



Postoperative Outcome of the Modified Broström Procedure in the Active Duty Military Population: A Retrospective Cohort Study



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ABSTRACT

Ankle sprains are common injuries and typically treated conservatively. Chronic ankle instability, however, can require surgery when nonoperative measures fail. We evaluated the clinical outcomes of an active duty population in a retrospective study of patients who had undergone a modified Broström procedure at our facility from January 2010 through April 2014 by a single surgeon. The electronic medical records and Army E-profile database were reviewed to determine whether the patients had returned to active duty and whether they had any permanent postoperative lower extremity activity restrictions. A total of 127 patients met the inclusion criteria and had undergone the modified Broström procedure during the study period; 34 (26.8%) separated from the military postoperatively. Of these 34 patients, 23 (18.1%) were unfit for reasons related to their ankle and 11 (8.7%) required military separation for reasons unrelated to their ankle. Thus, 93 patients (73.2%) were able to remain on active duty after undergoing the Broström procedure. Of the 93 patients able to remain on active duty, 38 (40.9%) required activity modifications and 55 (59.1%) were able to return to full duty. Chronic ankle instability in active duty patients can be severely limiting. The modified Broström procedure can provide significant improvement in symptoms and allow patients to remain on active duty. In our high-demand population, ~73% of patients were able to remain on active duty after their injury and subsequent surgery, 60% of whom returned to their previous level of duty without any physical restrictions.

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Ankle sprains are common sports-related injuries, with daily estimates of acute and subacute ankle sprains as great as 23,000 to 30,000 in the United States (1,2). Lateral ankle sprains constitute the vast majority of these injuries and are typically caused by an inversion and internal rotation movement of the hindfoot. This mechanism places strain on the lateral ligamentous complex, which includes the anterior talofibular ligament (ATFL), calcaneofibular ligament (CFL), and the posterior talofibular ligament (3). Although most patients will respond well to conservative treatment, chronic ankle instability will develop in 10% to 20% of patients (4). Persistent pain, recurrent sprains, and subjective instability are hallmarks of chronic ankle instability. Surgical repair or reconstruction is a treatment option when nonoperative modalities fail (5).

Several surgical options are available for the treatment of chronic ankle instability (3). Reparative procedures, such as the surgery described by Dr. Lennart Broström, involve imbrication of the native ATFL and CFL. The Gould modification involves augmenting the Broström procedure through mobilization of the lateral portion of the extensor retinaculum (6). The term “modified Broström” is typically used to describe the Broström-Gould procedure or any procedure involving primarily a repair of the native ligaments in which the technique differs slightly from that described by Broström in 1966 (7,8). Reconstructive procedures are those that stabilize the ankle by either augmenting or replacing the native ligaments with a tendon. Both autograft (commonly involving a split peroneal tendon) and allograft reconstructions have been described (4). Concomitant disease can also contribute to, or result from, chronic ankle instability. Examples of associated pathologic features include osteochondral lesions of the talus, chronic peroneal tendinopathy, symptomatic varus malalignment, and early tibiotalar osteoarthritis (9). Operations undertaken for chronic ankle instability will also often address these associated injuries.

The modified Broström is currently the most frequently used procedure for chronic ankle instability, with good to excellent treatment

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outcomes reported by several investigators (10–12). Although return to sports, work, or preinjury status has been described previously, the outcome is often subjective and thus prone to bias (13). Military organizations, however, keep accurate records of patients' ability to return to duty. This allows for an objective measurement of patients' return to activity after surgical treatment of chronic ankle instability. Our aim was to evaluate the objective occupational outcomes of the modified Broström procedure in a military population.

Patients and Methods

The institutional review board at Madigan Army Medical Center (Tacoma, WA) approved the present study. We performed a retrospective review of the electronic surgery records for a cohort of active duty patients aged 18 to 45 years. These patients had an indication for operative treatment of chronic ankle instability and had undergone surgical repair consisting of a modified Broström procedure at Madigan Army Medical Center from January 1, 2010 through April 30, 2014. All the patients were treated by a single surgeon and had a minimum of 1-year follow-up data available.

