

## Original Research Article

# Ultrasonid guided management of ankle sprain

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## ABSTRACT

**Background:** Ankle sprain accounts for 15-20% of sports injuries. They are complex injuries and studies that better delineate the etiology are needed. The accuracy of ultrasound as a diagnostic modality of ankle sprain is comparable to MRI. In this study we evaluated the use of ultrasound in delineating the grade of sprain, with special emphasis of grade 2 sprains.

**Methods:** We prospectively studied 80 ankle sprains of over two years. All the patients with features of ankle sprain were evaluated with high frequency ultrasound. Grade 1 & 2 sprains were included in the study. All the patients were followed up for 1 year. Grade 2 sprains were treated with cast for 6 weeks and evaluated for any residual symptoms and chronicity.

**Results:** There were 51 males and 29 females with right ankle injured in 57 patients. Seventy-three patients were injured during their leisure activities and 7 were sports injuries. According to ultrasound grading, there were 58 grade 1 injuries, 22 being grade 2 sprain. All the patients were followed up till 1 year. At the end of one year, 79 patients were recovered well with no residual symptoms.

**Conclusions:** Ultrasonogram effectively differentiates grade 1 from grade 2 and gives a clue for further management. Therefore, we recommend routine use of ultrasonogram for every ankle sprain. For grade 2 sprains, rigid immobilization for 6 weeks gives excellent results with no residual symptoms.

**Keywords:** Lateral ankle sprain, Sprained ankle syndrome, Ultrasonogram

## INTRODUCTION

Ankle sprains are one of the most common musculoskeletal injuries and accounts for 15-20% of sports injuries.<sup>1</sup> The most common mechanism is a combination of adduction and inversion of the foot in plantar flexion which in turn can cause damage to lateral ankle ligaments.<sup>1</sup> More than 40 percent of ankle sprains have potential to cause chronic problems.<sup>2,3</sup> The frequency of complications and duration of long standing symptoms after ankle sprain has led to the suggestion of "sprained ankle syndrome".<sup>4</sup> The largest risk factor for ankle sprains has been shown to be history of past sprains.<sup>5</sup> Ankle sprains are usually graded on the basis of

severity.<sup>6,7</sup> Grade I mild stretching of the ligaments without macroscopic rupture or joint instability. Grade 2 is a partial rupture of ligaments with slight to moderate instability. Typically, patients present with problems in bearing weight. Grade 3 is complete ligament rupture with marked joint instability.

All the sprains are complex injuries and studies that better delineate the etiology are needed.<sup>6</sup> The goal of the management is to achieve uniformity of diagnosis, to prevent recurrences and chronicity. Nevertheless, ankle sprains must be diagnosed based on accurate evidence which is more economical and for understanding of grade of sprain.

The grade of ankle can't be concluded precisely on radiography. The accuracy of ultrasound as a diagnostic modality of ankle sprain is comparable to MRI.<sup>8</sup> Knowledge about the use of ultrasound and MRI examination and the diagnostic performance is hampered by lack of research (level 4).<sup>9</sup> In this study we evaluated the use of ultrasound in delineating the grade of sprain, with special emphasis of grade 2 sprains. There is general agreement that the overwhelming majority of Grade I and II sprains heal uneventfully with conservative care. Treatment of Grade III sprains is more controversial: some practitioners prefer operative repair, at least for high performance athletes and others prefer a regimen of casting and physical therapy.<sup>10</sup>

