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## TRIPLE ARTHRODESIS OF THE TARSUS AS A TREATMENT FOR POSTTRAUMATIC CONDITIONS

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Triple arthrodesis of the tarsus is one of the most common operations in orthopaedic surgery. It is valuable in correcting deformities and stabilising the foot after paralytic conditions but also in the treatment for painful post-traumatic conditions of the foot and ankle.

The fractures which most often tend to cause osteoarthritis and pain in the subtalar region are fractures of the calcaneus and talus, less often the malunited malleolar fractures.

Despite the fact that triple arthrodesis is such a common procedure, surprisingly few reports on follow-up examinations have been published. *Lindholm* (1960) has published the late results of triple arthrodesis in the treatment of paralytic ankle performed in the orthopaedic hospital of the Invalid Foundation. In 1959 *Skobowytsh-Okolot* reported the results of triple arthrodesis in 80 patients of which 15 were paralytic cases. *Thompson & Friesen* (1959) reported the results of primary triple arthrodesis in 25 cases as the treatment of comminuted calcaneus fractures. In their material the result was good or excellent in 24 cases. Primary arthrodesis was also recommended by *Trojan* (1961) though *Dewar* (1959) noted no difference in the late results of 153 calcaneus fractures treated conservatively or by primary triple arthrodesis. The purpose of the present report is to estimate the late results achieved by triple arthrodesis in the treatment for different painful post-traumatic conditions of the ankle when the operation has been performed several years after the primary conservative treatment of the fracture. The patients were admitted to the hospital of the Invalid Foundation, Helsinki from different parts of Finland.

## MATERIAL AND METHODS

The material includes all patients who from July 1956 to June 1963 were treated by triple arthrodesis for painful conditions after fractures in the ankle region. The number of patients operated during this period was 32, of whom 24 were men and 8 women. Of the patients 24 were insured against accidents and 8 were uninsured.

The age of the patients at admission to the hospital can be seen in Table 1.

Table 1.

Under 20 years	3 patients
20-29	1 "
30-39	10 "
40-49	8 "
50 years or more	10 "
Total	<hr/> 32 patients

The youngest patient was aged 15 and the oldest 62. The dominant indication for the operation was pain caused either by osteoarthritis which appeared in the subtalar joints or pain caused by the deformity in itself especially in young patients. The original injury was in most cases either fracture of the calcaneus or talus or malunited bimalleolar fracture. The nature of the primary fracture may be seen in Table 2.

Table 2.

Fracture of the calcaneus	11 patients
Fracture of the talus	2 "
Bimalleolar fracture	8 "
Late sequels of gunshot fracture	11 "
Total	<hr/> 32 patients

The gunshot fractures were naturally open fractures and resulted almost without exception in suppuration of the fractured area.

Arthrodesis was performed by removing articular cartilage from the talo-calcaneal, the talo-navicular and the calcaneo-cuboidal joints, after which the denuded bone surfaces were pressed together. In most cases internal fixation was not used. In some cases, where an especially large correction was performed, Blount's vitallium staples were used to fix the talus and the calcaneus together. The time of immobilization in plaster was in all cases 4 months. During the first month no weight bearing was allowed, but during the following three months full weight bearing was ordered in a walking plaster boot. In only one case did a disturbance of post-operative development occur, This was a slight skin necrosis at the edges of incision, but it healed before the end of the immobilization period without any special treatment.

A fact which attracted our particular attention was that the interval between primary injury and arthrodesis was in 15 cases 1-3 years while in 17 cases it was over 10 years. Intervals of 3-10 years between fracture and arthrodesis were not noticed in this material. It seems obvious that in some cases pain continues after consolidation of the fracture, whereas in others a painless period is gradually followed by osteoarthritis and pain.

## RESULTS OF THE FOLLOW-UP EXAMINATION

The follow-up examination was carried out at the beginning of 1964. It appeared that bony ankylosis was achieved in all cases except in one, in which the Chopart joint developed fibrous union. The patient complained of pain on walking. The result was recorded as good both subjectively and objectively in 26 patients. In one of the six remaining patients there was a varus deformity in the foot and the patient had pain on walking. In 5 cases the position of the foot was good, but the patients complained of pain on prolonged walking. One of these was the patient whose Chopart joint was not consolidated. Another had a slight swelling of the ankle and osteoarthritis also in the talocrural joint after a bimalleolar fracture. Not a single patient complained of instability or difficulty in walking on uneven ground.