The patients included in the present study had complaints of lateral ankle instability that had not responded to nonoperative rehabilitation programs for a minimum of 6 months. In addition to subjective complaints of instability, all included patients had either positive clinical examination or positive radiographic stress examination findings. The clinical examination findings were considered positive when palpable luxation and reduction of the talus within the mortise with anterolateral drawer testing were present. In testing the anterolateral drawer, the surgeon firmly held the tibia with 1 hand and applied an anterolateral force to the heel with the other hand, with the patient's knee bent. If the examination finding was not grossly positive, the surgeon performed a radiographic stress examination, which included a talus tilt and anterolateral drawer test for both ankles. A stress examination finding was considered positive for an affected ankle if 9° of varus tilt was found between the talus and tibia on the talar tilt examination or 9 mm of anterior translation was found during the anterolateral drawer test. The examination findings were also considered positive if a side to side difference of 3° or 3 mm was found. Magnetic resonance imaging (MRI) was obtained for some patients to evaluate for associated injuries; however, the status of the ligaments found on MRI was not used in determining the indications for surgery. Patients found to have associated intraarticular findings on MRI were evaluated with diagnostic ankle arthroscopy before they underwent the open modified Broström procedure. Patients who were unable to obtain an MRI and had subjective or objective complaints consistent with associated intraarticular pathologic features also underwent diagnostic arthroscopy before undergoing ligamentous repair. Regardless of whether the patients had undergone an arthroscopic evaluation, the modified Broström was performed using a similar method for all patients. The surgical technique consisted of a curvilinear incision over the anterolateral aspect of the fibula with blunt dissection to expose the ankle capsule and retinaculum. The ATFL, CFL, and intervening capsule were incised over a hemostat and then repaired in a "vest over pants" fashion with interrupted 0 Ethibond suture (Ethicon, Somerville, NJ; Figs. 1 and 2). The repair was reinforced with the extensor retinaculum sutured to the superior leaf of the Broström repair with 0 Vicryl suture (Ethicon) similar to the method described by Dr. Nathaniel Gould in 1980 (14). In some situations, the senior author (P.R.) will use drill holes or suture anchors; however, none of the patients in the present cohort required the use of these techniques. The postoperative protocol consisted of the patient in a splint for 2 weeks, followed by 4 weeks in a short leg cast. The duration of immobilization is not universal but was similar that in other studies in which patients were immobilized for 4 to 6 weeks postoperatively (14–16). The patients were maintained non-weightbearing for the first 2 weeks, followed by 30% weightbearing for weeks 2 through 4 and 60% weightbearing for weeks 4 through 6, with a goal of full weightbearing by cast removal. After the cast was removed, the patients were placed into a controlled ankle motion boot for 6 additional weeks and allowed to weight bear, as tolerated. Physical therapy was initiated with a goal of progression to running at 16 to 20 weeks postoperatively. As the patients returned to activity, they were encouraged to use an ankle support orthosis (lace-up ankle brace) for the first 6 months.

The electronic medical records were reviewed for each patient to determine whether they had undergone an assessment by the medical evaluation board (MEB) during the follow-up period. An MEB assessment is initiated when it becomes apparent that the service member's condition could permanently interfere with their ability to serve on active duty. One possible outcome of the MEB process is that the service member will be found medically unfit for duty. The Army electronic profiling system (e-Profile) was also used to determine the patients' current lower extremity permanent profile status. Profiles are written for soldiers to provide them with physical activity limitations, either temporarily or permanently, that allows them to remain on active duty status. Finally, we reviewed the preoperative documentation to assess each patient's military occupational specialty (MOS) before surgery and compared that with their current MOS listed in the e-Profile system to assess which patients had had a change in their MOS during the follow-up period.



Fig. 1. First pass of nonabsorbable suture through the anterior talofibular ligament and anterior capsule.

Results

A total of 127 patients (117 males [92.1%], 10 females [7.9%]) who met the inclusion criteria had undergone a modified Broström procedure during the study period. Their age ranged from 19 to 44 (mean 30.4) years. Of the 127 patients, 23 (18.1%) were evaluated by the MEB for reasons related to their ankle and were found to be medically unfit for duty. Another 11 patients (8.7%) required military separation for reasons unrelated to their ankle. The reasons included a mental health



Fig. 2. "Vest over pants" repair of anterior talofibular ligament and anterior capsule.

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