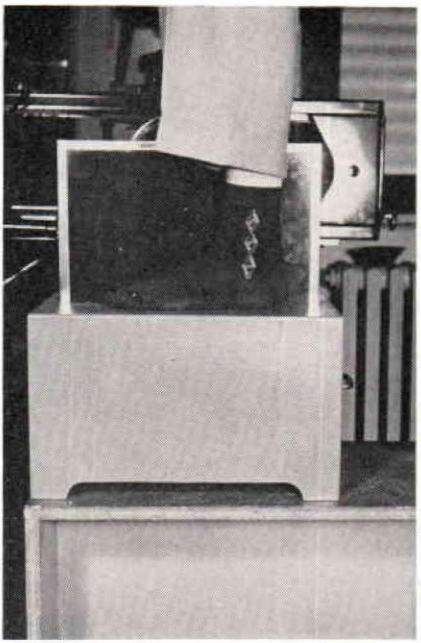

FIGURE V: Port View of Patient in Position On Weight Bearing Device.

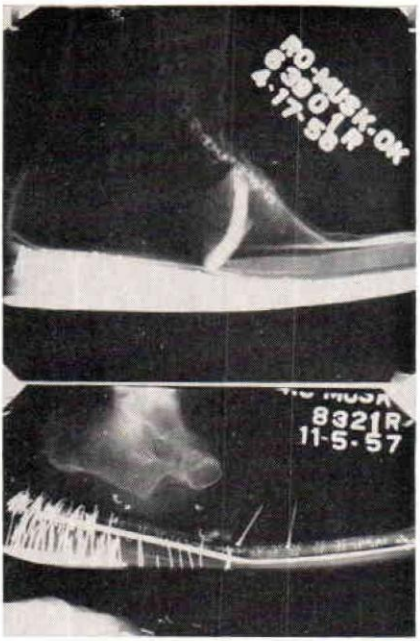

FIGURE VI: X-ray of Shoe and Chopart Amputation Stump in Shoe.

FIGURE VI shows two films, the upper one of the empty shoe and the lower one of the shoe with the Chopart amputation stump in place to best illustrate how much of the foot-shoe relationship can actually be shown by a weight bearing film of the foot in the shoe. An important relationship here was one that can be visualized at the instep of the shoe in showing why there was a tendency to develop an unsightly break of the shoe in this area. Alterations to the fabrication necessitated certain changes in the design of the toe-block surface and the insertion of an over-the-stump elastic gore which not only stabilized the stump but prevented the unsightly break of the upper in the instep area. You will notice in this view the wedge type heel and I believe you can also notice the importance of the wedge-type heel in placing a special orthopedic shoe on this type of amputation. If the midline of the tibia is followed downward it will be noted that the maximum weight bearing falls in the instep area directly in front of the position that would be occupied by a shoe with a normal heel. This would result without the wedge heel in a rapid breakdown of the instep of the shoe, necessitating early replacement.

FIGURE VII of the patient's feet in shoes in weight bearing points up the clarity of bone, joint and soft tissue relationship of the feet and shoes, shows at a glance that the heel-to-toe steel in the right shoe is broken allowing the toe of the shoe to start turning upward and that the toe-block is absent from the left shoe. It was necessary to replace the right heel-to-toe steel and fabricate a new toe-block to meet the needs and continue these shoes in service with maximum comfort to the patient.

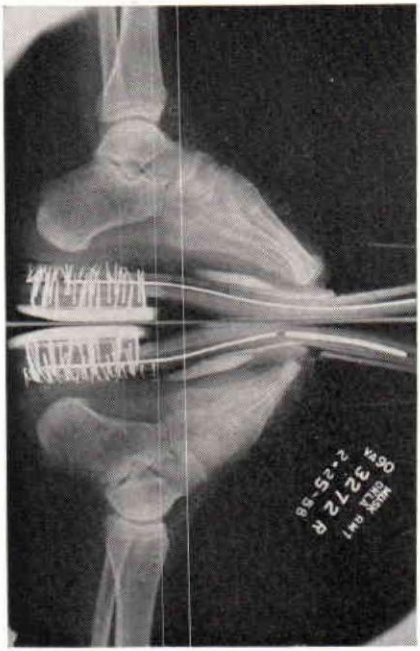

FIGURE VII: X-ray of Feet in Shoes. Note Broken Heel to Toe Steel on the Right and Absent Toe Block on the Left.

FIGURE VIII: Special Shoe with Incorporated Sole Plate and Short Leg Brace.

FIGURE VIII shows a fusion of the ankle joint which for comfort requires a maximum of foot-ankle stability at all times. Previously this has been secured through the use of a foot plate short leg brace. The foot plate and lateral and medial bars being quite bulky made the procuring of shoes to fit over the brace difficult and in this instance required the fabrication of a special shoe to accommodate the brace and foot plate. It was decided to combine the foot plate and special shoes in a single fabrication.

FIGURE IX illustrates the completed combination fabrication and the x-ray shows the foot in the shoe and brace for bone and soft tissue relationships and the resultant successful stabilization.

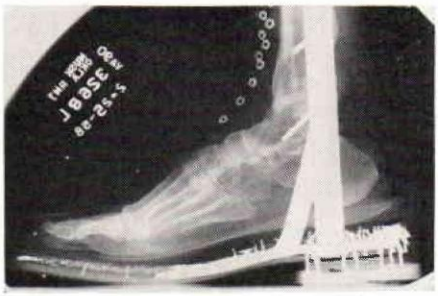

FIGURE IX: X-ray of Foot in Special Shoe with Sole Plate and Brace. Note Fused Ankle Joint.