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Original Article

Reconstruction of the medial column of the foot using plate fixation

Rekonstruktion der medialen Säule mittels Plattenfixation

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KEYWORDS

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Plate fixation;
Severe flat foot

Summary

Different pathophysiological proceedings are known to bring about instability and deformity of the medial longitudinal arch. As a result patients might suffer pain with loss of function and, in case of neuropathic disease, residual ulceration. In the presence of severe deformity and/or instability conservative measures can be inadequate or unacceptable for the patients. Then operative reconstruction of the deformity in order to achieve a neutral and stable situation is an option to be considered. The goal of these procedures might also be to re-align the foot in relation to the leg and thus to reduce valgus forces running through the ankle joint. Whether plate fixation is necessary can be a matter of debate. The use of so-called 'superconstructs', including medial column plates, is highly recommended in the treatment of neuropathic disintegration and is to be considered in cases involving multiple joints of the medial column and in treatment of secondary cases, for instance non-unions. In this article cases are shown where a plate was used to establish a stable fixation. The crux of the operation is, however, the reconstruction with proper realignment itself. Whether or not and in which manner screws and plates are used and, following this, which material is to be used, these discussions are less essential.

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SCHLÜSSELWÖRTER

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Zusammenfassung

Eine Instabilität und Deformität des Langsgewölbes des medialen Strahles kann durch verschiedene Pathologien bedingt sein. Letztlich leidet der Patient unter Schmerzen und Funktionsverlust, sowie bei neuropathischen Fehlstellungen, möglicherweise unter Ulcerationen. Bei ausgeprägten Fehlstellungen bzw. Instabilitäten können konservative Maßnahmen nicht ausreichen oder für den Patienten inakzeptabel sein. In diesen Fällen sollte über ein operatives Vorgehen, um eine neutrale und stabile Fußstellung zu erreichen überdacht werden. Ziel dieser Maßnahmen ist es die Fußstellung wieder herzustellen vergleichen zum Bein und den Valgus-Streß auf das obere Sprunggelenk zu reduzieren. Ob eine Plattenfixation notwendig ist, kann diskutiert werden. Die Verwendung von sogenannten „Superkonstrukten“, incl. „medial column plates“, wird empfohlen bei der Behandlung neuropathischer Fehlstellungen, muss überlegt werden bei Fällen, bei denen mehrere Gelenke der medialen Säule betroffen sind, sowie bei Revisions-Fällen, wie z.B. nach Pseudarthrosen.

In diesem Artikel werden Fälle gezeigt, bei denen eine Plattnosteosynthese zum Erreichen einer stabilen Situation verwendet wurden. Die Schwierigkeit der Operation bleibt jedoch die korrekte Stellung zu erreichen. Ob und wie Schrauben und Platten genutzt werden, welche Materialien verwendet werden, usw. ist dagegen sekundär.

Introduction

The integrity of the medial longitudinal column depends on all the joints involving this column, including the talonavicular (TN) joint, the naviculo-cuneiform (NC) joint, the Lisfranc joint line (TMT1-3) and the first metatarsophalangeal (MTP1) joint. Lateral and medial instability of the ankle joint and instability of the TN joint are often associated, thus from a pathophysiological point of view the ankle joint should also be taken into account [1].

Instability can be defined as the clinical condition that a joint, or a combination of joints, exhibits a pathological increase of motion. One will have to distinguish between 'normal' laxity and pathological subluxation based on careful history and both clinical and radiological examination. In case of instability patients will most often complain of 'giving way' and pain in addition to the deformity [2].

Hallux valgus deformity is associated with insufficiency of the medial column and it is clinically well established that correction of a (severe) hallux valgus has a stabilizing effect on the medial column whether it be through corrective osteotomy or through fusion of the MTP1 joint. As mentioned above collapse of the medial longitudinal arch can occur at all joints involving the column. This collapse can vary from a moderate subluxation in one or more of these joints to dislocation of the joints with severe loss of bone. Isolated arthritic conditions (causing pain, loss of function, deformity and/or instability) of one of these joints can be

addressed by isolated fusion of these joints or joint lines. At the level of the MTP1, TMT and TN joints good results are achieved with screw fixation. When performing a triple arthrodesis a near 100% union rate is attainable [3]. Again, particularly at the level of the tarsus, the repositioning of the tarsal bones, the re-alignment of the foot, is of more importance than the matter of fixation. In case of residual plano-valgus deformity after a tarsal fusion the clinical results are disappointing [3,4]. Fixation of the NC joint with only screws is feasible, however, from a mechanical point of view adding a plate fixation seems advantageous (Fig. 1). For all the smaller joints along the medial column it has been reported that adding a plate fixation will help to increase the union rate.

The content of this article is not focused on the above-mentioned rather isolated minor deformities but on the reconstruction of the foot in cases with more extensive deformity and collapse of the mid-foot. Changes as a result of degenerative disease and most posttraumatic situations are usually mild to moderate and can be corrected through a surgical procedure addressing the involved joint(s), only. The cases in the present paper have a slightly more complex deformity. The common components of the deformity are dorsal flexion in the mid-foot (the collapse), abduction of the forefoot, equinus position of the rear-foot and valgus of the rear-foot. Variations are dependent on the underlying pathology and, for instance, the location and the extent of the collapse. To a certain degree they all exhibit a rocker-bottom and valgus type deformity. Examples are the situation as can be seen after

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