FORWARD DISLOCATION OF THE ASTRAGALUS AND WITH IT THE FOOT*

BY ROBERT HENRY FALES DINEGAR, M.D.

OF NEW YORK, N. Y.

Stimson in his work on fractures and dislocations divides the possible tibiotarsal dislocations into five groups, namely: Forward, backward, inward, outward, and upward. Of these there are but relatively few collected cases, of the backward variety about 26; forward, 10; inward, 26; outward, 27; and upward but 4.¹ No doubt at the present time other cases have been added, but it is fair to assume that the relative proportion of these must all be the same.

If we leave out of consideration the very rare upward dislocation, of which Stimson found but two records (though some have seen four cases²), there remain but the four commoner varieties. From the figures given above we see that, of these the forward dislocation of the astragalus and with it the foot, is by far the rarest. It is a case of this variety that I wish to report.

Case Report.—A young adult male, aged twenty-two years, an iron worker by trade, was carried into the Emergency Department of the hospital, from a building upon which he had been working, twenty minutes after the accident had happened. The following was the history given by the patient. While engaged in working on the construction of a building, the patient’s position was such that his right leg and foot were advanced about 2½ feet in front of the left extremity. The patient's weight was borne on the forward (right) leg, while his left extremity was used to balance with. This leg was tense from the contraction of the muscles, and was extended at the knee, the foot dorsi-flexed at the ankle. The right leg was slightly flexed at the knee and the foot was at right angles with the line of the tibia.

While in this position the patient was suddenly hit on the left heel by a rapidly moving iron beam of great weight. This naturally exerted considerable force. The astragalus, and with it the foot, was dislocated forward; at the same time the patient lost his balance and fell to the side, inverting his left foot. The mechanism of dislocating the foot forward is in part the causative factor in fracturing the tips of the malleoli and displacing the internal fragment forward (by avulsion through the ligaments). But more especially the inversion and lateral displacement of the astragalus is the chief factor and, it would appear, the means of displacing the fragment of the tibia laterally outward.

* From the Surgical Service of Dr. Charles N. Dowd, at the Roosevelt Hospital, New York City.

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The man was a relatively normal white male; the left foot was swollen about each malleolus and across the dorsum. The skin here is very tense. An abnormal bony prominence is easily palpable in the upper dorsum of the foot. The foot appears lengthened, feels cold, is cyanosed, and the discoloration reaches the tips of the toes. The heel appears to be shortened and it is impossible to grasp the os calcis in the usual manner. The normal sulcus on each side of the tendo achillis is obliterated. Motion is impossible. There is tenderness over both malleoli with crepitus at the external. The foot appears to be more plantar-flexed than the opposite, and the hollow of the instep is increased. The malleoli appear to be nearer the sole and heel than normal. The patient is unable to bear any weight on the foot.

From the physical signs and symptoms a dislocation of the astragalus was apparent. The X-ray being immediately at hand, skiagraphs were taken before reduction was attempted (Figs. 1 and 2). In these pictures the following points are noted: Before reduction, Fig. 1: (a) The astragalus is dislocated forward. (b) The posterior portion of the os calcis is further forward and nearer the malleoli than normal. (d) The hollow of the instep is increased. (e) Malleoli are nearer the sole of the foot than normal. (f) The tip of the internal malleolus is fractured and is displaced forward. (g) The tip of the external malleolus is fractured but not displaced. (h) The relation of the astragalus to os calcis and navicular is normal. Fig. 2: (a) Tarsus slightly inverted. (b) Astragalus displaced laterally outward and inverted. (c) Fractured tip of the internal malleolus is displaced inward. (d) Fractured tip of the external malleolus is in good position.

While the pictures were being developed the dislocation was reduced. The method consisted in traction on the os calcis and dorsum of the foot, while with the fingers of the hand, making traction on the dorsum, the astragalus was pushed downward and backward. The surgeon was assisted by counter-traction at the knee. The patient was in the recumbent position. The astragalus slipped into place easily, with the usual feeling of crunching snow. Almost at once the cyanosis began to clear and the foot to feel warmer. Great relief from pain was experienced. The reduction required no anaesthetic. The foot tended to keep the normal position when at rest.

X-ray plates were again taken and when seen the position was as is indicated in "after reduction," Figs. 3 and 4. The corrections of the points enumerated above are noted.

A padded plaster case extending from just below the knee to the base of the toes was applied. The foot was put at right angles with the line of the tibia. The patient experienced such relief from the reduction and the support of the case that he was able to leave the hospital on crutches. The next day he was seen in the Out-Patients' Department; his foot felt very comfortable in its plaster encasement, and very little pain was experienced at the site of the
trauma. The patient reported at frequent intervals and the case was removed on the twenty-first day. No deformity and only a moderate amount of stiffness and limitation of motion was noted. These soon disappeared under active and passive motion, baking, and massage. When the patient last reported, six weeks from the date of the accident, he had an excellent result and practically perfect function.

Discussion.—There are two classical modes of producing this dislocation, according to Stimson, namely: (1) When the foot is in dorsiflexion and pressure is exerted through the long axis of the tibia downward and backward; (2) when direct pressure is made forward on the foot, at the same time the leg is pushed backward while making an angle of 90°. In the case reported above I believe the mode of production to be slightly different from either of the two accepted methods. The position is quite characteristic of the first, except that pressure was not made down through the long axis of the tibia (as even the body weight was on the opposite leg), but by a force pushing the foot forward. In this respect it resembles the second method, only the angle between the foot and leg was considerably less than 90°, about 55° in fact, and no pressure was made backward on the tibia.

This manner of dislocation, when the upper fragment is not fixed, except by muscle spasticity, could only be accomplished under certain conditions. First, although the leg and dorsum of the foot made an angle of 55°, the muscles were so taut that they, while not exerting pressure, rendered the leg so stiff as to splint it. Secondly, the object exerting the force on the foot was one of great weight. Thirdly, that this object moved quite rapidly. (Just as a sufficiently quick flick of the finger will displace a card from beneath a penny on the finger without carrying away the penny.) All these I believe to be potent factors, because if the blow was of less force and slower, it would have tended to push the extremity out from under the individual rather than to quickly dislocate the foot forward.

REFERENCES