

Cosmetic bilateral leg lengthening

EXPERIENCE OF 54 CASES

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The Ilizarov method for leg lengthening was used for cosmetic reasons in 54 patients with constitutional short stature. A mean lengthening of 7 cm with a low rate of complications produced an excellent or good outcome in all the patients, including improvement in psychological disturbances related to short stature. Those who undergo the procedure must be highly motivated, fully informed and understand the technique and possible complications. We suggest that the Ilizarov method for cosmetic limb lengthening is a technique without major complications. However, it requires careful follow-up, and the involvement of orthopaedic surgeons who are familiar with use of the circular frame and are experienced in limb lengthening and correction of deformity for pathological conditions.

Society places considerable value on physical beauty and presentation. These prejudices extend to short stature¹ which may cause psychological disturbance, mostly in early adolescence,² but also in childhood.³ Leg lengthening by the Ilizarov method is well established for the treatment of patients with dwarfism⁴ and deformities resulting from congenital anomalies, trauma, tumour or infection.^{4,5}

Recently, the technique has been applied to individuals with constitutional short stature⁶ who wish to be taller. This new application is called cosmetic leg lengthening or symmetrical extended limb lengthening and has been compared with the more simple options of plastic surgery.⁷ It is becoming more popular and is generating interest and controversy.⁷ However, there are few, if any, reports on the use of the Ilizarov method to gain height for aesthetic purposes and little is known of the inherent risks and benefits.

Patients and Methods

Between 1985 and 2001, of a total of 136 individuals seeking cosmetic leg lengthening, 54 (32 men and 22 women) with constitutional short stature were selected for bilateral leg lengthening using a hybrid advanced fixator.^{4,8,9}

Their mean age was 25.8 years (17 to 47); 28.1 in men and 23.6 in women. Their mean pre-operative height was 153 cm (141 to 174); 159 cm in men (145 to 174) and 147 cm in women (141 to 155). Two patients had a varus

deformity of the knee which also required correction during the treatment. All patients were practising non-competitive sports.

Pre-operative assessment and selection of cases.

Assessment included psychological evaluation of the patients and their families, anthropometry with particular attention to the proportions of the limbs and trunk and radiological examination for deformity and/or leg-length discrepancy.

During the first consultation the authors examined the impact of short stature on the patient's everyday life and how they might cope with difficulties encountered during treatment. Actual and perceived problems related to short stature were also discussed. We considered a good motivation for gaining height the functional limitations of short stature, including the difficulty to drive motorcycles of larger sizes. All the patients wishing to undergo this surgery were invited to discuss treatment with at least two other patients, one undergoing treatment and one after recovery.

Those selected for lengthening were below the 5th percentile for age and gender, and had no illness, hormonal deficiency or dysmorphic syndrome.² In order to exclude dysmorphophobia,¹⁰ a detailed history of all previous aesthetic interventions was included.

Patients with deformity and discrepancy were treated by simultaneous correction and lengthening.

Operative technique. The hybrid advanced fixator (Amplimedical, SpA, Milan, Italy) is a

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modification of the classic Ilizarov fixator¹¹ combining Kirschner wires with half-pins and full rings with arches.^{4,8,9} The standard apparatus (three rings and one half-ring for the leg) was assembled pre-operatively with the rings being sized directly on to the patient's legs and the wires and half-pins applied with routine transfixation. The whole construct was connected with threaded rods.^{8,9} Two osteotomies with a Gigli saw or multiple drill holes were carried out, one below the tibial tuberosity and the other at the supramalleolar level. A fibular osteotomy was performed at the junction of the middle and distal thirds.

A hand-controlled drill with a speed of 0 to 950 revolutions per minute was used for the insertion of the wires and pilot holes were drilled before insertion of the half-pins.

Post-operative care and follow-up. Lengthening was started on the tenth post-operative day at a rate of 0.75 mm per day (1/4 turn every eight hours) for each tibial osteotomy. Weight-bearing was encouraged on the second post-operative day as tolerated, following a rehabilitation programme of gradual increased load bearing and physiotherapy. Pin care began on the first post-operative day with the use of hydrogen peroxide and betadine, and attention to sterile technique. The patient was discharged with instructions on bi-weekly care of the pin site. Clinical and radiological examinations were carried out every 30 to 40 days in order to assess the formation of new bone, pin sites, patient satisfaction, tibial length and joint movements.

