Patient's Satisfaction with the Knee and Ankle Function After Limb Lengthening. A Long-term Follow-up

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Summary

In this study was analyzed outcome of lower limb lengthening in 37 respondents (70% rate) to the satisfaction questionnaire out of 53 patients. Follow-up was - 19.4 years (range 10-29). Ilizarov device was used. Distraction epiphysiodesis, metaphyseal osteotomy and corticotomy were compared regard the biomechanical function and patients satisfaction with functional gain at the long term. After one year the function was significantly improved, but flexion was still 12.3°±4.0° less from the preoperative values (p=0.010). Preoperative ankle function was restored completely after 1 year and there were no more differences between the different groups. Patient's satisfaction with the present situation (78%) and agreement to repeat the procedure (81%) at the long-term follow-up did not differ between the used operation methods.

Introduction

Surgical lengthening of limbs often results in loss of the range of joint movement. In most cases, the bone lengthening operation did not improve walking, especially because it was associated with serious loss of muscle strength and the author stated, "Function must be regarded as the essence of the matter"(Moore, 1941). Experimental investigation showed that changes in the connective tissue component after the distraction are important factors in loss of joint movement (Williams et al 1999).

Treatment of limb length inequality is a complicated and long-term procedure and one must carefully equalize limb length in a manner that is neither physically nor emotionally scarring (Guidera et al 1991). The answer to the question "Would you do it again?" was yes in 11 and no in 5 cases. In
satisfaction studies 8 of the 22 patients did no experience any psychological problem (Brutkay and Eilert 1990). In another study 82% of patients were satisfied with the over-all result, but only 67% of children thought that the duration of the treatment was reasonable and said that they would be willing to have the procedure a second time if it was needed (Ghoneem et al 1996).

Materials and Methods

During the years 1976-1995 72 limb lengthening operations performed on 63 lower limbs in 53 patients (22 male and 31 female) were analysed in this study. The mean age of the patients at the time of operation was 11.9 years. The Ilizarov external device was used. Three methods of distraction limb lengthening were used: distraction epiphysiodesis (n=13), metaphyseal osteotomy (n=16) or corticotomy (n=43). In 7 patients of tibial lengthening preliminary Achilles tendon shortening by Z-plasty was performed. Distraction began on the fifth day at a rate of 1 mm per day in four equal doses applied. Physical treatment and dynamization was applied in the case of every patient, partial to full weight bearing was allowed as tolerated with the external fixator in place.

A questionnaire was developed for this specific study, as example Tjønnstrøm and Rehnberg (1994) work was used. The questions about pain, limping, rubbing and satisfaction were asked. Calculations with continuous data and t-statistics for the patient groups were done. Depending on group size and number of divisions, Fisher's exact test or the $\chi^2$-test was applied. With all the methods a p value less than 0.05 was considered statistically significant. Regression analysis was performed for comparison between the groups to assess the affecting factors.

Results

Response rate to the questionnaire was 70% (37 patients out of 53); 15 men and 22 women responded. Four patients with achondroplasia, 17 with congenital shortening, 6 with sequelae of osteomyelitis, 7 with posttraumatic shortening and 3 patients with other diagnoses responded. Mean follow-up time was 19.4 years (range 10–29). Only one of the examined patients has disability.

Knee pain was observed in 18 patients and it was serious or extreme in 3 cases, moderate in 9 cases and a little in 6 cases. At the same time, 13 patients stated that they did not have any pain in any segment of the limb or in the back.

The degree of the impaired function of the knee did not significantly differ for the method of operation used. After one year the function was significantly improved, but flexion was still $12.3^\circ \pm 4.0^\circ$ less than the preoperative values (p=0.010). A statistically significant difference in knee flexion was found in the metaphyseal corticotomy patients: the preoperative value being $136.5^\circ \pm 2.6^\circ$ and the one-year postoperative value being $121.7^\circ \pm 5.6^\circ$ (p=0.019). Analysing patients with no pain and with pain these who have knee pain had
markedly less movement in the knee joint immediately after removal of the external fixator (46.9°±6.5°) compared with those who have no knee pain 75.6°±10.5° (p=0.027).

Four patients who responded had complication like knee stiffness or subluxation (three of them passed metaphysal corticotomity and one distraction epiphysiodesis). All procedures were performed in lower femoral epimetaphysal region. Three were dissatisfied with the present situation but only one would disagree to pass limb lengthening once more if it would indicated.

Preoperative ankle function was restored completely after 1 year and there were no more differences between the different groups.

Despite the fact that 24 (55%) of the respondents are limping most of the time or all of the time, 29 (78%) were satisfied with the present situation and 25 (68%) were satisfied with the cosmetic appearance. If there arose the need to pass limb lengthening once more, 30 (81%) of the examined patients would agree to do it. Although the last decision was not correlated with any objectively estimated functional indicator one year postoperatively.

Discussion

To preserve and improve the function of the limb after limb lengthening surgery is very important as Moore stated already in 1941. Our study demonstrated need for more cases to analyse better correlations between operation methods. Better knee function was associated with lesser pain intensity and appearance in follow-up. It is obvious, but the rhetorical question can be asked: is in bad function more pain appears in the knee. As the function disorder appears primarily the last question seems to be more reliable. The answers arose from investigation that muscle capability for lengthening is 20–30%, persistent damage to muscles may appear later (Lindsey et al 2002). Earlier Holm and the coworkers (1995) showed that limb lengthening may have a permanent effect on the neuromuscular tissue.

The question „would you do it again” is very emotional and 81% patients responded to the questionnaire in the current study are ready to pass limb lengthening surgery once more if it would be indicated. On the other hand the deformity itself (lower limb shortening) is very disabling and patients who have gained lower limb equality are mostly satisfied as it appeared from the current study as well.

The limb lengthening methods have still controversies as demonstrated in their study Langlois and Laville (2005). If surgery done properly good results can be obtained with different methods.

Conclusions

The knee pain was connected with the functional result but ankle function was restored to health during one year of lower limb lengthening.

Despite the complicated procedure the most of patients (81%) would agree to pass limb lengthening once more if it would indicated, as well as three out of four patients who have complication knee stiffness.
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References


