

# Isolated medial subtalar dislocations - conservative treatment

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## ABSTRACT

**Background:** Isolated subtalar dislocations are rare dislocations. Their treatment is mainly conservative. We present 3 cases of isolated medial subtalar dislocation and our experience of their conservative treatment.

**Patients - Method:** The last three-year period, 3 men 22, 35 and 43 years arrived in the emergency department after ankle and foot trauma, during athletic activity the first one and during their work the last two. The radiological control confirmed the diagnosis of isolated medial subtalar dislocation. The treatment was closed reduction under anaesthesia, with continuous traction, plantar flexion and pronation of the forefoot for all the patients. The ankle was immobilized in a below knee non-weight-bearing plaster for 6 weeks.

**Results:** The plaster was removed after 6 weeks and the patients started passive physiotherapy and they were encouraged to partial weight bearing. The evaluation of the patients was done with AOFAScore. After 6 months the two patients had returned in their daily activities, while the 22 years old athlete participates in his old athletic activities 1 year after the trauma. There was not observed instability.

**Conclusion:** The most known method of subtalar dislocation treatment is the closed reduction and the immobilisation in plaster. It is a very good method for the treatment of medial subtalar dislocation.

**Key words:** *subtalar dislocation, closed reduction.*

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## INTRODUCTION

Subtalar dislocation is a rare ankle injury. It constitutes 1-2% of all dislocations and it disturbs the normal anatomy between talus, calcaneus and navicular bone<sup>1,2,3,4,5</sup>. The stability of this joint is derived from the medial, the lateral and the interosseous talocalcaneal ligaments. The tibiotalar and calcaneocuboid ligaments usually do not participate in this dislocation<sup>3</sup>. Depending on the place that it presents the ankle in relation with calcaneus, this dislocation can be medial, lateral, anterior and posterior. Although it can occur in any direction, medial dislocation is the most common type of subtalar dislocation, near 85%. The lateral subtalar dislocation constitutes 13%. The anterior and the posterior subtalar dislocation is observed in much smaller percentage, near 2%<sup>6,7</sup>. The lesion is usually closed<sup>8</sup> as a result of a high-energy injury such as fall from a height or motor vehicle accident<sup>9</sup>.

The movement of subtalar joint is reported as bent, turn and roll of the calcaneus under the ankle<sup>10</sup>. In the bibliography are reported two mechanisms of subtalar dislocation: the rotation of the ankle at the same time with the oblique axis in anteroposterior and vertical direction and the parallel rotation anterior and posterior to the oblique axis<sup>7</sup>. The talus neck acts as fulcrum first of the talonavicular and then of the talocalcaneal joint<sup>11</sup>.

We report three cases of closed subtalar dislocation, who were treated conservatively and the results of the conservative treatment.

## PATIENTS - METHOD

We present 3 patients 22, 35 and 43 years old, who arrived the last three-year period, after closed trauma of their foot in the emergency department. The first one was an athlete who was injured during a basket ball game



**Figure 1.** Anteroposterior foot radiograph illustrate medial subtalar dislocation of the right foot.



**Figure 2.** Reduction of subtalar dislocation.

after a jump and the two others were injured during their work, after a fall from height in oblique level. The patients complained of severe ankle pain and inability to bear any weight on their extremity. In clinical examination the ankle was substantially swollen and the foot was displaced towards the midline. The pulses were palpable on the workers' foot, but not on the athlete's foot. There were not pulses with Doppler. No neurological disturbances were identified. Both oblique and anteroposterior radiographs showed medial displacement of the midfoot without any evidence of bone fracture.

Immediately, under anesthesia, the subtalar dislocation was successfully closed reduced in the operation room, with traction, plantar flexion and pronation of the forefoot. The pulses on the athlete were palpable after the closed reduction. A post-reduction CT scan was also performed to confirm the anatomic reduction of the subtalar joint dislocation and reveal any potential fractures.

The ankle was immobilized in a below knee non-weight-bearing plaster for 6 weeks. The plaster was removed after 6 weeks and the patients were encouraged to partial weight bearing, using crutches for another two weeks. All patients were included in intensive passive and active physiotherapy after plaster removal for restoring the foot and ankle mobility and preventing stiffness. Full weight bearing started eight weeks after the trauma. At six months and one year after the trauma, the patients scored in terms of complications, stability and range of motion.

## RESULTS

At the 6 months evaluation the 2 workers had returned in

their daily activities and in their previous work. The athlete needed one year to return in his athletic activities. No signs of instability, subluxation, pain and stiffness were identified at one year after the trauma. One patient complained occasionally for mild pain at six months, because he developed sudeck's syndrome, but without restriction of his activities. The good clinical results were also illustrated with the AOFAS<sup>12</sup> ankle hind foot scale at six months and at one year. A total score of 90, 90 and 100 out of 100 points at six months and 100, 100 and 100 at one year was achieved, respectively.

## DISCUSSION

Isolated subtalar dislocations are rare dislocations, but can cause problems according to their treatment and rehabilitation. They occur, mainly, during athletic activities and they are called "basketball foot". There is instability, stiffness, inability of bearing and restriction of joint movement after the trauma. The closed reduction of the dislocation must be done immediately for the prevention of early or late complications, as osteonecrosis of the navicular bone, post-traumatic arthritis, stiffness of subtalar and ankle joint or local osteoporosis and development of sudeck syndrome.

