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ARTHRODESIS OF THE ANKLE AS A TREATMENT FOR POST-FRACTURE CONDITIONS

By

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Despite the steady development of treatment for fractures, the after-effects of fractures of the ankle are still a formidable problem. This is because fracture of the ankle is a common occurrence, and in a considerable proportion of cases the late results of the treatment have been poor. *Klossner* (1962) noted poor results in 12 per cent of his material consisting of 403 severe fractures of the ankle. Since the ankle joint must carry the whole weight of the body, even slight anatomical changes may cause osteoarthritis with pain. Arthrodesis is the most reliable treatment for painful conditions of this kind, which age merely aggravates.

The Orthopaedic Hospital of the Invalid Foundation receives the majority of the cases of unsuccessfully treated ankle injuries in Finland. For this reason, fusion of the ankle is a comparatively often-used procedure in the hospital. The purpose of the present study is to ascertain the results of treatment in recent years. *Vainio* (1957) published a material on ankle arthrodesis from the same hospital including cases treated during the years 1946-54. This material includes patients treated by ankle fusion from July 1956 to June 1963.

MATERIAL

The material includes 55 patients on whom arthrodesis of the ankle was performed because of post-fracture conditions. Of these patients 4 were men and 12 women. Age grouping at the first examination was as follows:

The youngest was 20 years of age, the oldest 64.

Most patients were middle-aged manual workers. Treatment was sought because of pain which hindered work or rendered it impossible. The majority of fractures occurred at work or in traffic accidents, so that 42 patients were insured against accident and only 13 were without insurance cover.

Table 1. Age Grouping on First Visit to the Hospital.

Age	No.
20-29	5
30-39	17
40-49	19
50-	14
Total	55

The nature of the primary injury is shown in Table 2.

Table 2.

	No.	Open fractures	Closed fractures
Trimalleolar fractures	13	7	6
Bimalleolar fractures	24	6	18
Talar fractures	9	..	9
Leg fractures	9	5	4
Total	55	18	37

One third of all fractures and more than one half of the leg fractures were open. In the latter, inflammation, damage to soft parts and long immobilization caused injury to the ankle joint.

In Table 3 the primary treatment is divided into conservative and operative treatment. Fractures receiving operative treatment were closed, except for one leg fracture.

Table 3.

	Conservative treatment	Operative treatment
Trimalleolar fractures	12	1
Bimalleolar fractures	18	6
Talar fractures	7	2
Leg fractures	4	5
Total	41	14

In this material, pantalar arthrodesis was performed on 7 patients, talocrural arthrodesis after previous subtalar arthrodesis on 2 and talocrural arthrodesis alone on 46.

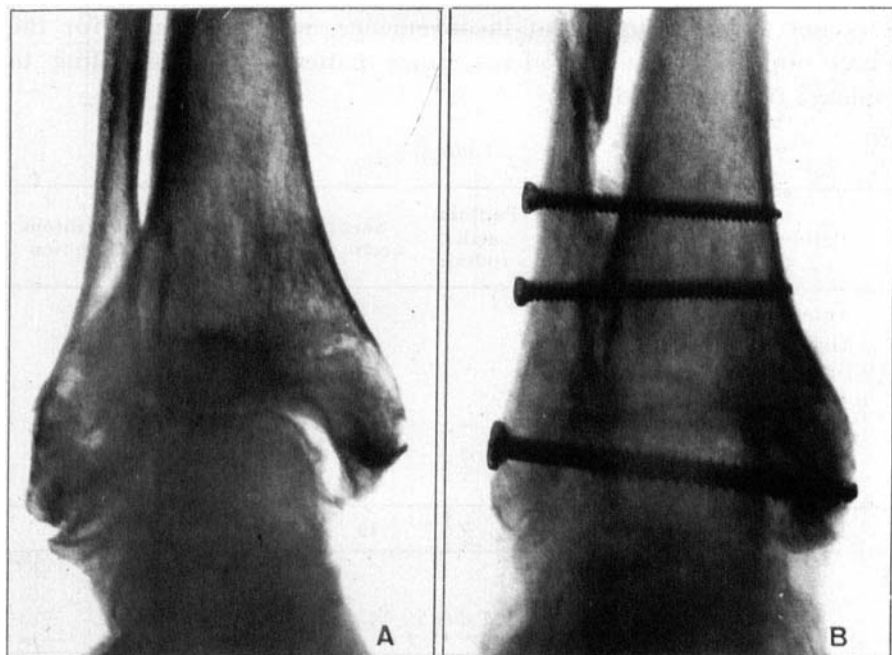


Figure 1. a) Radiograph of an ankle showing osteoarthritis after fracture. b) The same ankle as in a) four months after arthrodesis by the method of Adams.

Arthrodesis was performed by several methods. In anterior arthrodesis, the cartilage surfaces of the talocrural joint were removed, and a sliding graft taken from the anterior surface of the tibia was embedded in the talus. The Adams method comprised fixation of the talus and the tibia with the detached distal end of the fibula, which was fixed by screws (Figure 1 a and b). By the compression method the bones with the joint cartilage removed were pressed together by means of a Charnley compression device. Screw fixation was used in pantalar arthrodesis, with a long screw driven through the calcaneus and talus to the tibia, where it must penetrate the cortical bone.

