ABSTRACT: An ankle wrap for use with a splint and leg support members to provide a traction splint. An ankle wrap having five strap elements joined together, with first and second straps for wrapping a foot in overlapping relation, and fourth and fifth straps carried on a third strap for connection to the first and second straps to pull the first and second straps tight on the foot, while means for connecting the third strap to the splint and shortening the third strap to apply tension to the foot, while maintaining the foot in position 90° to the leg.
This invention relates to traction splints for legs and in particular, to a new and improved ankle strap for use in traction splinting. The Hare traction splint has been in use for some time as a leg splint, particularly in the emergency splinting of lower extremity fractures. The conventional traction splint includes an elongated U-shaped metal frame for receiving the leg, a plurality of leg support members positioned along the frame or splint and providing for supporting and retaining the leg in the splint, and an ankle strap which engages the foot and includes means for attachment to the foot end of the splint. Means are also included for applying a tension force to the ankle wrap, pulling the patient’s foot toward the end of the splint against the restraining force of the ischial half-ring which is curved at the hip end of the splint and which butts against the ischium, thereby creating the desired traction in the patient’s leg.

A variety of arrangements have been utilized for ankle straps and tensioning and these prior art devices suffer from various shortcomings. It is highly desirable that the foot be maintained in a position substantially 90° to the leg. When tension is applied in the prior art ankle wraps, the foot is maintained in the forward or Equinus position. It is an object of the present invention to provide a new and improved ankle wrap which will maintain the foot in the desired 90° position while the leg is under traction.

Prior art ankle wraps have required separate tensioning devices, which devices usually require special configurations for the U-shaped splint. It is an object of the present invention to provide a new and improved ankle wrap which is a unitary structure requiring no separate tensioning unit and which does not require any specific configuration of the splint. It is a particular object of the invention to provide a new and improved ankle wrap which provides the traction force separate from the ankle gripping force.

Other objects, advantages, features and results will more fully appear in the following description. The drawing merely shows and describes the present invention which is given by way of illustration or example.

In the drawings:

FIG. 1 is a perspective view illustrating the use of the ankle wrap to provide a traction producing mechanism;

FIG. 2 is a plan view of an ankle wrap incorporating a preferred embodiment of the present invention; and

FIG. 3 is a perspective view illustrating a preferred form of connector means for the ankle wrap of FIG. 2.

The ankle wrap includes a strap 10, a strap 11 and a strap 12 joined at a junction indicated generally at 13. In the preferred construction illustrated, the straps are of woven webbing and strap 12 is of double thickness, being looped over the straps 10 and 11, with the three straps stitched together. A reinforcing pad 14 may be provided at the stitched junction area 13.

The straps 10, 11, 12 preferably are in a generally Y configuration as shown in FIG. 2, and the straps 10 and 11 may carry a soft pad 16 of rubber or plastic, typically urethane foam plastic. The strap 10 passes through slots in the pad 16 at 17, 18 and 19 and the strap 11 passes through slots at 20, 21 and 22 for retaining the pad in position. The pad preferably is composed of Velcro hook material which provides friction and maintains immobility to the urethane foam pad 14, preventing the pad from slipping off the webbing.

Straps 25 and 26 are joined to the strap 12 at an area indicated generally by 27 spaced from the area 13. The straps 25, 26 typically may comprise a single piece of webbing which is sewn to the strap 12 at the area 27, and preferably are oriented to provide a cross configuration.

A cooperating connector means is provided on the straps 10 and 26 for connecting the straps together to form a loop and for varying the size of the loop. Similarly, a cooperating connector means is provided on the straps 11 and 25 for connecting the straps to form a loop. A preferred form for the connector means is illustrated in FIG. 3.

In the connector means of FIG. 3, a metal hook 30 is fastened to the end of the strap 10 by a small strap 31 passing through a slot in the hook 30, with the ends of the small strap 31 sewn to the end of the strap 10. The strap 26 passes through spaced slots 33, 34 of a metal buckle 35. A pull tab 36 is sewn on the end of the strap 26, providing a larger gripping area and also preventing pulling the end of the strap 26 through the slots of the buckle 35. One edge of the slot 34 may be serrated, as seen in FIG. 3, to provide a better grip on the strap 26.

In operation, the hooked end of the hook 30 is passed through the slot 33 of the buckle 35 to form a loop. Then the end 36 of the strap 26 is pulled to shorten the loop to the desired size. The grip of the buckle 35 on the strap 26 may be released by pulling on another tab 40 which is fixed in another slot 41 of the buckle 35. This combination of buckles and hooks allows adjustability and attachment of the device to any size foot, shoe or boot.

The strap 12 extends beyond the junction area 27 and terminates in a mechanism for attachment to the splint. In the preferred embodiment illustrated, a metal grommet 43 is fixed in the end of the strap and an S-shaped hook 44 has one end positioned in the grommet, with the other end open for hooking over the splint.