Indirect, high energy trauma can cause all four types of subtalar dislocation and it depends of the trauma direction and the disruption of ligaments and joints capsules<sup>13</sup>. If the foot is in supination with adduction is caused medial dislocation. The process of the dislocation has three phases. Initially, there is a rupture of dorsal talonavicular joint with lateral rotation of the talus and talonavicular dislocation.

Later there is rupture of lateral talocalcaneal ligament with dislocation of the anterior talocalcaneal joint. Finally there is a rupture of the interosseus ligament, which leads to dislocation of the posterior talocalcaneal joint<sup>13</sup>.

The lateral dislocation is caused when the foot is in pronation with abduction<sup>14</sup>. The mechanism of dislocation is rupture of the anterior bundle of deltoid ligament, rupture of the posterior talonavicular ligament with dislocation of subtalar joint and lateral rotation of talus and talonavicular joint dislocation. The mechanisms of medial and lateral dislocation are not symmetrical, with regard to their movements. The medial subtalar dislocation is talus-navicular-calcaneal dislocation, while the lateral is talus-calcaneal-navicular dislocation. The plantar calcaneonavicular ligament is intact for both of them<sup>15</sup>.

The main cause of posterior subtalar dislocation is the plantar displacement with tendency of interosseus, medial and lateral talonavicular ligaments and the fulcrum of the talus neck to the navicular bone<sup>16</sup>.

On the other hand the anterior subtalar dislocation results from resistance with direction to anterior, causing tendency of interosseus, medial and lateral talonavicular ligament with simultaneous sliding of talus above in the calcaneus. The higher instability of the anterior and the posterior dislocation and their transformation to medial or lateral dislocation respectively can explain their rare frequency<sup>17</sup>. The treatment of subtalar dislocation is mainly with closed reduction under general anaesthesia for prevention of movement restriction and circulatory complications<sup>18</sup> and it is usually successful<sup>15,18,19,20,21</sup>.

With our clinical experience, we presented the conservative treatment of 3 patients with isolated subtalar dislocation. They were immediately treated with closed reduction under anaesthesia. According to the bibliography the better method for the treatment of isolated subtalar dislocation is the closed reduction under general anaesthesia<sup>3,22,23</sup>. With this method the complications are minimum and the result excellent. The failure of conservative treatment is more frequent in the lateral subtalar dislocation from 10%<sup>22</sup> until 32%<sup>19</sup>. After failure of conservative treatment, the surgeon treats the dislocation with open reduction<sup>3,19,24</sup>.

The results of the treatment depend on a lot of factors, as the type of dislocation, the kind of trauma, the fractures of neighbouring bones and the degree of the foot and ankle motion<sup>3,5,24,25</sup>. The direction of dislocation seems to play also a significant role in the final functional outcome. Medial subtalar dislocations usually have shown good results when treated conservatively, while lateral dislocations have been associated with important disability<sup>26,27,28,29,30</sup>. The complications are more frequent in the lateral dislocation<sup>21,31</sup>, because of the big forces during the trauma. The bone defects that are observed after the trauma are very frequent and they affect negatively the results of the reduction<sup>3,5</sup>. There are bone defects in many researches in percentage from 47% until 64%<sup>3,32</sup>, elsewhere 88%<sup>19</sup> but can be 100% with the computer tomography<sup>19</sup>.

The late complications of subtalar dislocation are the post-traumatic arthritis, the osteonecrosis of talus and navicular bone and the stiffness of subtalar joint<sup>23</sup>. The arthritis is more often in subtalar joint and not often in talonavicular and ankle joint<sup>4,15,23</sup>. The symptoms of arthritis are more often in dislocations with associated fractures<sup>23</sup>, but they have been also observed in isolated dislocations<sup>4,19</sup>. The symptoms of arthritis are pain, restriction of joint movement and often painful instability of the foot, which requires immobilisation.

The osteonecrosis of the talus is not frequent, but it is a dangerous complication in 10% until 29% of the patients<sup>33</sup>. Studies with angiography have shown that the main blood supply of the talus is from anastomoses between dorsalis pedis, peroneal and posterior tibialis arteria<sup>10</sup>. The subtalar dislocation causes damage of the blood supply and development of talus osteonecrosis<sup>7,10</sup>. The talus osteonecrosis is observed in 50% of subtalar dislocations<sup>34</sup>. The talus osteonecrosis is more frequent in dislocations with associated fractures of other bones<sup>35</sup>. According to the bibliography talus osteonecrosis is observed mainly in patients older than 50 years, when the trauma is open and is associated with fractures of other bones. The time of immobilisation varies from 4 to 6 weeks.

The local osteoporosis is frequent and it is the result of the restricted mobility and the blood supply disturbance of the talus<sup>15</sup>. The stiffness of subtalar joint is caused after high energy trauma with soft tissue disorder, which leads to the joint fibrosis. A lot of researchers support that the stiffness can be prevented by decreasing the immobilisation time from 6 to 4 weeks. Most often the immobilisation is for 5 weeks in plaster<sup>4,5,25,36</sup>.

According to the rehabilitation and the clinical results of our patients, we support, that the immediately closed reduction medial subtalar dislocation under anaesthesia and the immobilisation in plaster for 6 weeks is a very good method for the treatment of medial subtalar dislocation with small percentage of complications. We consider that 6 weeks of immobilisation in plaster after the reduction of medial subtalar dislocation is the more suitable treatment.

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