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Reconstructive surgery for fibular deficiency

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Abstract

Three types of fibular deficiency are described which determine the nature of the surgery and prosthesis required. The surgical management of 50 patients who had a total of 103 operations is described.

Introduction

The seriousness of the pathology, variety of clinical manifestations, and the involvement of several limbs makes the medical rehabilitation of children with longitudinal congenital deficiencies very difficult. It is necessary to apply the whole complex of modern methods of surgical treatment and prosthetics and orthotics, in order to solve the problem.

Treatment must eliminate the deformity and shortening, improve the weightbearing and motor function of the limb and allow the fitment of an improved prosthesis. During the last 30 years the authors have followed up 213 children, 50 of whom underwent surgical reconstruction.

Fibular deficiency

Absence or deformity of the fibula, the most common longitudinal lower limb deficiency, was first described by Göller (a German scientist) in 1967 (Coventry and Johnson, 1962). Clinically this deficiency presents with shortening, malformation and deformity of the foot. In the majority of cases there is angulation of the distal tibia with convexity forwards and medial rotation. The foot is in equinovalgus and the ankle is subluxed laterally. The fourth and fifth metatarsals and toes are often absent. The talus and calcaneus are often deformed and may be fused. The tibial deformity and foot displacement (sometimes as far as the middle third of the leg) are caused by the presence of a fibro-cartilaginous cord or anläge representing the fibula. Haudek in 1896 was the first to describe this cord (Thompson *et al.*, 1957), and Karchinov (1963), Karimova (1975) and Bedova (1981) studied its location, structure and influence on the deformity. In addition some children have a valgus deformity of the knee with a flexion contracture.

Treatment

Three types of fibular deficiency are

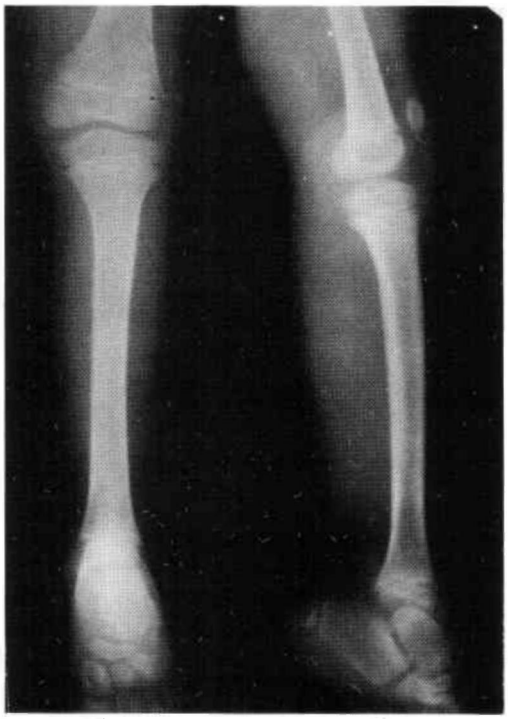

Fig. 1. An example of a Group 1 deficiency.

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recognised determining the nature of the surgery and prosthesis.

The first (Fig. 1) includes 10 patients with fibula absence, significant shortening, outward subluxation of the equinus foot, but with no tibial deformity. In these patients tenoligamentocapsulotomy was performed, and the corrected position maintained in plaster. No fibrus anläge was found at operation. A leg lengthening procedure using hinge-distracting apparatus was subsequently performed on 5 children.

The second group (Fig. 2) of 35 children had absence of the fibula accompanied by tibial angulation and rotation, and an equinovarus deformity of the foot which was subluxed backwards and outwards. All had a fibrous anläge and a flexion deformity of the knee was often seen. A hinge-distracting apparatus was used in the first operation to overcome the knee joint contracture and thus lengthen the limb. In a second stage the fibrous cord was excised, tendons elongated and the foot repositioned after tenotomy and exposure of the joint capsule. The resulting skin defect on the back of the leg was closed by a tube pedicle graft (Fig. 3).

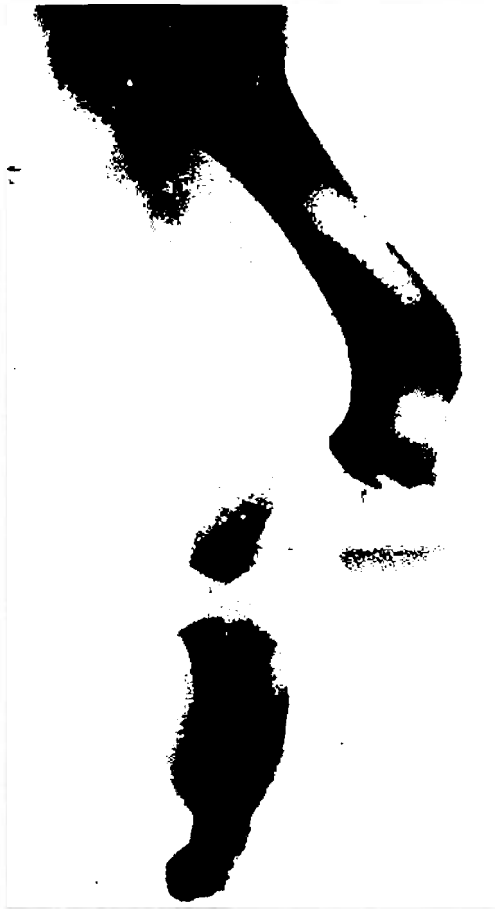

Fig. 2. Group 2 deficiency.