## METHODS

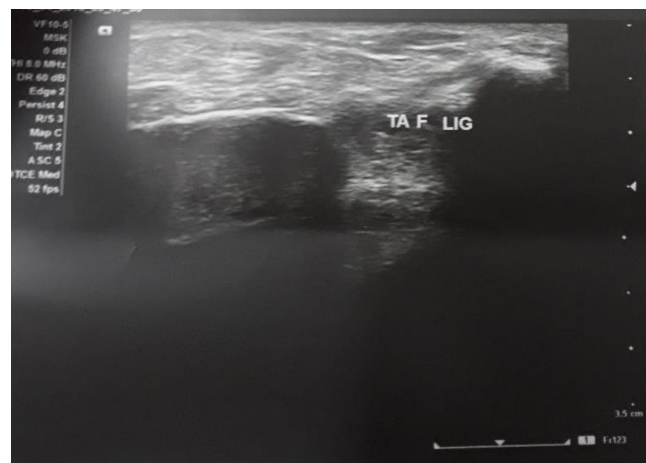
This study was conducted in MNR Medical College, Sangareddy, Telangana, India. We prospectively studied 80 ankle sprains of over two years from March 2016 to March 2018. All the patients who attended the outpatient department with features of ankle sprain are included in this study. Grade 1 & 2 sprains are included in the study. They were initially evaluated with X-rays according to Ottawa ankle rules.<sup>10</sup> Fractures, syndesmotic injuries and concomitant injuries to medial ankle ligaments were excluded from the study. Once no fracture seen on X-rays, all patients were made to undergo diagnostic ultrasound of injured ankle (Figure 1-3). High-frequency (7–15 MHz) ultrasound is performed in 80 patients with acute ankle injury. All ultrasound examinations were done by only one radiologist. If swelling is severe ultrasound is deferred and repeated after 3-5 days once the swelling subsides. Grade 1 ankle sprains was given semi rigid splint for 1 week followed by elastic compression bandage applied for next 2 weeks with regular life style, and proprioceptive and balancing exercises from 3<sup>rd</sup> month.



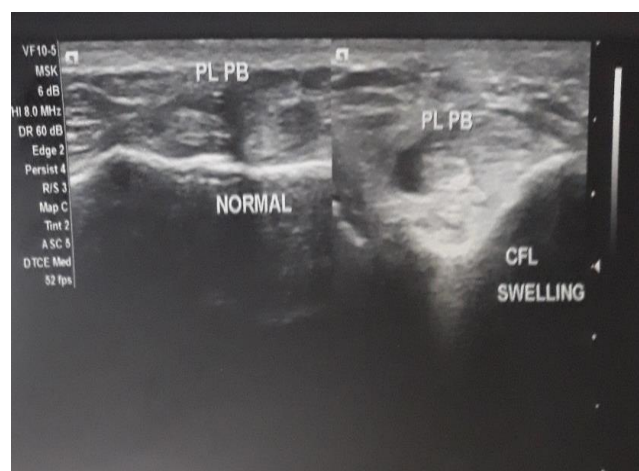
**Figure 1: Anterior tibial fibular ligament tear grade 2.**

Grade 2 ankle sprain, ultrasonography showed ligament sprain around 50 percent ligament tear associated with edema around peroneus ligament and swelling around ankle. Initially patients were advised rest, icing, foot elevation, crepe bandage & anti-inflammatory drugs for 5 days. Once edema subsided, they were given short leg

synthetic for six weeks. We allowed full weight bearing from 4<sup>th</sup> week. After 6 weeks, cast was removed, and proprioceptive and balancing board exercises were advised. We excluded grade 3 ankle sprains as we preferred surgery to prevent nipping and interposing of ligament tissue between joints and to prevent chronicity. All the patients were followed up at regular intervals at 1<sup>st</sup> week, 3<sup>rd</sup> week, 6<sup>th</sup> week and monthly thereafter till one year.



**Figure 2: Talo fibular ligament tear grade 1.**



**Figure 3: Calcaneo fibular ligament normal to grade 10 comparative.**

## RESULTS

There were 51 males and 29 females with right ankle injured in 57 patients (Table 1&2). Seventy-three patients were injured during their leisure activities and 7 were sports injuries.

**Table 1: Sex wise distribution.**

|                               | Male  | Female |
|-------------------------------|-------|--------|
| <b>Total number of people</b> | 51    | 29     |
| <b>Percentage of people</b>   | 63.7% | 36.7%  |

**Table 2: Sidewise distribution.**

|                               | Number of patients | Right ankle | Left ankle |
|-------------------------------|--------------------|-------------|------------|
| <b>Total number of people</b> | 80                 | 57          | 23         |
| <b>Percentage of patients</b> | 100 %              | 71%         | 29%        |

**Table 3: Outcome of ankle sprain management.**

| Outcome                       | Number of patients | Complete recovery | Partial recovery |
|-------------------------------|--------------------|-------------------|------------------|
| <b>Number of patients</b>     | 80                 | 79                | 1                |
| <b>Percentage of patients</b> | 100%               | 98.75%            | 1.25%            |

According to ultrasound grading, there were 58 grade 1 injuries, 22 being grade 2 sprain (Table1). All the patients were followed up till 1 year.