Skin necroses were cured during immobilization in plaster and did not prolong the time of recovery. Of three infections two subsided after prolonging recovery time by 3–4 months, but the third led to amputation. In the latter case the compression method had produced bony union, but osteomyelitis damaged the leg to such an extent that amputation was considered the best solution. This was originally an open fracture case. Re-arthrodesis was performed in two cases, one of which consolidated, the other not. Fibrous union after talocrural arthrodesis

does not always cause great inconvenience, which accounts for the small number of re-arthrodeses, since patients were unwilling to undergo further operation.

Table 4.

Method	Talocrural arth- rodesis	Pantalar arth- rodesis	Skin necrosis	Infec- tion	Consoli- dated	Fibrous union
Anterior Sliding Graft	14	..	3	..	14	..
Adams	22	..	3	1	22	..
Compression	6	..	1	1	5	1
Screw fixation	2	3	2	..	3	2
Without fixation	4	4	1	1	5	3
Total	48	7	10	3	49	6

Table 5.

	Subjectively			Objectively		
	Good	Satis- factory	Poor	Good	Satis- factory	Poor
Fibrous union	..	2	4	..	1	5
Consolidated	27	21	1	43	4	2
Total	27	23	5	43	5	7

"Subjectively good" signifies cases where no pain or swelling occurred under strain, "satisfactory" cases where occasional pain occurred under strain but the patient himself felt better than before the operation, and "poor" cases where pain from pseudoarthrosis occurred. The only ossified ankle in the "poor" category was in the case which ended in amputation. Of the cases showing fibrous union one was objectively satisfactory: here the X-ray revealed a nonossified layer, but mobility could not be clinically observed and the position of the foot was good. Cases showing bony union were considered satisfactory or poor if there was excessive equinus, valgus or, the most harmful of all deviations from a neutral position, varus deformity.

After operation, 43 patients returned to the same or corresponding work, and 10 to lighter work. Two did not return to work. One of these

was the amputation case, the other was a patient on whom subtalar arthrodesis was performed because of pain proceeding from the arthrotic subtalar joint. The treatment of both these patients was still unfinished at the time of re-examination.

DISCUSSION

On the basis of this material arthrodesis of the ankle appears to be a suitable form of treatment when a harmful deformity or pain remains after the fracture. A stiff ankle joint is not noticeably harmful even in heavy work, but a painful ankle often prevents work altogether when walking is necessary.

After talocrural arthrodesis, a considerable increase in the mobility of the subtalar joint can be observed almost regularly. This may be so considerable that in clinical examination it makes the estimation of consolidation difficult. On the one hand this lessens the harmful effect of fusion, but on the other it transfers the strain to the subtalar joint where it may be followed by later osteoarthritis. This occurred in a few cases in our series, and it was necessary to perform a subtalar arthrodesis later.

Slight equinus seems to be advantageous especially in women. In one male patient excessive equinus caused so much harm that it had to be corrected. Deviations from the neutral position to the varus or valgus position are harmful, although the varus position is much more harmful.

In this material the best results of talocrural arthrodesis were achieved by the Adams and the sliding graft methods. The material is so small, however, that no definite conclusions regarding the different methods can be drawn. *Adams* (1948), using the method which carries his name, achieved consolidation in 28 patients out of 30. This method is recommended also by *Watson-Jones* (1955) and *Brittain* (1952). *Jansen* (1962) reported consolidation by the Charnley compression method in 24 patients out of 25.

Results obtained in the present study are in full accordance with results published elsewhere.

Despite appropriate treatment for ankle fractures, the frequency of osteoarthritis may be over 30 per cent. Since the majority of these cases are painful, it is evident that in the future arthrodesis of the ankle will continuously be of importance in the treatment of post-fracture conditions.

SUMMARY

Fifty-five patients on whom talocrural (48) or pantalar arthrodesis had been performed as a treatment for post-fracture conditions were re-examined. Various methods of arthrodesis were used. Good results were achieved in 43 cases, satisfactory in 5 and poor in 7. These are in accordance with the results published elsewhere. Adams' method is recommended (Figure 1 a and b).

RESUME

Cinquante-cinq malades chez qui une arthrodèse talo-crurale (48) ou pantalaire a été pratiquée comme traitement de suites de fractures ont été réexaminés. Différentes méthodes d'arthrodèse ont été utilisées. De bons résultats ont été obtenus dans 43 cas, satisfaisants dans 5 et mauvais dans 7. Ceux-ci sont publiés ailleurs conformément au résultat. La méthode d'Adams est recommandée (Figure 1 a et b).

ZUSAMMENFASSUNG

Fünfundfünfzig Patienten, an denen eine talocrurale (48) oder pantalare Arthrodesen als Behandlung von Zuständen nach Brüchen ausgeführt worden war, wurden nachuntersucht. Verschiedene Methoden der Arthrodesen wurden verwendet. Gute Ergebnisse wurden in 43 Fällen, zufriedenstellende in 5 und schlechte in 7 Fällen erhalten. Dies ist in Übereinstimmung mit den von anderer Seite veröffentlichten Ergebnissen. Adams' Methode wird empfohlen (Figure 1 a und b).

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