The strap 12 includes means for adjusting the overall length thereof and preferably utilizes one of the buckles 35, with a portion 46 of the strap fed through the buckle in the same manner as the strap 26 of FIG. 3. The buckle 35 is attached to the main portion of the strap 12 at the junction area 27 by a short strap 50 which is passed through the slot 33 of the buckle 35 and sewn in with the straps 25, 26. The dashed lines, generally in a rectangular pattern with a cross therein, at the junction areas 13, 27 and at the ends of the straps indicate stitching or sewing. Of course, material other than webbing can be used for the straps as desired, and other methods of attaching may be utilized.

The use of the ankle wrap is illustrated in FIG. 1, where the patient's leg 60 is positioned in a conventional splint 61. The splint as illustrated comprises an elongated U-shaped frame 62, which may have a detachable U-bracket 63 for raising the foot end of the splint above the work surface. The splint 61 typically includes a ring and strap (not shown) for encircling the leg at the upper end of the thigh. A plurality of leg support members 65 are carried on the frame 62, each including an elastic strap 66 with a closure of some type for strapping the leg to the frame.

The patient’s leg is first on the splint, with the foot spaced from the end 68. The leg is then strapped in place by the ischial half-ring at the hip and the leg strap 65. The ankle wrap of FIG. 2 is then placed in position under the foot, with the junction area 13 at the back of the heel. The strap 11 is brought forward over the top of the foot and connected to the strap 25 and this loop around the foot is pulled snug. Then the strap 10 is brought over the top of the foot and connected to the strap 26 and the loop is pulled snug. Then both loops can be pulled as tight as desired, providing a firm grip on the foot adjacent the ankle.

The hook 44 may be engaged with the end 66 of the frame prior to or subsequent to placing the straps 10 and 11 around the foot. After the straps 10 and 11 are firmly in place and after the hook 44 is in place, the strap 12 is placed in tension by pulling on the end of the strap 46. This tensioning produces the desired traction on the patient's leg.

The ankle wrap of the present invention is a unitary structure with no loose parts. The three principal straps 10, 11, 12 are individually adjustable for tension. The wrap provides for gripping and adjusting the grip on the patient's foot independent of the adjustment of the traction via the tension in the strap 12. The unique arrangement of the straps and the adjustments thereof provides an ankle wrap and tension arrangement which maintains the patient's foot substantially at 90° relative to the leg, as seen in FIG. 1.

Although an exemplary embodiment of the invention has been disclosed and discussed, it will be understood that other
applications of the invention are possible and that the embodiment disclosed may be subjected to various changes, modifications and substitutions without necessarily departing from the spirit of the invention.

I claim:

1. In ankle wrap for use with a splint and leg support members to provide a traction splint, the combination of:
   first, second and third inelastic straps joined at a first junction;
   fourth and fifth inelastic straps joined to said third strap at a second junction intermediate said first junction and free end of said third strap, with a predetermined fixed spacing between said first and second junctions;
   first connector means carried on said first and fifth straps for interconnecting said first and fifth straps to form a first loop around a patient's foot adjacent the ankle and including means for adjusting the length of said first loop;
   second connector means carried on said second and fourth straps for interconnected said second and fourth straps to form a second loop around a patient's foot adjacent the ankle and overlapping said first loop including means for adjusting the length of said second loop; and
   third connector means carried on said third strap for connection to a splint and including means for adjusting the length of said third strap for applying tension to a patient's leg at the ankle and heel, and remote from the instep, with the foot maintained in a substantially 90° position relative to the leg while tension is applied.

2. An ankle wrap as defined in claim 1 wherein said first, second and third straps have Y configuration.

3. An ankle wrap as defined in claim 2 wherein said first, second and third straps have cross configuration.

4. In an ankle wrap for use with a splint and leg support members to provide a traction splint, the combination of:
   first, second and third straps joined at a first junction in a Y configuration;
   fourth and fifth straps joined to said third strap at a second junction intermediate said first junction and the free end of said third strap and in a cross configuration;
   first connector means carried on said first and fifth straps for interconnecting said first and fifth straps to form a loop around a patient's foot adjacent the ankle and including means for adjusting the length of said loop;
   second connector means carried on said second and fourth straps for interconnecting said second and four straps to form a loop around a patient's foot adjacent the ankle and including means for adjusting the length of said loop; each of said first and second connector means including means for manually pulling a strap to shorten the loop and clamp the foot therein; and
   third connector means carried on said third strap for connection to a splint and including means for adjusting the length of said third strap for applying tension to a patient's foot, said third connector means including a hook member for engaging the splint and means for manually pulling a strap to shorten said third strap and apply the tension maintaining the foot in a substantially 90° position relative to the leg.

5. An ankle wrap as defined in claim 4 in which said straps and connector means are permanently fastened together to provide a unitary structure.