We considered a bilateral leg lengthening of 5 to 8 cm to be satisfactory. The radiological criteria for successful lengthening was complete bone bridging in at least two projections. Bone regeneration was assessed clinically by loosening the connecting rods and applying stress.

If consolidated new bone was confirmed clinically and radiologically, the frames were removed in the clinic, usually without anaesthesia. Fibreglass casts or braces which included the foot were applied for a mean of six weeks.

The patients were reviewed every three months for the first year and then every two years. This included evaluation of patient satisfaction, possible axial deviation, the range movement of the knee and ankle, pronation of the foot, leg-length discrepancy and scars. Based on these parameters and scores given by the patient and physician, the outcome was classified as poor (0 to 4), fair (5 to 9), good (10 to 14) or excellent (15 to 18).

The psychological outcome after treatment was evaluated by determining improvement in self esteem, distress and shyness and quality of life. All the patients were asked if they would undergo the procedure again and whether they would recommend it to others of similar stature.

Results

In the 54 patients undergoing simultaneous leg lengthening, the mean lengthening achieved was 7 cm (5 to 11; Fig. 1) over a mean of nine months and 15 days of treatment in the frame (7 to 18). Treatment in the frame was followed by the wearing of fibreglass casts in 26 patients (48.15%) and of

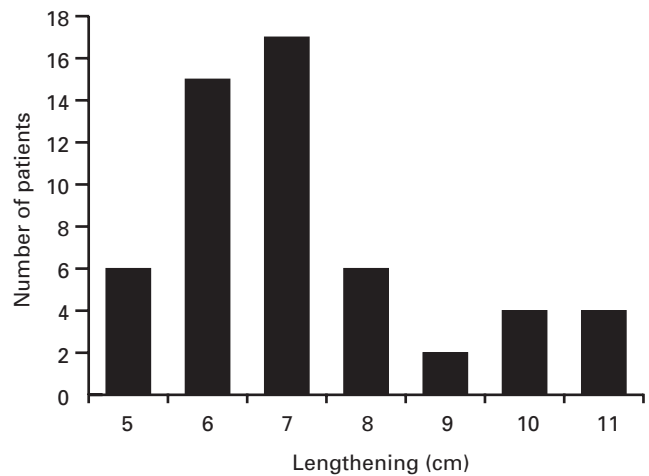


Fig. 1

Bar chart showing that the mean lengthening achieved was 7 cm (5 to 11) over a mean time of 9 months and 15 days of treatment (7 to 17 months).

commercial braces including the foot in 28 (51.85%). All had physiotherapy for a mean of six weeks (4 to 8). The mean follow-up was 6.25 years (1 to 16). No patient was lost to follow-up.

An associated varus deformity of the knee was corrected in two patients. In 19 patients (35.2%), bilateral lengthening of the tendo Achillis was necessary for an equinus deformity which developed during distraction. One patient refused this operation.

Complications. Autologous cancellous bone grafting from the iliac crest was undertaken for atrophy of the new bone at the distal distraction site in two patients. In one patient a repeat fibular osteotomy was performed for early consolidation. In three patients (four limbs), collapse of the regenerate occurred after removal of the frame with proximal varus in one and proximal anterior bowing and distal valgus in the other two. This was corrected by the application of a new Ilizarov frame.

Other complications included proximal anterior tibial bowing (4° and 5°, respectively) resulting in a minor loss of knee extension (two), slight recurvatum of the proximal tibia of 3° which did not affect the movement of the knee (one), distal varus of 4° (two), distal valgus (between 3° and 5°) resulting in pronation and minor stiffness of the subtalar joint (five), limitation of dorsiflexion of the ankle to 20° (two) and a leg-length discrepancy of 10 mm (one). In 26 patients (48.2%) there was superficial infection at the pin site. No patient required hospital admission because of a pin site infection.

Most responded to local pin-site care and oral antibiotics. In some cases, wires or pins had to be removed without compromising the stability of the frame. Although a further surgical procedure was required in 25 patients (46.3%); this did not significantly lengthen the time in the frame or result in further complications.

