

Unassisted Reduction and Splinting Technique for Ankle Injuries

Michael Gerrity DPM PGY-3, Adam Killpack DPM PGY-1, Jeffrey Christensen DPM, FACFAS

Statement of Purpose:

The purpose of this case series is to present our protocol for closed reduction and splint application using a modified Quigley maneuverer combined with a common peroneal and hematoma block (1). Our experience adds to a growing body of evidence that this combination is an efficient and effective option when reducing a variety of ankle fractures and among a variety of patient types.

Literature Review:

Ankle fractures are among the most common injuries that a foot and ankle surgeon manages in the emergency department (2,3). Timely and accurate closed reduction of a displaced ankle fracture helps prevent further morbidity, decreases patient discomfort, and facilitates surgical correction. The patient's discomfort, size, and the need for assistants are all potential barriers to performing a reduction in an efficient manner (2,3). Recent studies have shown that a hematoma block provides comparable analgesia to conscious sedation and does so without the added cost, need for continued monitoring, and cardiovascular risks (2,4,5). Furthermore, by using a modified Quigley technique a single provider can reduce and splint an ankle fracture (1,2,3).



Figure 1. Depicts positioning of limb prior to splinting, and alternative suspension method

Methodology:

Retrospective review of patients that underwent unassisted ankle fracture reduction at our institution. All patients underwent an ankle hematoma block with 10 mL of 1% lidocaine without epinephrine and a common peroneal block with 5 mL of 0.5% Marcaine without epinephrine, no conscious sedation was used. Twenty-five patients meet the above criteria, Table 1 summarizes the demographic data.

Table 1.					
Age (y)		Fracture Pattern (n)		Dislocation at presentation (n)	
Mean	52.4	SER II	3 (12%)	Yes	11 (44%)
Range	30-74	SER IV	12 (48%)	No	14 (56%)
Sex (n)		SAD II		Reduction Attempts (n)	
Male	13 (52%)	PER IV	4 (16%)	Once	24 (96%)
Female	12 (48%)	Pilon variant	5 (20%)	Twice	1 (4%)

A standardized reduction technique was used for these ankle injuries. Neurovascular status was checked prior placement of the stockinette. If there is concern or need to check neurovascular status a modification using 4 inch gauze roll for suspension was used, leaving the ankle exposed for evaluation after reduction (Figure 1).

Reduction Technique:

1. Anaesthetic administered with alcohol and betadine skin preparation.
2. Stockinette placed to the thigh and secured with foam tape.
3. Thigh secured to bed rail using a bedsheet padded with bath towel or pillow – Figure 1.
4. Hip and knee should be positioned in 90 degrees of flexion, suspending leg from IV pole with stockinette – Figure 1.
5. Initial reduction maneuverer based on fracture pattern is performed, limb remains suspended (5-10 minutes) to allow for gravity reduction and muscle relaxation.
6. Single layer compression dressing with cast padding and elastic bandage is placed followed by a sugar-tong splint.
7. Maintain reduction while splint sets.

Analysis and Discussion:

Twenty-four of 25 (96%) ankle injuries were successfully reduced after the first reduction attempt. There did not seem to be any correlations between fracture type, dislocation of the of the ankle at the time of evaluation, or body mass index (BMI), summarized in Table 2. Eight of 25 (32%) patients had a BMI over 30 which expands the usefulness of this technique.



Figure 3. Depicts attempted reduction by ED staff, followed by reduction with a single provider with hematoma block

This technique has been used after failed emergency department (ED) physician reduction with conscious sedation reductions by the ED physician, (Figures 3). We have not found any contraindication to using this technique, but imagine that suspension of anteriorly unstable fracture patterns would not be appropriate.

Ankle injuries frequently require reduction in the emergency department setting. At our institution, it is difficult to find assistance, particularly after hours, to appropriately reduce and splint injuries. We have found reproducible reduction success across multiple providers using this technique. Furthermore, application of a compressive dressing and splint is made easier when the ankle reduction is held by gravity during suspension. This reduces operative delay due to edema and/or blistering.

All the reductions were completed without conscious sedation, which negates the need for ED physician and support staff assistance, making for reduced costs to the patient and more efficient trips to the ED. Additionally, while not reported in this series, we have used this technique for midfoot and rearfoot fractures and dislocations for both reduction and splinting.

References:

1. Quigley TB. A simple aid to the reduction of abduction-external rotation fractures of the ankle. Am J Surg. 1959;97:488-493.
2. Alton TB, Harden E, Hagen J, et al. Single Provider Reduction and Splinting of Displaced Ankle Fractures: A Modification of Quigley's Classic Technique. J Orthop Trauma. 2015;29:e166-e171
3. Skelley NW, Ricci WM: A Single-Person Reduction and Splinting Technique for Ankle Injuries. J Orthop Trauma. 2015;29: e172-e177
4. Ross A, Catanzariti AR, Mendicino RW. The hematoma block: a simple, Effective technique for closed reduction of ankle fracture dislocations. J Foot Ankle Surg. 2011;50:507-509.
5. White BJ, Walsh M, Ego KA, et al. Intra-articular block compared with conscious sedation for closed reduction of ankle fracture dislocations. A Prospective Randomized Trial. J Bone Joint Surg Am. 2008;90:731-734.