**Table 4: Comparison with other studies.**

| Names of Author                   | Mean age | Side            | Sex          | Recalcitrant cases | Mode of injury     |
|-----------------------------------|----------|-----------------|--------------|--------------------|--------------------|
| <b>Bosein et al<sup>12</sup></b>  | 28 yrs   | Rt-79 %, Lt-21% | Male =female | 47%                | -                  |
| <b>Elis<sup>13</sup></b>          | 22.7 yrs | Rt-66%, Lt-33%  | Male >female | -                  | Sports             |
| <b>Yeungm et al<sup>14</sup></b>  | 28       | Rt-75%, Lt-25%  | Male >female | 75%                | Leisure activities |
| <b>Glasgow et al<sup>15</sup></b> | 30       | -               | Male >female | 26%                | Leisure activities |
| <b>Alanen et al<sup>16</sup></b>  | 30       | Rt =lt          | Male =female | -                  | Leisure activities |
| <b>Our article</b>                | 33       | Rt>lt           | Male >female | 1%                 | Leisure activities |

In our case ultrasound gave reliable clue for the diagnosis and plan of treatment. In the supine position, intact ligaments are more easily depicted as full-length, parallel-layered echogenic structure (longitudinal scans in the direction of each ligament), with the bony insertions as reference structures. In the case of a ruptured ligament (Figure 1-3), the site of lesion is seen more clearly in this position because the torn ends are separated from each other.<sup>19-22</sup> Grade 1 injury had only physiological strain without macroscopic tear. They healed well by 3 weeks without much residual symptoms and chronicity. Immediate post injury, rest, elevation decreases swelling. Anti-inflammatory drugs decrease inflammation with complete non-weight bearing walking. Moderate 2<sup>nd</sup> grade ankle sprain would not heal completely with simple rest and may cause instability or recurrence of symptoms. Proper immobilization with short leg cast for longer duration would enhance complete healing without recurrent episodes of sprains. In our study only one patient had persistent symptoms after 1 year. We agree with other studies that grade 2 sprain needs proper immobilization with a cast, perhaps for a longer duration (6 weeks) than suggested by other studies. There is no residual stiffness of ankle at the end of 1 year. We propose to immobilize grade 2 sprains for a duration of 6 weeks to prevent instability and recurrent symptoms.

At the end of one year, 79 patients were recovered well with no residual symptoms (Table 3).

## DISCUSSION

Ankle injuries are common in sports but they are more frequent in leisure activities.<sup>15,16</sup> Mean age is 33years (18-64) in our study and right ankle being more commonly involved (71%) as it is dominant which is comparable to other studies.<sup>3,12-15</sup> Anatomically sprains of the ankle can be divided into the lateral ligament, medial ligament and syndesmotic sprains of which the lateral ligament sprain induced by an inversion injury, which takes up 85% of ankle sprains, is the most common.<sup>17</sup> Ultrasonography can also be used to diagnose acute ankle sprains because its accuracy in diagnosing ligament injuries has shown to be comparable to that of magnetic resonance imaging (MRI).<sup>18</sup> In our study there were 58 grade 1 sprains (72.5%) and 22 grade 2 sprains (27.5%) which is comparable to other studies (Table 4).

Recalcitrant ankle sprain being more common with grade 2 sprains.<sup>12,13</sup> Various authors advised 2-4 weeks of strict immobilization to prevent chronicity.<sup>12,15,17</sup> In our study we applied short leg cast for longer duration (6 weeks). Prevention of chronicity given importance.

## CONCLUSION

Most of grade 1 ankle sprains heal without any chronicity. The management of grade 2 sprains poses a clinical challenge because of their tendency for chronicity. Six weeks of rigid immobilization is found to be highly effective in our study to prevent residual joint instability. Ultrasonogram effectively differentiates grade 1 from grade 2 and gives a clue for further management. Therefore, we recommend routine use of ultrasonogram for every ankle sprain. For grade 2 sprains, rigid immobilization for 6 weeks gives excellent results with no residual symptoms.

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