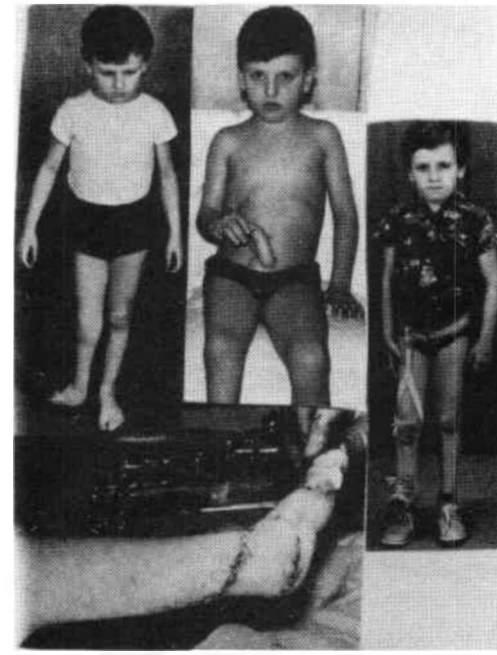

Fig. 3. Preoperative appearance, closure of skin defect using pedicle graft and extension prosthesis.

In 18 children the foot was repositioned using a distraction apparatus. A supracondylar

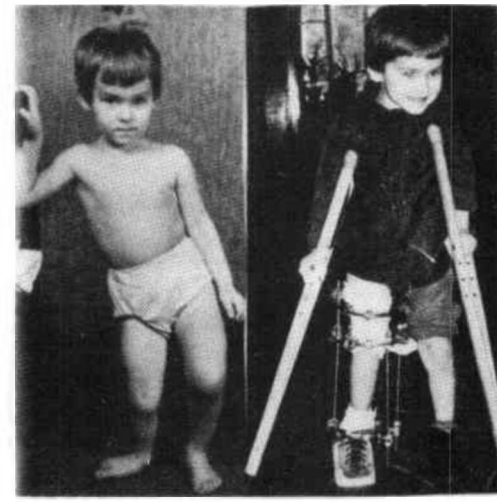

Fig. 4. Child undergoing lengthening procedure.

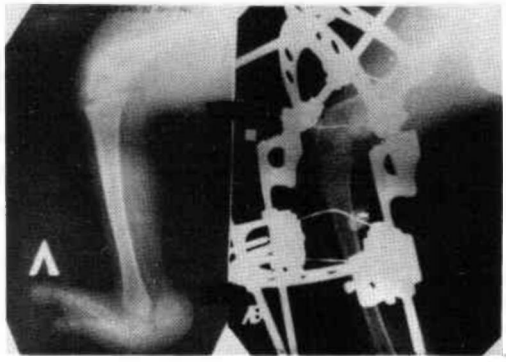

Fig. 5. Group 3 deficiency showing knee abnormality and hinge distraction apparatus.

osteotomy of the femur or correction of the tibia was necessary in 12 patients in order to improve the alignment of the limb. Femoral lengthening was carried out in 7 cases, tibial lengthening in 12 and 3 cases needed lengthening of both bones (Fig. 4). Femoral lengthening of 6–10 cm was achieved at the expense of the distal epiphysis. In most cases tibial lengthening of 4–16 cm was at the expense of the proximal epiphysis. In all cases the Ilizarov apparatus was used for distraction. Two children required repeated lengthening and three subsequently had a Pirogov type of amputation during adolescence.

The third group (Fig. 5) contained those whose absence of the fibula was accompanied by ankylosis of the knee in flexion. The presence of the epiphysis made it possible to correct the deformity and to increase the length with the aid of a distraction apparatus.

Study of the long term results showed that the corrected foot position was preserved. Tibial torsion did not increase, indeed it actually decreased in some young children. In 4 cases the flexion contracture of the knee recurred. The lengthening was preserved and limb growth continued in all children.

The variety of the manifestations, their combination with joint deformities, and their effect on the overall development of the child requires that surgery and provision of prostheses start early. In carrying out reconstructive procedures, it is important to follow the steps in sequence and to take into account the possibility of providing a suitable prosthesis between the stages and after the surgery.

It is desirable to start by correcting contractures of the proximal joints, and excising the fibrous cord and correcting the subluxation of the foot, and thus increasing the length of the limb. The use of the hinge-distraction apparatus makes such corrections easier.

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