



Elastic Bandage Traction Technique for Reduction of Distal Tibial Fractures



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ABSTRACT

In the present technique report, we describe a useful noninvasive traction technique that uses a 6-inch elastic bandage that can be obtained in every operating room and can be easily applied around the patient's ankle and the surgeon's waist to offer a stable traction force during minimally invasive plate fixation of distal tibial fractures. This technique frees the surgeon's hands to focus on applying other forces, such as rotational, varus, or valgus forces, to reduce the fracture and stabilize the reduction and alignment during percutaneous insertion and fixation of the plate. This technique, although simplistic and old-fashioned, is also useful for the closed reduction of distal tibial physal injuries in children, because it can provide a significant amount of traction force while allowing the surgeon to apply other forces for fracture reduction. This technique can be used in the emergency room, where an ankle distractor is not usually present, and in some cases could be useful during ankle arthroscopy.

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Minimally invasive plating using indirect fracture reduction has been successfully used to treat distal tibial fractures (1–4). Minimally invasive techniques have a biologic advantage compared with open plating techniques. However, it is more demanding operatively than the open reduction technique because the reduction is achieved using closed, indirect methods. Misalignment has been reported in the case of distal tibial fractures that were treated with minimally invasive plate osteosynthesis (5). Several techniques have been introduced for the successful reduction of the fracture and maintenance of the reduction during subcutaneous insertion of the plate (6–9). The patient can be positioned on a traction table and the reduction performed using transcalcaneal skeletal traction, or the patient can be positioned on a standard table and the reduction performed using a temporary external fixator (tibio calcaneal fixation). However, these techniques are rather invasive and have the potential to cause neurovascular injury and iatrogenic fractures. Moreover, the attending surgeon can apply manual traction with both hands holding the ankle. However, it is difficult for surgeons to pull the ankle manually and simultaneously apply other forces, such as rotational, varus, or valgus forces, to reduce the fracture. Occasionally, the reduction will be lost during insertion of the plate when the surgeon's hands have been

removed from performing manual traction. An ankle distractor (normally used for noninvasive distraction during ankle arthroscopy) can be used during these procedures. However, not all hospitals have



Fig. 1. Noninvasive traction is applied using a 6-in. elastic bandage around the patient's ankle and the surgeon's waist to offer a stable traction force during reduction of distal tibial fractures. This technique frees the surgeon's hands to focus on the application of other forces, such as rotational, varus, or valgus forces, to reduce the fracture and stabilize the reduction and alignment during percutaneous insertion and fixation of the plate.

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Fig. 2. (A) The 6-in. elastic bandage (EB) is folded in half, and the scrub nurse holds 1 end and the surgeon circles around holding the other end such that the elastic bandage will go around the surgeon's waist (similar to the manner in which a surgeon puts on a sterile gown). A loop is created at one end. (B) The ends of the EB are put through the loop. (C) The loop is tightened. (D) The EB is placed over the ankle. (E) The 2 ends of the EB are circled around the back of the ankle. One end is inserted into the space between the ankle and the EB and the other end is placed outside the EB. (F) A knot is made and tied 2 or 3 times.

an ankle distractor, and it can be quite expensive to prepare one if it is not readily available. Furthermore, an ankle distractor placed at the end of the operating table will block the surgeon from standing in front of the ankle or from moving freely at the end of the operating table. Still further, it will require time to setup an ankle distractor. Some noninvasive distraction techniques without an ankle distractor have been developed for ankle arthroscopy, and several different materials can be used, including a noninvasive strap, Kerlix™ Gauze Bandage Roll (Kendall Division, Covidien Plc, Dublin, Ireland), any simple roll bandage, and others. These noninvasive distraction techniques can be used for ankle distraction during the reduction of distal tibial fractures. However, some are cumbersome and difficult to apply and can require special devices and training.

We used a noninvasive traction technique using a 6-in. elastic bandage (EB) that can be easily obtained in every operating room. This bandage can easily be applied around the patient's ankle and the surgeon's waist to offer a stable traction force (Fig. 1) during the reduction of distal tibial fractures. This traction technique frees the surgeon's hands to apply other forces to reduce the fracture and to facilitate percutaneous plate fixation. An ankle arthroscope can also be inserted into the ankle joint with this traction technique to assess the anatomic reduction for intra-articular fractures. This technique will also be useful for the closed reduction of distal tibial physeal injuries in children because it produces a significant amount of traction force and simultaneously allows the surgeon to apply other forces for fracture reduction. It reduces the risk of iatrogenic physeal damage

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