



Research Article

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Deformity Correction of Lower Extremities by Application of Ilizarov

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Abstract

Objective: The objective of this study is to evaluate the results of osteotomy and application of Ilizarov of lower limb deformities.

Material and Methods: This is a case series study on 23 patients of either sex that has been conducted in the Department of Medical Teaching Institute Hayatabad Medical Complex and Akbar Medical Center Peshawar from November 2016 to April 2021. The age of the patients was 10 and above. To reduce the bias, we have excluded patients with diabetes mellitus, patients on oral anticoagulants, tobacco addicts and those on steroid or immunocompromised patients. Preoperative deformity was calculated that how much time it will take to correct, so when the deformity is corrected double the time was required for consolidation of the callus at corticotomy site. So, some frames were removed early while others were removed late. All the data were collected with the help of a proforma and then entered SPSS version 20 for analysis [1,2].

Results: There were total 23 patients in which male 9(39.1%) and female were 14(60.9%). The mean age was 19.39 while minimum was 10 and maximum was 40 years. Both sides were involved 6(26.1%) in right while 9(39.1%) was involved in left 8(34.8%) in cases. The deformity was ankle in 4(17.4%), femur in 4(17.4%), knee in 8(34.8%) while tibia was involved in 7(30.4%) cases. Single osteotomy was done in 16(69.6%) while double osteotomy was done in 7(30.4%) cases due to the CORA calculated in two places. Ten (43.5%) cases were totally complication free while there was acceptable residual deformity in 4(17.4%), pin loosening in 2(8.7%), pin tract infection 3(13.0%), and restricted knee movement in 4(17.4%).

Conclusion: Ilizarov External fixator is best for deformity correction in all dimensions and directions if the patient and attendant are complaint otherwise.

Keywords: Deformity, Knee, Ilizarov, Tibia, Varus, Valgus

Introduction

Deformities in upper limbs are well tolerated but in lower limbs it creates a lot of problems and cannot be tolerated. Deformities in children are mostly metabolic but may occur secondary to trauma; either to growth plate or mal-united fracture. In adults the deformities are mostly traumatic that can be the result of mal-united fracture. Deformities can also occur secondary to arthritis either Rheumatoid or osteoarthritis. Deformity in the lower limb changes the mechanical axis of limb that can lead to pain and restriction of movement which ends ultimately in early osteoarthritis of the affected limb. Therefore, correction of deformity in lower limb needs urgent attention to avoid complication. There are a lot of ways to

correct it. In children for juxta particular area either temporary or permanent epiphysiodesis of the affected bone can be done in single stage by stapling or plating. But the original challenges come when deformity is found in adults. In adults there are also many surgical procedures to correct the mechanical axis of the lower limb. In acute correction the surgical procedure is opening or closing wedge osteotomy with plating/nailing, but this procedure is not free of complications. Opening wedge needs bone graft and causes lengthening while closing wedge causes shortening but there is one method that neither causes shortening or lengthening or bone grafting with less complication and that is called close osteotomy

and application of Ilizarov. With Ilizarov deformity can be corrected gradually without affecting the soft tissues. If there is shortening, it can elongate the bone postoperatively with gradual distraction. There is a special type of frame which is called Taylor Spatial Frame that is computer operated; all the deformity is enter into the software and that calculate how much struts must be rotated for how many days to correct the deformity, but it needs high cost. The one and single most benefit of Ilizarov is that one can correct the deformity post operatively up to his satisfaction which cannot be done with acute correction with osteotomy and plating/nailing. Therefore, the objective of this study is to evaluate the results of osteotomy and application of Ilizarov of lower limb deformities [3].

Material and Methods

This is a case series study on 23 patients of either sex that has been conducted in the Department of Medical Teaching Institute Hayatabad Medical Complex and Akbar Medical Center Peshawar from November 2016 to April 2021. The age of the patients was 10 and above. To reduce the bias, we have excluded patients with diabetes mellitus, patients on oral antidiabetics, tobacco addicts and those on steroid or immunocompromised patients. Patients were admitted from the outpatient department. All the patients that fulfilled the inclusion criterion were counseled for the procedure and written informed consent was taken. All patients have done scanogram of both lower limbs beforehand, the site and magnitude of deformity has been calculated. All the surgery was done by the same consultant. Paper tracing was done, and angle of deformity calculated. Patients were either anesthetized by spinal or general anesthesia. At the time of induction two grams of cephazolin + sulbactam were given intravenously after test dose. Prefabricated Ilizarov frame that contains hinges, is fixed to the bone with wires and shanz pins [4]. Then 1–2-centimeter incision given over the deformity and closed corticotomy was done with the help of osteotome. The rings were loosened to check that corticotomy is complete or vice versa. The wound is closed, antiseptic dressing

done and the patient shifts to orthopedic unit after full recovery. On the day of discharge from unit, patient was instructed for follow up, daily dressing and about distraction. Patient and attendant were instructed to rotate the nuts of two hinges on the concave side of deformity after two weeks of operation, half turn in morning and half turn in evening. Patients were followed up at 2 weeks, 6 weeks, 10 weeks, 14 weeks, six months and ninth months while some needed one year follow up. At final follow up scanogram or x ray of the affected limb was done to check the correction Preoperative the deformity was calculated that how much time it will take to correct, so when the deformity is corrected double the time was required for consolidation of the callus at corticotomy site. So, some frames were removed early while others were removed late. All the data were collected with the help of a proforma and then entered SPSS version 20 for analysis [5-14].