All 26 patients in whom the result of treatment was uniformly successful, returned to the same work as they had before the operation. Of the 6 in whom weight bearing caused pain 5 also returned to their former work. Only one did not resume work. Objectively no reason could be found for the inability to work, but the patient himself considered that the pain of weight bearing made work impossible. It seems obvious that the fear of reduced insurance compensation was the most pressing reason for the inability to work in this case.

The results of this follow-up examination confirm the opinion that triple arthrodesis is a suitable and effective treatment for painful conditions after fractures in the region of the ankle, if the pain is in the subtalar joints. It was not possible to draw any conclusions whether arthrodesis as a primary treatment would have been preferable to conservative treatment since all patients had received their primary treatment in different general hospitals. For this reason it was also impossible to analyse the nature of the primary fracture or its rôle in the pain appearing later in the subtalar joint.

## SUMMARY

The authors report the results of a follow-up examination of 32 patients in which triple arthrodesis of the tarsus was performed to relieve pain or to correct deformity after different fractures in the ankle region. The most dominant indication for operation was pain after fracture of the calcaneus or the talus or after bimalleolar fracture. Bony ankylosis of the subtalar joints was achieved in 31 cases. In one case the Chopart joint did not consolidate. The result was recorded as good both accord-

ing to the patient's subjective estimate and according to the position of the foot in 26 patients. All these returned to their preoperative occupation. Five patients had pain on walking but not enough to prevent them from working. One patient did not resume work and the reason for this was considered to be the fear of reduced insurance compensation since no objective reason for this inability was discovered.

#### RESUME

Les auteurs rapportent les résultats d'un examen complémentaire de 32 malades chez lesquels a été pratiquée une triple arthrodèse du tarse pour soulager de douleurs ou pour redresser une déformité après différentes fractures dans la région de la cheville. L'indication dominante pour l'opération a été des douleurs après une fracture du calcaneum ou du talus, ou encore après une fracture bimalléolaire. L'ankylose osseuse des articulations sub-talaires a été pratiquée dans 31 cas. Dans un cas l'articulation Chopart ne s'est pas consolidée. Le résultat enregistré a été bon selon l'appréciation subjective des malades et selon la position du pied chez 26 malades. Tous ceux-ci ont repris leurs occupations antérieures. Cinq malades avaient des douleurs à la marche, mais pas suffisamment pour les empêcher de travailler. Un malade n'a pas repris son travail, par crainte, semble-t-il, d'une réduction de l'indemnité à verser par l'assurance. Il n'a en effet pas été possible de découvrir une raison objective à cette incapacité de travail.

#### ZUSAMMENFASSUNG

Die Verfasser berichten über die Ergebnisse einer Nachuntersuchung von 32 Patienten an denen eine Triplearthrodese des Tarsus ausgeführt worden war, um Schmerzen zu erleichtern oder Deformitäten nach verschiedenen Brüchen in der Knöchelregion zu korrigieren. Die Hauptanzeige zur Operation war Schmerzen nach Calcaneus- oder Talusbruch oder nach bimalleolären Brüchen. Knöcherne Ankylose des subtalaren Gelenkes wurde in 31 Fällen erzielt. In einem Falle kam es nicht zur Konsolidierung des Chopart Gelenkes. Das Ergebnis wurde sowohl gemäss der subjektiven Angabe des Patienten als auch gemäss der Fussstellung bei 26 Patienten als gut klassifiziert. Alle diese kehrten zu ihrer voroperativen Beschäftigung zurück. Fünf Patienten hatten Schmerzen beim Gehen, doch nicht so stark, dass sie am Arbeiten verhindert waren. Ein Patient arbeitete nicht mehr, doch nahm man an, dass der Grund dafür Furcht vor einer Merabsetzung der Unfalls-

rente war, da keine objektive Ursache für seine Arbeitsunfähigkeit zu entdecken war.

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