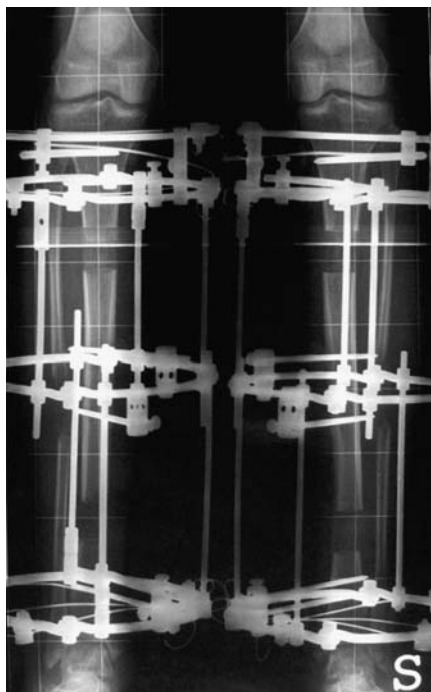


Fig. 2a



Fig. 2b



Fig. 2c



Fig. 2d



Fig. 2e



Fig. 2f

A 30-year-old man received treatment in the frame for 7 months and 25 days and for one month in a cast. He achieved simultaneous tibial lengthening of 7.8 cm. Figure 2a – Anteroposterior radiograph showing the hybrid advanced Ilizarov frames. Figure 2b – Clinical photograph during treatment. Figure 2c – Anteroposterior radiograph at the end of the treatment. Figures 2d, 2e and 2f – Photographs showing the clinical follow-up 18 months after removal of the frames.

In all cases, neither the public-health system nor the patients' medical insurance covered the cost of treatment, since constitutional short stature is not considered to be pathological. The mean cost of the operation, including hospital fees was €12 000, plus an additional €3000 for bilateral tendo Achillis lengthening.

During treatment 30 patients (15 students and 15 office workers) continued to attend school or work full time, four (three physicians and one engineer) delegated some of their work, 19 (manual and factory workers) took sick or unpaid leave for ten to 12 months; and one was unemployed. All patients resumed fully their previous sporting activities, with the exception of the patient who refused lengthening of tendo Achillis.

At the latest follow-up, all the patients were satisfied with the improvement in self-esteem, distress or shyness and quality of life. They all stated that they would recommend the treatment to others of similar stature. When asked if they would have the procedure again, 48 said that they would and the remaining six were undecided.

Based on the parameters of patient satisfaction, axial deviation, restricted joint movement, pronation of the foot, leg-length discrepancy and scars, the clinical results were excellent in 49 patients (90.7%) and good in five (9.3%). The final aesthetic effects were satisfactory in all cases (Fig. 2).

Discussion

Limb lengthening with the Ilizarov apparatus has been used for pathological conditions such as dwarfism, hemimelia and other congenital or acquired limb-length discrepancy^{4,5,10,11} in our unit for the past 24 years and in recent years we have broadened the scope to include cosmetic and psychological indications based upon patient demand.

We selected only patients with constitutional short stature which is defined as a height which is below the fifth percentile for age and gender and caused by illness, hormonal deficiency or dysmorphism.³ Although not considered an illness, the condition can cause psychological^{1-3,12} and functional disadvantages.¹³

Selection of patients for cosmetic leg lengthening requires careful psychological investigation. Those who undergo this procedure must be highly motivated, fully informed and understand the procedure and possible complications. Moreover, they should be aware that the cost of treatment is not covered by medical insurance or the public-health system.

Dysmorphophobia or body dysmorphic disorder is a distressing and impairing preoccupation with an imagined or grossly exaggerated defect of appearance. This disorder is associated with high rates of occupational and social dis-

ability, hospitalisation and suicide attempts.⁸ Patients with dysmorphophobia may seek cosmetic operations to alter their subjective perceived abnormality. We excluded such patients but other authors have accepted them for limb lengthening.¹⁴

Our results were gratifying in that the patients considered their stature as normal and they could shed their inferiority complex. We conclude that the Ilizarov method for cosmetic limb lengthening is a technique without major complications. However, it requires careful follow-up and the involvement of orthopaedic surgeons who are familiar with the circular frame and experienced in limb lengthening and correction of deformity for pathological conditions. Patients eligible for the procedure should be carefully selected and their co-operation is paramount for success.

Supplementary Material

 A further opinion by Mr Christopher Bradish is available with the electronic version of this article on our website at www.jbjs.org.uk

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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