Results

There was total 23 patients in which male 9(39.1%) and female were 14(60.9%) (Table 1).

The mean age was 19.39 while minimum was 10 and maximum was 40 years (Table 2).

Both sides were involved 6(26.1%) in right while 9(39.1%) was involved in and left 8(34.8%) in cases (Table 3).

The deformity was ankle in 4(17.4%), femur in 4(17.4%), knee in 8(34.8%) while tibia was involved in 7(30.4%) cases (Table 4).

Single osteotomy was done in 16(69.6%) while double osteotomy was done in 7(30.4%) cases due to the CORA calculated in two places (Table 5).

Ten (43.5%) cases were totally complication free while there was acceptable residual deformity in 4(17.4%), pin loosening in 2(8.7%), pin tract infection 3(13.0%), and restricted knee movement in 4(17.4%) (Table 6).

Table 1: Gender of Patient.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	14	60.9	60.9	60.9
	male	9	39.1	39.1	100
	Total	23	100	100	

Table 2: Statistics.

Age of the Patient		
N	Valid	23
	Missing	0
Mean		19.39
Median		18
Mode		12
Std. Deviation		7.057
Range		30
Minimum		10
Maximum		40

Table 3: Side of involvement.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Both	6	26.1	26.1	26.1
	Left	8	34.8	34.8	60.9
	Right	9	39.1	39.1	100
	Total	23	100	100	

Table 4: Site of deformity.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ankle	4	17.4	17.4	17.4
	Femur	4	17.4	17.4	34.8
	Knee	8	34.8	34.8	69.6
	Tibia	7	30.4	30.4	100
	Total	23	100	100	

Table 5: Type of Surgery.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Double osteotomy	7	30.4	30.4	30.4
	Osteotomy	16	69.6	69.6	100
	Total	23	100	100	

Table 6: Complications.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Correction of deformity is not perfect but acceptable	4	17.4	17.4	17.4
	No Complications	10	43.5	43.5	60.9
	Pin Loosening	2	8.7	8.7	69.6
	Pin tract infection	3	13	13	82.6
	Restricted ROM	4	17.4	17.4	100
	Total	23	100	100	

Discussion

Valgus/varus malalignment of the lower limbs is considered normal in kids under six years of age. After age 8 years, little correction in alignment is expected, and treatment for excessive physiological valgus may be needed [15]. There are many conditions which may be responsible for pathological genu valgum such as post traumatic, metabolic disorders (rickets), post infections, various forms of dysplasias, and secondary to tumor like conditions such as fibrous dysplasia and enchondromatosis [16]. Radiological evaluation is mandatory in children with excessive genu valgum. Valgus deformity may progress and become symptomatic. In such cases the knees may rub, child walks with awkward gate and may develop lateral patellar subluxation [17,18].

Corrective osteotomy for excessive genu valgum is appropriate when the patient presents near or after skeletal maturity. Usually, a contoured compression plate is required to achieve stability, but a blade plate is preferred [19]. Varus osteotomy has been proved as an effective treatment option if good correction is achieved [20]. By

taking a wedge from the medial supracondylar area a stable construction is achieved, fixation of the osteotomy with a 90° blade plate provides intrinsic stability [21]. An ordinary 90° plate with offset, normally used in intertrochanteric osteotomies, provides the necessary extra stability for early mobilization of the patient. Tibial medial closing wedge osteotomy may be a suitable surgical choice when a small correction is required [22]. No graft is required and healing generally occurs in four weeks from surgery. This study, supported by Coventry [23]. Chambat, et al. [24] and Marti and Verhagen [25]. a joint surface tilt of 10° in the coronal plane is well tolerated.

In the current study there are a total of 23 patients with Ilizarov. All osteotomies were opening wedge followed by Ilizarov ring fixator. Hundreds of percent correction was achieved in 19 patients (82.6%) in terms of deformity correction, knee range of motion, leg length discrepancy and union at osteotomy site. Complications in our study were pin loosening in 2(8.7%), pin tract infection 3(13.0%), and restricted knee movement in 4(17.4%).

Conclusion

Ilizarov External fixator is best for deformity correction in all dimensions and directions if the patient and attendant are compliant otherwise. Physiotherapy and exercises can prevent many complications and make it a success.

Acknowledgments

None.

Conflict of Interest

None.

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